



APPLIED TEST
SYSTEMS

***Instruction
Manual***

THE MARK OF RELIABILITY

FURNACE



34XX
Models

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Section 1: Safety Information







This manual uses note, caution, and warning symbols throughout to draw your attention to important operational and safety information.







1.1 Owners, Operators, and Maintenance Personnel







Read and understand all instructions and safety precautions listed in this manual before installing or operating your unit. If you have any questions regarding operation of the unit or instructions in this manual, contact our Service Engineering Department at +1-724-283-1212.

In addition to the safety warnings listed here, warnings are posted throughout the manual. Read and follow these important instructions. Failure to observe these instructions can result in permanent damage to the unit, significant property damage, personal injury, or death.

	Read and understand all instructions and safety precautions listed in this manual before installing or operating your unit. If you have any questions regarding operation of the unit or instructions in this manual, contact our Service Engineering Department.
	Thoroughly understand the safety features and operation of the equipment. This manual will provide operators with safety concerns and general procedures. Be familiar with correct operating principles and use good judgment. Also refer to the appropriate manuals for system component safety instruction manuals.

	<p>Use caution when working with elements at elevated temperatures. Prevent burns by wearing protective clothing, and follow safety, operation, and maintenance procedures described in the appropriate instruction manuals.</p>
	<p>Avoid radiating heat. Items with a large mass retain heat for a long time. First-degree burns may occur from heat radiation as well as from direct contact with a hot surface.</p>
	<p>Obey all national and local electric code requirements. Furnaces and control systems must be grounded and wired according to national and local electrical code requirements.</p>
	<p>Handle the furnace carefully. Avoid dropping and jarring the furnace. Damage to elements and insulation may result.</p>
	<p>Avoid damage to cables. Do not let the power cables touch the heated furnace shell.</p>
	<p>Do not exceed maximum operating temperature. Operate the furnace and accessories within the appropriate temperature range. Refer to the appropriate manuals.</p>
	<p>Dangerous high voltages present. Do not attempt to open the enclosure or gain access to areas where you are not instructed to do so. Refer servicing to qualified service personnel only.</p>

	<p>Caution - Injury to the operator could occur if operational procedures are not followed. Follow all steps or procedures as instructed and refer to accompanying documents.</p>
	<p>Ventilation – slots and openings in the cabinet are provided for ventilation and to ensure reliable operation of the product. To protect the unit from overheating, those openings must not be blocked or covered. This product should not be placed in a built-in installation, such as a wall cut-out unless proper ventilation is provided. Hot temperatures will result.</p>
	<p>Refer to manual. Before tuning the temperature controller, be sure to read and understand the tuning instructions in the controller manual. Follow all operating and other instructions carefully.</p>
	<p>If it should become necessary to clean this equipment, disconnect the unit from its power source first. Do not use liquid cleaners, aerosols, abrasive pads, scouring powders or solvents, such as benzene or alcohol. Use a soft cloth lightly moistened with a mild detergent solution. Ensure the surface cleaned is fully dry before reconnecting power.</p>
	<p>Do not attempt to operate the temperature control system in ambient temperatures higher than 120° F (49° C) without providing a cooling fan or air conditioning.</p>
	<p>Do not use a temperature control system with a power output rating lower than the current rating of the furnace.</p>

 <p><small>© 1999 HCS, Inc. 000-730-00-01 No. 90148-103</small></p>	<p>Use the same thermocouples as indicated on the setpoint controller. Other types will result in faulty control which may cause damage from overheated components.</p>
 <p><small>© 1999 HCS, Inc. 000-730-00-01 No. 90148-103</small></p>	<p>When changing fuses in current limiting power controllers, use only the fuse type and size specified by the power controller manufacturer.</p>
 <p><small>© 1999 HCS, Inc. 000-730-00-01 No. 90148-103</small></p>	<p>Use interconnecting cables of the proper gauge to match the ratings on the data labels for the furnace and controller.</p>
 <p><small>© 1999 HCS, Inc. 000-730-00-01 No. 90148-103</small></p>	<p>Do not connect any measuring or controlling devices to the thermocouple other than the main temperature controller.</p>
 <p><small>© 1999 HCS, Inc. 000-730-00-01 No. 90148-103</small></p>	<p>Use thermocouple extension wires and connectors that match the thermocouple type being used. Use of copper wires will cause errors in readings and result in faulty control.</p>
 <p><small>© 1999 HCS, Inc. 000-730-00-01 No. 90148-103</small></p>	<p>Do not allow the bare thermocouple wires or any part of the thermocouple to come in contact with other metals. This could induce incorrect voltages and result in erroneous readings and faulty control.</p>

1.2 Environmental Conditions

The furnace is meant for use in laboratory/factory settings in a dry, clean work environment. There should be a clean and sturdy work surface both at a reasonable working height and away from any water, gas, or electrical hazards. The work surface should be able to support more than the weight of the unit itself. The indoor area should be well-ventilated and containing no open flames or materials that may constitute a fire hazard.

- Temperature of 15° C to 35° C
- Relative humidity not more than 75%
- Air pressure of 75 kPa to 106 kPa
- No hard-frost, dew, percolating water rain, solar irradiation, etc.
- Installation category II
- Pollution degree 2

Section 2: Preface


2.1 Unpacking

Retain all cartons and packaging materials until the unit is operated and found to be in good condition. If damage has occurred during shipping, notify Applied Test Systems and the carrier immediately. If it is necessary to file a damage claim, retain the packing materials for inspection by the carrier.

2.2 After-Sale Support

When you receive your equipment, please take a moment to copy your data label information to the data label template below. Doing this will ensure you will have the appropriate information for your records.

If you have any questions concerning the operation of your unit, contact your sales representative. Before calling, please obtain the serial number from the unit's data label. Also, please be prepared to give a complete description of your problem.

	NO. _____	
	AMP _____	VAC _____
	PHI _____	HZ _____

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Section 3: Installation

3.1 General Installation

This section describes how to prepare your ATS furnace for operation. Only perform those that apply to your specific furnace type.

3.2 Positioning and Connecting

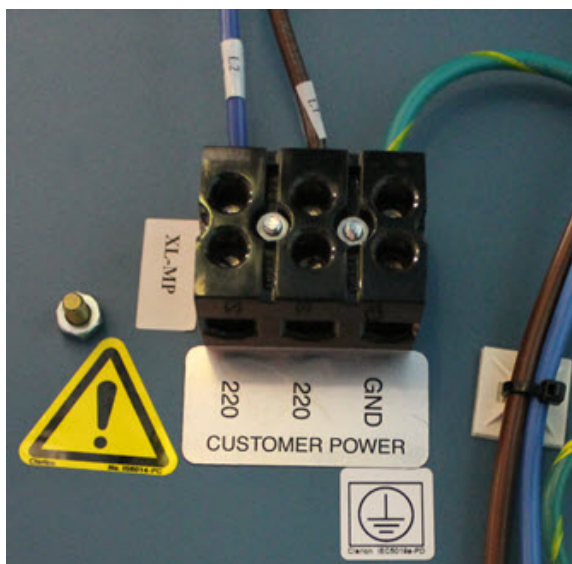
The following procedure describes how to position and connect an ATS furnace. For furnaces that are mounted to a test machine or are mounted using a test bracket, contact ATS for the appropriate mounting drawings.

1. Carefully remove the shipping crate and packing materials. Do not discard the packing materials until all items on the invoice have been accounted for.
2. Position the furnace in the desired location.
3. If the unit comes with a control system, skip this step. If a control system is not supplied, remove the terminal block cover to access the terminal block. Refer to the electrical connection drawings to make the proper power connections.



CAUTION: Obey all national and local electrical code requirements. Furnaces and control systems must be grounded and wired according to national and local electrical codes.

4. If the control cabinet is not supplied with a power cord, supply the incoming power to the terminal block.



NOTE: ATS recommends one of the following cords. The gauge size should have the same amp rating or larger than the supplied circuit breaker.

Size (AWG)	Thermoset Types/ Thermoplastic Types*
14	15
12	20
10	25
8	35
6	45
4	60
2	80

*Thermoset Types: C, E, EO, PD, S, SJ, SJO, SJOW, SJOO, SJOOW, SO, SOW, SOO, SOOW, SP-1, SP-2, SP-3, SRD, SV, SVO, SVOO

Thermoplastic Types: ET, ETLB, ETP, ETT, SE, SEW, SEO, SEOW, SEOOW, SJE, SJEW, SJEO, SJEOW, SJEOOW, SJT, SJTW, SJTO, SJTOW, SJTOO, SJTOOW, SPE-1, SPE-2, SPE-3, SPT-1, SPT-1W, SPT-2, SPT-2W, SPT-3, ST, SRDE, SRDT, STO, STOW, STOO, STOOOW, SVE, SVEO, SVT, SVTO, SVTOO

5. Ensure all connections are made between the control system and furnace.



6. Turn on the breaker and turn switch to ON to activate the controllers. Refer to the controller manufacturer instructions for operation instructions.



7. If the controller is equipped with an emergency stop button (E-stop button), be sure it is functioning properly by pushing the knob (this will stop the test in an emergency) and then pulling the knob and rotating it according to the arrows on the knob (this will re-engage the E-stop).



Section 4: Preoperation Instructions

4.1 Furnace Bake-Out

The following bake-out procedure must be performed on new furnaces or those that have new insulation. If the furnace is used with a retort, perform the bake-out with the retort. By baking out the retort with the furnace, any impurities on the retort's surface will burn off.

Note: The following procedure is NOT required after replacing heating elements only.

Note: Be sure to vent the retort during the bake-out.



CAUTION: If your furnace is equipped with sealed terminal covers, these covers must be opened during bake-out to allow moisture to escape.



WARNING: Bake-out will produce odors and smoke. It should be performed in a well-ventilated area.

1. Slightly open the end caps or door to provide ventilation. Heat the furnace to 400° F (205° C). Maintain this temperature for approximately two (2) hours or until all traces of water vapor and gases are gone, whichever takes more time.
2. When all traces of water vapor and gases are gone, increase the furnace temperature to 1000° F (537° C), or the rated temperature of the furnace, whichever is **lower**. Bake until smoke and odor are eliminated.
3. Increase the temperature to the expected operating temperature. At this time, the temperature control system may be auto-tuned for operation.
4. After the operating temperature is reached, shut off the power. With the door or end caps closed, allow the furnace to cool 8-10 hours before opening.

Section 5: Operation

After completing furnace setup and connections, refer to the manufacturer's instructions for the temperature controller operation.

Before setting the temperature controller to the desired temperature, be sure you have observed temperature change restrictions of other system components such as pull rods, extensometers, retort, and the specimen. Observe and comply with recommended heat-up and cool-down rates.



CAUTION: Maximum operating temperatures of silicon carbide elements are reduced when operating in an atmosphere other than air or carbon dioxide. Refer to the list below for these ratings in degrees Centigrade.

Air	1620°
CO ₂	1620°
Vacuum	1000-1200°
Nitrogen	1350°
Hydrogen	1200°
Hydrocarbons	1250°



CAUTION: Rapid heat-up from cold will cause premature if not immediate failure of silicon carbide elements. The maximum starting voltage listed in the specifications should never be exceeded until the element has reached about 800° C (except in the case of a thyristor control which will control element temperature by rapid on-off switching of current).



CAUTION: Silicon carbide elements should not be restricted axially or radially in any way. They should be free to move in the support holes.



CAUTION: Silicon carbide elements should not be placed under a tensile or compressive load.

PERFORMANCE TIPS:

Some insulation shrinkage may occur and is normal. To eliminate heat loss at these points, seal cracks with a non-asbestos blanket insulation of a similar temperature rating (2500° F).

Do not operate furnace with open-end bores. Severe damage can result from excessive escaping heat. Pack open bores with insulation.

Use smallest load train components that will accept loading to minimize heat transfer.

Pack load train ports around pull rods with blanket insulation to prevent heat loss. Be careful not to restrict load train motion.

Section 6: Maintenance

On a frequent basis, the Series 34XX furnace should be inspected for problems that may cause abnormal operation.

About once a month, check the thermal insulation for any signs of damage, cracking, or poor fit. Any of these problems could lead to poor furnace performance. Check with your ATS Sales Engineer if any insulation problems exist.

Section 7: Silicon Carbide Heating Elements

7.1 Introduction

Silicon Carbide Heating Elements are mounted in the furnace in either a horizontal or vertical arrangement. Horizontally-mounted elements are supported by the side insulation panels. These elements generally have the electrical connections on both ends. The vertically-mounted elements are supported by the roof insulation panel.

7.2 Replacement of Vertically-Mounted Heating Elements in Box, Tube, and Split Furnaces

1. Disconnect power to the furnace.
2. If necessary, remove the furnace from the test machine and set upright on bench. DO NOT INVERT since the elements may slide out and possibly break.
3. Remove the heating element terminal cover to gain access to the heating elements.
4. Disconnect the cable to the elements being changed.
5. Carefully lift the heating element out through the top of the furnace. Use a slight twisting motion when removing the element.
6. Carefully slide the new heating element into the furnace using a slight twisting motion, and connect electrical cables.
7. Reassemble furnace and install in testing machine.

7.3 Replacement of Horizontally-Mounted Heating Elements in Box, Tube, and Split Furnaces

1. Disconnect power to the furnace.
2. If necessary, remove the furnace from the test machine and set upright on bench.
3. Remove the heating element terminal cover to gain access to the heating elements.
4. Remove the spring clip and aluminum braid from both ends of the element being replaced.
5. Carefully remove the heating element from the furnace using a slight twisting motion.
6. Carefully insert new heating element into the furnace using a slight twisting motion.
7. Place the aluminum braids on the new element terminal and install spring clips.
8. Reassemble furnace and install in testing machine.

Section 8: MSDS Information

FIBERFRAX® DURABOARD® LD

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SAFETY DATA SHEET

SDS No. M0042

Effective Date: 02/12/2015

1. IDENTIFICATION

- (a) Product identifier used on the label FIBERFRAX® DURABOARD® LD
- (b) Other means of identification Duraboard® LD, Duraboard® LD-RG, Duraboard® LD-HT
- (c) Recommended use of the chemical and restrictions on use
- **Primary Use:** Refractory Ceramic Fiber (RCF) materials are used primarily in industrial high temperature insulating applications. Examples include heat shields, heat containment, gaskets, expansion joints, industrial furnaces, ovens, kilns, boilers and other process equipment at applications up to 1400°C. RCF based products are not intended for direct sale to the general public. While RCFs are used in the manufacture of some consumer products, such as catalytic converter mats and wood burning stoves, the materials are contained, encapsulated, or bonded within the units.
 - **Secondary Use:** Conversion into wet and dry mixtures and articles (refer to section 8).
 - **Tertiary Use:** Installation, removal (industrial and professional) / Maintenance and service life (industrial and professional) (refer to section 8).
- Uses Advised Against
Spraying of dry product.
- (d) Name, address, and telephone number
- Unifrax I LLC
600 Riverwalk Parkway, Suite 120
Tonawanda, NY 14150
Product Stewardship Information Hotline
1-800-322-2293 (Monday - Friday 8:00 a.m. - 4:30 p.m. EST)
For additional SDSs, visit our web page, <http://www.unifrax.com> or call Unifrax Customer Service at (716) 768-6500
- (e) Emergency Phone Number: CHEMTREC will provide assistance for chemical emergencies. Call 1-800-424-9300

2. HAZARDS IDENTIFICATION

- (a) Classification of the chemical in accordance with paragraph (d) of §1910.1200

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 (see, e.g., §1910.1200, Appendix F, Part D).

- (b) Signal word, hazard statement(s), symbol(s) and precautionary statement(s) in accordance with paragraph (f) of §1910.1200

Under OSHA HCS 2012, RCF is classified as a category 2 carcinogen.

Hazard Pictogram

**Signal Word**

Warning

Hazard Statements

Suspected of causing cancer by inhalation.

Precautionary statements

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

Use respiratory protection as required; see section 8 of the Safety Data Sheet.

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.

Supplementary Information

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

Minimize exposure to airborne dust.

(c) Describe any hazards not otherwise classified that have been identified during the classification process

Mild mechanical irritation to skin, eyes and upper respiratory system may result from exposure.
These effects are usually temporary.

(d) Mixture rule

Not applicable.

3. COMPOSITION / INFORMATION ON INGREDIENTS
--

(a) Chemical and (b) Common Name	(c) CAS Number	% BY WEIGHT
Refractories, Fibers, Aluminosilicate	142844-00-6	70-85
Silica (amorphous)	112926-00-8	10-15
Starch	9005-25-8	5-10

***Synonyms:** RCF, ceramic fiber, Alumino Silicate Wool (ASW), synthetic vitreous fiber (SVF), man-made vitreous fiber (MMVF), man-made mineral fiber (MMMF), high temperature insulation wool (HTIW)

(d) Impurities and stabilizing additives

Not applicable.

4. FIRST AID MEASURES

(a) Description of necessary measures, subdivided according to the different routes of exposure, i.e., inhalation, skin and eye contact, and ingestion

SKIN

Handling of this material may generate mild mechanical temporary skin irritation. If this occurs, rinse affected areas with water and wash gently. Do not rub or scratch exposed skin.

EYES

In case of eye contact flush abundantly with water; have eye bath available. Do not rub eyes.

NOSE AND THROAT

If these become irritated move to a dust free area, drink water and blow nose.
If symptoms persist, seek medical advice.

(b) Most important symptoms/effects, acute and delayed

Mild mechanical irritation to skin, eyes and upper respiratory system may result from exposure.
These effects are usually temporary.

(c) Indication of immediate medical attention and special treatment needed, if necessary

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

(a) Suitable (and unsuitable) extinguishing media

Use extinguishing agent suitable for surrounding combustible materials.

(b) Specific hazards arising from the chemical (e.g., nature of any hazardous combustion products):

Non-combustible products, class of reaction to fire is zero.
Packaging and surrounding materials may be combustible.

Thermal decomposition of binder from fires or from first heat of product may release smoke, carbon monoxide, and carbon dioxide. Use adequate ventilation or other precautions to eliminate exposure to vapors resulting from thermal decomposition of binder. Exposure to thermal decomposition fumes may cause respiratory tract irritation, bronchial hyper-reactivity or an asthmatic-type response.

(c) Special protective equipment and precautions for fire-fighters

NFPA Codes: Flammability: 0 Health: 1 Reactivity: 0 Special: 0

6. ACCIDENTAL RELEASE MEASURES
(a) Personal precautions, protective equipment, and emergency procedures

Minimize airborne dust. Compressed air or dry sweeping should not be used for cleaning. See Section 8 "Exposure Controls / Personal Protection" for exposure guidelines.

(b) 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.

EMPTY CONTAINERS

Product packaging may contain residue. Do not reuse.

7. HANDLING AND STORAGE
(a) Precautions for safe handling

Handle fiber carefully to minimize airborne dust. Limit use of power tools unless in conjunction with local exhaust ventilation. Use hand tools whenever possible.

(b) Conditions for safe storage, including any incompatibilities

Store in a manner to minimize airborne dust.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

(a) OSHA permissible exposure limit (PEL), American Conference of Governmental Industrial Hygienists (ACGIH) Threshold Limit Value (TLV), and any other exposure limit used or recommended by the chemical manufacturer, importer, or employer preparing the safety data sheet, where available

<u>Components</u>	<u>OSHA PEL</u>	<u>NIOSH REL</u>	<u>ACGIH TLV</u>	<u>MANUFACTURER REG</u>
Refractory Ceramic Fiber (RCF)	None established*	0.5 f/cc, 8-hr. TWA	0.2 f/cc TLV, 8-hr. TWA	0.5 f/cc, 8-hr. TWA**
Silica (amorphous)	20 mppcf or 80 mg/m ³ / % SiO ₂		10 mg/m ³	None established
Starch	5 mg/m ³ PEL (resp. dust) 15 mg/m ³ PEL (total dust)		10 mg/m ³	None established

*Except for the state of California, where the PEL for RCF is 0.2 f/cc 8-hr TWA, 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 Total Dust 15 mg/m³; Respirable Fraction 5 mg/m³.

**In the absence of an OSHA PEL, HTIW Coalition has adopted a recommended exposure guideline (REG), as measured under NIOSH Method 7400 B. For further information on the history and development of the REG see "Rationale for the Recommended Exposure Guideline" at page 34 of the HTIW Coalition Product Stewardship Program http://www.htiwoalition.org/documents/PSP_2012.pdf.

OTHER OCCUPATIONAL EXPOSURE LEVELS (OEL)

RCF-related occupational exposure limits vary internationally. Regulatory OEL examples include: California, 0.2 f/cc; Canadian provincial OELs ranging from 0.2 to 1.0 f/cc. The objectives and criteria underlying each of these OEL decisions also vary. The evaluation of occupational exposure limits and determining their relative applicability to the workplace is best performed, on a case-by-case basis, by a qualified Industrial Hygienist.

(b) Appropriate 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.

(c) Individual protection measures, such as personal protective equipment

Skin Protection

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 area, wash work clothing separately, and rinse washer before washing other household clothes).

Eye Protection

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

Respiratory Protection

When engineering and/or administrative controls are insufficient to maintain workplace concentrations below the 0.5 f/cc REG or a regulatory OEL, 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 recommendations, 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 exposures are known to be above 5.0 f/cm³, 8 hour TWA, 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 (B) for airborne fibers.
- The manufacturer recommends the use of a full-facepiece 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.

9. PHYSICAL AND CHEMICAL PROPERTIES

(a) Appearance	White, fibrous wool	(j) Upper/lower flammability or explosive limits	Not applicable
(b) Odor	Odorless	(k) Vapor pressure	Not applicable
(c) Odor threshold	Not applicable	(l) Vapor density	Not applicable
(d) pH	Not applicable	(m) Relative density	2.50 – 2.75
(e) Melting point	1760° C (3200° F)	(n) Solubility	Insoluble
(f) Initial boiling point and boiling range	Not applicable	(o) Partition coefficient: n-octanol/water	Not applicable
(g) Flash point	Not applicable	(p) Auto-ignition temperature	Not applicable
(h) Evaporation rate	Not applicable	(q) Decomposition temperature	Not applicable
(i) Flammability	Not applicable	(r) Viscosity	Not applicable

10. STABILITY AND REACTIVITY

(a) Reactivity	RCF is non-reactive.
(b) Chemical stability	As supplied RCF is stable and inert.
(c) Possibility of hazardous reactions	None
(d) Conditions to avoid	Please refer to handling and storage advice in Section 7
(e) Incompatible materials	None
(f) Hazardous decomposition products	Thermal decomposition of binder from fires or from first heat of product may release smoke, carbon monoxide, and carbon dioxide. Use adequate ventilation or other precautions to eliminate exposure to vapors resulting from thermal decomposition of binder. Exposure to thermal decomposition fumes may cause respiratory tract irritation, bronchial hyper-reactivity or an asthmatic-type response.

11. TOXICOLOGICAL INFORMATION

For more details on scientific publications referenced in this SDS see
<http://www.htiwoalition.org/publications.html>

(a) through (d)

TOXICOKINETICS, METABOLISM AND DISTRIBUTION

Basic Toxicokinetics

Exposure is predominantly by inhalation or ingestion. Man-made vitreous fibers of a similar size to RCF have not been shown to migrate from the lung and/or gut and do not become located in other organs of the body.

Human Toxicological Data/Epidemiology Data

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 of 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).

Information on Toxicological Effects

• *Acute toxicity: short term inhalation*

No data available: Short term tests have been undertaken to determine fiber (bio) solubility rather than toxicity; repeat dose inhalation tests have been undertaken to determine chronic toxicity and carcinogenicity.

• *Acute toxicity: oral*

No data available: Repeated dose studies have been carried out using gavage. No effect was found.

• *Skin corrosion/irritation*

Not a chemical irritant according to test method OECD no. 404.

• *Serious eye damage/irritation*

Not possible to obtain acute toxicity information due to the morphology and chemical inertness of the substance.

• *Respiratory or skin sensitization*

No evidence from human epidemiological studies of any respiratory or skin sensitization potential.

- *Germ cell mutagenicity/genotoxicity*

Method: In vitro micronucleus test
Species: Hamster (CHO)
Dose: 1-35 mg/ml
Routes of administration: In suspension
Results: Negative

- *Carcinogenicity*

Method: Inhalation, multi-dose
Species: Rat
Dose: 3 mg/m³, 9 mg/m³ and 16 mg/m³
Routes of administration: Nose only inhalation
Results: Fibrosis just reached significant levels at 16 and 9 mg/m³ but not at 3 mg/m³. None of the parenchymal tumor incidences were higher than the historical control values for this strain of animal.
Method: Inhalation, single dose
Species: Rat
Dose: 30 mg/m³
Routes of administration: Nose only inhalation
Results: Rats were exposed to a single concentration of 200 WHO fibers/ml specially prepared RCF for 24 months. High incidence of exposure-related pulmonary neoplasms (bronchoalveolar adenomas and carcinomas) was observed. A small number of mesotheliomas were observed in each of the fiber exposure groups (Mast et al 1995a).
Method: Inhalation, single dose
Species: Hamster
Dose: 30 mg/m³
Routes of administration: Nose only inhalation
Results: Hamsters were exposed to a single concentration of 260 WHO fibers/ml specially prepared RCF for 18 months and developed lung fibrosis, a significant number of pleural mesotheliomas (42/102) but no primary lung tumors (McConnell et al 1995).
Method: Inhalation, single dose
Species: Rat
Dose: RCF1: 130 F/ml and 50 mg/m³ (25% of non fibrous particles)
RCF1a: 125 F/ml and 26 mg/m³ (2% of non fibrous particles)
Routes of administration: Nose only inhalation
Results: Rats were exposed to RCF1 and RCF1a for 3 weeks. The objective of the study was to compare lung retention and biological effects of the original RCF1 compared to RCF1a. The main difference of these 2 samples was the non-fibrous particle content of respectively 25% versus 2%. The post treatment observation was 12 months. Alveolar clearance was barely retarded after RCF1A exposure. After RCF1 exposure, however, a severe retardation of clearance was observed. (Bellmann et al 2001).
After intraperitoneal injection of ceramic fibers into rats in three experiments (Smith et al 1987, Pott et al 1987, Davis et al 1984), mesotheliomas were found in the abdominal cavity in two studies, while the third report (Pott et al 1987) had incomplete histopathology. Only a few mesotheliomas were found in the abdominal cavity of hamsters after intraperitoneal injection in one experiment (Smith et al 1987). However, the ceramic fibers tested were of relatively large diameter. When rats and hamsters were exposed via intraperitoneal injection, tumor incidence was related to fiber length and dose (Smith et al 1987, Pott et al 1987, Miller et al 1999, Pott et al 1989). (From SCOEL publication (EU Scientific Committee on Occupational Exposure Limits) SCOEL/SUM/165, September 2011).

- *Reproductive toxicity*

Method: Gavage

Species: Rat

Dose: 250mg/kg/day

Routes of administration: Oral

Results: No effects were seen in an OECD 421 screening study. There are no reports of any reproductive toxic effects of mineral fibers. Exposure to these fibers is via inhalation and effects seen are in the lung. Clearance of fibers is via the gut and the feces, so exposure of the reproductive organs is extremely unlikely.

- *STOT-Single exposure*

Not applicable

- *STOT-Repeated exposure*

Not applicable

- *Aspiration hazard*

Not applicable

See the following review publications for a summary and discussion:

Interpretation of these animal experiments is complex and there is not complete agreement amongst scientists internationally. A summary of the evidence relating to RCF carcinogenicity in vivo can be found in SCOEL/SUM/165 and in Utell and Maxim 2010.

Other information

Numerous studies indicate the relevance of biopersistence as a determinant of toxic effects of fiber exposure. (Maxim et al 2006).

Irritant Properties

Negative results have been obtained in animal studies (EU method B 4) for skin irritation. Inhalation exposures using the nose only route produce simultaneous heavy exposures to the eyes, but no reports of excess eye irritation exist. Animals exposed by inhalation similarly show no evidence of respiratory tract irritation.

Human data confirm that only mechanical irritation, resulting in itching, occurs in humans. Screening at manufacturers' plants in the UK has failed to show any human cases of skin conditions related to fiber exposure.

(e) International Agency for Research on Cancer and National Toxicology Program

IARC, in 1988, Monograph v.43 (and later reaffirmed in 2002, v.81), classified RCF as possibly carcinogenic to humans (group 2B). IARC evaluated the possible health effects of RCF as follows:

- There is inadequate evidence in humans for the carcinogenicity of RCF.
- There is sufficient evidence in experimental animals for the carcinogenicity of RCF.

The Annual Report on Carcinogens (latest edition), prepared by NTP, classified respirable RCF as "reasonably anticipated" to be a carcinogen).

Not classified by OSHA.

12. ECOLOGICAL INFORMATION (Non-mandatory)

- | | |
|---|---|
| (a) Ecotoxicity (aquatic and terrestrial, where available) | No known aquatic toxicity. |
| (b) Persistence and degradability | These products are insoluble materials that remain stable over time and are chemically identical to inorganic compounds found in the soil and sediment; they remain inert in the natural environment. |
| (c) Bioaccumulative potential | No bioaccumulative potential. |
| (d) Mobility in soil | No mobility in soil. |
| (e) Other adverse effects (such as hazardous to the ozone layer) | No adverse effects of this material on the environment are anticipated. |

13. DISPOSAL CONSIDERATIONS (Non-mandatory)

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.

14. TRANSPORT INFORMATION (Non-mandatory)

- | | |
|--|------------------------|
| (a) UN number | Not Applicable |
| (b) UN proper shipping name | Not Applicable |
| (c) Transport hazard class(es) | Not Applicable |
| (d) Packing group, if applicable | Not Applicable |
| (e) Environmental hazards (e.g., Marine pollutant (Yes/No)) | Not a marine pollutant |
| (f) Transport in bulk (according to Annex II of MARPOL 73/78 and the IBC Code) | Not Applicable |
| (g) Special precautions which a user needs to be aware of, or Not Applicable needs to comply with, in connection with transport or conveyance either within or outside their premises | |

Canadian TDG Hazard Class & PIN: Not regulated

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

15. REGULATORY INFORMATION (Non-mandatory)

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).
Hazard Categories: Immediate Hazard – No

Delayed Hazard – Yes
Fire Hazard – No
Pressure Hazard – No
Reactivity Hazard – No

Toxic Substances Control Act (TSCA) - RCF is not required to be listed 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.

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) – 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 into ANNEX 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.

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 minimum contains the name of the substance.

16. OTHER INFORMATION

Product Stewardship Program

Unifrax LLC has established a program to provide customers with up-to-date information regarding the proper use and handling of refractory ceramic fiber. In addition, Unifrax has also established a program to monitor airborne fiber concentrations at customer facilities. If you would like more information about this program, please call the Product Stewardship Information Hotline at 1-800-322-2293.

In 2002, OSHA endorsed a five year voluntary product stewardship program called PSP 2002. On May 23, 2007, HTIW Coalition's predecessor, RCFC, and its member companies renewed this voluntary product stewardship agreement with OSHA. On April 16, 2012, HTIW Coalition renewed this agreement.

This new five year program, called PSP 2012, continues and builds upon the earlier programs. PSP 2012 is a highly acclaimed, multifaceted strategic risk management initiative designed specifically to reduce workplace exposures to refractory ceramic fiber (RCF). For more information regarding PSP 2012, please visit <http://www.htwcoalition.org>

Hazardous Materials Identification System (HMIS) Hazard Rating

HMIS Health 1* (* denotes potential for chronic effects)
 HMIS Flammability 0
 HMIS Reactivity 0
 HMIS Personal Protective Equipment X (To be determined by user)

Additional Information on After Service Material

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 approximately 1100° C (2012° 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 or furnace contaminants. 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 (circa 20 micrograms/cm²).

DEFINITIONS

ACGIH:	American Conference of Governmental Industrial Hygienists
ADR:	Carriage of Dangerous Goods by Road (International Regulation)
CAA:	Clean Air Act
CAS:	Chemical Abstracts Service
CERCLA:	Comprehensive Environmental Response, Compensation and Liability Act
DSL:	Domestic Substances List
EPA:	Environmental Protection Agency
EU:	European Union
f/cc:	Fibers per cubic centimeter
HEPA:	High Efficiency Particulate Air

HMIS:	Hazardous Materials Identification System
IARC:	International Agency for Research on Cancer
IATA:	International Air Transport Association
IMDG:	International Maritime Dangerous Goods Code
mg/m³:	Milligrams per cubic meter of air
mmpcf:	Million particles per cubic meter
NFPA:	National Fire Protection Association
NIOSH:	National Institute for Occupational Safety and Health
OSHA:	Occupational Safety and Health Administration
29 CFR 1910.134 & 1926.103:	OSHA Respiratory Protection Standards
29 CFR 1910.1200 & 1926.59:	OSHA Hazard Communication Standards
PEL:	Permissible Exposure Limit (OSHA)
PIN:	Product Identification Number
PNOC:	Particulates Not Otherwise Classified
PNOR:	Particulates Not Otherwise Regulated
PSP:	Product Stewardship Program
RCRA:	Resource Conservation and Recovery Act
REL:	Recommended Exposure Limit (NIOSH)
RID:	Carriage of Dangerous Goods by Rail (International Regulations)
SARA:	Superfund Amendments and Reauthorization Act
SARA Title III:	Emergency Planning and Community Right to Know Act
SARA Section 302:	Extremely Hazardous Substances
SARA Section 304:	Emergency Release
SARA Section 311:	MSDS/List of Chemicals and Hazardous Inventory
SARA Section 312:	Emergency and Hazardous Inventory
SARA Section 313:	Toxic Chemicals and Release Reporting
STEL:	Short Term Exposure Limit
SVF:	Synthetic Vitreous Fiber
TDG:	Transportation of Dangerous Goods
TLV:	Threshold Limit Value (ACGIH)
TSCA:	Toxic Substances Control Act
TWA:	Time Weighted Average
WHMIS:	Workplace Hazardous Materials Information System (Canada)

Revision Summary: Updated SDS to align with OSHA HCS 2012. Replaces 06/06/2013 SDS.

Revision Date: 02/12/2015

SDS Prepared By: UNIFRAX RISK MANAGEMENT DEPARTMENT

DISCLAIMER

The information presented herein is presented in good faith and believed to be accurate as of the effective date of this Safety Data Sheet. Employers may use this SDS 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 SDS. Therefore, given the summary nature of this document, Unifrax I LLC 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.



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MATERIAL SAFETY DATA SHEET

EMERGENCY PHONE: INFORMATION PHONE:	(800) 458-RATH (302) 294-4446	NFPA FIRE HAZARD	
Date: July 23, 2012 Supersedes: October 19, 2007	KV PRODUCTS	F Flammability H Health (*) R Reactivity S Special Hazards (*) See text	 4 Extreme 3 High 2 Moderate 1 Slight 0 Insignificant

SECTION 1 – MATERIAL IDENTIFICATION

MANUFACTURER: Rath Incorporated
300 Ruthar Drive
Newark, DE 19711

MATERIAL NAME: Rath High Temperature KV, KVS, KVF, KVR

COMMON NAME: Refractory Fiber, Ceramic Fiber

TRADE NAMES: Kerform, Kerasetter

PRODUCT FORMS: Boards, Shapes

SECTION 2 - PRODUCT INGREDIENTS

Ingredient Name	CAS Number	%	Exposure Limits Reference
Alumina	1344-28-1	43-98	0.5 fibers/cc TWA (RATH) ¹ 10 fibers/cc CL ¹
Silica ²		2-56	10 mg/m ³ (total) TLV (ACGIH 1988-89) 6 mg/m ³ PEL (OSHA)
Organic and Inorganic Binder ²			

No OSHA or ACGIH exposure limits have been established for these materials. Pending the results of long-term health effects studies, airborne exposures should be controlled at or below the RATH exposure guidelines listed above.

Identity, CAS Numbers &/or percent composition are a trade secret.

SECTION 3 – PHYSICAL DATA

Melting Point: above 1700°C
Vapor Pressure: N/A
Appearance: N/A
pH Value: N/A
Specific Gravity Range: N/D

Boiling Point: N/A
Solubility in water: N/A
Evaporation Rate: N/A
Vapor Density (air =1): N/A
% Volatile by Volume: N/A



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SECTION 4 – FIRE AND EXPLOSION DATA

Flash point: None
Auto-ignition Temperature: None
Explosion Hazards: None
Flammability Limits in Air: Lower - None Upper - None

SECTION 5 – HEALTH HAZARDS

Signs and Symptoms of Exposure

Eyes contact: Slightly to moderately irritating. Abrasive action may cause damage to the outer surface of the eye.

Skin contact: Slightly to moderately irritating. May cause irritation and inflammation due to mechanical reaction to sharp, broken ends of fibers.

Ingestion: May cause disturbances to the gastrointestinal tract. Symptoms may include irritation, nausea, vomiting, and diarrhea.

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.

Emergency and First Aid Procedures

Eye contact: Flush immediately with large amounts of water for at least 15 minutes. Eyelids should be held away from the eyeball to ensure thorough rinsing. Do not rub eyes.

Skin contact: Wash area of contact thoroughly with soap and water. Do not rub or scratch exposed skin. Using a skin cream or lotion after washing may be helpful.

Ingestion: Do not induce vomiting.

Inhalation: Remove affected person from source of exposure.

CONSULT A PHYSICIAN IF ANY SYMPTOMS PERSIST

SECTION 6 – REACTIVITY DATA

Chemical Incompatibilities: None known
Hazardous Decomposition Products: None
Hazardous Polymerization: Will not occur



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SECTION 7 – SPILL OR LEAK/HANDLING PROCEDURES

Handling: Collect in a convenient manner, which will avoid dusting conditions. Wear respiratory protection during cleanup. Sweep up and recover or mix material with moist absorbent and shovel into waste container. Follow federal, state and local regulations for disposal.

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.

Product which has been in service at elevated temperatures (greater than 1800° 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 in service.

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 2A carcinogen. By definition a group 2A carcinogen is probably carcinogenic to humans. For crystalline silica, IARC's 2A classification was based on limited evidence of carcinogenicity in humans and sufficient evidence of carcinogenicity in experimental animals.

The National Toxicology Program (NTP) listed ceramic fibers (respirable size) as being reasonably anticipated to be human carcinogens in the Seventh Annual Report on Carcinogens (1994). The listing has been repeated for the Eight Annual Report (1998), the Ninth Annual Report (2000) and the Tenth Annual Report (2002).

The OSHA permissible exposure limit (PEL) for cristobalite is 0.05 mg/m³ (resp.). The ACGIH threshold limit value (TLV) for cristobalite is 0.05 mg/m³ (resp.) (ACIGH 1988-89). Particular care should be taken when working with "used" material to minimize generation of dust. When removing and handling ceramic fiber used in high temperature applications special caution should be taken to avoid unnecessary cutting and tearing of the used material to minimize generation of airborne dust. Use NIOSH or MSHA approved equipment when airborne exposure limits may be exceeded, especially in confined areas with inadequate ventilation or other areas. Acceptable respirators recommended for given airborne cristobalite concentrations are:

Concentration

Respirator Type

Up to 10 times the PEL
10 to 100 times the PEL
> 100 times the PEL

Half-face cartridge respirator with high-efficiency filter.
Full-face cartridge respirator with high-efficiency filters.
Full-face, positive-pressure supplied air respirator.



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SECTION 8 – EXPOSURE CONTROLS/PERSONAL PROTECTION

Engineered Controls: Use local exhaust ventilation, hood or equipment enclosure to avoid dispersal of fibrous particulate into workplace air. Use an approved dust respirator or an approved air-supplied or self-contained respirator for non-routine or emergency conditions.

Use dust suppressant where sweeping is necessary. Avoid clean up procedures that may result in water pollution. Personal safety and exposure recommendations described elsewhere in this data sheet apply to exposure during clean up of spilled material

Eye Protection: Wear safety glasses or chemical goggles to prevent eye contact. Do not wear contact lenses when working with this substance. Have eye-washing facilities readily available where eye contact can occur.

Protective Clothing: Wear gloves, hats or full body clothing to prevent skin contact as necessary. Avoid taking unwashed work clothes home or provide disposable work clothing. Wash work clothes separately from other clothing. If clothing is to be laundered by someone else, inform launderer of proper procedures.

Respiration: Use NIOSH or MSHA approved equipment when airborne exposure limits are exceeded. Acceptable respirators recommended for given airborne ceramic fiber concentrations are:

Concentration	Respirator
Up to 20 f/cc	Half-face air purifying respirator such as a respirator with appropriate cartridges or a disposable dust respirator (3M 8710 or equivalent).
> 20 f/cc to 200 f/cc	Full-face respirator with high-efficiency filters.
> 200 f/cc	Full-face, positive-pressure supplied air respirator.

SECTION 9 – TOXICOLOGICAL INFORMATION

Currently, there are no known chronic health effects in humans from long-term exposure to ceramic fibers.

Animal studies have indicated that refractory ceramic fibers ingested into the peritoneal cavity (abdominal) have caused acute abdominal hemorrhaging in hamsters but not rats. Injections of this type have also caused tumors in the abdominal or pleural cavities in lifetime rat and hamster studies.

Recently published inhalation studies have provided contradictory results. One study, which used rats as the experimental animal, reported lung damage consisting of alveolar proteinosis and interstitial fibrosis, whereas, other studies using rats and hamsters, showed no similar effects.

Similarly, the pulmonary tumor-causing potential of refractory ceramic fibers in animals is unclear. Two inhalation studies suggest a low-order potential in inducing pulmonary tumors in animals, while other inhalation and intratracheal injection studies conclude that ceramic fibers are not tumorigenic in animals.



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The International Agency of Research on Cancer (IARC) has recently reviewed the animal, human and other relevant experimental data on man made mineral fibers in order to critically evaluate and classify the cancer causing potential of these materials. Based on its review, IARC classified fibrous glass wool, mineral wool (both rock wool and slag wool) and ceramic fiber as group 2B carcinogens. By definition, a group 2B agent is possibly carcinogenic to humans. For refractory ceramic fiber, IARC's 2B classification was based on sufficient evidence of carcinogenicity in experimental animals in the absence of human epidemiologic data.

The National Toxicology Program (NTP) listed ceramic fibers (respirable size) as being reasonably anticipated to be human carcinogens in the Seventh Annual Report on Carcinogens (1994). The listing has been repeated for the Eight Annual Report (1998), the Ninth Annual Report (2000) and the Tenth Annual Report (2002).

This product contains amorphous silica. IARC has determined that there is inadequate evidence for the carcinogenicity of amorphous silica to experimental animals and humans.

Further animal and human health studies are planned. Pending the results of these studies, strict adherence to recommended safe work practices described elsewhere in this data sheet is advised.

SECTION 10 – DISPOSAL INFORMATION

Waste Management/Disposal: This substance, when discarded or disposed of, is not specifically listed as a hazardous waste in Federal regulations; however it could be hazardous if it is considered toxic, corrosive, ignitable, or reactive according to Federal definitions (40 CFR 261). Additionally, it could be designated as hazardous according to state regulations. This substance could be also become a hazardous waste if it is mixed with or comes in contact with a hazardous waste. If such contact or mixing may have occurred, check 40 CFR 261 to determine whether it is a hazardous waste. If it is a hazardous waste, regulations at 40 CFR 262, 263, and 264 apply. The transportation, storage, treatment, and disposal of this waste material must be conducted in compliance with all applicable Federal, State and local regulations.

SECTION 11 – REGULATORY INFORMATION

SARA Title III: Listed below are the hazard categories for the Superfund Amendments and Reauthorization Act (SARA) Section 311/312 (40 CFR 370):

SARA Title III Hazard Categories:

Acute Health:	no	Pressure Hazard:	no
Chronic Health:	yes	Reactivity Hazard:	no
Fire Hazard:	no		

Additional Environmental There may be specific regulations at the local, regional or state level that pertain to this material.

Regulatory Information:

The information herein is given in good faith but no warranty expressed or implied is made.



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SECTION 12 – DEFINITIONS

- ACGIH:** American Conference of Governmental Industrial Hygienists
CAS#: CAS Registration Number is an assigned number to identify a material.
CAS stands for Chemical Abstracts Service.
EPA: Environmental Protection Agency
HEPA: High Efficiency Particulate Air
HMIS: Hazardous Materials Identification System
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
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
TITLE III: Emergency Planning and Community Right To Know Act
TCLP: Toxicity Characteristics Leaching Procedures (EPA)
TLV: Threshold Limit Values (ACGIH)
TSCA: Toxic Substance Control Act
29 CFR 1910.134 & 29 CFR 1926.103: OSHA Respiratory Protection Standard
29 CFR 1910.1200 & 29 CFR 1926.59: OSHA Hazard Communications Standard

SECTION 13 – DISCLAIMER OF LIABILITY

THE INFORMATION CONTAINED HERE IN IS BASED ON DATA TAKEN FROM SOURCES BELIEVED TO BE BOTH CURRENT AND RELIABLE AT THE TIME OF PUBLICATION. RATH INCORPORATED MAKES NO WARRANTIES EXPRESSED OR IMPLIED, AS TO THE ACCURACY AND ASSUMES NO LIABILITY ARISING FROM ITS USE BY OTHERS. COMPLIANCE WITH ALL APPLICABLE FEDERAL, STATE AND LOCAL LAWS AND REGULATIONS REMAINS THE RESPONSIBILITY OF THE USERS.



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PRODUCT SAFETY INFORMATION

CERAMIC AND ALUMINA 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 fibers 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 persist, seek medical attention immediately

For additional product information and work practices refer to the MSDS

Rath Incorporated
300 Ruthar Drive
Newark, DE 19711
800-458-RATH

Section 9: Warranty Statement

Your Applied Test Systems product has been manufactured and inspected by experienced craftsmen. Applied Test Systems warrants, for the original purchaser, each product to be free from defects in material and workmanship for a period of thirteen (13) months from date of shipment or twelve (12) months from date of installation whichever comes first. This warranty does not apply to failures caused by normal usage, misuse, or repair or service by unauthorized personnel, nor does it cover limited life electrical components which deteriorate with age such as tubes, lamps, fuses, and heaters. The warranty does not extend to products not manufactured or assembled by Applied Test Systems.

This warranty is expressly limited to the repair, replacement, or adjustment of the product at Applied Test Systems' option. The product must be returned to the Applied Test Systems factory or an authorized repair center. Applied Test Systems shall not be liable for any labor, transportation, or installation costs that may arise in connection with the product or return.

To obtain warranty service:

1. Applied Test Systems must be promptly notified in writing of the defect.
2. Upon receipt of written authorization, said defective equipment is returned as directed, with transportation charges prepaid by the buyer and –
3. Applied Test Systems examination of such equipment discloses to its satisfaction that the defect exists and was not caused by negligence, misuse, improper installation, accident, or unauthorized repair or alteration.

This warranty is in lieu of all other warranties, expressed or implied, including the implied warranty of merchantability or fitness for particular purpose. In no event shall Applied Test Systems be liable for direct, indirect, special, incidental, collateral or consequential damages.

The aforementioned provisions do not extend the original warranty period of any article that has been either repaired or replaced by Applied Test Systems.

Applied Test Systems reserves the right to change published specifications.

