Thermal Ceramics

MATERIAL SAFETY DATA SHEET 4005

MSDS No: 201	Date Prepared: 05/01/1987	Revised/Reviewed: 03/16/1998

1. PRODUCT AND COMPANY IDENTIFICATION

Material Name:	Refractory Ceramic Fiber Product
Common Name:	RCF; Ceramic Fiber; Man-made Vitreous Fiber (MMVF); Synthetic Vitreous Fiber (SVF)
Intended Use:	High temperature industrial thermal insulation
Trade Names:	**Kaowool®; Cerafiber®; Cerawool®; Cerachem®; Uni-Bloc®; Saber-Bloc®; Quad-Bloc™; Pyro-Fold®; Ultrafelt®; Pyro-Blanket®; Pyro-Log™; Cerablanket®; Z-Blok®; Pyro-Bloc® Blanket, Modules, Strips, Bulk, Packing, Insulation, Shapes, Rope, Engineered Fiber (all grades)**
Manufacturer/Supplier:	THERMAL CERAMICS INC. P.O. BOX 923; DEPT. 300 AUGUSTA, GA 30903-0923 **Product Stewardship Program: 800-722-5681 / FAX: 706-560-4053** **For additional MSDS's, call our automated FAXBACK: 800-329-7444**

2. COMPOSITION/INFORMATION ON INGREDIENTS

INGREDIENT CAS NUMBER	PERCENT	OSHA PEL	ACGIH TLV	MANUFACTURER RECOMMENDED
Refractories, fibers, aluminosilicate 142844-00-6	95 - 100	Not Established	Not Established	0.5 f/cc *

NOTES:
* Thermal Ceramics' recommended exposure guideline (REG) for respirable fibers as an 8 hour time weighted average (TWA) exposure, based on air samples collected and analyzed using NIOSH method 7400(8).

(See Section 8 for Personal Protection Guidelines.)

3. HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW

**** WARNING ****

• Possible cancer hazard by inhalation. [SEE BELOW]

• Dust and respirable fibers from this product may aggravate existing chronic lung conditions such as bronchitis, emphysema and asthma.

Possible Health Effects

Target Organs:	Eyes, skin and respiratory system
Primary Entry Route:	Inhalation
Acute effects:	Upper respiratory physical irritation. Irritation and inflammation to the eyes on contact and to the skin on prolonged contact.
Chronic effects:	Studies to date, involving occupationally exposed workers, have not identified any increased incidence of respiratory disease. Long-term, high-dose exposure to specially-sized, rodent respirable fiber has resulted in the development of fibrosis, lung cancer and mesothelioma in rats & hamsters. See Sections 11 & 16 of this MSDS for more information.

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Hazard Classification:

Although studies, involving occupationally exposed workers, have not identified any increased incidence of respiratory disease, results from animal testing have been used as the basis for hazard classification:

The Seventh Annual Report on Carcinogens (1994), prepared by the **National Toxicology Program (NTP)**, classified respirable refractory ceramic fiber (RCF) and glasswool as substances reasonably anticipated to be carcinogens.

The **International Agency for Research on Cancer (IARC)** has classified man made vitreous fibers (MMVF), including fibrous glasswool, mineral wool (rockwool & slagwool), and refractory ceramic fiber, as possible human carcinogens (Group 2B). The classification of refractory ceramic fiber was based on sufficient evidence of carcinogenicity in animals and no available data in humans.

The **State of California,** pursuant to Proposition 65, The Safe Drinking Water and Toxic Enforcement Act of 1986, has listed "ceramic fibers (airborne fibers of respirable size)" as a material known to the State of California to cause cancer.

The **Commission of The European Communities (DG XI)** has classified RCF as a substance which should be regarded as if it is carcinogenic to man.

IARC has also classified inhaled crystalline silica in the form of quartz or cristobalite [which may be found in after service RCF following sustained, high temperature use (>1800°F)] as carcinogenic to humans (Group 1).

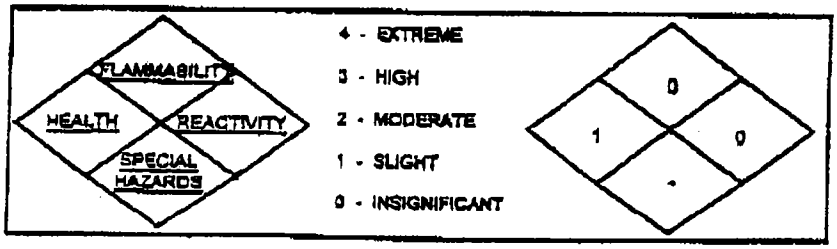
Signs and Symptoms of Overexposure:

Eye Contact:	Physical irritation - inflammation
Skin Contact:	Physical irritation - rash
Ingestion:	May cause temporary irritation to the gastrointestinal tract.
Inhalation:	Irritation or soreness in throat, nose and respiratory tract

4. FIRST AID MEASURES

Eye Contact:	Flush with large amounts of water for at least 15 minutes. Do not rub eyes.
Skin Contact:	Wash affected area gently with soap and water. Skin cream or lotion after washing may be helpful.
Ingestion:	Do not induce vomiting; drink plenty of water.
Inhalation:	Remove affected person to clean fresh air.
	** **If any of the symptoms persist, seek medical attention immediately.**

5. FIRE FIGHTING MEASURES



NFPA Unusual Hazards: None
Flash Point: Non-combustible

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Extinguishing Media: Use extinguishing media appropriate to the surrounding fire.
Explosion Hazards: None
Protective Equipment: Wear NIOSH approved respirator together with other protective gear appropriate to the surrounding fire.

6. ACCIDENTAL RELEASE MEASURES

Spill/Leak Procedures: Avoid creating airborne dust. Follow routine housekeeping procedures. Vacuum only with HEPA filtered equipment. If sweeping is necessary, use a dust suppressant and place material in closed containers. Do not use compressed air for clean-up. Personnel should wear gloves, goggles and approved respirator. Avoid clean-up procedures that could result in water pollution.

7. HANDLING AND STORAGE

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.

Handling After-Service:
- Aluminosilicate fibers become friable after exposure to high temperatures and may be partially converted to crystalline silica. [See Section 16 for additional information.]
- Handling after-service fibers may result in exposure to crystalline silica and fibers. It is possible that other contaminants might also be present depending on the material's application. [See Section 8 - Personal Protection Equipment.]
- To reduce exposure to these materials, follow the recommendations in Section 8 and minimize dust by dampening the material with a water/surfactant mist. Do not allow water to accumulate on the floor.

rage: This product is stable under all conditions of storage. Store in original factory container in a dry area. Keep container closed when not in use.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Engineering Controls: Use engineering controls such as ventilation and dust collection devices to reduce airborne fiber concentrations to the lowest attainable level.

Respiratory Protection: When it is not possible or feasible to reduce airborne fiber and dust levels below the PEL or REG through engineering controls, or until they are installed, employees are encouraged to use good work practices together with respiratory protection. Before providing respirators to employees (especially negative pressure type), employers should 1) monitor for airborne fibers and respirable cristobalite concentrations using NIOSH method 7400(B) and 7500 respectively and select the appropriate respiratory protection based upon the results of that monitoring, 2) have the workers evaluated by a physician to determine the workers' ability to wear respirators, and 3) implement respiratory protection training programs. Use NIOSH/MSHA approved respirators, in compliance with OSHA Respiratory Protection Standard 29 CFR 1910.134 and 29 CFR 1926.103, for the particular hazard or airborne concentrations to be encountered in the work environment.

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Recommended Respiratory Protection
When Handling RCF Products

• AS-PRODUCED and AFTER-SERVICE FIBER (1)

CONCENTRATION (2)	RESPIRATOR
Up to 0.5 f/cc	Disposable dust/mist respirator (N, R, or P, 95 rated) (e.g. 3M 8212) (3) (4)
0.5 f/cc - 5 f/cc	Half-mask, air-purifying respirator with high efficiency particulate air (HEPA) or P100 rated filter cartridges (e.g. 3M 6000 with 2091 filters)
5 f/cc - 25 f/cc	Full facepiece air-purifying respirator with HEPA or P100 rated filter cartridges (e.g. 3M 7800 with 2091 filters) or powered air-purifying respirator (PAPR) with HEPA or P100 rated filter cartridges (e.g. 3M W3265S with W3267 filters)
> 25 f/cc	Full facepiece positive pressure supplied air respirator (e.g. 3M 7800 with W9435 hose and W3196 regulator)

(1) Unless air monitoring data indicates a lower concentration, as a minimum, use a full facepiece air-purifying respirator with HEPA or P100 rated filter cartridges during furnace tear out or when conducting RCF removal in a confined area. [See Section 16]
(2) Eight hour time weighted average (TWA) of concentrations determined by air samples collected and analyzed using NIOSH method 7400(B) for airborne fibers.
(3) Not recommended for fiber chopping, blanket/module folding, cutting, installation or other tasks using power tools and machinery (e.g. band sawing, lathing, grinding, drilling, die cutting) unless effective engineering controls reduce fiber concentrations below REG, PEL or TLV.
(4) If oil present, use only R or P rated filters.
NOTE: For unknown concentrations or when working with other contaminants, consult an industrial hygienist for air monitoring and respirator selection.

Protective Clothing: Wear full body clothing, gloves, hat and eye protection. Wash work clothes separately from other clothing. Rinse washer after use. If you take work clothing home, it is recommended you vacuum your clothes with a HEPA filtered vacuum before leaving the work area.

Eye Protection: Goggles/safety glasses with sideshields should be worn.

9 - PHYSICAL AND CHEMICAL PROPERTIES

Appearance:	White odorless wool-like fibrous material		
Chemical Family:	Vitreous Aluminosilicate Fibers		
Vapor Pressure:	Not applicable	Vapor Density:	Not applicable
Boiling Point:	Not applicable	Specific Gravity Range:	2.50 - 2.70
Melting Point:	>3200°F (1768°C)	Volatile by Volume (%):	0
Water Solubility (%):	Not soluble in water	pH:	Not applicable

10 - STABILITY AND REACTIVITY

Hazardous Polymerization:	Will not occur
Chemical Incompatibilities:	Hydrofluoric acid, phosphoric acid, strong alkalies
Hazardous Decomposition Products:	None

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11. TOXICOLOGICAL INFORMATION

Epidemiology:

Industry epidemiologic investigations of RCF production workers are ongoing. The preliminary evidence, obtained from employees in RCF manufacturing facilities, is as follows:

1) There is no evidence of any fibrotic lung disease (interstitial fibrosis) on x-ray.

2) There is no evidence of any lung disease among those employees exposed to RCF that have never smoked. Data, however, indicates that RCF workers who smoke have a greater reduction in pulmonary function than those who do not. Therefore, it is recommended that persons who work with RCF do not smoke.

3) A statistical trend was observed in the exposed population between the duration of exposure to RCF and a decrease in some measures of pulmonary function. These observations are clinically insignificant. The results would be interpreted as being within the normal range if these observations were made on an individual employee.

4) Pleural plaques (thickening along the chest wall) have been observed in a small number of employees who had a long duration of employment. There are several occupational and non-occupational causes for pleural plaques. Pleural plaques are a marker of exposure only and under most circumstances are not associated with any measurable effect on lung function.

Toxicology:

A number of studies on the health effects of inhalation exposure with rats and hamsters have recently been completed. In a lifetime nose-only inhalation study, rats exposed to the Maximum Tolerated Dose of 30 mg/m^3 (approximately 200 fibers/cc) developed progressive lung damage (interstitial fibrosis) and cancers of the lung and of the pleura (lining of the chest wall and lung). In contrast, hamsters similarly exposed developed interstitial fibrosis and pleural cancer, but no lung cancer. Cancer of the pleura is called mesothelioma.

A multiple dose study in rats (3,9,16 mg/m^3; approximately 25,75,115 fibers/cc, respectively) has been concluded after 29 months. These study data demonstrate a dose-response relationship to the biological effects of RCF in rats. There is no RCF related increase in lung tumors at 3,9 or 16 mg/m^3. A pleural fibrosis and mesothelioma were seen in a single rat in the mid-dose (9 mg/m 3) group. In addition, no consistently diagnosed fibrosis was seen below 9 mg/m^3. Pulmonary fibrosis was observed at 9 and 16 mg/m^3.

The International Agency for Research on Cancer (IARC) reviewed the carcinogenicity data on man-made vitreous fibers (including ceramic fiber, glasswool, rockwool, and slagwool) in 1987. IARC classified fibrous glasswool, mineral wool (rockwool and slagwool) and refractory ceramic fiber as possible human carcinogens (Group 2B). IARC's classification of refractory ceramic fiber was based on sufficient evidence of carcinogenicity in experimental animals and inadequate evidence (no data) of the carcinogenicity in humans.

12. ECOLOGICAL INFORMATION

Adverse effects of this material on the environment are not anticipated.

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13. DISPOSAL INFORMATION

Waste Management:	To prevent waste materials becoming airborne, a covered container or plastic bagging is recommended. Comply with federal, state and local regulations. Method of disposal: Landfill. Chemical additions, processing or otherwise altering this material may make the waste management information presented in this MSDS incomplete, inaccurate, or otherwise inappropriate.
RCRA:	If discarded in its purchased form, this product would not be a hazardous waste either by listing or by characteristic. However, under RCRA, it is the responsibility of the product user to determine at the time of disposal whether a material containing the product or derived from the product should be classified as a hazardous waste (40 CFR 261.20-24).
TCLP Disposal:	As manufactured, refractory ceramic fiber blankets were tested using EPA's Toxicity Characteristics Leaching Procedure (TCLP). Results showed there were no detectable contaminants or detectable leachable contaminants which exceeded the regulatory levels.

14. TRANSPORT INFORMATION

Department of Transportation (D.O.T.):

Hazard Class:	Not regulated	United Nations (UN) Number:	Not applicable
Labels:	Not applicable	North America (NA) Number:	Not applicable
Placards:	Not applicable		
Bill of Lading:	Product name		

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.
OSHA:	Comply with Hazard Communication Standards 29 CFR 1910.1200 and 29 CFR 1926.59 and Respiratory Protection Standards 29 CFR 1910.134 and 29 CFR 1926.103. Components of this product are considered to be hazardous as defined by the OSHA Hazard Communication Standard.
TSCA:	All substances contained in this product are listed in the TSCA Chemical Inventory [Section 8(b)].
California:	Listed as "Ceramic Fibers (airborne particles of respirable size)" Proposition 65, The Safe Drinking Water and Toxic Enforcement Act of 1986: Known to the State of California to cause cancer.
Other States:	RCF products are not known to be regulated by states other than California; however, state and local OSHA and EPA regulations may apply to these products. Contact your local agency if in doubt.

International Regulations

Canadian WHMIS:	Class D-2A Materials Causing Other Toxic Effects
Canadian EPA:	All substances in this product are listed, as required, on the Domestic Substance List (DSL).
European Class:	Refractory ceramic fiber (RCF) has been classified by the European Union as Category 2 carcinogen, that is it "should be regarded as if it is carcinogenic to man". It has also been classified as an "irritant".

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16. OTHER INFORMATION

Precautionary Measures to be Taken After Service and Upon Removal:

As manufactured, RCF products are vitreous aluminosilicates which may transform upon heating at temperatures above 1800°F to mullite and cristobalite (a form of crystalline silica). Removal of after-service RCF may generate respirable dust. Prolonged/repeated inhalation of respirable free 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. The OSHA PEL for respirable cristobalite is 0.05 mg/m^3. Appropriate ventilation and respiratory protection should be provided in compliance with OSHA standards. (See Section 8)

HMIS Hazard Rating:

HMIS Acute Health:	1*
HMIS Flammable:	0
HMIS Reactivity:	0
HMIS Personal Protective:	To be determined by user.

*See Section 3 of the MSDS for possible chronic health effects.

SARA Title III Hazard Categories:

Acute Health:	Yes	**Pressure Hazard:**	No
Chronic Health:	Yes	**Reactivity Hazard:**	No
Fire Hazard:	No		

Definitions:

ACGIH:	American Conference of Governmental Industrial Hygienists
CAS:	Chemical Abstracts Service Registry Number
EPA:	Environmental Protection Agency
f/cc:	Fibers per cubic centimeter
HEPA:	High Efficiency Particulate Air
HMIS:	Hazardous Materials Identification System
mg/m3 :	Milligrams per cubic meter of air
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
RCRA:	Resource Conservation and Recovery Act
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

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WHMIS: Workplace Hazardous Materials Information System (Canada)
29 CFR 1910.134 & 1926.103: OSHA Respiratory Protection Standard
29 CFR 1910.1200 & 1926.59: OSHA Hazard Communications Standard

Revisions: Replaces revision 09/12/97. Revised Section 2 by incorporating the ACGIH TLV. Also changed the REG from 1 f/cc to 0.5 f/cc. Revised Sections 3, 5, 7, 8, 11 & 15 with updated information.

Reasonable care has been taken in the preparation of the information contained in this Material Safety Data Sheet and is given in good faith. However, Thermal Ceramics Inc. assumes no responsibility as to the accuracy or suitability of such information and no warranty, expressed or implied, is made.

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PRODUCT SAFETY INFORMATION

REFRACTORY CERAMIC FIBER PRODUCT

WARNING:

This product contains a substance which has been identified by the International Agency for Research on Cancer (IARC) as possibly carcinogenic to humans.

Avoid breathing fiber particulates and dust

RISKS:

- Possible cancer hazard by inhalation.
- May cause temporary irritation to eyes, skin and respiratory tract.

PRECAUTIONARY MEASURES:

- Minimize airborne particulates and dust with engineering controls.
- Wear a NIOSH/MSHA approved respirator.
- Wear long sleeved, loose-fitting clothing, eye protection, and gloves.
- Wash work clothing separately and rinse washing machine after use.

FIRST AID MEASURES:

Eyes: Flush with Water.
Skin: Wash with soap and warm water.
Ingestion: Do not induce vomiting. Get medical attention if gastrointestinal symptoms develop.
Inhalation: Remove to fresh clean air.

If any of the above irritations persists, seek medical attention immediately.

FOR ADDITIONAL PRODUCT INFORMATION AND WORK PRACTICES, REFER TO THE MATERIAL SAFETY DATA SHEETS (MSDS).

THERMAL CERAMICS INC.
P.O. BOX 923 DEPT. 300
AUGUSTA, GA 30903-0923
(800) 722-5681

Canadian WHMIS Class D-2A: Material causing other toxic effects.

Label No: 1-0991 (Rev. 01/98)