

CERAMIC FIBER PRODUCTS
MATERIAL SAFETY DATA SHEET
June 4, 2009

SECTION I. IDENTIFICATION

PRODUCT NAMES:

Ceramic Fiber Heaters, Molded Insulation Modules and Ceramic Fiber Radiant Heater Panels.

CHEMICAL FAMILY

Vitreous Aluminosilicate and Silicon Dioxide Fibers, molded in Semi-Rigid block form.

CHEMICAL NAME: NA

CHEMICAL FORMULA: NA

MANUFACTURER'S NAME AND ADDRESS

Watlow Columbia
2407 Big Bear Court
Columbia, MO 65202

Phone 573-443-8817
Emergency Phone 1-800-424-9300 (Chemtrec)
Fax 573-443-8818

HEALTH HAZARD SUMMARY
WARNING

- Possible cancer hazard based on tests with laboratory animals.
- May be irritating to the skin, eyes and respiratory tract.
- May be harmful if inhaled.
- Cristobalite (crystalline silica) formed at high temperatures (above 1200°C (2192°F)) can cause severe respiratory disease. (See Section V.)

SECTION II. PHYSICAL DATA

APPEARANCE AND ODOR:

Cream to white colored fiber shapes. With or without optional white to gray granular surface coating and/or optional black surface coating.

DENSITY: 12-25 lb./ft³

BOILING POINT: NA

VOLATILES (% BY WT.): NA

WATER SOLUBILITY: NA

SECTION III. HAZARDOUS INGREDIENTS

COMPONENT, QUANTITY, AND THRESHOLD/EXPOSURE LIMIT VALUES:

Aluminosilicate (vitreous)	75-99+%	0.5 fibers/cc TWA (Recommended Exposure Guideline)
CAS No. 142844-00-06		0.2 fibers/cc TLV
Zirconium Silicate	0-10%	5 mg/m ³ TLV, PEL
CAS No. 14940-68-2		
Amorphous Silica	0-10%	6 mg/m ³ PEL
CAS No. 7631-86-9		
Iron*	0-25%	10 mg/m ³ PEL
CAS No. 1309-37-1		
Chromium*	0-8%	0.5 mg/m ³ PEL
CAS No. 7440-47-3		
Aluminum*	0-2%	15 mg/m ³ total dust, 5 mg/m ³ respirable fraction PEL
CAS No. 7429-90-5		
Nickel*	0-2%	1.0 mg/m ³ PEL
CAS No. 7440-02-0		
Black Surface Coating**	0-1%	5 mg/m ³ TLV
Total Respirable Dust		5 mg/m ³ PEL

*Wire element component.

**Composition is a trade secret.

SECTION IV. FIRE AND EXPLOSION DATA

- FLASH POINT: None FLAMMABILITY LIMITS: NA.
- EXTINGUISHING MEDIA: Use extinguishing agent suitable for type of surrounding fire.
- UNUSUAL FIRE / EXPLOSION HAZARDS / SPECIAL FIRE FIGHTING PROCEDURES: NA

SECTION V. HEALTH HAZARD DATA

- HAZARD CLASSIFICATION OF RCF

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)** reclassified RCF as a possible human carcinogen (Group 2b), based on sufficient evidence of carcinogenicity in animals, but inadequate data in humans.

The Seventh Annual Report on Carcinogens (1994), prepared by the **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."

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

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 chemical known to the State of California to cause cancer.

The **Canadian Environmental Protection Agency (CEPA)** has classified RCF as "probably carcinogenic" (Group 2).

The **Canadian Workplace Hazardous Materials Information System (WHMIS)** – RCF is classified as Class D2A – Materials Causing Other Toxic Effects

The **Hazardous Materials Identification System (HMIS)** –

Health 1* Flammability 0 Reactivity 0 Personal Protection Index: X
(* denotes potential for chronic effects) (Employer Determined)

- THRESHOLD LIMIT VALUE: (See Section III)
- EFFECTS OF OVER EXPOSURE

EYE:

Avoid contact with eyes. Slightly to moderately irritating. Abrasive action may cause damage to outer surface of eye.

INHALATION:

May cause respiratory tract irritation. Repeated or prolonged breathing of particles of respirable size may cause inflammation of the lung leading to chest pain, difficult breathing, coughing and possible fibrotic change in the lung (Pneumoconiosis). Pre-existing medical conditions may be aggravated by exposure: specifically, bronchial hyper-reactivity and chronic bronchial or lung disease.

INGESTION:

May cause gastrointestinal disturbances. Symptoms may include irritation and, nausea, vomiting and diarrhea.

SKIN:

Slightly to moderate irritating. May cause irritation and inflammation due to mechanical reaction to sharp, broken ends of fibers.

OTHER:

Chronic over exposure to Black Surface Coating is potentially hazardous due to some components' effects of the central nervous system. These effects have been identified (in other applications of these components) as occurring at levels well above the recommended exposure limit.

Wire Element Components as supplied generally present no health hazards. Proper ventilation and filtration should be used when welding, grinding, or otherwise producing fumes or dust. Contact manufacturer for further information should exposure to fumes or dust from element wire be unavoidable.

- **EXPOSURE TO USED CERAMIC FIBER PRODUCT:**

Fiber products which have been in normal furnace service at elevated temperatures (greater than 1200°C (2192°F)) may undergo partial conversion to Cristobalite, a form of crystalline silica which can cause severe respiratory disease (Pneumoconiosis). The amount of Cristobalite present will depend on the temperature and length of time in service (Typically 0-5%). (See Section IX for permissible exposure levels).

- **SPECIAL TOXIC EFFECTS:**

The existing toxicology and epidemiology databases for RCF's are still preliminary. Information will be updated as studies are completed and reviewed. The following is a review of the results to date:

EPIDEMIOLOGY:

At this time there are no known published reports demonstrating negative health outcomes of workers exposed to refractory ceramic fiber (RCF). Epidemiologic investigations of RCF production workers are ongoing.

- 1) There is no evidence of any fibrotic lung disease (interstitial fibrosis) whatsoever on x-ray.
- 2) There is no evidence of any lung disease among those employees exposed to RCF that had never smoked.
- 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. In other words, if these observations were made on an individual employee, the results would be interpreted as being within the normal range.
- 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 plaque. It should be noted that plaques are not "pre-cancer" nor are they associated with any measurable effect on lung function.

TOXICOLOGY:

A number of studies on the health effects of inhalation exposure of rats and hamsters are available. Rats were exposed to RCF in a series of life-time nose-only inhalation studies. The animals were exposed to 30, 16, 9, and 3 mg/m³, which corresponds with approximately 200, 150, 75, and 25 fibers/cc.

Animals exposed to 30 and 16 mg/m³ were observed to have developed a pleural and parenchymal fibroses; animals exposed to 9 mg/m³ had developed a mild parenchymal fibrosis; animals exposed to the lowest dose were found to have the response typically observed any time a material is inhaled into the deep lung. While a statistically significant increase in lung tumors was observed following exposure to the highest dose, there were no excess lung cancers at the other doses. Two rats exposed to 30 mg/m³ and one rat exposed to 9 mg/m³ developed mesotheliomas.

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 ceramic fiber, fibrous glasswool and mineral wool (rockwool and slagwool) as possible human carcinogens (Group 2B). IARC reviewed this classification in 2001 without change.

- **RADIOACTIVITY OF ZIRCONIUM-SILICATE HOT-FACE COATING**

[See Special Addendum at end of this MSDS.]

- **EMERGENCY FIRST AID PROCEDURES**

INHALATION:

Remove person from source of exposure. Move to fresh air. Some people may be sensitive to fiber induced irritation of the respiratory tract. If symptoms such as shortness of breath, coughing, wheezing or chest pain develop, seek medical attention. If breathing difficulties continue, administer oxygen until medical assistance can be rendered.

INGESTION:

Do not induce vomiting. Get medical attention if irritation persists.

EYE CONTACT:

Flush eyes immediately with large amounts of water for approximately 15 minutes. Eye lids should be held away from the eyeball to insure thorough rinsing. Do not rub eyes. Get medical attention if irritation persists.

SKIN CONTACT:

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. Get medical attention if irritation persists.

SECTION VI. REACTIVITY DATA

• **STABILITY/CONDITIONS TO AVOID:**

Stable under normal conditions of use.

• **HAZARDOUS POLYMERIZATION/CONDITIONS TO AVOID:** N.A.

• **INCOMPATIBILITY/MATERIALS TO AVOID:**

Incompatible with hydrofluoric acid and concentrated alkali.

• **HAZARDOUS DECOMPOSITION PRODUCTS:** N.A.

SECTION VII. SPILL OR LEAK PROCEDURES

STEPS TO BE TAKEN IF MATERIAL IS RELEASED OR SPILLED:

Where possible, use vacuum suction with HEPA filters to clean up spilled material. Use dust suppressant where sweeping if necessary. Avoid clean up procedure that may result in water pollution. (Observe Special Protection Information Section VIII).

WASTE DISPOSAL METHODS:

Measures should be taken during waste handling to prevent generation of airborne dust. The transportation, treatment, and disposal of this waste material must be conducted in compliance with all applicable Federal, State, and Local regulations. Also, see Special Addendum section on low-level radioactivity of zirconium-silicate.

SECTION VIII. SPECIAL PROTECTION INFORMATION

• **RESPIRATORY PROTECTION:**

Use NIOSH or MSHA approved equipment when airborne exposure limits may be exceeded. NIOSH/MSHA approved breathing equipment may be required for non-routine and emergency use. (See Section IX for suitable equipment).

Pending the results of long term health effects studies, engineering control of airborne fibers to the lowest levels attainable is advised.

• **VENTILATION:**

Ventilation should be used whenever possible to control or reduce airborne concentrations of fiber and dust. Carbon monoxide, carbon dioxide, oxides of nitrogen, reactive hydrocarbons and a small amount of formaldehyde may accompany binder burn-off during first heat. Use adequate ventilation or other precautions to eliminate vapors resulting from binder burn-off. Exposure to burn-off fumes may cause respiratory tract irritation, bronchial hyper-reactivity and asthmatic response.

• **SKIN PROTECTION:**

Wear gloves, hats and full body clothing to prevent skin contact. Use separate lockers for work clothes to prevent fiber transfer to street clothes. Wash work clothes separately from other clothing and rinse washing machine after use.

• **EYE PROTECTION:**

Wear safety glasses or chemical worker's goggles to prevent eye irritation. Do not wear contact lenses when working with this substance. Have eye baths readily available where eye contact can occur.

SECTION IX. SPECIAL PRECAUTIONS

- PRECAUTIONS TO BE TAKEN IN HANDLING AND STORING:**

General cleanliness should be followed.

The Toxicology data indicate that ceramic fiber should be handled with caution. In particular, when handling refractory ceramic fiber in any application, special caution should be taken to avoid unnecessary cutting and tearing of the material to minimize generation of airborne dust.

It is recommended that full body clothing be worn to reduce the potential for skin irritation. Washable or disposable clothing may be used. Do not take unwashed work clothing home. Work clothes should be washed separately from other clothing. Rinse washing machine thoroughly after use. If clothing is to be laundered by someone else, inform launderer of proper procedure. Work clothes and street clothes should be kept separate to prevent contamination.

Product which has been in normal furnace temperature service at temperatures greater than 1200°C (2192°F) may undergo partial conversion to Cristobalite, a form of crystalline silica. This reaction occurs primarily at the furnace lining hot face. As a consequence, this material becomes more friable; special caution must be taken to minimize generation of airborne dust. The amount of Cristobalite present will depend on the temperature and length in service (typically less than 5% of the hot-face area). To date, analysis of after service samples of RCF found that, for the furnace conditions sampled, most did not contain detectable levels of crystalline silica.

IARC has recently reviewed the animal, human and other relevant experimental data on silica in order to critically evaluate and classify the cancer causing potential. Based on its review, IARC classified crystalline silica as a group 1 carcinogen (carcinogenic to humans).

The OSHA permissible exposure limit (PEL for Cristobalite is 0.05 mg/m³ (respirable dust). The ACGIH threshold limit value (TLV) for Cristobalite is 0.05 mg/m³ (respirable dust) (ACGIH 1991-92). Use NIOSH or MSHA approved equipment when airborne exposure limits may be exceeded. The minimum respiratory protection recommended for given airborne fiber or Cristobalite concentrations are:

CONCENTRATION		RESPIRATOR TYPE
VITREOUS FIBERS	CRISTOBALITE	
< 0.5 fibers/cc	< 0.05 mg/m ³	No specific recommendation. User preference based upon conditions present.
0.5 - 5.0 fibers/cc	0.05 - 0.5 mg/m ³	Half face, air-purifying respirator equipped with NIOSH-certified P100 particulate filter cartridge.
5.0 - 25.0 fibers/cc	0.5 - 2.5 mg/m ³	Full face, air-purifying respirator with NIOSH-certified P100 particulate filter cartridge or powered air-purifying respirator (PAPR) equipped with HEPA filter cartridges.
> 25.0 fibers/cc	> 2.5 mg/m ³	Full face, positive pressure supplied air respirator or PAPR.

If airborne fiber or Cristobalite concentrations are not known, as minimum protection, use NIOSH/MSHA approved half face, air-purifying respirator with HEPA filter cartridges.

Insulation surface should be lightly sprayed with water before removal to suppress airborne dust. As water evaporates during removal, additional water should be sprayed on surfaces as needed. Only enough water should be sprayed to suppress dust so that water does not run onto the floor of the work area. To aid the wetting process, a surfactant can be used.

After RCF removal is completed, dust-suppressing cleaning methods, such as wet sweeping or vacuuming, should be used to clean the work area. If dry vacuuming is used, the vacuum must be equipped with HEPA filter. Air blowing or dry sweeping should not be used. Dust-suppressing components can be used to clean up light dust.

Product packaging may contain product residue. Do not reuse except to reship or return Ceramic Fiber products to the factory.

**ADDITIONAL MSDS DATA ON LOW-LEVEL RADIOACTIVITY OF ZIRCONIUM-SILICATE
HOT-FACE COATING:****HEALTH HAZARD DATA***Potential health effects:*

Zircon sand, as shipped and coated onto the heater hot-face, does not pose an inhalation health hazard because it contains essentially no particles in the respirable size range. However, if during handling or use the particles are broken down to a size that can be inhaled, the dusts may be harmful to the respiratory system. Zircon flour particles below 10 microns in size may also be harmful to the respiratory system. Zircon sands and flour contain trace quantities (90-120 pCi/g) of **naturally occurring** radioactive uranium and thorium (less than or equal to 475 ppm total uranium and thorium or 0.0475% w/w) , and (109-116 pCi/g) radium. Overexposure by inhalation to respirable dusts containing radioactive uranium, thorium, and radium may cause lung cancer

Measurements made in DuPont during use of a similar mineral sand indicate that 1 mg/m³ of respirable dust is equivalent to about 0.1 pCi/m³ of thorium plus uranium. Therefore observance of the 5 mg/m³ OSHA PEL for respirable dust will ensure that the Mineral Sands user is within limits established for exposure to respirable quartz, and to naturally occurring radioactive uranium, thorium, and radium.

Zircon is exempt from NRC regulations for source material per 10 CFR 40, since it falls under the definition of unprocessed material containing less than 0.05% uranium or thorium. However, calculations show that observance of 2.2-2.8 mg/m³ of respirable dust (particles less than 10 microns) will under voluntary guidelines ensure that intake is less than 10% of the Annual Limits on Intake (ALIs) specified in 10 CFR 20.1502(b) and NRC Standards for Protection Against Radiation for uranium, thorium, radium and radioactive daughter decay products.

Carcinogenicity:

Quartz (crystalline silica) is listed by the International Agency for Research on Cancer as probably carcinogenic to humans on the basis of at least limited human data (IARC, group 2A). See main section of MSDS above.

HANDLING AND STORAGE*Handling (Personnel)*

Avoid breathing dust. Wash thoroughly after handling.

If handling respirable flour, use of gloves and washing before eating, drinking, applying cosmetics or smoking is advisable to minimize dust inhalation from hands.

TOXICOLOGICAL INFORMATION*Animal Data*

Zircon sands and zircon flours contain low levels of quartz (up to 0.3%). Effects noted in animals exposed to respirable quartz sands by inhalation or intratracheal instillation included pulmonary fibrosis, inflammation, edema, and emphysema. Lung tumors occurred in rats exposed by inhalation for up to two years to levels of 12.4 to 51.6 mg/m³ of quartz. Also, lung tumors were seen in studies in which quartz was instilled in the trachea of rats. Quartz was positive in mammalian cell cultures for cell transformation and chromosomal effects and was negative in cell culture assays for gene mutation in bacteria and DNA damage in mammalian cells and in a whole animal assay for chromosomal effects.

DISPOSAL CONSIDERATIONS*Waste Disposal:*

Treatment, storage, transportation and disposal must be in accordance with applicable Federal, State, and local regulations. If approved, may be transferred to a land disposal site.

NOTE: Many states have, or are developing, new regulations for disposal of waste containing Naturally Occurring Radioactive Materials (NORM) above background levels. Consult and comply with current regulations.

OTHER INFORMATION:*WARNING!*

This product contains quartz and radionuclides, both known to the State of California to cause cancer.