1. PRODUCT AND COMPANY IDENTIFICATION

Material Name: Polycrystalline Alumina Fiber Product
Common Name: Polycrystalline Fiber; Man-made Alumina Fiber; Refractory Alumina Fiber; Saffil®
Intended Use: High temperature industrial thermal insulation
Trade Names:
Kaowool® 3000 Paper;
Pyro-Bloc® Grade S: Modules, Strips, Packing, Insulation, Shapes
Saffil®: Paper, Felt
Cer-Wool® HT Paper

Manufacturer/Supplier: Thermal Ceramics Inc.
P. O. Box 923; Dept. 300
Augusta, GA 30903-0923

For Product Stewardship and Emergency Information -
Hotline: 1-800-722-5681
Fax: 706-560-4054

2. COMPOSITION/INFORMATION ON INGREDIENTS

<table>
<thead>
<tr>
<th>INGREDIENT</th>
<th>CAS NUMBER</th>
<th>PERCENT</th>
<th>OSHA PEL</th>
<th>ACGIH TLV</th>
<th>SUPPLIER RECOMMENDED</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aluminum oxide (fibrous forms)</td>
<td>1344-28-1</td>
<td>95</td>
<td>15 mg/m³ (total); 5 mg/m³ (respirable)</td>
<td>Not Established</td>
<td>0.5 f/cc *</td>
</tr>
<tr>
<td>Silica, amorphous</td>
<td>7631-86-9</td>
<td>&lt;5</td>
<td>(80 mg/m³ ÷ % SiO₂ **) or 20 mppcf</td>
<td>10 mg/m³</td>
<td></td>
</tr>
<tr>
<td>Latex</td>
<td>Proprietary</td>
<td>0 - 10</td>
<td>Not Established***</td>
<td>Not Established**</td>
<td></td>
</tr>
</tbody>
</table>

NOTES:
* 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(B).
** % SiO₂ = percent of crystalline silica
*** Trace amount of formaldehyde may release from latex during initial heating of this product. The current OSHA PELs for formaldehyde are: 0.75 ppm (8 hr.TWA) and 2 ppm (STEL).

(See Section 8 for Personal Protection Guidelines.)

3. HAZARDS IDENTIFICATION

WARNING!
POSSIBLE CANCER HAZARD BY INHALATION.

(See Section 11 for more information)
**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:** Toxicological studies indicates that Saffil® alumina fiber showed no fibrogenic, carcinogenic nor other significant toxicological effects when exposure occurs by relevant routes. Despite this evidence, the IARC has placed Alumina Fiber into a broad group called ceramic fibers. (See Below)

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

The International Agency for Research on Cancer (IARC) has classified ceramic fiber including Saffil® alumina fiber as possible human carcinogens (Group 2B). The classification of 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.

**Signs and Symptoms of Overexposure:**

- **Eye Contact:** Physical irritation - inflammation  
- **Skin Contact:** Physical irritation - rash  
- **Ingestion:** Unlikely route of exposure  
- **Inhalation:** Irritation or soreness in throat, nose and respiratory tract

**4. FIRST AID MEASURES**

**Respiratory Tract (nose and throat) Irritation:**  
If respiratory tract irritation develops, move the person to a dust free location. See Section 8 for additional measures to reduce or eliminate exposure.

**Eye Irritation:**  
If eyes become irritated, flush immediately with large amounts of lukewarm water for at least 15 minutes. Eyelids should be held away from the eyeball to ensure thorough rinsing. Do not rub eyes.

**Skin Irritation:**  
If skin becomes irritated, 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:**  
If gastrointestinal tract irritation develops, move the person to a dust free environment.

- If the above symptoms persist, seek medical attention.

**Notes To Physicians:**  
Skin and respiratory effects are the result of temporary, mild mechanical irritation; fiber exposure does not result in allergic manifestations.
5. FIRE FIGHTING MEASURES

<table>
<thead>
<tr>
<th>NFPA Codes:</th>
<th>Flammability: 0</th>
<th>Health: 1</th>
<th>Reactivity: 0</th>
<th>Special: 0</th>
</tr>
</thead>
<tbody>
<tr>
<td>NFPA Unusual Hazards:</td>
<td>None</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Flammable Properties:</td>
<td>None</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Flash Point:</td>
<td>None</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hazardous Decomposition Products:</td>
<td>None</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unusual Fire and Explosion Hazard:</td>
<td>None</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Extinguishing Media:</td>
<td>Use extinguishing media suitable for type of surrounding fire</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

6. ACCIDENTAL RELEASE MEASURES

**Spill Procedures**
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 should be equipped with a HEPA filter. Compressed air or dry sweeping should not be used for cleaning.

7. HANDLING AND STORAGE

**Storage**
Store in original container in a dry area. Keep container closed when not in use.

**Handling**
Handle ceramic fiber carefully. 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.

**Empty Containers**
Product packaging may contain residue. Do not reuse.

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 significantly reduce airborne fiber and dust levels 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 certified 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. For the most current information on respirator selection, contact your supplier.

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**Recommended Respiratory Protection**
When Handling Polycrystalline Alumina Fiber
AS PRODUCED AND AFTER SERVICE

<table>
<thead>
<tr>
<th>CONCENTRATION</th>
<th>RESPIRATOR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Up to 0.5 f/cc</td>
<td>Disposable particulate respirator (N, R, or P, 95 rated) (3) (4)</td>
</tr>
<tr>
<td>0.5 f/cc - 5 f/cc</td>
<td>Half-mask, air-purifying respirator with high efficiency particulate air (HEPA) or P100 rated filter cartridges.</td>
</tr>
<tr>
<td>5 f/cc - 25 f/cc</td>
<td>Full facepiece air-purifying respirator with HEPA or P100 rated filter cartridges or powered air-purifying respirator (PAPR) with HEPA or P100 rated filter cartridges.</td>
</tr>
<tr>
<td>&gt; 25 f/cc</td>
<td>Full facepiece positive pressure supplied air respirator.</td>
</tr>
</tbody>
</table>

(1) Unless air monitoring data indicates a lower exposure, as a minimum, use a full facepiece air-purifying respirator with HEPA or P100 rated filter cartridges during furnace tear out or when conducting removal in a confined area.

(2) Eight hour time weighted average (TWA) exposures 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 exposures.

(4) If oil present, use only R or P rated filters.

NOTE: For unknown exposures 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

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Appearance</td>
<td>White odorless wool-like fibrous material</td>
</tr>
<tr>
<td>Chemical Family</td>
<td>Polycrystalline Alumina</td>
</tr>
<tr>
<td>Vapor Pressure</td>
<td>Not applicable</td>
</tr>
<tr>
<td>Boiling Point</td>
<td>Not applicable</td>
</tr>
<tr>
<td>Melting Point</td>
<td>&gt;3600°F (2032°C)</td>
</tr>
<tr>
<td>Water Solubility (%)</td>
<td>Not soluble in water</td>
</tr>
<tr>
<td>Specific Gravity Range</td>
<td>3.0 - 3.5</td>
</tr>
<tr>
<td>Volatile by Volume (%)</td>
<td>0</td>
</tr>
<tr>
<td>pH</td>
<td>Not applicable</td>
</tr>
</tbody>
</table>

10. STABILITY AND REACTIVITY

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hazardous Polymerization</td>
<td>Will not occur</td>
</tr>
<tr>
<td>Chemical Incompatibilities</td>
<td>None known</td>
</tr>
<tr>
<td>Hazardous Decomposition Products</td>
<td>Carbon monoxide, carbon dioxide, oxides of nitrogen and trace amounts of aromatic and aliphatic hydrocarbons may be released from burning of latex polymer</td>
</tr>
</tbody>
</table>

11. TOXICOLOGICAL INFORMATION

Saffil® alumina fiber was administered to rats in intraperitoneal, intratracheal and intrapleural studies and all showed negative results. An international reference standard asbestos was used as a positive control and behaved as predicted in
all of these studies. This comprehensive group of toxicological studies indicates that Saffil® alumina fiber showed no fibrogenic, carcinogenic nor other significant toxicological effects when exposure occurs by relevant routes (i.e., by inhalation or oral ingestion) or when introduced artificially into the lung in large quantities by injection. Despite this evidence, the IARC has placed Alumina Fiber into a broad group called ceramic fibers.

The International Agency for Research on Cancer (IARC) reviewed the carcinogenicity data on man-made mineral fibers in 1987. IARC classified ceramic fiber (including Saffil polycrystalline alumina fiber) as possible human carcinogens (Group 2B). IARC’s classification of 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.

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).

14. TRANSPORT INFORMATION

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

<table>
<thead>
<tr>
<th>Hazard Class:</th>
<th>Not regulated</th>
<th>United Nations (UN) Number:</th>
<th>Not applicable</th>
</tr>
</thead>
<tbody>
<tr>
<td>Labels:</td>
<td>Not applicable</td>
<td>North America (NA) Number:</td>
<td>Not applicable</td>
</tr>
<tr>
<td>Placards:</td>
<td>Not applicable</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bill of Lading:</td>
<td>Product name</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

15. REGULATORY INFORMATION

United States Regulations

SARA Title III: This product contains aluminum oxide (fibrous forms) which is reportable under Section 313 (40 CFR 372). Sections 311 and 312 apply.


TSCA: All substances contained in this product are listed in the TSCA Chemical Inventory [Section 8(b)].

Other States: Ceramic fiber 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).

16. OTHER INFORMATION

Trace amounts of formaldehyde, acrylonitrile may be released from latex polymer during initial heating. Under normal conditions of handling, processing and use it is reasonable to expect the amount of acrylonitrile released to be below 1.0 ppm. Consult OSHA Standards on acrylonitrile and formaldehyde (29 CFR 1910.1045 and 29 CFR 1910.1048 respectively) for specific requirements if the exposure level is beyond the threshold levels.
Revision Summary:
Section 1: Product Cer-Wool® HT Paper added.

MSDS Prepared By:
THERMAL CERAMICS ENVIRONMENTAL, HEALTH & SAFETY DEPARTMENT

DISCLAIMER
The information presented herein is presented in good faith and believed to be accurate as of the effective date of this Material Safety Data Sheet. Employers may use this MSDS to supplement other information gathered by them in their efforts to assure the health and safety of their employees and the proper use of the product. This summary of the relevant data reflects professional judgment; employers should note that information perceived to be less relevant has not been included in this MSDS. Therefore, given the summary nature of this document, Thermal Ceramics does not extend any warranty (expressed or implied), assume any responsibility, or make any representation regarding the completeness of this information or its suitability for the purposes envisioned by the user.