APPLIED TEST SYSTEMS
THE MARK OF RELIABILITY

INSTRUCTION MANUAL

FURNACE

Model Numbers: 3110 / 3150 / 3160 / 3210

This manual contains important operating and safety information. Carefully read and understand the contents of this manual prior to the operation of this equipment.

REVISED MARCH 2025.

Information in this document is subject to change without notice and does not represent a commitment on the part of Applied Test Systems (ATS).

For assistance with set-up or operation, contact the ATS service department. Please have this manual and product serial number available when you call.

Telephone: +1.724.283.1212.

MANUAL CONTENTS

A. Safety

A.1 Owners, Operators, and Maintenance

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

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.

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.

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.

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.

Handle the furnace carefully. Avoid dropping and jarring the furnace.

Avoid damage to cables. Do not let the power cables touch the heated furnace shell.

Do not exceed maximum operating temperature. Operate the furnace and accessories within the appropriate temperature range. Refer to the appropriate manuals.

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.

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.

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.

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.

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.

Do not attempt to operate the temperature control system in ambient temperatures higher then 120°F (49°C) without providing a cooling fan or air conditioning.

Do not use a temperature control system with a power output rating lower than the current rating of the furnace.

Use the same thermocouples as indicated on the setpoint controller. Other types will result in faulty control which may cause damage from overheated components.

When changing fuses in current limiting power controllers, use only the fuse type and size specified by the power controller manufacturer.

Use interconnecting cables of the proper gauge to match the ratings on the data labels for the furnace and controller.

Do not connect any measuring or controlling devices to the thermocouple other than the main temperature controller.

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.

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.

A.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

B. Introduction

B.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.

B.2 After Sale Support

When you receive your equipment, copy your data label information onto the data label template below (Figure B.1). 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.

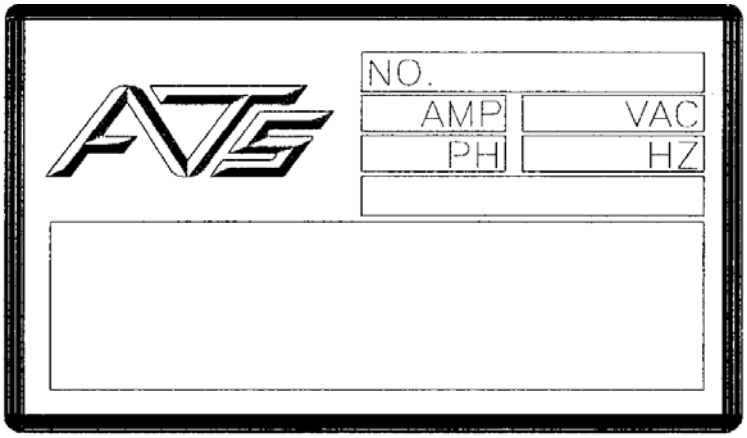


Figure B.1 - Sample ATS data tag

C. Installation

C.1 General Installation

This section describes how to prepare your Applied Test Systems (ATS) furnace for operation. Only perform the steps that apply to your specific furnace type. The installation of the equipment must be performed by a qualified and licensed electrician in accordance with National Electric code and local codes.

C.2 Positioning and Connecting

The following procedure describes how to position and connect an ATS Furnace that is equipped with leg levelers. For furnaces that are mounted to a test machine or are mounted using a test bracket, refer to 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 did not come with a control system, skip to step 8.

4. The control system may or may not have a power cord supplied. If it does not, remove the top cover of the control system to locate the power supply connection. To do this, remove the two screws at the top of the back of the unit and slide the cover off toward the back side. See Figure C.1 for screw location.

NOTE: Figure C.1 shows a typical control system. Not all control systems will appear exactly the same.

Figure C.1 - Typical Control System (Back)

5. Locate the Line Power Access Port on the center of the back side of the control system. Determine the appropriate gauge wire by confirming the amperage on the data label. Insert the wire into the Line Power port.

6. Connect the power cord to the power supply block and replace the top cover. Tighten the line power clamp to the power cord to help prevent bad connections and any movement of the cord.

Figure C.2 - Interior Controller - Line Power Access Port

7. Use the supplied interconnecting cord to connect the control system to the furnace, along with the thermocouples. Skip to step 9.

NOTE: When attaching the green twist lock plug, make sure to push the lock in then turn. Repeat this motion until the plug is tight.

8. 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.

9. Connect the thermocouples to the control system. Use the thermocouple type specific to your furnace.

CAUTION: Thermocouple extension cables and connectors must be compatible with the thermocouple type being used.

10. Verify that the heating elements do not have any exposed wires. If sections of the embedding are missing or there are large cracks in the embedding, refer to Section G of this manual for repair instructions. Not all elements require embedding cement.

D. Pre-Operation Instructions

D.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. 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. If supplied with sealed terminal covers, slightly open to provide ventilation. After bake out is complete, reseal terminal box. 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, if higher than 1000°F (537°C). 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.

E. Temperature Controller

E.1 Temperature Controller Overview

The ATS temperature control system regulates the power applied to the resistive heating elements to reach and maintain the desired temperature (setpoint) as measured by a control thermocouple. The basic temperature control system includes the following:

- Setpoint temperature controller
- Solid state power controller
- One (1) matching control thermocouple
- Additional optional features include:
- High-limit alarms and over-temperature controllers
- SCR power controllers
- Multiple-zone independent controls
- Programmable Capabilities

The most extensive information needed to operate the system is found in the manufacturers' literature. It is recommended the operator read the entire manual and become familiar with the equipment before attempting to perform any tests.

ATS temperature control systems are available in a variety of options and several configurations. Those explained here are typical examples. Your model will differ in appearance due to the options requested; however, the basic operating principles are the same.

E.2 Temperature Controller Installation

1. Position the control cabinet in the desired location.

2. Connect the cables between the furnace and the control cabinet.

CAUTION: Use interconnecting cables of the proper gauge to match the ratings on the data labels for the furnace and controller.

3. Connect the thermocouple to the control system.

4. Provide a source of grounded electrical power per the (furnace/oven) data label to the terminal block labeled “customer power” inside the control cabinet. Refer to the power block labeling inside the control cabinet for wiring data.

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.

5. Verify all connections are correct and in accordance with any applicable wiring codes.

E.3 Temperature Controller Operation

Although the appearance of the controllers differ, the basic operation is similar. Functional differences are noted in the operation sequences.

1. Turn the power “on” to the main system.

2. Turn the power “on” to the setpoint controller.

3. Bake-out the furnace according to Section D - Pre-Operation Instructions.

4. You are now ready to tune and perform operating sequences with the controller. Refer to the manufacturers’ literature for specific instructions.

CAUTION: Before tuning and operating the temperature controller, be sure to read and understand the instructions in the manufacturers’ literature.

E.4 Over-Temperature Option

The over-temperature systems provide protection from over-temperature of the furnace that may be caused by:

- Controller failure
- Shorted power controller
- Defective thermocouple
- Outside interference

The over-temperature controller is an independent controller with an independent thermocouple. When an over-temperature is reached, an alarm is signaled and the electrical current is interrupted from the power controller to the heating elements. This protects against a runaway temperature controller or malfunctioning power controller.

In the event of shutdown, the operator will have to manually reset the controller after the over-temperature condition is cleared.

NOTE: All new systems require the high limit to be set before the first initial run. It will be necessary to press the manual reset button to activate the system when power is turned on.

F. Furnace Operation

After completing furnace installation and pre-operational procedures, refer to the manufacturer’s instructions for temperature controller operation.

CAUTION: Before setting the temperature controller to the desired temperature, check restrictions of other system components such as pull rods, extensometers, retorts, and specimens. Comply with recommended heat-up and cool-down rates.

CAUTION: Use caution when working with elements at elevated temperatures. Refer to the Safety Section of this manual for further safety concerns.

G. Furnace and Element Maintenance

G.1 Preventative Maintenance

Once a month, ensure the thermal insulation is not damaged, cracked, or ill-fitting. If the thermal insulation is cracked, eliminate heat loss at these points by sealing cracks with a blanket insulation of a similar temperature rating.

G.2 Embedding & Patching Elements

If heating elements have exposed wire, use only ATS supplied embedding compound to secure them.

NOTE: Not all elements require embedding cement. Contact ATS with any questions by calling +1.724.283.1212.

The following tools are necessary for this procedure:

- Embedding compound powder
- Distilled water
- Tool to mix compound

1. After the furnace is in place and the leads are secure, mix the embedding compound powder with distilled water so a paste is formed. The paste should be thin enough to go down into the coils, but thick enough to maintain body.

2. Work the paste down into the groove, making sure it goes between the coils. Smooth the surface and remove any excess paste.

3. After the coils are embedded, turn the power on to heat the element to approximately 100°C (212°F). This will allow the cement to dry quickly and prevents possible coil damage.

NOTE: Do not overheat the coils at this point. If necessary, turn the power on and off in order to prevent the coils from becoming so hot they are red. Notice that the compound texture is powdery at this time. The compound will harden when it is brought up to operating temperature later.

4. Allow the furnace to cool. Clean off any excess compound with a fine emery cloth or sandpaper.

G.3 Element Replacement

Please use the instructions following that are specific to your furnace type. The following tools are necessary for all element replacement procedures:

- Ohmmeter
- Wire Clippers
- Screw Driver
- Bar Clamp (optional)
- Hammer (optional)
- Punch (optional)

Before performing the element replacement procedure, carefully inspect the furnace. Plan to replace any excessively worn or deteriorated parts that also affect furnace performance, such as excessively-deteriorated insulation.

NOTE: Use all ceramic insulators as originally supplied to prevent electrical short circuits. Use a voltmeter to check for short circuits before applying power to the furnace.

3110 Tube Furnace Element Replacement

The element replacement procedure described below is for an ATS Series 3110 Tube Furnace only. Refer to Figure G.1 during disassembly.

1. Turn off furnace and allow to cool completely.

2. Disconnect the power and instrumentation wiring from the furnace. If applicable, remove the furnace from the testing machine and position the furnace on a workbench in a suitable cradle.

WARNING: Failure to completely disconnect the furnace from the power supply before attempting disassembly may cause personal injury or death.

3. Remove the terminal cover. Isolate element wires from terminal block and check resistance with an ohmmeter. If there is resistance, no further action is needed. If there is not any resistance, replacement is needed. Disconnect and mark the element from the terminal block. It is important to straighten or cut off the loops at the end of the element leads in order to prevent damage to the insulation cylinder when the leads are

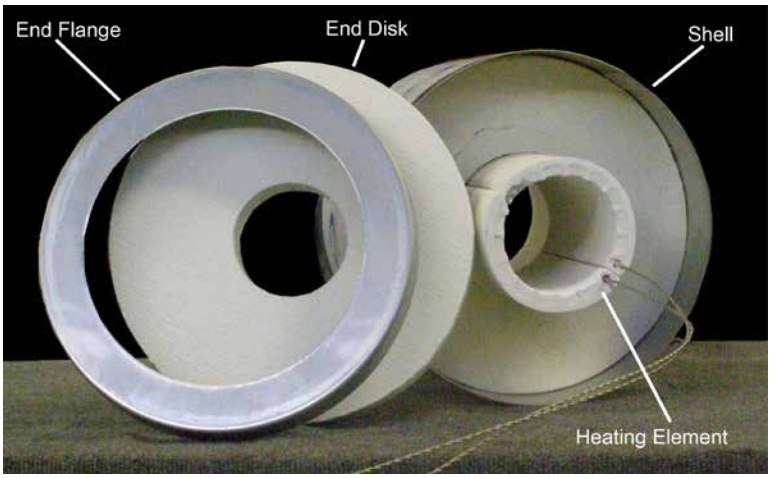


Figure G.1 - Series 3110 Furnace Disassembly

pulled through it.

4. Mark the shell and end flanges for easy assembly alignment. Remove the end flange closest to the burned-out element and carefully remove the end flange and end disk.

5. Carefully feed the element lead wires through the shell while removing the defective element from its seat. Be careful not to damage the insulation.

6. If necessary, straighten the new wire leads. Align the wires with the wire paths in the insulation and feed the wires through the shell by inserting a guide tube into the wire path and pushing the wire through the guide tube, or by putting a string through the hole, tying it to the wire, and pulling it through the wire path.

7. Place the wires to maintain the maximum distance between them. Carefully position the element in place. Align any ports if applicable. Refer to Figure G.2.

8. After installing the new element, insert the thermocouple to ensure alignment.

9. Install the insulation end disk. Align the end flange with the shell and install it. If necessary, a bar clamp can be used to gently compress the assembly enough to align the screw

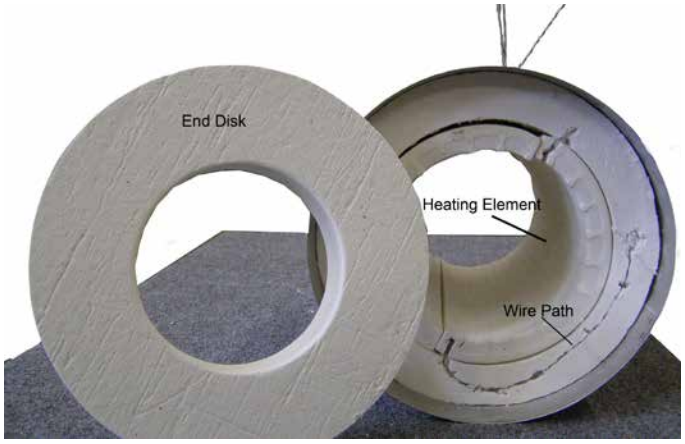


Figure G.2 - End View of ATS Series 3110 Tube Furnace

holes.

10. Ensure that the leads do not short circuit against the outside case.

11. Use an ohmmeter to check for short circuits. Install the terminal block and attach the wires. Cut off any excess wires. Check again for short circuits, and correct any problems before completing the installation.

12. Inspect the embedding material for cracks or damage. If the embedding must be repaired, refer to the Embedding & Patching Elements section of this manual (Section G.2).

13. If applicable, mount the furnace on the testing machine. Connect the leads and instrumentation, and install the terminal covers.

14. If any insulation has been replaced, follow the bake-out procedures outlined in the furnace manual. Bake-out is not necessary unless the insulation has been replaced.

3210 Split Tube Furnace Element Replacement

The element replacement procedure described in this section is for ATS Series 3210 Split Tube Furnace types only. Refer to Figure G.3 for an identification of parts.

1. Turn off furnace and allow to cool completely.

2. Disconnect the power and instrumentation wiring from the furnace. If applicable, remove the furnace from the testing machine and position the furnace on the workbench in a suitable cradle.

WARNING: Failure to completely disconnect the furnace from the power supply before attempting disassembly may cause personal injury or death.

3. Remove the terminal cover. Isolate element wires from the terminal block and check resistance with an ohmmeter. If there is resistance, no further action is needed. If there is not any resistance, replacement

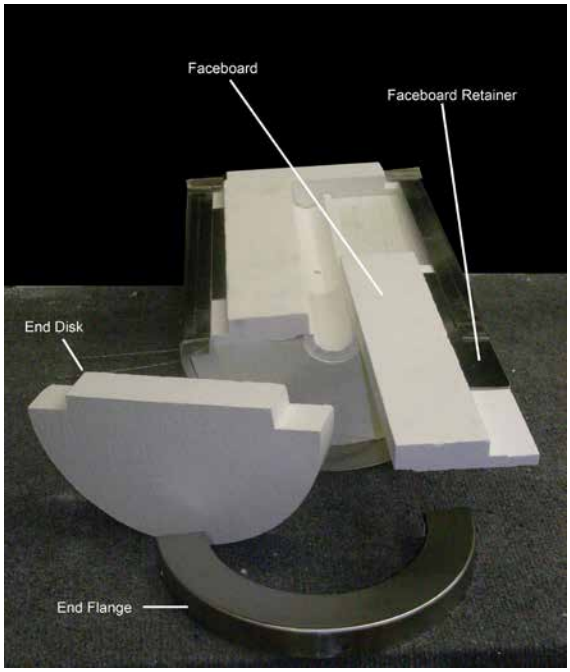


Figure G.3 - Series 3210 Furnace

is needed. Disconnect and mark the terminal block for reassembly. It is important to straighten or cut off the loops at the end of the element leads in order to prevent damage to the insulation cylinder when the leads are pulled through it.

4. Mark the shell and end flanges for easy assembly alignment. Remove the end flange closest to the burned-out element. Carefully remove the end flange and end disk.

5. Carefully feed the element lead wires through the shell while removing the defective element from its seat. Be careful not to damage the insulation.

6. If necessary, straighten the new wire leads. Align the wires with the wire paths in the insulation and feed the wires through the shell by inserting a guide tube into the wire path and pushing the wire through the guide tube, or by putting a string through the hole, tying it to the wire, and pulling it through the wire path.

7. Place the wires to maintain the maximum distance between them. Carefully position the element in place. Align any ports if applicable.

8. After installing the new element, insert the thermocouple to ensure alignment.

9. Install the insulation end disk. Align the end flange with the shell and install it. If necessary, a bar clamp can be used to gently compress the assembly enough to align the screw holes.

10. Ensure that the leads do not short-circuit against the outside case.

11. Use a ohmmeter to check for short circuits. Install the terminal block and attach the wires. Cut off any excess wires. Check again for short circuits and correct any problems before completing the installation.

12. Inspect the embedding material for cracks or damage. If the embedding must be repaired, refer to the Embedding & Patching Elements (Section G.2)

13. If applicable, mount the furnace on the testing machine. Connect the leads and instrumentation, and install the terminal covers.

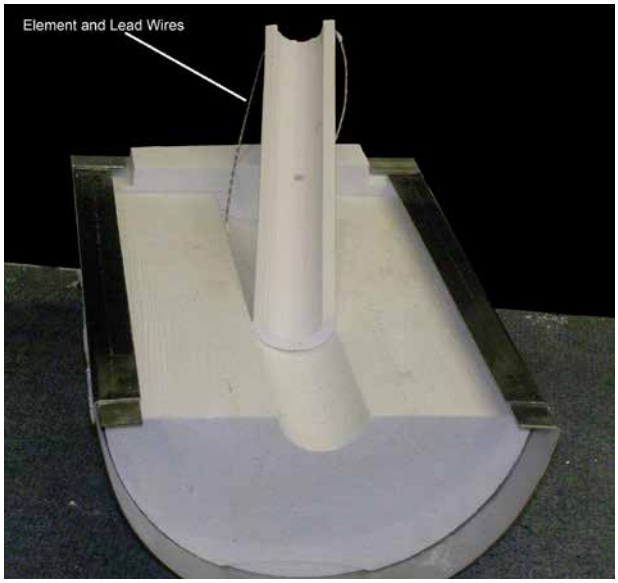


Figure G.4 - Safe Distance Between Lead Wires

14. If any insulation has been replaced, follow the bake-out procedures outlined in Section D.1. Bake-out is not necessary unless the insulation has been replaced.

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

3150/3160 Box Furnace Element Replacement

1. Turn off furnace and allow to cool completely.

2. Disconnect the power and instrumentation wiring from the furnace. If applicable, remove the furnace from the testing machine and position the furnace on the workbench in a suitable cradle.

WARNING: Failure to completely disconnect the furnace from the power supply before attempting disassembly prior to element replacement may cause personal injury or death.

3. Remove the terminal cover. Isolate element wires from terminal block and check resistance with an ohmmeter. If there is resistance, no further action is needed. If there is not any resistance, replacement is needed. Disconnect and mark the element from the terminal block. It is important to straighten or cut off the loops at the end of the element leads in order to prevent damage to the insulation when the leads are pulled through it.

4. Remove terminal block and ceramic beads on element leads. Beads may be inside furnace.

Removing Side Elements – 3150 and 3160

1. Unbolt the element retainers located on the top side of the elements. This may require a top to hold the retainer inside the furnace from spinning.
2. Remove bottom hearth plate if supplied.
3. The element then can be lifted up to clear the lower element and pulled directly out through the front door opening.

Removing Bottom Elements – 3150

1. Side elements must be removed before removing bottom element.
2. Once the hearth plate and side elements are removed the bottom element can be pulled directly out through the front door opening.

Removing Side Elements – 3160

1. Unbolt the element retainers located on the side of the elements at the split line. This may require a top to hold the retainer inside the furnace from spinning.
2. The element then can be pulled directly out through the front opening.

Removing Rear Elements – 3160

1. Side elements must be removed before removing rear element
2. The element then can be pulled directly out through the front opening.

Replacement and Reassembly

1. Replace removed element with correct new element. Carefully push leads through existing holes in the insulation. Replace ceramic beads in proper locations if required.
2. Check that the new element is in the proper position and that the thermocouple ports are properly aligned.
3. Check that all leads are not shorting against the shell. Reposition ceramic beads as necessary.
4. Check resistance of elements to verify elements are properly wired and not shorting against each other.
5. Continue replacing elements as needed.
6. Repeat bake-out procedure for new furnace, especially if insulation has been replaced.

G.4 Thermocouple Replacement

1. Disconnect power from the furnace.
2. Unplug thermocouple connector.
3. Remove the 2 screws holding the thermocouple bracket to the shell.

Figure G.5 - Thermocouple Bracket

4. Pull the complete assembly out of the furnace.
5. Loosen the 2 screws holding the thermocouple wires to the connector and remove.

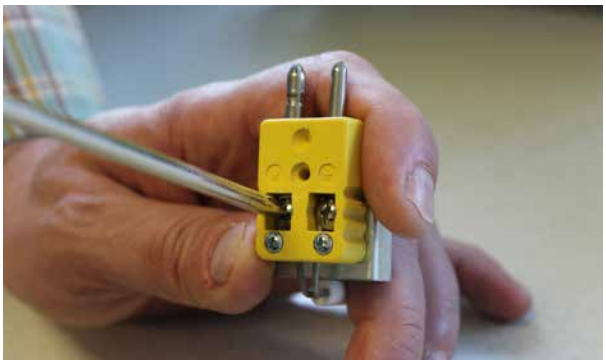


Figure G.6 - Thermocouple Connector

6. Mark the location of the bend on the replacement wires using the old one as a template. Before bending double-check the direction you need to bend. The replacement wire will have the leads marked with a "+" and "–" tag.

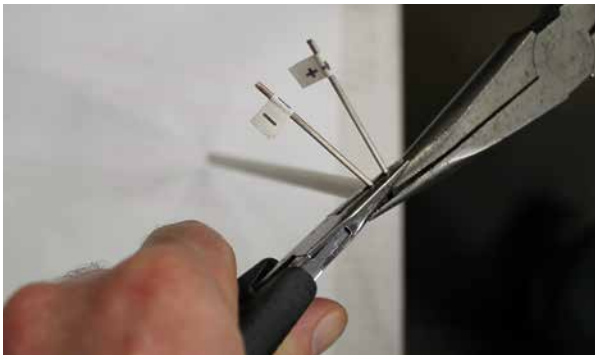


Figure G.7 - Bending Thermocouple Wires

7. After the wires are bent mark the leads to the same length as the ones removed and cut off the excess.
8. Wire the positive leg to the "+" terminal on the connector.
9. Reassemble the thermocouple and insert it into the furnace. Double-check that the tip of the thermocouple extends past the element's surface (minimum 1/8").

Figure G.8 - Thermocouple Extending Past Element

H. Temperature Controller Maintenance

H.1 Preventative Maintenance

Inspect components every month for defects. If defects are discovered during operation, make a note of the defect and correct it as soon as possible. Stop the process immediately if a deficiency is discovered that could ultimately damage the equipment or present a safety hazard.

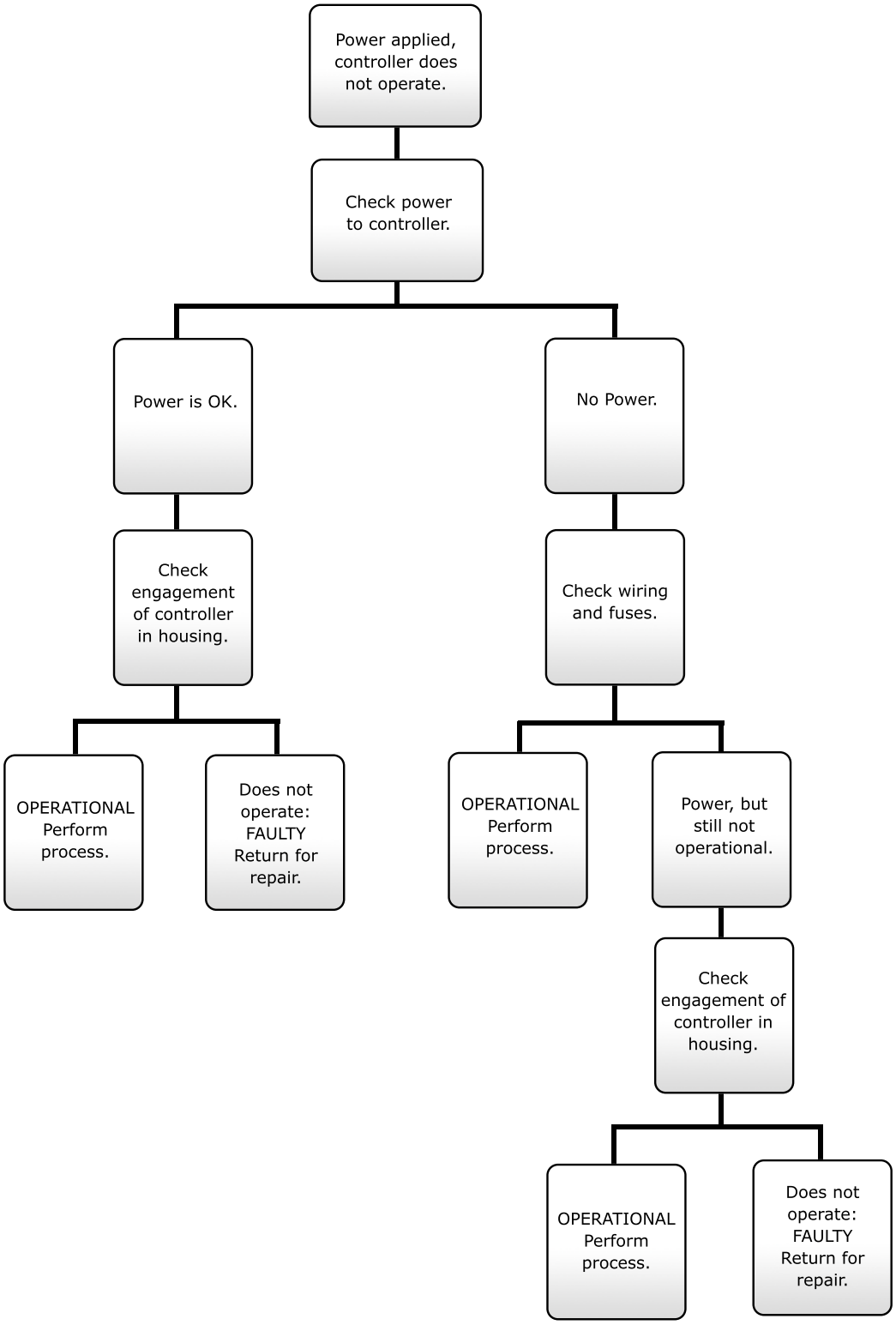
WARNING: Disconnect power when performing maintenance checks and servicing. Failure to disconnect power may cause personal injury or death.

Inspect connectors and cable assemblies for evidence of bent pins, damaged shells, worn or frayed insulation, and oxidation.

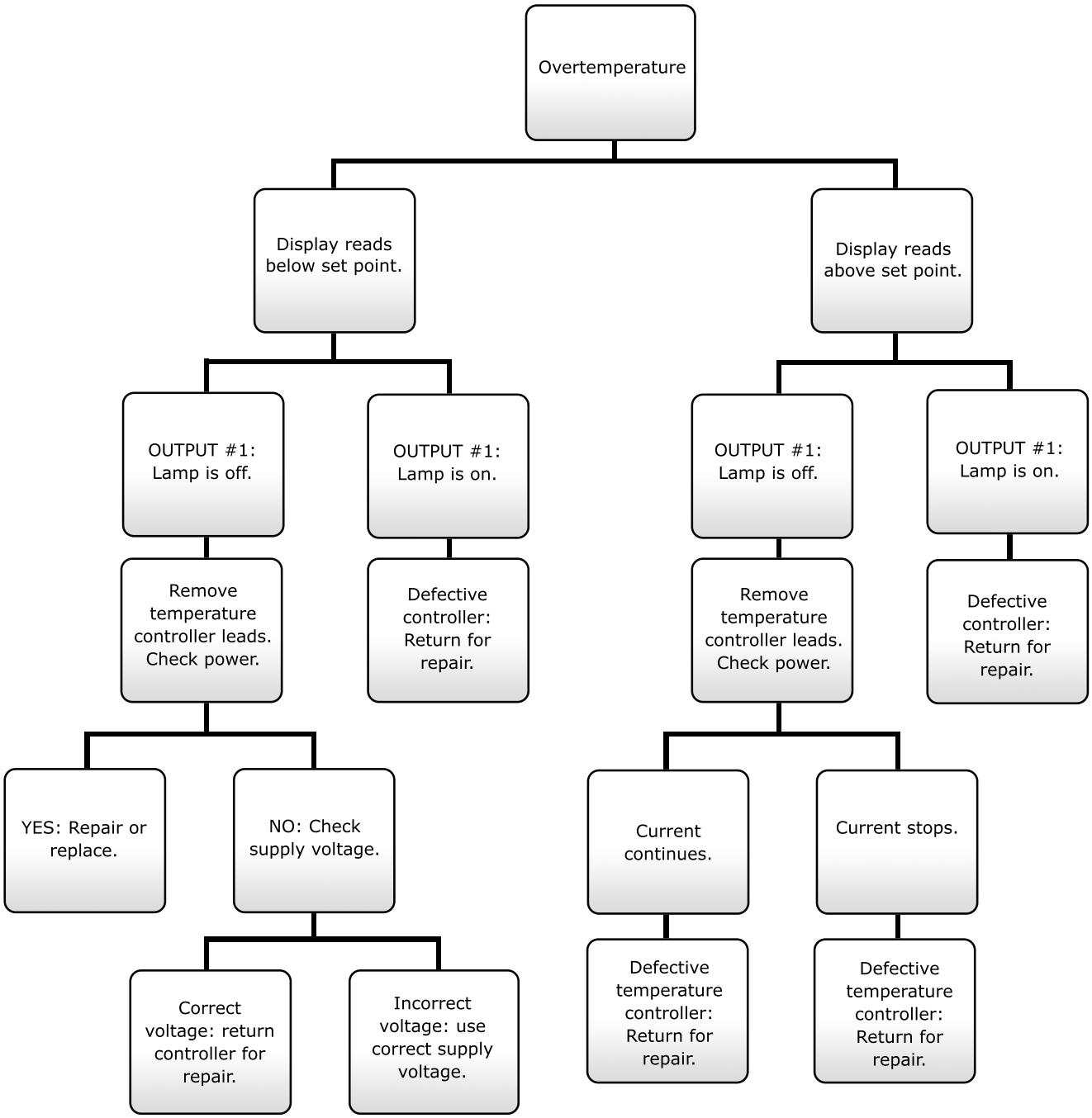
Inspect components for evidence of physical damage and replace. Use only one (1) amp fast-acting fuse (AGC-1).

I. Troubleshooting

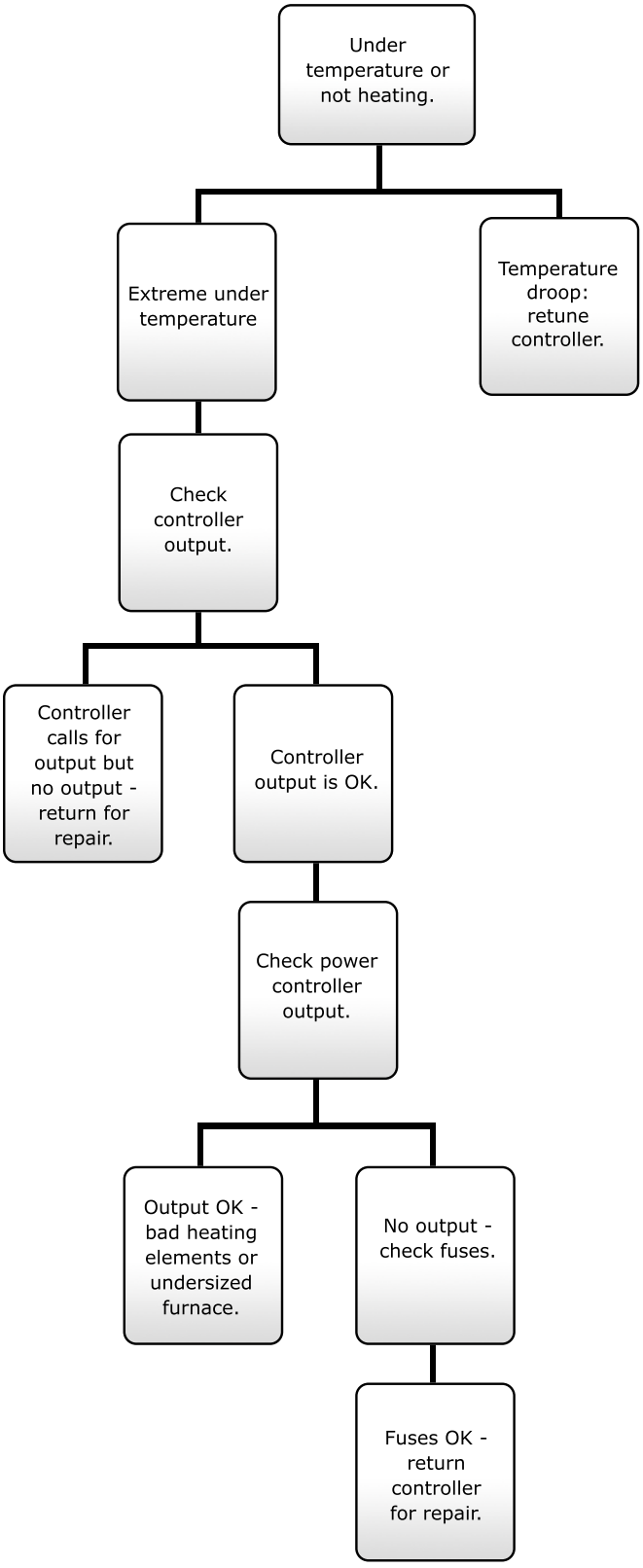
I.1 Controller Does Not Operate



I.2 Over-Temperature



I.3 Under-Temperature



ThermalMax
Insulating Products

SAFETY DATA SHEET

Following Regulation 1910.1200

SDS Number: 102 Date of first issue: 01 December 2019 Date of last revision: 01 December 2019

1 - Identification of product

a - Product identifier used on the label

Tradenames: Armorwool X Board

b - Other means of identification

REFRACTORY CERAMIC FIBER or RCF

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.

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 or blowing of dry product.

d - Name, address, and telephone number

Thermalmax, Inc.
202 East Cherry Street New
Castle, PA 16102 Phone
(724-656-1750

e - Emergency Phone Number

Phone (724) 656-1750
Fax - (724) 656-1759

2 - Hazard 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 GHS category 2 carcinogen.

Hazard Pictograms

Signal Words
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.

Emergency Overview

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 - Composition table

COMPONENTS	CAS Number	% By Weight
Refractories, Fibers, Aluminosilicate Ceramic Mixtures	142844-00-66 6402-684	40 - 100 up to 25%
Silica, Amorphous	7631-86-9	5 - 15
Starch	9005-25-8	4 - 8

b - Common Name

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

Eyes

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

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.

Respiratory Tract

If respiratory tract irritation develops, move the person to a dust free location. See Section 8 for additional measures to reduce or eliminate exposure.

Gastrointestinal

If gastrointestinal tract irritation develops, move the person to a dust free environment.

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

5 - Fire-fighting measures

a - Suitable (and unsuitable) extinguishing media and

Use extinguishing media suitable for type of surrounding fire

c - Special Protective Equipment and Precautions for Firefighters

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

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

None

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.

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.

c - empty containers

Product packaging may contain residue. Do not reuse.

8 - Risk Management Measures / Exposures 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

EXPOSURE GUIDELINES			
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**
Starch	15 mg/m3(total dust);5 mg/m3(respirable dust)	10 mg/m3	NONE
Silica, Amorphous	(80 mg/m3 ÷ % SiO2) or20 mppcf	None Established	NONE

*Except of 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/m^3; Respirable Fraction 5 mg/m^3. The PEL for RCF in California is 0.2 f/cc, 8-hr TWA

** HTIW Coalition has sponsored comprehensive toxicology and epidemiology studies to identify potential RCF-related health effects [see Section 11 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, HTIW Coalition 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.

OTHER OCCUPATIONAL EXPOSURE LEVELS (OEL)
RCF-related occupational exposure limits vary internationally. Regulatory OEL examples include: Canada – 0.2 to 1.0 f/cc; Ontario Canada – 0.5 f/cc. United Kingdom – 1.0 f/cc. Non-regulatory OEL examples include: HTIW Coalition 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.

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

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

PPE - Eye

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

PPE – Respiratory

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/cm^3). Accordingly, N-95 would provide the necessary protection for exposures up to 5 f/cm^3. 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/cm^3, 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) **N**ot resistant to oil, (R) **R**esistant to oil and (P) oil **P**roof. 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-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.

9 - Physical and chemical properties

a - Appearance	Fiber Shapes
b -Odor	Not applicable
c - Odor Threshold	Not applicable
e- pH	Not applicable
d - Melting Point	1760°C (3200°F)
f- Initial Boiling Point/Range	Not applicable
g- Flashpoint	Not applicable
h - Evaporation Rate	Not applicable
i - Flammability	Not applicable
j - Upper/Lower Flammability or Explosive Limits	Not applicable
k - VAPOR PRESSURE	Not applicable
l - VAPOR DENSITY	Not applicable
m - Solubility	Not soluble in water
n - Relative Density	2.50 - 2.75
o - Partition Coefficient: n-Octanol/water	Not applicable
p - Auto-ignition temperature	Not applicable
q - Decomposition Temperature	Not applicable
r - Viscosity	Not applicable

10 - Stability and Reactivity

a - Reactivity
Stable under conditions of normal use.
b - Chemical Stability
This is a stable material.
c - Possibility of Hazardous Reaction
Not applicable.
d - Conditions to Avoid
Please refer to handling and storage advise in Section 7.
e - Incompatible Materials
None
f - Hazardous decomposition products
Oxides of carbon and trace of ammonia may be released from starch during the 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. Initial use of this products shall be in area with sufficient ventilation or air movement

11 - Toxicological information

a - TOXICOKINETICS, METABOLISM AND DISTRIBUTION

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.

b - Acute Toxicity

c - 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 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).

d - Toxicology

- *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.

- G*erm cell mutagenicity/genotoxicity*

  Method: In vitro micro nucleus 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/m^3, 9 mg/m^3 and 16 mg/m^3

  Routes of administration: Nose only inhalation

  Results: Fibrosis just reached significant levels at 16 and 9 mg/m^3 but not at 3 mg/m^3. 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*

  Notapplicable

- *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 among 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

  Numerousstudies 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.

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

a - Ecotoxicity (aquatic and terrestrial, where available)

These products are not reported to have any ecotoxicity effects.

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

Waste Management and Disposal

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

Additional information

This product, as manufactured, is not classified as a listed or characteristic hazardous waste according to U. S. Federal regulations (40 CFR 261). Any processing, use, alteration or chemical additions to the product, as purchased, may alter the disposal requirements. Under U. S. 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

a - UN number.

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

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))

No.

f - Transport in bulk (according to Annex II of MARPOL 73/78 and the IBC Code)

Not regulated.

g - Special precautions which a user needs to be aware of, or needs to comply with, in connection with transport or conveyance either within or outside their premises

Not applicable.

International

INTERNATIONAL
Canadian TDG Hazard Class & PIN: Not regulated
Not classified as dangerous goods under ADR (road), RID (train), IATA (air) or IMDG (ship).

15 - Regulatory information

15.1 - United States Regulations

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 localregulatory agency.

15.2 - International Regulations

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 (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

initial statement

Devitrification

As produced, all RCF fibers are vitreous (glassy) materials which do not contain crystalline silica. Continued exposure to elevated temperatures over time 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 as 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 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 micrograms/cm² - by comparison, pure quartz or cristobalite were significantly active at much lower levels (circa 20 micrograms/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)

TECHNICAL DATA SHEETS

SDS Prepared By: Thermalmax, Inc

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, Thermalmax, Inc. 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.

SAFETY DATA SHEET

SDS No. M0042A **Effective Date: 05/08/2023**

1. IDENTIFICATION

(a) Product identifier used on the label

FIBERFRAX® DURABOARD® LD, Thermfrax® Gemcolite® LD

(b) Other means of identification

Duraboard® LD, Duraboard® LD-RG, Duraboard® LD-HT, Gemcolite® LD

(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

Alkegen
600 Riverwalk Parkway, Suite 120
Tonawanda, NY 14150

For Product Stewardship Information or additional SDSs, visit our web page, http: //www.Alkegen.com or call Alkegen 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

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). WHMIS 2015 Carcinogenicity Category 2.

(b) Signal word, hazard statement(s), symbol(s) and precautionary statement(s)

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 appropriately 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.

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

Components	OSHA PEL	NIOSH REL	ACGIH TLV	MANUFACTURER REG
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/m³ / % SiO2		10 mg/m³	None established
Starch	5 mg/m³ PEL (resp. dust) 15 mg/m³ PEL (total dust)		10 mg/m³	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/m^3; Respirable Fraction 5 mg/m^3.

**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.htiwcoalition.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/cm^3). Accordingly, N-95 would provide the necessary protection for exposures up to 5 f/cm^3. 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/cm^3, 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) **N**ot resistant to oil, (R) **R**esistant to oil and (P) oil **P**roof. 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.htiwcoalition.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 final report of the USA mortality study (LeMasters et al., 2017) concluded that “after 30 years of follow-up, no excess of lung cancers in the mortality study and no significant association with radiographic findings of interstitial fibrosis were found in this group of workers.” The study also found a small incidence of other effects that appear unrelated to RCF exposure. The final mortality report did not change the current hazard classification for RCF.

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.

- G*erm 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/m^3, 9 mg/m^3 and 16 mg/m^3
  Routes of administration: Nose only inhalation
  Results: Fibrosis just reached significant levels at 16 and 9 mg/m^3 but not at 3 mg/m^3. 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

(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

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

(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 needs to comply with, in connection with transport or conveyance either within or outside their premises	Not Applicable

Canadian TDG Hazard Class & PIN: Not regulated

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

15. 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). **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 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

Alkegen has established a program to provide customers with up-to-date information regarding the proper use and handling of refractory ceramic fiber. In addition, Alkegen has also established a program to monitor airborne fiber concentrations at customer facilities. If you would like more information about this program, please call Alkegen Product Stewardship at **716-768-6500**.

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. In 2012, 2017 and 2022, HTIW Coalition renewed this agreement.

This new five-year program, called PSP 2022, continues and builds upon the earlier programs. PSP 2022 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 2022, please visit http://www.htiwcoalition.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:	SDS/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 to Alkegen format.

SDS Prepared By: ALKEGEN PRODUCT STEWARDSHIP

DISCLAIMER

The information presented on this SDS (1) provides details on material identity, manufacturer/supplier information, hazard characterization and prevention, emergency response and other specialized information, (2) is considered to be accurate to the best of our knowledge, information and good faith belief as of the date of publication, (3) is designed only as a guide for safe handling, use, processing, storage, transportation, disposal and release of the material named, (4) should be read and used in conjunction with the company's relevant literature, (5) relates only to the specific material designated and may not be valid for such material used in combination with any other material or process and (6) is provided without warranty, expressed or implied, in law or in fact, of merchantability or fitness for a particular purpose. This document does not constitute a product specification and should not be relied on as such. 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.

Safety Data Sheet

according to 1907/2006/EC (REACH), 1272/2008/EC (CLP), and OSHA GHS

Printing date 15.06.2015 Revision: 15.06.2015

SECTION 1: Identification of the substance/mixture and of the company/ undertaking

· **1.1 Product identifier**

· **Trade name: EA1043, EA162, EA198, GA287, MA1099, MA1100, MA176, PA748, RA206, RA207**

· **Article number:** EA1043, EA162, EA198, GA287, MA1099, MA1100, MA176, PA748, RA206, RA207

· **1.2 Relevant identified uses of the substance or mixture and uses advised against**
No further relevant information available.

· **Application of the substance / the mixture** Alumina Cement

· **1.3 Details of the supplier of the Safety Data Sheet**

· **Manufacturer/Supplier:**
Saint-Gobain
1 New Bond Street
Worcester, MA 01609
(508) 795-5000

· **1.4 Emergency telephone number:** (508) 795-5000

SECTION 2: Hazards identification

· **2.1 Classification of the substance or mixture**

· **Classification according to Regulation (EC) No 1272/2008**
The product is not classified as hazardous according to OSHA GHS regulations within the United States.
The product is not classified as hazardous according to the CLP regulation.

· **Additional information:**
There are no other hazards not otherwise classified that have been identified.
0 % of the mixture consists of component(s) of unknown toxicity.

· **2.2 Label elements**

· **Labelling according to Regulation (EC) No 1272/2008**
This product does not have a classification according to the CLP regulation.
The product is not classified as hazardous according to OSHA GHS regulations within the United States.

· **Hazard pictograms** Not Regulated

· **Signal word** Not Regulated

· **Hazard-determining components of labelling:** None.

· **Hazard statements** Not Regulated

· **Precautionary statements** Not Regulated

· **Additional information:**
EUH210 Safety data sheet available on request.

· **Hazard description:**

· **WHMIS-symbols:** Not hazardous under WHMIS.

(Contd. on page 2)

Safety Data Sheet

according to 1907/2006/EC (REACH), 1272/2008/EC (CLP), and OSHA GHS

Printing date 15.06.2015 Revision: 15.06.2015

Trade name: EA1043, EA162, EA198, GA287, MA1099, MA1100, MA176, PA748, RA206, RA207

(Contd. of page 1)

· **NFPA ratings (scale 0 - 4)**

Health = 0
Fire = 0
Reactivity = 0

· **HMIS-ratings (scale 0 - 4)**

Health = 0
Fire = 0
Reactivity = 0

· **HMIS Long Term Health Hazard Substances**
None of the ingredients are listed.

· **2.3 Other hazards**
· **Results of PBT and vPvB assessment**
· **PBT:** Not applicable.
· **vPvB:** Not applicable.

SECTION 3: Composition/information on ingredients

· **3.2 Mixtures**
· **Description:** Mixture of substances listed below with nonhazardous additions.

· **Dangerous components:**

CAS: 1344-28-1 EINECS: 215-691-6	aluminium oxide	substance with a Community workplace exposure limit	80-90%

· **Additional information:**
For the listed ingredients, the identity and exact percentages are being withheld as a trade secret.

SECTION 4: First aid measures

· **4.1 Description of first aid measures**
· **General information:** No special measures required.
· **After inhalation:** Supply fresh air; consult doctor in case of complaints.
· **After skin contact:**
Brush off loose particles from skin.
Immediately rinse with water.
If skin irritation is experienced, consult a doctor.
· **After eye contact:**
Protect unharmed eye.
Remove contact lenses if worn, if possible.
Rinse opened eye for several minutes under running water. If symptoms persist, consult a doctor.
· **After swallowing:**
Rinse out mouth and then drink plenty of water.
Do not induce vomiting; call for medical help immediately.

(Contd. on page 3)

Safety Data Sheet

according to 1907/2006/EC (REACH), 1272/2008/EC (CLP), and OSHA GHS

Printing date 15.06.2015 Revision: 15.06.2015

Trade name: EA1043, EA162, EA198, GA287, MA1099, MA1100, MA176, PA748, RA206, RA207

(Contd. of page 2)

· **4.2 Most important symptoms and effects, both acute and delayed**
Breathing difficulty
Coughing
· **Hazards** No further relevant information available.
· **4.3 Indication of any immediate medical attention and special treatment needed**
No further relevant information available.

SECTION 5: Firefighting measures

· **5.1 Extinguishing media**
· **Suitable extinguishing agents:**
The product is not flammable.
Use fire extinguishing methods suitable to surrounding conditions.
· **For safety reasons unsuitable extinguishing agents:** None.
· **5.2 Special hazards arising from the substance or mixture** No further relevant information available.
· **5.3 Advice for firefighters**
· **Protective equipment:**
Wear self-contained respiratory protective device.
Wear fully protective suit.
· **Additional information** No further relevant information available.

SECTION 6: Accidental release measures

· **6.1 Personal precautions, protective equipment and emergency procedures**
Ensure adequate ventilation
Do not breathe dust.
Avoid formation of dust.
For large spills, use respiratory protective device against the effects of fumes/dust/aerosol.
· **6.2 Environmental precautions:** Avoid release to the environment.
· **6.3 Methods and material for containment and cleaning up:**
Pick up mechanically.
Dispose of the material collected according to regulations.
Send for recovery or disposal in suitable receptacles.
· **6.4 Reference to other sections**
See Section 7 for information on safe handling.
See Section 8 for information on personal protection equipment.
See Section 13 for disposal information.

SECTION 7: Handling and storage

· **7.1 Precautions for safe handling**
Use only in well ventilated areas.
Prevent formation of dust.
Any unavoidable deposit of dust must be regularly removed.
· **Information about fire - and explosion protection:** No special measures required.

(Contd. on page 4)

Safety Data Sheet
according to 1907/2006/EC (REACH), 1272/2008/EC (CLP), and OSHA GHS

Printing date 15.06.2015 Revision: 15.06.2015

Trade name: EA1043, EA162, EA198, GA287, MA1099, MA1100, MA176, PA748, RA206, RA207

(Contd. of page 3)

· **7.2 Conditions for safe storage, including any incompatibilities**
· **Storage:**
· **Requirements to be met by storerooms and receptacles:** Store in a cool location.
· **Information about storage in one common storage facility:**
Store away from foodstuffs.
Store away from oxidising agents.
· **Further information about storage conditions:** Keep container tightly sealed.
· **7.3 Specific end use(s)** No further relevant information available.

SECTION 8: Exposure controls/personal protection

· **Additional information about design of technical facilities:** No further data; see section 7.

· **8.1 Control parameters**

· **Ingredients with limit values that require monitoring at the workplace:**	
1344-28-1 aluminium oxide	
PEL (USA)	Long-term value: 15*; 15** mg/m³ *Total dust; ** Respirable fraction
REL (USA)	Long-term value: 10* 5** mg/m³ as Al*Total dust**Respirable/pyro powd./welding f.
TLV (USA)	Long-term value: 1* mg/m³ as Al; *as respirable fraction
EL (Canada)	Long-term value: 1,0 mg/m³ respirable, as Al
EV (Canada)	Long-term value: 10 mg/m³ total dust

· **DNELs** No further relevant information available.
· **PNECs** No further relevant information available.
· **Additional information:** The lists valid during the making were used as basis.

· **8.2 Exposure controls**
· **Personal protective equipment:**
· **General protective and hygienic measures:**
The usual precautionary measures are to be adhered to when handling chemicals.
Keep away from foodstuffs, beverages and feed.
Avoid breathing dust.
Avoid contact with the eyes.
Avoid close or long term contact with the skin.
· **Respiratory protection:**
Wear appropriate NIOSH respirator when ventilation is inadequate and occupational exposure limits are exceeded.
Use suitable respiratory protective device in case of insufficient ventilation.
For large spills, respiratory protection may be advisable.
Particulate mask should filter at least 99% of airborne particles.
· **Protection of hands:**
Wear gloves for the protection against mechanical hazards according to NIOSH or EN 388.

(Contd. on page 5)

Safety Data Sheet

according to 1907/2006/EC (REACH), 1272/2008/EC (CLP), and OSHA GHS

Printing date 15.06.2015 Revision: 15.06.2015

Trade name: EA1043, EA162, EA198, GA287, MA1099, MA1100, MA176, PA748, RA206, RA207

(Contd. of page 4)

· **Eye protection:**

Safety glasses

· **Body protection:** Not required under normal conditions of use.
· **Limitation and supervision of exposure into the environment** Avoid release to the environment.
· **Risk management measures** See Section 7 for additional information.

SECTION 9: Physical and chemical properties

· **9.1 Information on basic physical and chemical properties**
· **General Information**
· **Appearance:**

Form:	Granulate
Colour:	White
· **Odour:**	Odourless
· **Odour threshold:**	Not determined.
· **pH-value:**	Not applicable.
· **Change in condition**	
Melting point/Melting range:	1950 °C (3542 °F)
Boiling point/Boiling range:	Undetermined.
· **Flash point:**	Not applicable.
· **Flammability (solid, gaseous):**	Not determined.
· **Auto/Self-ignition temperature:**	Not determined.
· **Decomposition temperature:**	Not determined.
· **Self-igniting:**	Product is not self-igniting.
· **Danger of explosion:**	Product does not present an explosion hazard.
· **Explosion limits:**	
Lower:	Not determined.
Upper:	Not determined.
· **Vapour pressure:**	Not applicable.
· **Density:**	Not determined.
· **Relative density**	Not determined.
· **Vapour density**	Not applicable.
· **Evaporation rate**	Not applicable.
· **Solubility in / Miscibility with water:**	Insoluble.
· **Partition coefficient (n-octanol/water):**	Not determined.

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· **Viscosity:**
Dynamic: Not applicable.
Kinematic: Not applicable.
· **9.2 Other information** No further relevant information available.

SECTION 10: Stability and reactivity

· **10.1 Reactivity**
· **10.2 Chemical stability**
· **Thermal decomposition / conditions to be avoided:**
No decomposition if used and stored according to specifications.
· **10.3 Possibility of hazardous reactions**
Reacts with strong acids and alkali.
As the product is supplied it is not capable of dust explosion; however enrichment with fine dust causes risk of dust explosion.
· **10.4 Conditions to avoid** Moisture.
· **10.5 Incompatible materials:** No further relevant information available.
· **10.6 Hazardous decomposition products:**
Possible in traces:
Toxic metal oxide smoke

SECTION 11: Toxicological information

· **11.1 Information on toxicological effects**
· **Acute toxicity**
· **LD/LC50 values relevant for classification:** None.
· **Primary irritant effect:**
· **Skin corrosion/irritation** No irritant effect.
· **Serious eye damage/irritation** No irritating effect.
· **Respiratory or skin sensitisation** No sensitising effects known.
· **Subacute to chronic toxicity:** No further relevant information available.
· **Additional toxicological information:**
The product is not subject to classification according to the calculation method of the General EU Classification Guidelines for Preparations as issued in the latest version.
When used and handled according to specifications, the product does not have any harmful effects to our experience and the information provided to us.
0 % of the mixture consists of component(s) of unknown toxicity.
· **Repeated dose toxicity:** No further relevant information available.
· **CMR effects (carcinogenity, mutagenicity and toxicity for reproduction):**
· **Germ cell mutagenicity** Based on available data, the classification criteria are not met.
· **Carcinogenicity** Based on available data, the classification criteria are not met.
· **Reproductive toxicity** Based on available data, the classification criteria are not met.
· **STOT-single exposure** Based on available data, the classification criteria are not met.
· **STOT-repeated exposure** Based on available data, the classification criteria are not met.

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· **Aspiration hazard** Based on available data, the classification criteria are not met.

SECTION 12: Ecological information

· **12.1 Toxicity**
· **Aquatic toxicity:** No further relevant information available.
· **12.2 Persistence and degradability** No further relevant information available.
· **12.3 Bioaccumulative potential** No further relevant information available.
· **12.4 Mobility in soil** No further relevant information available.
· **Additional ecological information:**
· **General notes:** Generally not hazardous for water
· **12.5 Results of PBT and vPvB assessment**
· **PBT:** Not applicable.
· **vPvB:** Not applicable.
· **12.6 Other adverse effects** No further relevant information available.

SECTION 13: Disposal considerations

· **13.1 Waste treatment methods**
· **Recommendation**
Smaller quantities can be disposed of with household waste.
The user of this material has the responsibility to dispose of unused material, residues and containers in compliance with all relevant local, state and federal laws and regulations regarding treatment, storage and disposal for hazardous and nonhazardous wastes.

· **Uncleaned packaging:**
· **Recommendation:** Disposal must be made according to local official regulations.

SECTION 14: Transport information

· **14.1 UN-Number**
· **DOT, ADR, ADN, IMDG, IATA** Not Regulated
· **14.2 UN proper shipping name**
· **DOT, ADR, ADN, IMDG, IATA** Not Regulated
· **14.3 Transport hazard class(es)**

· **DOT, ADR, ADN, IMDG, IATA**
· **Class** Not Regulated
· **14.4 Packing group**
· **DOT, ADR, IMDG, IATA** Not Regulated
· **14.5 Environmental hazards:**
· **Marine pollutant:** No
· **14.6 Special precautions for user** Not applicable.
· **14.7 Transport in bulk according to Annex II of MARPOL73/78 and the IBC Code** Not applicable.

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· **UN "Model Regulation":** -

SECTION 15: Regulatory information

· **15.1 Safety, health and environmental regulations/legislation specific for the substance or mixture**
· **United States (USA)**
· **SARA**

· **Section 355 (extremely hazardous substances):**
None of the ingredients are listed.

· **Section 313 (Specific toxic chemical listings):**

1344-28-1	aluminium oxide

· **TSCA (Toxic Substances Control Act):**
All ingredients are listed.

· **Proposition 65 (California):**

· **Chemicals known to cause cancer:**
None of the ingredients is listed.

· **Chemicals known to cause reproductive toxicity for females:**
None of the ingredients are listed.

· **Chemicals known to cause reproductive toxicity for males:**
None of the ingredients are listed.

· **Chemicals known to cause developmental toxicity:**
None of the ingredients are listed.

· **Carcinogenic Categories**

· **EPA (Environmental Protection Agency)**
None of the ingredients are listed.

· **IARC (International Agency for Research on Cancer)**
None of the ingredients are listed.

· **TLV (Threshold Limit Value established by ACGIH)**

1344-28-1	aluminium oxide	A4

· **NIOSH-Ca (National Institute for Occupational Safety and Health)**
None of the ingredients are listed.

· **Canada**

· **Canadian Domestic Substances List (DSL)**
All ingredients are listed.

· **Canadian Ingredient Disclosure list (limit 0.1%)**
None of the ingredients are listed.

· **Canadian Ingredient Disclosure list (limit 1%)**

1344-28-1	aluminium oxide

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· **Other regulations, limitations and prohibitive regulations**
This product has been classified in accordance with hazard criteria of the Controlled Products Regulations and the SDS contains all the information required by the Controlled Products Regulations.

· **Substances of very high concern (SVHC) according to REACH, Article 57**

None of the ingredients are listed.

· **15.2 Chemical safety assessment:** A Chemical Safety Assessment has not been carried out.

SECTION 16: Other information

This information is based on our present knowledge. However, this shall not constitute a guarantee for any specific product features and shall not establish a legally valid contractual relationship.

· **Abbreviations and acronyms:**
ADR: Accord européen sur le transport des marchandises dangereuses par Route (European Agreement concerning the International Carriage of Dangerous Goods by Road)
IMDG: International Maritime Code for Dangerous Goods
DOT: US Department of Transportation
IATA: International Air Transport Association
GHS: Globally Harmonised System of Classification and Labelling of Chemicals
ACGIH: American Conference of Governmental Industrial Hygienists
EINECS: European Inventory of Existing Commercial Chemical Substances
ELINCS: European List of Notified Chemical Substances
CAS: Chemical Abstracts Service (division of the American Chemical Society)
NFPA: National Fire Protection Association (USA)
HMIS: Hazardous Materials Identification System (USA)
WHMIS: Workplace Hazardous Materials Information System (Canada)
DNEL: Derived No-Effect Level (REACH)
PNEC: Predicted No-Effect Concentration (REACH)
LC50: Lethal concentration, 50 percent
LD50: Lethal dose, 50 percent

· **Sources**
SDS Prepared by:
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1305 North Florida Avenue
Tampa, Florida USA 33602-2902
Toll Free North America 1-888-255-3924 Intl. +01 813-248-0573
Website: www.chemtelinc.com

APPENDIX B: Warranty

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. Load cells are covered for manufactured defects only - incidents of over load or other customer misuse are not covered under warranty. 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.

APPENDIX C: Image Glossary