



INDUSTRIES 3R

MATERIAL SAFETY DATA SHEET

IDENTITY

Part Number: **3R 4600**
 Identity: Vitreous Aluminosilicate Fiber
 Description: Kaowool[®] Boards

SUPPLIER

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COMPOSITION/INFORMATION ON INGREDIENTS

| <u>COMPONENTS</u> | <u># CAS</u> | <u>% BY WEIGHT</u> |
|---------------------------------------|--------------|--------------------|
| Refractories, Fibers, Aluminosilicate | 142844-00-6 | Up to 70 |
| Polycrystalline Wool ⁽³⁾ | 1302-93-8 | Up to 50 |
| Aluminum Oxide | 1344-28-1 | Up to 30 |
| Silica Amorphous | 7631-86-9 | 8-15 |
| Starch ⁽¹⁾ | 9005-25-8 | 0-10 |
| Lartex ⁽²⁾ | NONE | 5-15 |

⁽¹⁾ Starch is not in 2600R, Unifelt 14C, XT and 3000(HT)

⁽²⁾ Latex is only in Unifelt 14C, XT and 3000(HT)

⁽³⁾ PCW can sometime be identified as alimun oxide (fibrous form) CAS no.1344-28-1 or Mullite fiber.

The detail PCW content in applicable products are:

| | |
|--|--------|
| - Kaowool [®] 2600 | 10-20% |
| -Kaowool 2600R, 14C and Unifelt [®] 14C | 5-15% |
| - Kaowool 3000, 15C, 17C | 40-50% |
| - Unifelt XT and 3000(HT) | 45-59% |

*See Section *Exposure Controls/ Personal Protection* for exposure guidelines.

PHYSICAL AND CHEMICAL PROPERTIES

| | |
|--|----------------------|
| Odor and appearance: | Fiber shapes |
| Odor: | N/A |
| Odor Threshold: | N/A |
| pH: | Not Applicable |
| Melting Point: | 1760°C (3200°F) |
| Boiling Point: | Not Applicable |
| Flashpoint: | Not Applicable |
| Evaporation Rate: | Not Applicable |
| Flammability: | Not Applicable |
| Upper/ Lower Flammability or Exposure Limits: | Not Applicable |
| Vapor Pressure: | Not Applicable |
| Vapor Density: | Not Applicable |
| Solubility: | Not soluble in water |
| Relative Density: | 2.50-2.75 |

Partition Coefficient:

n-Octanol/water Not Applicable

Auto-ignition temperature: Not Applicable

Decomposition Temperature: Not Applicable

Viscosity: Not Applicable

FIRE-FIGHTING MEASURES

Extinguishing media: Use extinguishing media suitable for type of surrounding fire

Special hazards arising from the chemical (e.g., nature of any hazardous combustion products): None

NFPA Codes:

Health: 1

Fire: 0

Reactivity: 0

Other: 0

STABILITY AND REACTIVITY

Reactivity: Stable under conditions of normal use.

Chemical Stability: This is a stable material.

Possible of Hazardous Reaction: Not Applicable.

Conditions to Avoid: Please refer to handling and storage advise in Section *Handling and Storage*.

Incompatible Materials: None.

Hazardous Decomposition products: Oxides or carbon and traces of ammonia may be released from starch during initial heating of this product. Starch is an organic hydrocarbon and as such will emit water vapor, oxides of carbon (e.g., carbon dioxide, carbon monoxide, etc.) and traces of ammonia when heated. The fumes may cause discomfort and irritation to some people if released into an unventilated area. Also some products also contain starch.

Decomposition of the latex binder will occur at temperatures above 200 degrees C releasing smoke, water, carbon monoxide, carbon dioxide and hydrocarbons. The duration and the amount of release will depend upon the applied temperature, the thickness and area of the material and binder content. During the first heating cycles increased ventilation or the use of suitable respirator protection may be required. (see Section 16 for additional information if available).

EXPOSURE CONTROLS/PERSONAL PROTECTION

| MAJOR COMPONENT | OSHA PEL | ACGIH TLV | MANUFACTURER'S REG. |
|---------------------------------------|--|--------------------|----------------------------|
| Refractories, Fibers, Aluminosilicate | None Established* | 0.2 f/cc, 8-hr TWA | 0.5 f/cc, 8-hr. TWA** |
| Latex*** | None Established* | None Established | NONE |
| Aluminum Oxide | 15mg/m ³ (total dust) 5mg/m ³ (respirable dust) | None Established | NONE |
| Pocystalline wool (PCW) | NONE | None Established | 1 f/cc, 8-hr, TWA |
| Starch | 15mg/m ³ (total dust) 5mg/m ³ (respirable dust) | None Established | NONE |

* Except in the state of California, There is no specific regulatory standard for RCF in the U.S. OSHA's «Particulate Not Otherwise Regulated (PNOR)» standard [29 CFR 1910.1000, Subpart Z, Air Contaminants] applies generally - Total Dust 15 mg/m³; Respirable Fraction 5 mg/m³. The PEL for RCF in California is 0.2 f/cc, 8-hr TWA.

**The Refractory Ceramic Fibers Coalition (RCFC) has sponsored comprehensive toxicology and epidemiology studies to identify potential RCF-related health effects [see *Section Toxicological Information* for more details], consulted experts familiar with fiber and particle science, conducted a thorough review of

the RCF-related scientific literature, and further evaluated the data in a state-of-the-art quantitative risk assessment. Based on these efforts and in the absence of an OSHA PEL, RCFC has adopted a recommended exposure guideline (REG), as measured under NIOSH Method 7400 B. The manufacturers' REG is intended to promote occupational health and safety through feasible exposure controls and reductions as determined by extensive industrial hygiene monitoring efforts undertaken voluntarily and pursuant to an agreement with the U.S. Environmental Protection Agency.

*** Trace amounts 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).

OTHER OCCUPATIONAL EXPOSURE LEVELS (OEL)

RCF-related occupational exposure limits vary internationally. Regulatory OEL examples include: Canada – 0.2 to 1.0 f/cc; United Kingdom – 1.0 f/cc. Non-regulatory OEL examples include: RCFC REG – 0.5 f/cc. The objectives and criteria underlying each of these OEL decisions also vary. The evaluation of occupational exposure limits and their relative applicability to the workplace is best performed, on a case-by-case basis, by a qualified Industrial Hygienist.

ENGINEERING CONTROLS

Use engineering controls such as local exhaust ventilation, point of generation dust collection, down draft work stations, emission controlling tool designs, and materials handling equipment designed to minimize airborne fiber emissions.

PERSONAL PROTECTION EQUIPMENT

Skin: Wear personal protective equipment (e.g gloves), as necessary to prevent skin irritation. Washable or disposable clothing may be used. If possible, do not take unwashed clothing home. If soiled work clothing must be taken home, employees should be informed on best practices to minimize non-work dust exposure (e.g., vacuum clothes before leaving the work, wash work clothing separately, and rinse washer before washing other household clothes.

Eye: As necessary, wear goggles or safety glasses with side shields.

Respiratory Protection – RCF:

When engineering and/or administrative controls are insufficient to maintain workplace exposures within the 0.5 f/cc REG, the use of appropriate respiratory protection, pursuant to the requirements of OSHA Standards 29 CFR 1910.134 and 29 CFR 1926.103, is recommended. A NIOSH certified respirator with a filter efficiency of at least 95% should be used. The 95% filter efficiency recommendation is based on NIOSH respirator selection logic sequence for exposure to manmade mineral fibers. Pursuant to NIOSH recommendation, N-95 respirators are appropriate for exposures up to 10 times the NIOSH Recommended Exposure Limit (REL). With respect to RCF, both the NIOSH REL and the industry REG have been set at 0.5 fibers per cubic centimeter of air (f/cm³). Accordingly, N-95 would provide the necessary protection for exposures up to 5 f/cm³. Further, the Respirator Selection Guide published by 3M Corporation, the primary respirator manufacturer, specifically recommends use of N-95 respirators for RCF exposures. In cases where Corporation, the primary respirator manufacturer, specially recommends use of N-95 respirators for RCF exposures. In cases where exposures are known to be above 5.0 f/cm³, 8 hour TWA, a filter, a filter efficiency of 100% should be used. Other factors to consider are the NIOSH filter series N, R or P – (N) Not resistant to oil, (R) Resistant to oil and (P) oil Proof. These recommendations are not designed to limit informed choices, provided that respiratory protection decisions comply with 29 CFR 1910.134.

The evaluation of workplace hazards and the identification of appropriate respiratory protection is best performed, on a case by case basis, by a qualified Industrial Hygienist.

Other Information: Concentrations based upon an eight-hour time weighted average (TWA) as determined by air samples collected and analyzed pursuant to NIOSH method 7400 9B) for airborne fibers. The manufacturer recommends the use of a full-face piece air purifying respirator equipped with an appropriate particulate filter cartridge during furnace tear-out events and the removal of used RCF to control exposures to airborne fiber and the potential presence of crystalline silica.

DISPOSAL CONSIDERATIONS

Waste Management: To prevent waste materials from becoming airborne during waste storage, transportation and disposal, a covered container or plastic bagging is recommended.

Disposal: This product, as manufactured, is not classified as a hazardous waste according to Federal regulations (40 CFR 261). Any processing, use, alteration or chemical additions to the product, as purchased, may alter the disposal requirements. Under Federal regulations, it is the waste generator's responsibility to properly characterize a waste material, to determine if it is a «hazardous» waste. Check local, regional, state or provincial regulations to identify all applicable disposal requirements.

HAZARDS IDENTIFICATION

WARNING!

SUSPECTED OF CAUSING CANCER BY INHALATION

The U.S. Occupational Safety and Health Administration (OSHA) Hazard Communication Standard (HCS) 2012 indicates that IARC Group 2B corresponds to OSHA HCS 2012 Category 2 carcinogen classification. Under OSHA HCS 2012, RCF is classified as GHS category 2 carcinogen.

Do not handle until all safety instructions have been read and understood.

Use respiratory protection as required; See section Exposure Controls/ personal Protection.

If concerned about exposure, get medical advice.

Store in a manner to minimize airborne dust.

Dispose of waste in accordance with local, state and federal regulations.

May cause temporary mechanical irritation to exposed eyes, skin or respiratory tract.

Minimize exposure to airborne dust.

FIRST AID MEASURES

Respiratory Tract (nose and throat) Irritation:

If respiratory tract irritation develops, move the person to a dust free location. See *Section Exposure Controls/Personal protection* 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.

Indication of immediate medical attention and special treatment needed, if necessary.

ACCIDENTAL RELEASE MEASURES

Personal precautions, protective equipment, and emergency procedures: Minimize airborne dust. Compressed air or dry sweeping should not be used for cleaning. See *Section Exposure Controls / Personal Protection* for exposure guidelines.

Methods and materials for containment and cleaning up: Frequently clean the work area with vacuum or wet sweeping to minimize the accumulation of debris. Do not use compressed air for clean-up.

HANDLING AND STORAGE

Storage: Store in manner to minimize airborne dust.

Handling: Handle ceramic fiber carefully. Limit use of power tools unless in conjunction with local exhaust. Use hand tools whenever possible.

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

TRANSPORT INFORMATION

U.S. Department of Transportation (DOT)

| | | | |
|---------------|----------------|-----------------------------|----------------|
| 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 |

International

Canadian TDG Hazard Class & PIN: Not regulated

Not classified as dangerous goods under ADR (road), RID (train) or IMDG (ship).

TOXICOLOGICAL / ECOLOGICAL INFORMATION

Acute Toxicity

Epidemiology:

In order to determine possible human health effects following RCF exposure, the University of Cincinnati has been conducting medical surveillance studies on RCF workers in the U.S.A; this epidemiological study has been ongoing for 25 years and medical surveillance of RCF workers continues. The Institute of Occupational Medicine (IOM) has conducted medical surveillance studies on RCF workers in European manufacturing facilities.

Pulmonary morbidity studies among production workers in the U.S.A. and Europe have demonstrated an absence of interstitial fibrosis. In the European study a reduction of lung capacity among smokers has been identified, however, based on the latest results from a longitudinal study of workers in the U.S.A. with over 17-year follow-up, there has been no accelerated rate of loss lung function (McKay et al. 2011).

A statistically significant correlation between pleural plaques and cumulative RCF exposure was evidenced in the U.S.A. longitudinal study.

The U.S.A. mortality study showed no excess mortality related to all deaths, all cancer, or malignancies or diseases of the respiratory system including mesothelioma (LeMasters et al. 2003)

REGULATORY INFORMATION

United States 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 not required to be listed on the TSCA inventory. Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) and the Clean Air Act (CAA) - RCF 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.

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.

International Regulations

Canada: Canadian Workplace Hazardous Materials Information System (WHMIS) - RCF is 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 Substances List (DSL)

European Union: European Directive 97/69/EC classified RCF as a Category 2 carcinogen; that is it «Should be regarded as if it is carcinogenic to man.»

REACH Regulation: RCF is classified under the CLP 9classification, labelling and packaging of substances and mixtures) regulation as a category 1B carcinogen. On January 13, 2010 the European Chemicals Agency 9ECHA) 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.

As a consequence, EU)European Union) or EEA (European Economic Area) suppliers of articles which contain 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 a minimum contains the name of the substance.

OTHER INFORMATION

DEVITRIFICATION:

As produced, all RCF fibers are vitreous (glassy) materials that 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 silica (cristobalite) formation may begin at temperatures of approximately 1200°C (2192°F). 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 «in making the overall evaluation, the Working Group noted that carcinogenicity in humans was not detected in all industrial circumstances studied. Carcinogenicity may be dependent on inherent characteristics of the crystalline silica or on external factors affecting its biological activity or distribution of its polymorphs.» (IARC Monograph Vol. 68, 1997). NTP lists all polymorphs of crystalline silica (respirable size) amongst substances «known to be a human carcinogen».

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 EPA, 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 mg/cm² - by comparison, pure quartz or cristobalite were significantly active at much lower levels (circa 20 mg/cm²).

HMIS HAZARD RATING

| | |
|------------------------------------|---|
| HMIS Health | 1* (*denotes potential for chronic effects) |
| HMIS Flammable | 0 |
| HMIS Reactivity | 0 |
| HMIS Personal Protective Equipment | x (To be determined by user) |

DISCLAIMER

The information, details, dimensions and values indicated are to our best knowledge. We recommend testing according to local conditions. The specifications are subject to change without notice.