

FURNACE

Model Number: 31XX, 32XX



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

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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.

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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 than 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

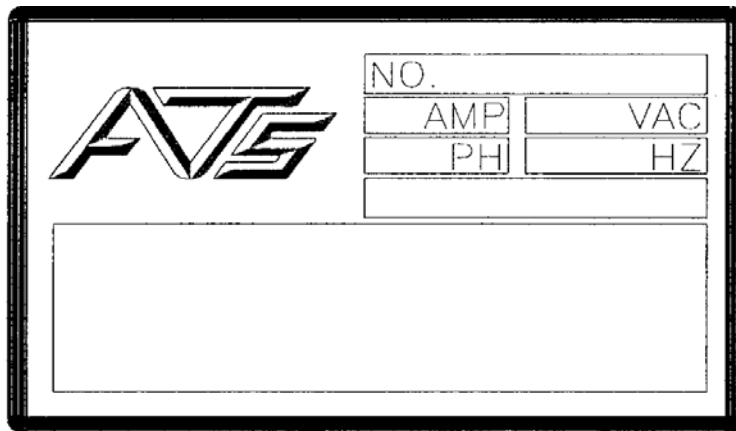
B.1 Unpacking

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.



The image shows a rectangular data tag template with a thick black border. On the left side, there is a stylized logo for 'ATS'. To the right of the logo is a table with four rows and two columns. The first row is labeled 'NO.' and has a single large box. The second row has 'AMP' in the left column and 'VAC' in the right column. The third row has 'PH' in the left column and 'HZ' in the right column. The fourth row is empty. Below the table is a large empty rectangular box for additional information.

NO.	
AMP	VAC
PH	HZ

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

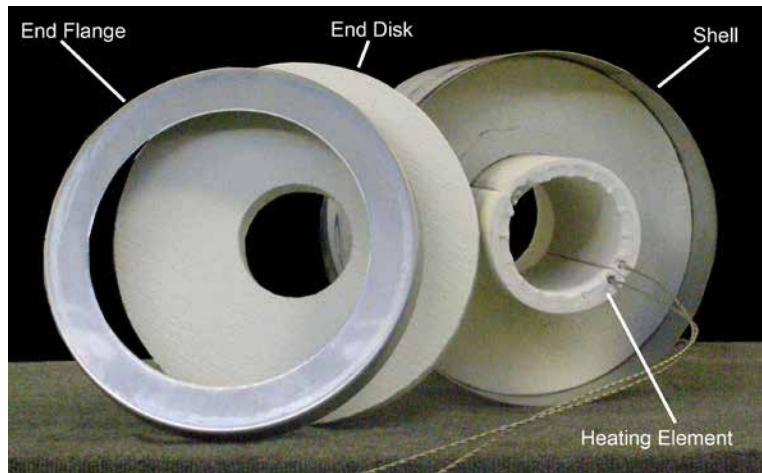


Figure G.1 - Series 3110 Furnace Disassembly

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

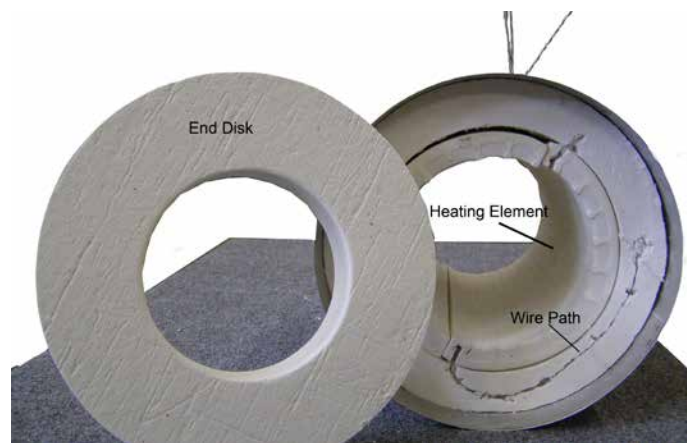


Figure G.2 - End View of ATS Series 3110 Tube Furnace

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

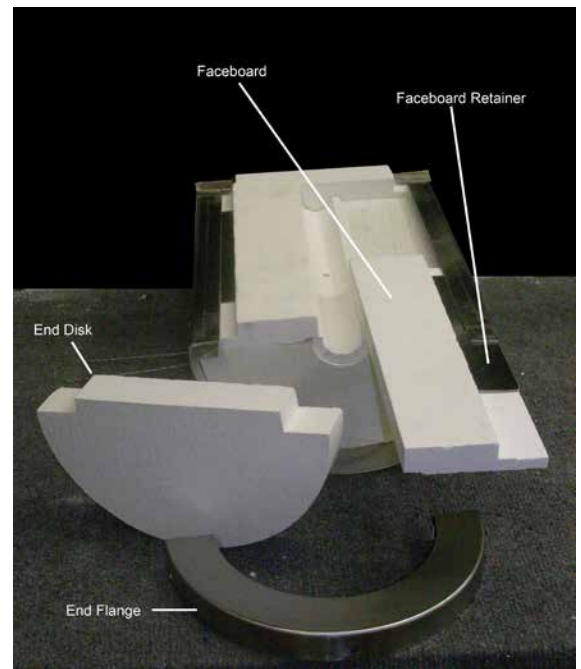


Figure G.3 - Series 3210 Furnace

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.

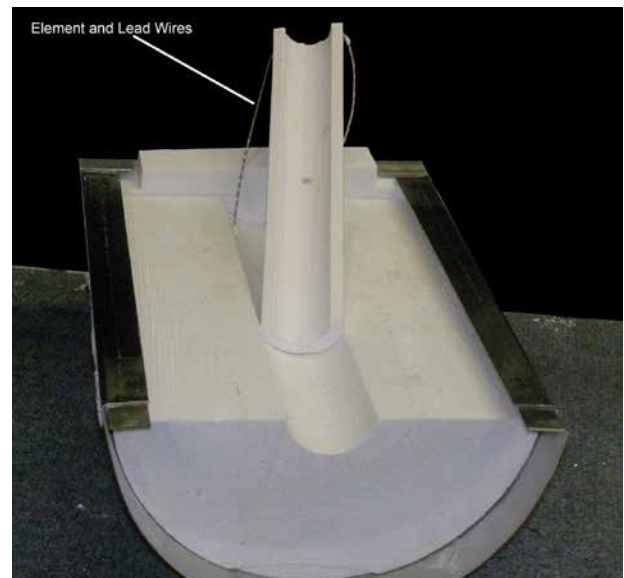


Figure G.4 - Safe Distance Between Lead Wires

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.

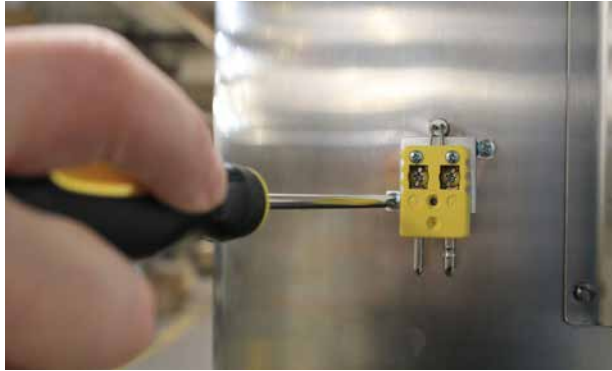


Figure G.5 - Thermocouple Bracket

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.



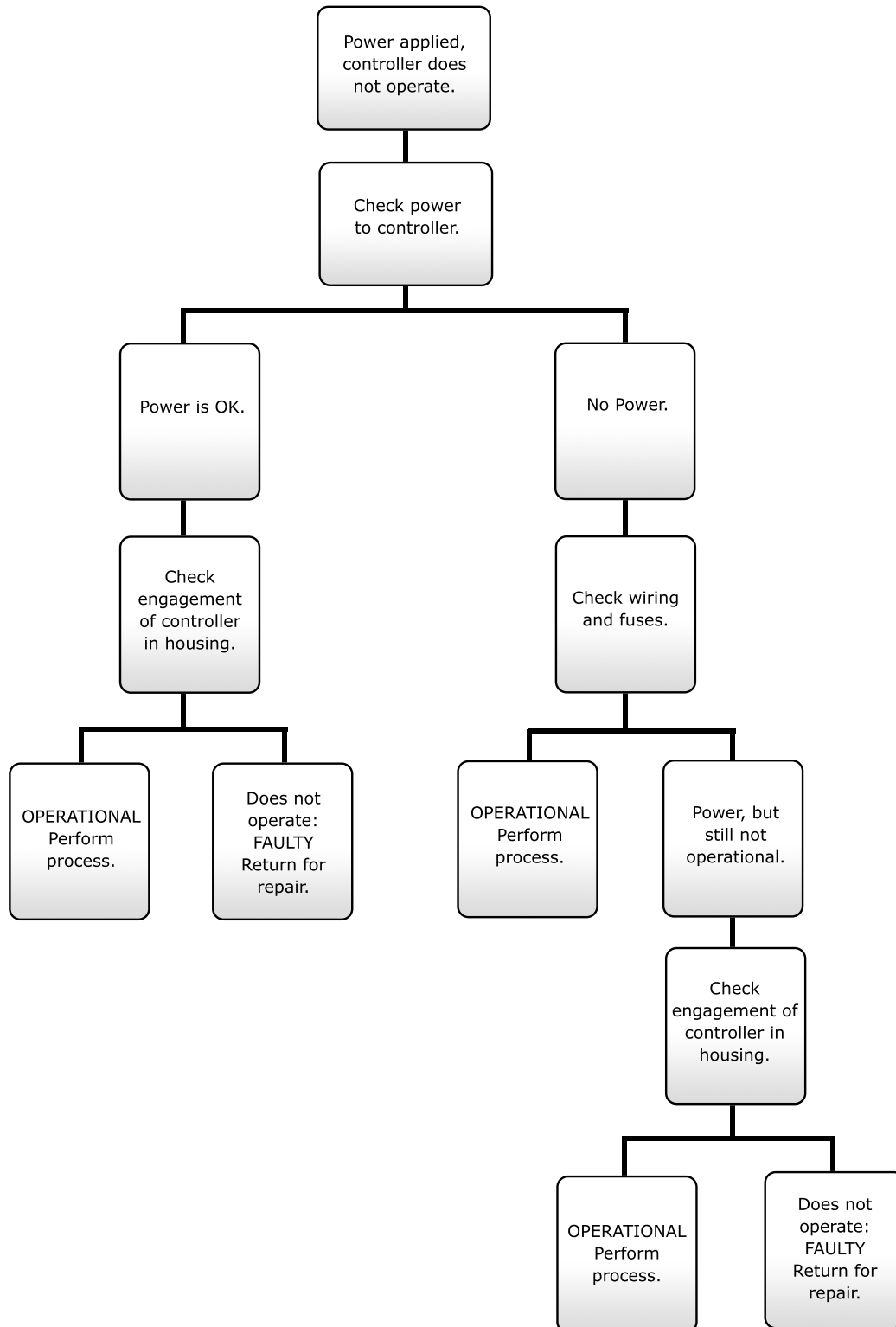
WARNING: Disconnect power when performing maintenance checks and servicing. Failure to disconnect power may cause personal injury or death.

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

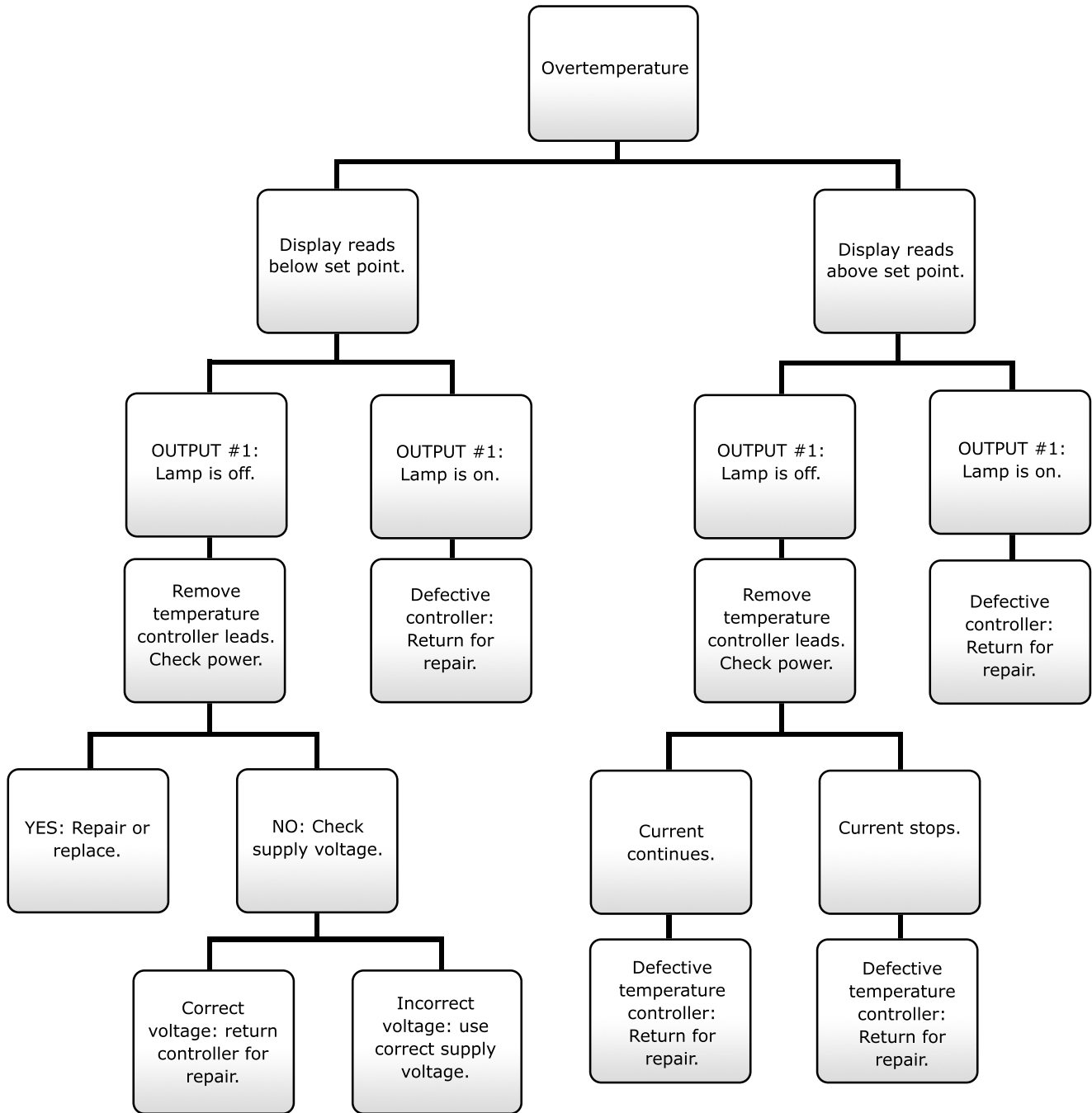
Inspect components for evidence of physical damage and replace. Use only one (1) amp fast-acting fuse (AGC-1).

I. Troubleshooting

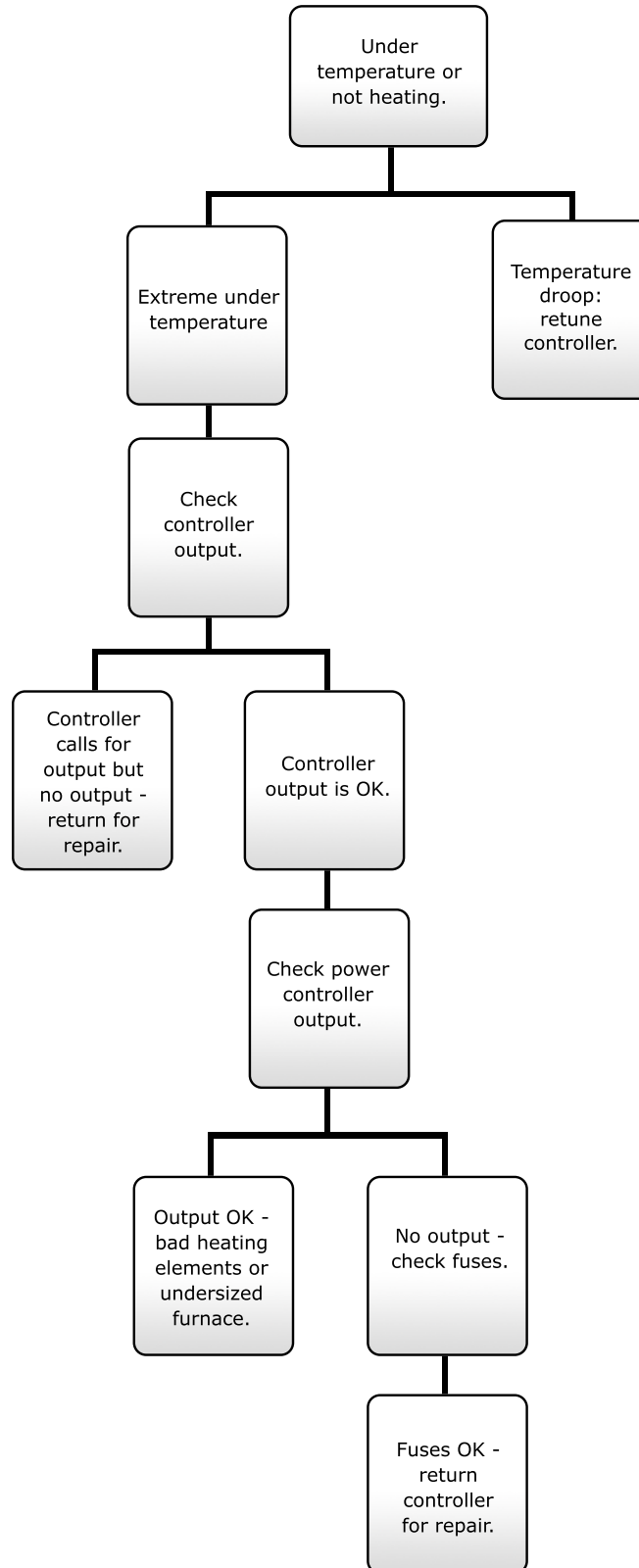
I.1 Controller Does Not Operate



I.2 Over-Temperature



I.3 Under-Temperature



APPENDIX A: Safety Data Sheet Information



SAFETY DATA SHEET

SDS No. M0370

Effective Date: 10/07/2014

1. IDENTIFICATION

- (a) **Product identifier used on the label** **ISOFRAX® 1260C BOARD LD**
- (b) **Other means of identification** **ALKALINE EARTH SILICATE WOOL (AES)**, Synthetic vitreous fiber (SVF), man-made vitreous fiber (MMVF), man-made mineral fiber (MMMF), alkaline-earth-silicate fiber, magnesium silicate fiber, high temperature insulation wool (HTIW)
- (c) **Recommended use of the chemical and restrictions on use** Application as thermal insulation, heat shields, heat containment, gaskets and expansion joints in industrial furnaces, ovens, kilns, boilers and other process equipment and in the aerospace, automotive and appliance industries, and as passive fire protection systems and firestops. (Please refer to specific technical data sheet for more information).
- (d) **Name, address, and telephone number** **Unifrax I LLC**
600 Riverwalk Parkway, Suite 120
Tonawanda, NY 14150
- Product Stewardship Information Hotline**
1-800-322-2293 (Monday - Friday 8:00 a.m. - 4:30 p.m. EST)
- For additional SDSs, visit our web page, <http://www.unifrax.com>, or call Unifrax Customer Service at (716) 768-6500**
- (e) **Emergency phone number** CHEMTREC will provide assistance for chemical emergencies. Call **1-800-424-9300**

2. HAZARDS IDENTIFICATION

- (a) **Classification of the chemical in accordance with paragraph (d) of §1910.1200**
- AES wools are not classified following self-classification guidelines of the OSHA Hazard Communication Standard (HCS) 2012. The assessment of all available toxicological data on AES during the classification process resulted in a "no classification" conclusion.
- (b) **Signal word, hazard statement(s), symbol(s) and precautionary statement(s) in accordance with paragraph (f) of §1910.1200**
- Not applicable.
- (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. Minimize exposure to airborne dust.
- (d) **Mixture rule not applicable**

3. COMPOSITION / INFORMATION ON INGREDIENTS

(a) Chemical and (b) Common Name	(c) CAS Number	% BY WEIGHT
Amorphous alkaline-earth-silicate (magnesium-silicate) wool (SiO ₂ 70-80 %, MgO 18-27 %, trace elements 0-4%)	436083-99-7	80-90
Silica (amorphous)	7631-86-9	10-15
Starch	56780-58-6	3-7

(See Section 8 "Exposure Controls / Personal Protection" for exposure guidelines)

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 and

(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. Use extinguishing agent suitable for surrounding combustible materials.

(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 HEPA filtered 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.

EMPTY CONTAINERS

Product packaging may contain residue. Do not reuse.

8. EXPOSURE CONTROL / 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	ACGIH TLV	MANUFACTURER
Amorphous alkaline-earth-silicate (magnesium-silicate) wool	See below*	Particulates Not Otherwise Classified (PNOC) : Inhalable particulate -- 10 mg/m ³ . Respirable particulate -- 3 mg/m ³	See below**
Silica (amorphous)	6 mg/m ³ (< 1% crystalline silica)		None Established
Starch	5 mg/m ³ PEL (resp. dust) 15 mg/m ³ (total dust)	10 mg/m ³ (total Dust, containing < 1% crystalline silica), 3 mg/m ³ (respirable dust, containing < 1% crystalline silica). 10 mg/m ³ TLV (total dust)	None Established

*There is no specific regulatory standard for ISOFRAX® in the U.S. OSHA's "Particulate Not Otherwise Regulated (PNOR)" standard [29 CFR 1910.1000, Subpart Z, Air Contaminants] applies generally; Total Dust 15 mg/m³; Respirable Fraction 5 mg/m³.

** As with most industrial materials, it is prudent to minimize unnecessary exposure to respirable dusts. Note that Industrial hygiene standards and occupational exposure limits differ between countries and local jurisdictions. Check with your employer to identify any "respirable dust", "total dust" or "fiber" exposure standards to follow in your area. If no regulatory dust or fiber control standard apply, a qualified industrial hygiene professional can assist with a specific evaluation of workplace conditions and the identification of appropriate respiratory protection practices. In the absence of other guidance, the supplier has found that it is generally feasible to control occupational fiber exposure to 1 f/cc or less.

(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 gloves, head coverings and full body clothing 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, employers should ensure employees are thoroughly trained on the best practices to minimize non-work dust exposure (e.g., vacuum clothes before leaving the work area, wash work clothing separately, rinse washer before washing other household clothes, etc.).

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 applicable level, 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 particulates. Selection of filter efficiency (i.e. 95%, 99% or 99.97%) depends on how much filter leakage can be accepted and the concentration of airborne contaminants. Other factors to consider are the NIOSH filter series N, R or P. (N) Not resistant to oil, (R) Resistant to oil and (P) oil Proof. These recommendations are not designed to limit informed choices, provided that respiratory protection decisions comply with 29 CFR 1910.134.

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

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	2.60
(e) Melting point	1500-1550°C (2730-2820°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	AES is non-reactive.
(b) Chemical stability	As supplied AES 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	

11. TOXICOLOGICAL INFORMATION

(a) through (d)

Toxicological Data/Epidemiology Data

EPIDEMIOLOGY

This product has not been the subject of epidemiological study. Epidemiological studies related to other fiber chemistries of similar solubility have not identified a statistically significant incidence of exposure-related respiratory disease.

TOXICOLOGY

This product has been the subject of limited testing.

A review of available scientific literature suggests an inverse relationship between dissolution rate and potential health effects; i.e. the higher the dissolution rate of a fiber the lower its potential to produce health effects. The dissolution rate of ISOFRAX® fiber has been determined through standardized *in vitro* testing. The dissolution rate of ISOFRAX® fibers is higher than that of other fiber types that have been tested in chronic animal studies and did not produce respiratory disease.

This product possesses a fiber chemistry within the regulatory (European Commission Directive 97/69/EC) definition as a "man-made vitreous (silicate) fiber with random orientation with alkaline oxide and alkaline earth oxide (Na₂O + K₂O + CaO + MgO + BaO) content greater than 18% by weight". ISOFRAX® fibers have been tested pursuant to EU protocol ECB/TM/26, rev. 7, Nota Q, Directive 97/69/EC. The results for the short term biopersistence test by inhalation (IH test) was 6 days; well below the regulatory threshold of 10 days cited in Directive 97/69/EC. Based on testing results, ISOFRAX® based products are not regarded as potential carcinogens and they ARE EXEMPT from European classification as such. By virtue of these test results, these products ARE EXEMPT from European regulatory guidelines that require hazard warning labels with specific risk phrases citing respiratory disease potential. In addition, ISOFRAX® fibers have been tested in an independent laboratory, by intratracheal (IT test) instillation, under a protocol that was consistent with the requirements of the German Hazardous Substances Ordinance (BGBI. I pp. 1782, 2049, Third Amendment, Appendix V, No. 7). The half-life clearance of Isofrax® fibers was 32.7 days; well below the applicable regulatory thresholds. Based on the IT test results, Isofrax products ARE EXEMPT from the requirements of the German Ordinance.

The definition of "irritant" contained in the hazard communication standard, 29 CFR 1900.1200, Appendix A, is "...a reversible inflammatory effect on living tissue by chemical action...". ISOFRAX® fiber is an inert material which doesn't interact chemically with exposed skin. However, there is a possibility that exposure to this product may cause temporary mechanical irritation to the eyes, skin or respiratory tract (nose, throat, lungs). This temporary irritation can be mitigated with proper handling practices designed to limit exposure and the use of protective clothing (glasses, gloves, clothing).

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

This product has not been specifically evaluated by any regulatory authority or other classification entity, such as the International Agency for Research on Cancer (IARC) or the National Toxicology Program (NTP).

12. ECOLOGICAL INFORMATION

<p>(a) Ecotoxicity (aquatic and terrestrial, where available)</p> <p>(b) Persistence and degradability</p> <p>(c) Bioaccumulative potential</p> <p>(d) Mobility in soil</p> <p>(e) Other adverse effects (such as hazardous to the ozone layer)</p>	<p>No known aquatic toxicity.</p> <p>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.</p> <p>No bioaccumulative potential.</p> <p>No mobility in soil.</p> <p>No adverse effects of this material on the environment are anticipated.</p>
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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

ISOFRAX® fiber, 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.

EUROPEAN UNION

Waste from this product is not classified as "hazardous" or "special" under European Union regulations. Disposal is permitted at landfills licensed for industrial waste.

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).
Toxic Substances Control Act (TSCA) - All substances in this product are listed, as required, on the TSCA inventory.
Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) and the **Clean Air Act (CAA)** - ISOFRAX® 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.
- States:** ISOFRAX® products are not known to be regulated. However, state and local OSHA and EPA regulations may apply to these products. If in doubt, contact your local regulatory agency.

INTERNATIONAL REGULATIONS

- Canada:** **Canadian Workplace Hazardous Materials Information System (WHMIS):**
No Canadian Workplace Hazardous Materials Information System (WHMIS) categories apply to this product.
Canadian Environmental Protection Act (CEPA) - All substances in this product are listed, as required, on the Domestic Substance List (DSL)
- European Union:** **European Directive 97/69/EC** - By virtue of testing results, ISOFRAX® fiber has been exempted from classification and labeling as a potential carcinogen.

16. OTHER INFORMATION

After-Service ISOFRAX® Thermal Insulation: Removal

As produced, Isofrax fibers are vitreous (glassy) materials, which upon continued exposure to elevated temperatures (above about 800°C) might devitrify, initially forming magnesia-bearing phases (enstatite). At higher temperatures, (above about 1000°C) crystalline phase silicas may occur. The occurrence and extent of crystalline phase formation is dependent on the duration and temperature of exposure, fiber chemistry and/or the presence of fluxing agents. The presence of crystalline phases can be confirmed only through laboratory analysis of the "hot-face" fiber.

IARC's evaluation of crystalline silica states "Crystalline silica inhaled in the form of quartz or cristobalite from occupational sources is carcinogenic to humans (Group 1)" and additionally notes "carcinogenicity in humans was not detected in all industrial circumstances studied" (IARC Monograph Vol. 68, 1997). NTP lists all polymorphs of crystalline silica amongst substances which may "reasonably be anticipated to be carcinogens".

During removal operations, the use of a full face respirator is recommended to reduce inhalation exposure along with eye & respiratory tract irritation. A specific evaluation of workplace hazards and the identification of appropriate respiratory protection is best performed, on a case by case basis, by a qualified industrial hygiene professional. For more detailed information regarding respirable crystalline silica, call the Product Stewardship Information Hotline (see below).

PRODUCT STEWARDSHIP PROGRAM

Unifrax has established a program to provide customers with up-to-date information regarding the proper use and handling of fiber-based products, including ISOFRAX® THERMAL INSULATION PRODUCTS. In addition, Unifrax has also established a program to monitor airborne fiber concentrations at customer facilities. If you would like more information about this program, please call the Unifrax Product Stewardship Information Line at 1-800-322-2293.

The HTIW Coalition and the U.S. Occupational Safety and Health Administration (OSHA) are partners in PSP HTW, a comprehensive, multi-faceted risk management program designed to control and reduce workplace exposures to high

temperature insulation wools (HTIW). For more information regarding PSP HTW, please visit <http://www.htiwcoalition.org>

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 SDS to align with OSHA HCS 2012. Replaces 10/07/2014 SDS.

SDS Prepared By: UNIFRAX RISK MANAGEMENT DEPARTMENT

DISCLAIMER

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

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.

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· **NFPA ratings (scale 0 - 4)**

Health = 0
Fire = 0
Reactivity = 0

· **HMIS-ratings (scale 0 - 4)**

HEALTH 0 Health = 0
FIRE 0 Fire = 0
REACTIVITY 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	aluminium oxide	substance with a Community workplace exposure limit	80-90%
EINECS: 215-691-6			

· **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.

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Safety Data Sheet
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- **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.

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(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/m ³ *Total dust; ** Respirable fraction
REL (USA)	Long-term value: 10* 5** mg/m ³ as Al*Total dust**Respirable/pyro powd./welding f.
TLV (USA)	Long-term value: 1* mg/m ³ as Al; *as respirable fraction
EL (Canada)	Long-term value: 1,0 mg/m ³ respirable, as Al
EV (Canada)	Long-term value: 10 mg/m ³ 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.

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

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Revision: 15.06.2015

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

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

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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": -

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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:

ChemTel Inc.

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.

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