Safety Data Sheet

Section 1, Identification

Product identifier

Product Name: Ceramic Fiber Paper, Ceramic Fiber Blanket, product style code 3170, 3180

Chemical Name: Aluminosilicate Ceramic Fiber

Synonyms: Ceramic Fiber, Refractory Ceramic Fiber, RCF

Trade Name: CeraTex

Manufacturer/Supplier's Name: Mineral Seal Corporation

Address (Number, Street, City, State and ZIP Code): 1832 S. Research Loop, Tucson, AZ 85710

Emergency Telephone Number: (520) 885- 8228

Telephone Number for Information: (520) 885 - 8228

Recommended use: High temperature insulation and sealing applications.

Restrictions: Not established

Section 2, Hazard(s) identification

Hazard classification(Physical, Health, OSHA): OSHA Hazard Communication Standard (HCS) 2012 Category 2 carcinogen classification (IARC Group 2B)

Label elements

Hazard Symbol:

Signal Word: Warning

Hazard statement: Suspected cancer hazard by inhalation

Precautionary statement (Prevention, Response, Storage, Disposal):

Follow handling safety instructions in this Safety Data Sheet. Use respiratory protection as instructed. Minimize airborne dust in handling and storing. May cause mild and temporary irritation to eye, skin and upper respiratory tract upon contact or exposure.

Hazards not otherwise classified: Mild and temporary irritation to eye, skin and upper respiratory tract upon contact or exposure.

Section 3, Composition/information on ingredients

Including chemical ingredients and trade secret claims

Ingredient	CAS Number	%(By Weight)
Aluminosilicate Ceramic Fiber (Al_2SiO_5)	142844-00-6	90%-95%
Other components: sizing or binder material, optional cover material	N/D	Varies

Section 4, First-aid measures

First-aid measures:

RESPIRATORY TRACT IRRITATION:
Move the person to a dust free location. Get medical attention if the irritation continues.

EYE IRRITATION:
Flush with large amounts of water. Eyelids should be held away from the eyeball to ensure thorough rinsing. Do not rub eyes. Get medical attention if irritation persists.

SKIN IRRITATION:
For skin irritation, remove soiled clothing. Do not rub or scratch exposed skin. Wash area of contact thoroughly with soap and water. Using a skin cream or lotion after washing may be helpful.

GASTROINTESTINAL IRRITATION:
Unlikely to happen. However, if gastrointestinal tract irritation develops, move the person to a dust free environment.

Most Important symptoms and effects, both acute and delayed: Mild and temporary irritation to eye, skin and upper respiratory upon contact or exposure.

Indication of any immediate medical attention and special treatment required: None

Other possible effects: None

Section 5, Fire-fighting measures

Suitable extinguishing media: Ceramic fiber is not flammable. Use extinguishing media suitable for type of surrounding fire. The product should be cooled with water

Specific hazards arising from the substance: None

Special protective equipment and actions for firefighters: None

Section 6, Accidental release measures

Personal precautions, protective equipment and emergency procedures: Avoid creating airborne dust. Use air purifying respirator if airborne dust presents (see section 8 for details)

Environmental precautions: Do not release the material to sewers or drains.

Methods and material for containment and cleaning up: Avoid creating airborne dust. Dust suppressing cleaning methods such as wet sweeping or vacuuming should be used to clean the work area. If vacuuming, the vacuum must be equipped with a HEPA filter. Compressed air or dry sweeping should not be used for cleaning.

Section 7, Handling and storage

Precautions for safe handling and storage: Handle ceramic fiber carefully. Avoid creating airborne dust. Use air purifying respirator if airborne dust presents (see section 8 for details). If power tools are used for handling ceramic fiber, high airborne dust may be generated, therefore local exhaust and other dust control measure should be implemented. 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.

Conditions for safe storage including any incompatibilities: Store in original container in a dry area. Keep container closed when not in use. No known incompatible substances under normal conditions.

Section 8, Exposure controls/personal protection

OSHA's Permissible Exposure Limits (PELs); Threshold Limit Values (TLVs); appropriate engineering controls; personal protective equipment (PPE).

Occupational exposure limits

Ingredient	C.A.S. No.	Agency	Type Limit	Additional Comments
Aluminosilicate Ceramic Fiber (Al_2SiO_5)	142844-00-6	OSHA ACGIH NIOSH Supplier	Not established TLV 0.2 f/cc, 8-hr. TWA 0.5 f/cc, 8-hr. TWA 0.5 f/cc, 8-hr, TWA	

ACGIH : American Conference of Governmental Industrial Hygienists	TWA: Time-Weighted-Average
AIHA : American Industrial Hygiene Association	STEL: Short Term Exposure Limit
CMRG : Chemical Manufacturer's Recommended Guidelines	CEIL: Ceiling

Appropriate engineering controls: Local exhaust ventilation, dust collection, and other equipment designed to minimize dust.

Personal protective equipment (PPE) and protection measures:

Eye/face protection: If dusts or debris are generated during processing, wear safety glasses with side shields or other forms of eye protection in compliance with appropriate OSHA standards. Do not touch eyes with soiled body parts or materials.

Skin hand protection: Wear gloves, head coverings and washable or disposable full body clothing as necessary to prevent skin irritation. clothing may be used. Wash work clothing separately. Minimize or avoid non-work dust.

Respiratory protection: When exposure is under 0.5 f/cc, respiratory protection equipment is optional. When exposure is above 0.5f/cc limit, half -facepiece, or full-facepiece air purifying respirator equipped with a NIOSH certified P100 particulate filter cartridge or PAPR with tight-fitting full facepiece is recommended depending on the exposure level.

Section 9, Physical and chemical properties

ODOR AND APPEARANCE:	White, odorless, fibrous material
CHEMICAL FAMILY:	Vitreous Aluminosilicate Fibers
BOILING POINT:	N/A
WATER SOLUBILITY (%):	Not Soluble in Water
MELTING POINT:	1760° C (3200° F)
SPECIFIC GRAVITY:	2.50 - 2.75
VAPOR PRESSURE:	N/A
pH:	N/A
VAPOR DENSITY (Air = 1):	N/A
% VOLATILE:	N/A
MOLECULAR FORMULA:	Al_2SiO_5

Section 10, Stability and reactivity

CHEMICAL STABILITY:	Stable under conditions of normal use
INCOMPATIBILITY:	Hydrofluoric, phosphoric acids and concentrated alkalis
CONDITIONS TO AVOID:	None.
HAZARDOUS DECOMPOSITION PRODUCTS:	None
HAZARDOUS POLYMERIZATION:	N/A

Section 11, Toxicological information

Signs and Symptoms of Exposure:

Inhalation and Respiratory Tract Irritation: Ceramic Fiber/RCF may cause temporary and mild irritation to respiratory tract if it is inhaled in sufficient quantity. Symptoms may include scratchiness of the nose or throat, cough or chest discomfort.
Skin Contact: Mild itchiness or irritation
Eye Contact: Mild eye irritation similar to symptoms caused by other debris
Ingestion: No adverse effects under normal exposure conditions

Toxicological Effects and Data:
There have been a number of long term on going toxicological studies designed to identify any potential health effects from refractory ceramic fiber (RCF) exposure. There is no evidence of acute toxicity resulted from RCF short term exposure through contact, inhalation, or ingestion.

Skin corrosion/irritation: No adverse effects are expected.
Serious eye damage/eye irritation: No adverse effects are expected.
Respiratory sensitization: No Data.
Skin sensitization: Not a skin sensitizer
Central Nervous System (CNS) Depression: Very unlikely, no data available
Peripheral Neuropathy: Very unlikely, no data available
Reproductive/Developmental Toxicity: No data
Germ cell mutagenicity: No data
Single exposure may cause target organ effects: No data
Prolonged or repeated exposure may cause target organ effects: No data
Aspiration hazard: Not classified.

Carcinogenicity and Long Term Health Effects:

A definitive Maximum Tolerated Dose Study (MTD) by nose only, lifetime inhalation in rats and hamsters appeared to confirm that RCF was an animal carcinogen under certain test conditions, e.g., extremely high concentrations of approximately 200 f/cc inhaled directly into the lungs. In one study, conducted by the Research and Consulting Company, (Geneva, Switzerland), rats and hamsters were exposed to 30 mg/m³ (about 200 fibers/cc) of specially-prepared RCF for 6 hours/day, 5 days/week,for up to 24

months. In rats, a statistically significant increase in lung tumors was observed; two mesotheliomas (cancer of the pleural lining between the chest wall and lung) were also identified. Hamsters did not develop lung tumors; however, interstitial fibrosis and mesothelioma was found. Some, in the scientific community, have concluded that the "maximum tolerated dose" was exceeded and that significant particle contamination was a confounding issue; therefore, these study findings may not represent an accurate assessment of the potential for RCF to produce adverse health effects.

In a subsequent multi-dose animal inhalation study at 25 f/cc, 75 f/cc, and 115 f/cc found no statistically significant increase in lung cancer; a no observed effect level (NOEL) was found at 25 f/cc. This level is 50 times the HTIW Coalition recommended exposure guideline (REG) of 0.5 f/cc for humans.

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. In each of the following cases, the conclusions are qualitative only and do not rest upon any quantitative analysis suggesting that the hazard actually may occur at current occupational exposure levels. 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.

Epidemiology

University of Cincinnati has been conducting a long term epidemiological studies of RCF human health effects, collecting data from respiratory questionnaires, lung function tests, chest X-rays, exposure monitoring, and worker mortality. The results of this study have shown (LeMasters et al, 2003) no excess mortality related to all deaths, all cancers, or lung cancer, no statistically significant increase in interstitial findings (fibrosis), and no mesotheliomas or increase in lung cancer.

Devitrification

As produced, all RCF fibers are vitreous (glassy) materials which do not contain crystalline silica. Continued exposure to elevated temperatures may cause these fibers to devitrify (become crystalline). The first crystalline formation (mullite) begins to occur at approximately 985° C (1805° F). Crystalline phase silica may begin to form at temperatures of approximately 1200° C (2192° F). When the glass RCF fibers devitrify, they form a mixed mineral crystalline silica containing dust. The crystalline silica is trapped in grain boundaries within a matrix predominately consisting of mullite. The occurrence and extent of crystalline phase formation is dependent on the duration and temperature of exposure, fiber chemistry and/or the presence of fluxing agents. The presence of crystalline phases can be confirmed only through laboratory analysis of the "hot face" fiber.

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 "carcinogenicity in humans was not detected in all industrial circumstances studied." IARC also studied mixed mineral crystalline silica containing dusts such as coal dusts (containing 5 – 15 % crystalline silica) and diatomaceous earth without seeing any evidence of disease. (IARC Monograph Vol. 68, 1997). NTP lists all polymorphs of crystalline silica amongst substances which may "reasonably be anticipated to be carcinogens".

IARC and NTP did not evaluate after-service RCF, which may contain various crystalline phases. However, an analysis of after-service RCF samples obtained pursuant to an exposure monitoring agreement with the USEPA, found that in the furnace conditions sampled, most did not contain detectable levels of

crystalline silica. Other relevant RCF studies found that (1) simulated after-service RCF showed little, or no, activity where exposure was by inhalation or by intraperitoneal injection; and (2) after-service RCF was not cytotoxic to macrophage-like cells at concentrations up to 320 micrograms/cm² - by comparison, pure quartz or cristobalite were significantly active at much lower levels (about 20 micrograms/cm²).

Section 12, Ecological information

Ecotoxicity: Not an environmental hazard
Persistence and degradability: Not degradable
Bioaccumulative potential: Not applicable
Mobility in soil: No mobility in soil
Mobility in general: Not applicable
Other adverse effects: No known other adverse effects to the environment

Section 13, Disposal considerations

Disposal instructions: Dispose in approved landfill. This substance is not specifically listed as hazardous waste in federal regulations. To prevent waste materials from becoming airborne during waste storage, transportation and disposal, a covered container or plastic bagging is recommended. For particular situation check federal, local, regional, state or provincial regulations to identify all applicable disposal requirements.

Hazardous waste code: Not established
Waste from residues / unused products: Follow the same disposal instructions for the product.
Contaminated packaging Dispose: Follow the disposal requirements for the packaging material.

Section 14, Transport information

Ceramic fiber is not regulated as dangerous goods by the following agencies: DOT, IATA, IMDG.
UN number: Not assigned
UN proper shipping name: Not specified
Transport hazard class(es): Not classified
Packing group, if applicable: Not applicable
Environmental hazards (e.g., Marine pollutant (Yes/No)): No
Transport in bulk (according to Annex II of MARPOL 73/78 and the IBC Code): Not available
Special precautions which a user needs to be aware of, or needs to comply with, in connection with transport or conveyance either within or outside their premises: None

Section 15, Regulatory information

US Federal Regulations

EPA: Superfund Amendments and Reauthorization Act (SARA) Title III - This product does not contain any substances reportable under Sections 302, 304, 313, (40 CFR 372). Sections 311 and 312 (40 CFR 370) apply (delayed hazard).
Toxic Substances Control Act (TSCA) - RCF has been assigned a CAS number; however; it is an "article" under TSCA and therefore exempt from listing on the TSCA inventory.
Comprehensive Environmental Response, Compensation and Liability Act(CERCLA) and the Clean Air Act (CAA) - This product contains fibers with an average diameter greater than one micron and thus is not considered a hazardous air pollutant.

OSHA: Comply with Hazard Communication Standards 29 CFR 1910.1200 and 29 CFR 1926.59 and the Respiratory Protection Standards 29 CFR 1910.134 and 29 CFR 1926.103.

US State Regulations

California: Ceramic fibers (airborne particles of respirable size) is listed in Proposition 65, The Safe Drinking Water and Toxic Enforcement Act of 1986 as a chemical 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. If in doubt, contact your local regulatory agency.

Canada

Canadian Workplace Hazardous Materials Information System (WHMIS) – Classified as Class D2A – Materials Causing Other Toxic Effects
Canadian Environmental Protection Act (CEPA) - All substances in this product are listed, as required, on the Domestic Substance List (DSL)

Europe

Integration of RCF/ASW in to ANNEXE XV of the REACH Regulation:
RCF is classified under the CLP (classification, labelling and packaging of substances and mixtures) regulation as a category 1B carcinogen. On January 13, 2010 the European Chemicals Agency (ECHA) updated the candidate list for authorization (Annex XV of the REACH regulation) and added 14 new substances in this list including aluminosilicate refractory ceramic fibers and zirconia aluminosilicate refractory ceramic fibers.

As a consequence, EU (European Union) or EEA (European Economical Area) suppliers of articles which contain aluminosilicate refractory ceramic fibers and zirconia aluminosilicate refractory ceramic fibers in a concentration above 0.1% (w/w) have to provide sufficient information, available to them, to their customers

or upon requests to a consumer within 45 days of the receipt of the request. This information must ensure safe use of the article, and as minimum contains the name of the substance.

Other Regulations

IARC: The International Agency for Research on Cancer (IARC) confirmed that Group 2b (possible human carcinogen) remains the appropriate IARC classification for RCF including ceramic fiber. Possible cancer hazard by inhalation, especially when the fiber become cristobalite at high temperature above 1,800 F.

National Toxicology Program (NTP), classified respirable RCF and glasswool as substances reasonably anticipated to be carcinogens.

The American Conference of Governmental Industrial Hygienists (ACGIH) has classified RCF as "A2-Suspected Human Carcinogen."

Section 16, Other information

NFPA Hazard Classification

Health: 1 Flammability: 0 Instability: 0 Special Hazards: 0

Date of preparation/last revision: October 20, 2018

This Safety Data Sheet was prepared in accordance with OSHA 1910.1200 Hazard Communication Standard (HCS 2012).

DISCLAIMER: The information provided in this Safety Data Sheet (SDS) is believed to be correct as of the date of preparation and to the best of our knowledge. Mineral Seal Corporation (Minseal) makes no warranties. Users should use this information to make an independent determination of the safety of their workers and the environment. Users should provide the information in this form to their employees or contractors that are involved in handling of the substances. Users are responsible for determining whether the product is fit for a particular purpose and application.