APPLIED TEST SYSTEMS
THE MARK OF RELIABILITY

INSTRUCTION MANUAL

Pyro-Clean® Series

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

www.atspa.com

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)
154 East Brook Lane
Butler, PA 16002
USA

Telephone: +1.724.283.1212

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

Manual Contents

A. Introduction

A.1 Unpacking

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

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

A.2 Warranty Information

All new ATS systems are shipped with a warranty. Units have a warranty against defective parts and workmanship for one full year from the date of shipment. Please see APPENDIX A of this manual for complete details on the warranty.

A.3 After Sale Support

If there are any questions concerning the operation of the unit or software, contact the ATS Service Department at +1-724-283-1212.

Before calling, please obtain the software revision number from the View Screen and the serial number from the unit's data tag. A sample data tag is illustrated below, and can be completed with the unit's information for easy reference. Please be prepared to give a complete description of the problem to the ATS Service Department.

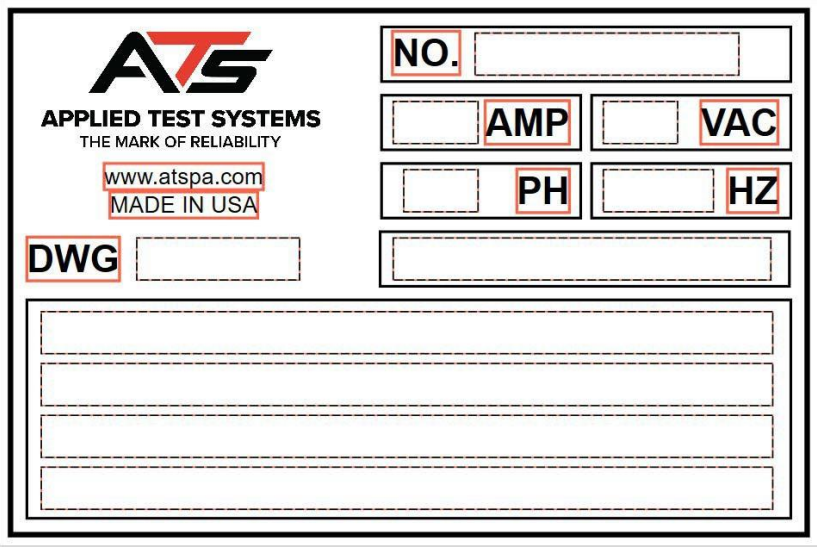


Figure A.1: ATS Sample Data Tag

B. Safety

B.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.

Your Pyro-Clean® has been designed with function, reliability, and safety in mind. It is the user's responsibility to install it in conformance with local electrical codes. For safe operation, please pay attention to the alert boxes throughout the manual.

Burn Hazard/Hot Surface

Electrical Shock/Electrocution

Protective Earth (Ground)

General Danger. When this symbol is displayed, user must always consult the manual to determine the potential hazard(s) and any actions required to avoid them.

No Access for Unauthorized Persons

Ignition/Exposion

Additionally, the responsible body shall ensure that:

1. Appropriate decontamination is carried out if hazardous material is spilled onto or into the equipment.
2. No decontamination or cleaning agents are used which could cause a hazard as a result of a reaction with parts of the equipment or with material contained in it.
3. The manufacturer or his agent is consulted if there is any doubt about the compatibility of decontamination or cleaning agents with parts of the equipment or with material contained in it.

B.2 Warnings

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.

WARNING: Disconnect power prior to performing maintenance. Place Main Power Switch in ‘OFF’ position and disconnect the line cord from the power source before performing any maintenance procedures

WARNING: Obey electrical code requirements. To avoid electric shock, the oven and control system must be wired and grounded in accordance with national and electrical code requirements. Use a properly grounded electrical supply of correct voltage and current handling capacity.

WARNING: To avoid personal injury do not use in Class I, II, or Ill locations as defined by the National Electrical Code.

WARNING: Service to be performed by qualified personnel.

WARNING: Be careful when working with equipment at elevated temperatures. To prevent burns, wear proper Personal Protective Equipment (PPE) for accessing oven and removal of hot items.

WARNING: Use caution when opening the oven. Electrically heated equipment can cause severe burns.

WARNING: Unpack and operate on a stable surface.

WARNING: Do not open the side panel unless explicitly instructed to do so for troubleshooting purposes.

WARNING: Do not use flammable solvents to clean the oven or use with products other than designed for. Using solvents or products not specified by the equipment manufacturer may create potential for formation of flammable or volatile gas mixtures. Always refer to product SDS or contact the manufacturer.

WARNING: Follow manufacturer's directions for proper draft settings, improper draft may create potential for formation of flammable or volatile environment inside the oven.

WARNING: Always ensure that the tray containing desiccant beads is installed in the oven during operation. Failure to install the desiccant bead tray may create potential for formation of flammable or volatile environment inside the oven.

WARNING: Unit should always be operated in a well ventilated area. Refer to and adhere to SDS sheets of product being tested.

WARNING: Do not use in the presence of flammable or combustible materials; fire or explosion may result. This device contains components which may ignite such materials.

WARNING: Do not put sealed containers in the Pyro-Clean®.

WARNING: THIS PRODUCT CONTAINS REFRACTORY CERAMIC, REFRACTORY CERAMIC FIBER OR FIBERGLASS (GLASS WOOL) INSULATION WHICH CAN PRODUCE RESPIRABLE FIBERS AND DUST WHEN HANDLED. THESE FIBERS OR DUSTS CAN CAUSE IRRITATION AND CAN AGGRAVATE PRE-EXISTING RESPIRATORY DISEASE. REFRACTORY CERAMIC INSULATIONS MAY CONTAIN OR MAY FORM CRYSTALLINE SILICA (CRYSTOBALITE) WHICH MAY CAUSE LUNG DAMAGE (SILICOSIS).

THE INTERNATIONAL AGENCY FOR RESEARCH ON CANCER (IARC) HAS CLASSIFIED REFRACTORY CERAMIC FIBER AND FIBERGLASS AS (2B) POSSIBLY CARCINOGENIC. IARC HAS CLASSIFIED CRYSTALLINE SILICA AS (GROUP 1) CARCINOGENIC.

The insulating materials are located in the door, the hearth collar, in the chamber of the product or the top plate assembly. Tests performed by the manufacturer indicate that there is no significant risk of exposure to dust or respirable fibers resulting from operation of this equipment under normal conditions. However, there may be a risk of exposure to respirable dusts or fibers when repairing or maintaining the insulating materials, or when otherwise disturbing the materials in a manner which causes release of dust or fibers therefrom. Use proper handling procedures to work safely with these insulating materials and minimize any exposure. Accordingly, before repair or replacement of any insulating materials, or performing any other service on this product which could disturb or cause exposure to dust from insulating materials, consult the appropriate Safety Data Sheets (SDS) for such products with respect to proper handling and appropriate protective equipment. For additional Saftey Data Sheets, or additional information concerning the handling of refractory ceramic products, please contact the ATS Service Department at +1-724-283-1212.

WARNING: This warning is presented for compliance with California Proposition 65 and other regulatory agencies and only applies to the insulation in this product. This product contains refractory ceramic, refractory ceramic fiber or fiber glass insulation, which can produce respirable dust or fibers during disassembly. Dust or fibers can cause irritation and can aggravate pre-existing respiratory diseases. Refractory ceramic and refractory ceramic fibers (after reaching 1000°C) contain crystalline silica, which can cause lung damage (silicosis). The International Agency for Research on Cancer (IARC) has classified refractory ceramic fiber and fiberglass as possibly carcinogenic (Group 2B), and crystalline silica as carcinogenic to humans (Group 1).

The insulating materials can be located in the door, the hearth collar, in the chamber of the product or under the hot plate top.

Tests performed by the manufacturer indicate that there is no risk of exposure to dust or respirable fibers resulting from operation of this product under normal conditions. However, there may be a risk of exposure to respirable dust or fibers when repairing or maintaining the insulating materials, or when otherwise disturbing them in a manner which causes release of dust or fibers. Using proper handling procedures and protective equipment when handling these insulating materials will minimize any exposure. Refer to the appropriate Safety Data Sheets (SDS) for information regarding proper handling and recommended protective equipment. For additional SDS copies, or additional information concerning the handling of refractory ceramic products, please contact ATS Service Department at +1-724-283-1212.

B.3 Cautions

The following statements are caution statements. These statements alert the operator to conditions that may damage equipment. Operators must be aware of these conditions in order to ensure safe operation of the equipment.

CAUTION: Installation of electrical devices must be accomplished by qualified personnel and done in accordance with any current local and national codes.

CAUTION: The Pyro-Clean® must be grounded and wired in accordance with national and local electrical code requirements.

CAUTION: Before energizing the electrical power to the Pyro-Clean®, place all controls in the OFF position.

CAUTION: Do not exceed the maximum operating temperature.

CAUTION: All supporting and contacting surfaces must be non-flammable. Do not allow flammable materials to contact the shell.

CAUTION: If an emergency shutdown needs to be performed, place ON/OFF switch in the OFF position.

CAUTION: Do not overfill Pyro-Clean®. Refer to ‘Tips on Loading’ and ‘Training of Operators’ sections of the manual for load size limits.

C. System Overview

C.1 Equipment Parts

Front of Unit

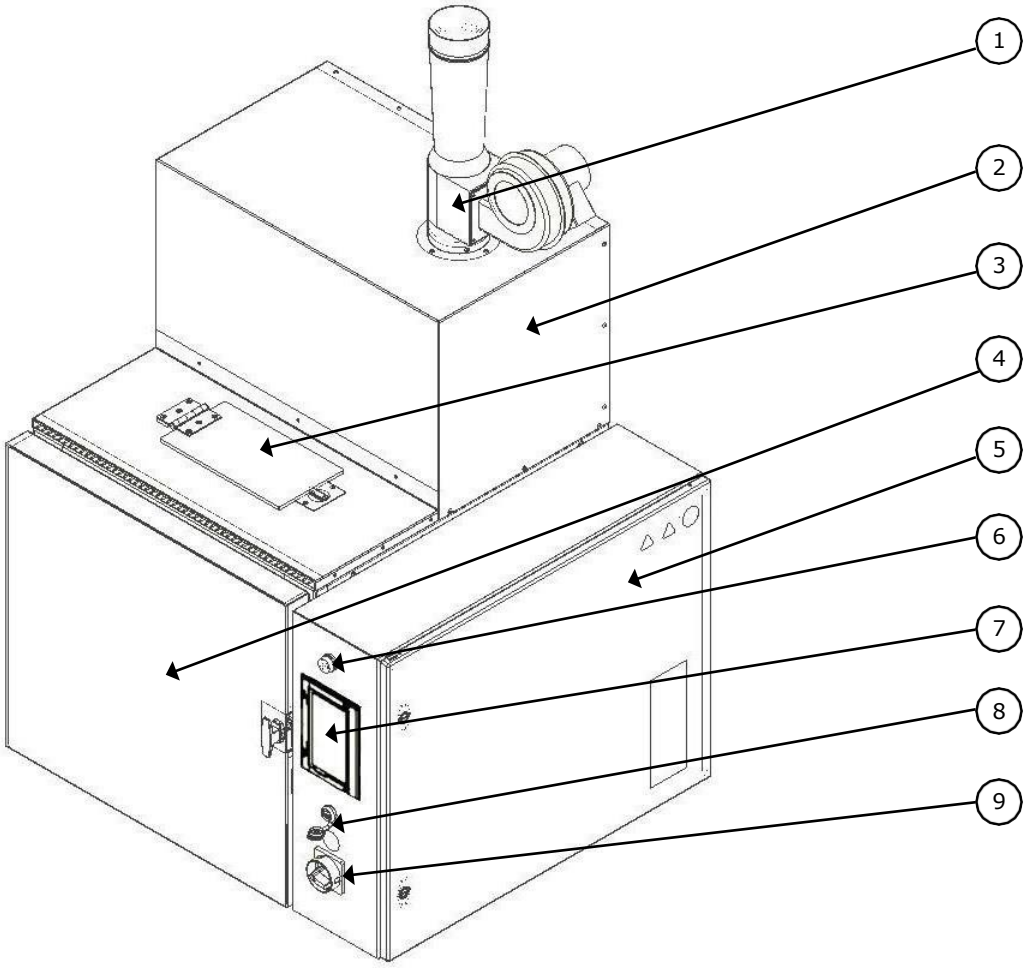


Figure C.1: Pyro-Clean® (Front View)

1. Draft Inducer
2. Oxidizer Chamber
3. Blow-Off Door
4. Oven Chamber
5. Electrical Box
6. Power Light
7. HMI Touch Screen
8. USB Port
9. Power Switch

Back of Unit

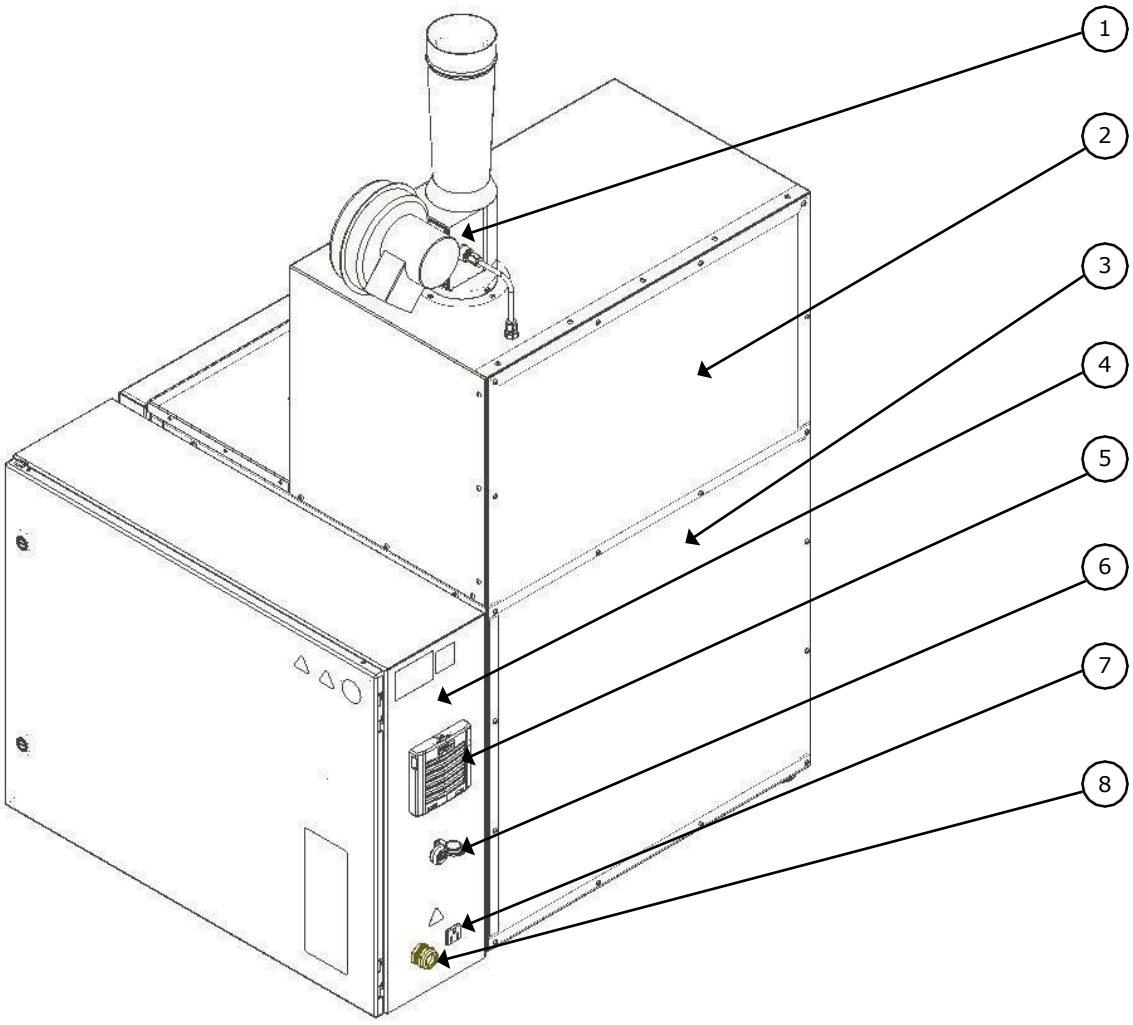


Figure C.2: Pyro-Clean® (Rear View)

1. Draft Inducer
2. Oxidizer Chamber
3. Oven Chamber
4. Electrical Control Box
5. Air Intake Filter
6. Ethernet Port
7. Draft Inducer Power Outlet (230V, 15A, 60Hz, 1ph)

   Note: For Draft Inducer FAN ONLY. NOT to be used as a service outlet!
8. Power Cord

Control Panel

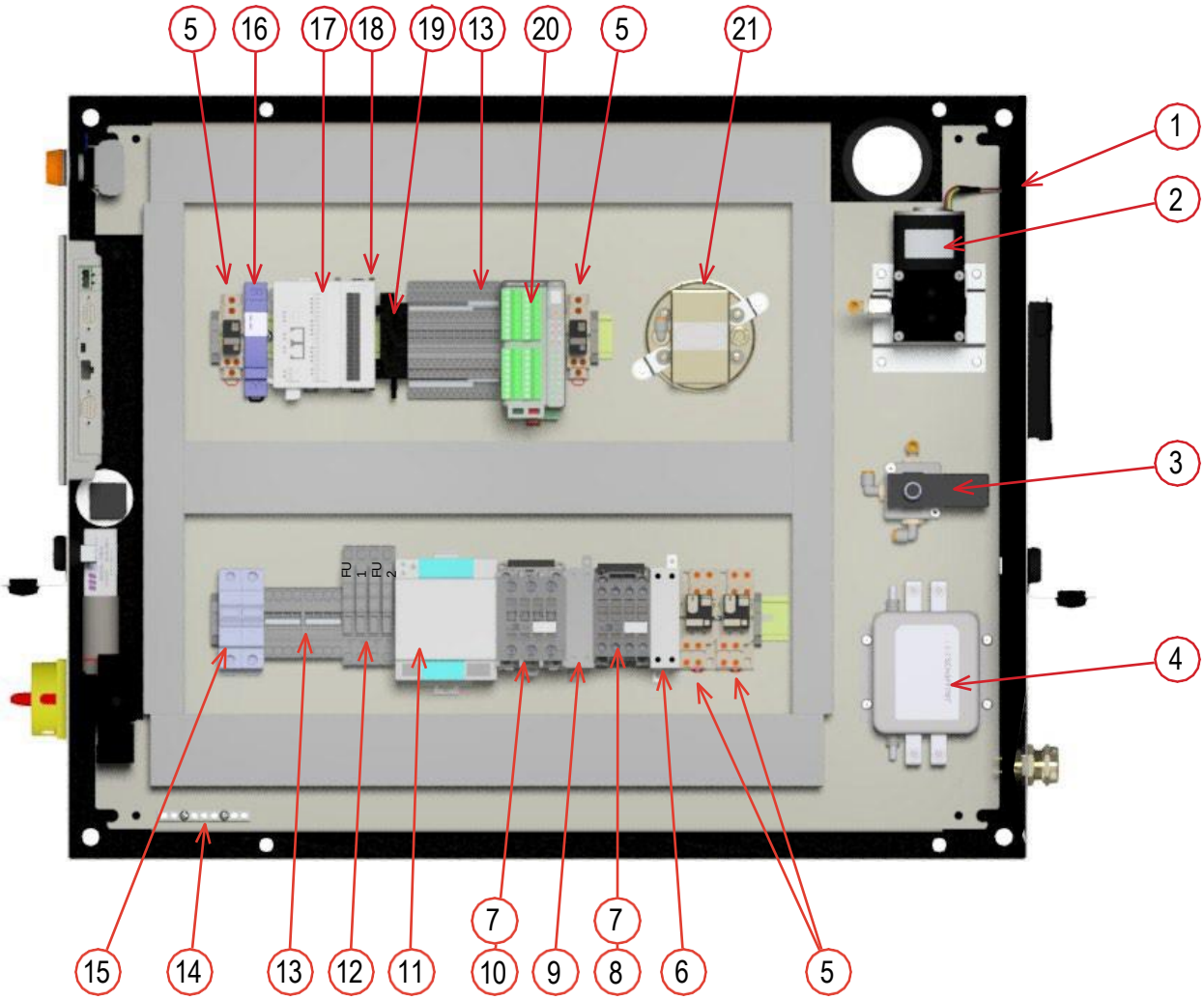


Figure C.3: Pyro-Clean® (Control Panel)

1. Control Panel
2. Vacuum Pump
3. Solenoid Valve
4. Line Filter
5. Cube Relay, 15A
6. Solid State Relay, 10A
7. Diode Surge Suppressor
8. Non-Reversing Contactor, 12A
9. Solid State Relay, 30A
10. Non-Reversing Contactor, 32A
11. Power Supply, 7.5A, 24V
12. Fuse Holder, 30A
13. Terminal Blocks, IEC
14. Ground Bar, 7 Position
15. Miniature Protector, 30A
16. AC/DC Supply 24V, 0.4A
17. PLC
18. I/O Module
19. Differential Pressure Transducer
20. Temp Control Module
21. Pressure Switch

*FU1, FU2: Class MDL, Time Delay, Current Limiting, 250VAC, 1A [ATS Part No. ELE6111]

*FU3, FU4: Class MDL, Time Delay, Current Limiting, 250VAC, 2A [ATS Part No. ELE6110]

C.2 General Overview

Use

The Pyro-Clean® is designed to clean glass or metal parts contaminated with residues of various organic substances such as polymers, waxes, resins, asphalts, tars, or other similar contaminants. Cleaning is done entirely with heat, eliminating the use of solvent or chemical cleaning. Organic residues are thermally decomposed and vaporized from glass or metal parts at 900 degrees F. Virtually all types of heat-resistant glass and metal parts can be cleaned in the oven. As long as the heat will not hurt the parts being cleaned, and the residues to be removed are organic and can be removed thermally, the Pyro-Clean® is a suitable alternative to solvent and chemical cleaning methods.

This equipment is intended to be used only as described in this manual and the applicable standards. Use in any other manner may result in personal injury, property damage, damage to the equipment, and void of warranty.

How it Works

1. Heat Decomposes and Vaporizes Organic Residues from the Glass or Metal Parts

The Pyro-Clean® is a high-temperature oven capable of operating at 800-1000 degrees F. This temperature is sufficient to thermally decompose (vaporize) most polymeric residues and other organic material to volatile gases and carbonized residues without harming the glass or metal parts. The pyrolysis smoke and gases produced by degradation of the organic residues reacts with a catalyst suspended in stainless steel wire mesh which comprise of two racks (trays) inside the oven chamber. If sufficient smoke or pyrolysis gases are produced inside the oven, the oxidation of this smoke will consume oxygen inside the oven and actually inert the oven to a very low oxygen level of one to two percent.

2. Pyrolysis Smoke and Gases are Consumed by Electric/Catalytic Oxidizer (Afterburner)

Any un-reacted pyrolysis products formed inside the oven exit through a pipe at the top of the oven and passes through a small Oxidizer chamber which sits on top of the oven. The Oxidizer is a combination electric/catalytic system which preheats the oven exhaust gases to 1300-1500 degrees F with excess air before they pass through a honeycomb ceramic catalyst which completes any oxidation not occurring in the preheat zone of the chamber. This pollution control method is very effective at destroying any smoke and odor produced during the cleaning process. The exhaust gases from the oxidizer chamber are mixed with fresh air, resulting in a pollution-free exhaust at temperatures of 130-160 degrees F.

3. Final Cleaning is Accomplished by the Oxidation Stage.

The heat-cleaning process actually consists of two distinct stages. The first stage is the pyrolysis stage described above. The second stage consists of oxidation of any carbonized residues produced during the first, pyrolysis stage. Virtually all organic materials produce some soot-like, carbon residues on thermal decomposition. Injecting air into the 950 degree F oven chamber during the final cleaning stage oxidizes carbon residues, leaving the glassware or metal parts completely free of any organic matter. Ash, or other inorganic material, is left behind on the parts and can be washed off with water.

Parts That Can Be Cleaned

Any part which the normal cleaning temperature of 800-950°F will not hurt can be cleaned in the oven. Laboratory glassware, particularly the heat resistant types, are easily cleaned without damage or distortion. Ceramic parts which can tolerate the heat can also be cleaned.

Organic Residues That Can Be Cleaned

Virtually any contaminant which is organic in nature can be removed at the normal operating temperature of the cleaning oven, 950 degrees F. In recent years, new high temperature polymers have been developed which are very resistant to heat and are not easily removed thermally. However, the numbers of these polymers are limited.

Organics Which Should Not Be Processed

Plastics or polymers which contain large amounts of halogens such as chlorine, bromine, or fluorine would not be processed in the oven as they will react with the catalyst contained inside the oven trays and deactivate it. The most common example of this plastic is PVC (polyvinyl chloride). The oven oxidizer is designed to handle organic residues which contain predominantly only carbon, hydrogen, and oxygen. Do not process any parts which may emit vapors of toxic metals such as lead or mercury. Do not process any material which decomposes violently upon heating. Nitrocellulose or other explosive materials are in this category.

Never clean any hollow, sealed glass or metal parts which might build up dangerous, internal pressures during the heating cycle. Make sure all parts have vent holes or openings to allow pyrolysis gases or steam to escape as they are formed. Any pumps, pipes, or vessels must have openings to allow pyrolysis gases to escape, otherwise they could rupture in an explosion.

WARNING: NEVER PLACE GLASSWARE OR OTHER PARTS IN THE OVEN WHICH CONTAINS RESIDUES OF VOLATILE, FLAMMABLE SOLVENTS SUCH AS ACETONE, TOLUENE, MINERAL SPIRITS, MEK, ETC., AS THEY WILL FORM AN EXPLOSIVE MIXTURE INSIDE THE OVEN CHAMBER.

SPECIAL NOTE REGARDING SILICONES: Silicone oil is commonly used in many laboratories as a heating medium for carrying out reactions in glass vessels. Glassware which contains silicone oil residues from the heating medium should be wiped off with a cloth or paper towels or rinsed with acetone. Experience has shown that when silicone polymers are removed in the oven, they leave a “cloudy” residue which etches the glassware and affects its appearance. A round bottomed flask coated on the outside with silicone heating oil will be cloudy if cleaned in the oven without removing the silicone. Glass stopcocks lubricated with silicone grease should likewise be wiped free of silicone before cleaning the glassware in the oven.

Silicones are poisons for the catalysts used both in the oven chamber and in the afterburner, and should not be removed in the oven.

Automatic Cleaning Cycle

The Pyro-Clean® is equipped with an Automatic Cycle Time Feature which adjusts itself to the load placed in the oven. The cleaning time is limited by the processing speed of the oxidizer. The more organic residues or polymers on the parts, the more smoke that will be evolved off the parts during the thermal cleaning process. The oxidizer is equipped with a temperature sensor and controller which monitors the amount of smoke evolved off the parts and controls the heat-up rate of the oven to prevent the oxidizer from being overwhelmed by too much smoke. The oxidizer control system will cut off the oven heaters if too much smoke is being produced. The oven temperature seeks whatever temperature is necessary to produce the maximum amount of smoke the oxidizer can process. Thus the oxidizer actually controls the heat-up rate. When all the organic residue is pyrolyzed/vaporized off the parts, smoke evolution will fall off, allowing the oven temperature to climb to the normal processing temperature of 950 degrees to finish the pyrolysis stage of the cleaning process.

For the oxidation stage, a cycle time is located on the settings screen, with an adjustable range of 1 to 1000 hours.

The Factory setting of 2 hours is recommended for most applications.

NOTE: For removing asphalts, a factory setting of 3 to 4 hours is recommended as asphalts are among the more difficult organics to remove. Asphalts produce a carbon residue during pyrolysis that is resistant to oxidation, and therefore requires more processing time during the oxidation stage of the cleaning cycle. Glassware should be loaded to promote drainage. This will speed up the cleaning process.

The Cycle Time does not start until the oven temperature reaches within 10 degrees F of the set-point of the Oven Temperature Controller.

With a normal set-point of 950 degrees F, the Cycle Time does not start timing until the oven temperature reaches 940 degrees °F. When the timer is started, the status bar will show “Run Cycle”. If the glass or metal parts do not come clean with a 2 hour setting on the Cycle Time, then increase the time until any soot-like, carbonaceous residues are completely removed. If cleaning times require more than 5 hours on the Cycle Time, then consult the Factory as this would be quite uncommon. (Asphalt residues are the exception).

For safety reasons, never set the Cycle Time to less than one hour. This amount of time at 950 °F should ensure that the oven cycle does not shut down before all organic residues are evolved off as smoke or pyrolysis gases.

Limitations

The Pyro-Clean® cleans only with heat, so they cannot remove any non-volatile, inorganic residues from the parts being cleaned. This includes paint pigments such as titanium dioxide, fillers such as clay, talc, fiber glass, ordinary dirt, or any other inorganic ashes. However, such inorganic residues normally are easily removed from the glass or metal parts by wiping off with a cloth or rinsing with water. The ashes are easy to remove because all organic resins which act as a binder or “glue” are decomposed, freeing the inorganic material.

Cost of Operation

Cost of operation depends on the local rates for electrical power. The Pyro-Clean® consumes a maximum of 28 amperes at 240 volt, single phase. This is 6.6 kilowatts. At a cost of 0.06 cents per KWh (our current Factory rate in Butler, PA), operating costs would be 6.6 KWH x $0.06 = $0.40 per hour. With a typical complete cycle time of 5 to 7 hours, then cost per cleaning cycle would average about $2.00 to $3.00.

Training of Operators

Because the success and safety of the cleaning process is dependent upon proper loading and operation of the Pyro-Clean®, do not allow anyone to use the oven unless they fully understand how it works and its limitations. Users of the oven must be cautioned against overloading the oven with glass or metal parts containing very large amounts of organic residues. The oven is designed for removing small amounts of asphalts, organic residues, or plastics only, from 1/4 pound up to about 2 pounds. More than 2 pounds of organic residues should not be loaded into the oven.

C.3 Product Specifications

Cleaning Temperature	User adjustable, factory set at 900 °F
Safety Features	Built in over pressure protection and shut off, automatic door lock, auto safety shutdown upon over temp, loss of draft, and numerous other conditions
Oven Capacity (Size Options)	2.5 cubic feet 5.2 cubic feet
Interior Dimensions	(2.5 cu ft) 14.9 in W x 18.5 in D x 16 in H (5.2 cu ft) 23 in W x 19.5 in D x 20 in H
Power Requirements	240 VAC, 1 ph, 50/60 Hz, 30 A
Exterior Dimensions	(2.5 cu ft) 38 in W x 33 in D x 60 in H (5.2 cu ft) 46 in W x 33 in D x 63 in H
Approx. Weight	(2.5 cu ft) 380 lb (5.2 cu ft) 450 lb
RTFO Bottle Capacity	(2.5 cu ft) 64 bottles (5.2 cu ft) 112 bottles
Environmental Conditions	Operating: 17°C to 27°C; 20% to 80% relative humidity, non-condensing. Installation Category II (overvoltage) in accordance with IEC 664. Pollution Degree 2 in accordance with IEC 664.
Altitude Limit	2,000 Meters
Burnoff Temperature	Approximately 1300°F
Construction	Powder coated steel exterior, welded stainless steel interior, dual gasket system, pressure release door

D. Installation

D.1 Installation Overview

WARNING: Do not use in Class I, II, or lll locations as defined by the National Electrical Code.

CAUTION: Be sure ambient temperature does not exceed 104°F (40°C). Ambient above this level may result in damage to controller.

WARNING: This equipment must be positioned so that the plug is accessible unless other means for disconnection from the power supply (e.g., circuit breaker or disconnect switch) is provided.

CAUTION: Install equipment with sufficient space allowed to easily access and operate all safety and disconnect devices.

NOTE: Allow at least 4 inches of space between the oven and any vertical surfaces.

NOTE: Disconnect the oven from its power supply prior to maintenance and servicing. Refer servicing to qualified personnel.

NOTE: Pyro-Clean® ovens are supplied with a power cord only, end-user to supply appropriate plug in accordance with local electrical requirements and codes. The plug shall be rated, at a minimum, for 240VAC @ 30A. The plug shall be installed by a qualified electrical technician in accordance with the electrical diagram and in compliance with all applicable electrical codes.

WARNING: Use a properly grounded electrical outlet of correct voltage and current handling capacity.

WARNING: Do not use in the presence of flammable or combustible materials; fire or explosion may result. This device contains components which may ignite such material.

NOTE: Do not put sealed containers in oven.

D.2 Receiving

The Pyro-Clean® is shipped partially assembled and crated. Inspect the oven crate and any other additional boxes or crates carefully upon receipt. If there is any sign of damage to the crate or oven, do not sign the delivery receipt until the freight company has been notified and such damage has been noted on the receipt. Claims for shipping damage must be made by the customer to the freight company and not to the distributor or manufacturer.

Remove the crate lumber carefully to avoid damaging or scratching the surface of the oven. The Pyro-Clean® weighs about 400 pounds crated and can be moved with a fork truck or heavy dolly while crated. Uncrated, the oven weights slightly over 350 pounds and can be moved by hand with sufficient help. Avoid applying leverage on the door to prevent bending the hinges. Use heavy gloves or other protection to prevent cutting or slicing your hands when lifting on the oven. The door may be removed at the hinges if necessary to ease handling of the oven.

If the draft inducer is not already installed when you receive your oven, it will be wrapped in protective bubble wrap and packed in the crate with the oven. Unpack the oven from the crate and install in its final position, then attach the draft inducer to the exhaust port on top of the oven oxidizer as shown in Figure D.1.

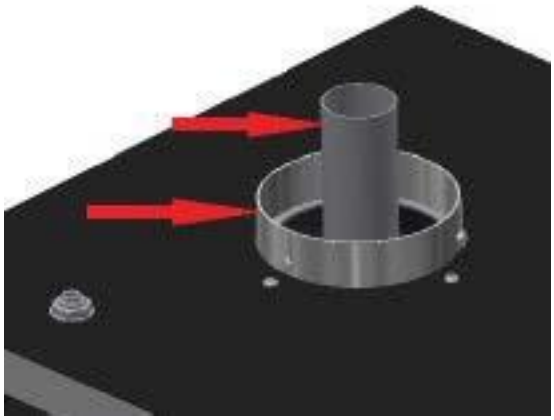


Figure D.1: Insert Oxidizer Exhaust Tube, then mount Draft Influencer Assembly to exhaust port flange using (4) screws from the flange

Figure D.2: Draft inducer tubing must be installed here for proper operation

Figure D.3: Completed assembly with tubing installed. Plug fan motor cord (not shown) into outlet on rear of control cabinet (Ref Fig C/it. 7)

NOTE: The draft inducer tubing must be connected in order to interlock the oven heaters to the pressure switch. The oven heaters will not energize until the pressure switch closes.

Exhaust gases from the draft inducer must be vented outdoors. Proper venting is very critical. Refer to section D.5 for additional information.

WARNING: Unit should always be operated in a well ventilated area. Refer to and adhere to SDS sheets of product being tested.

WARNING: Follow manufacturer's directions for proper draft settings, improper draft may create potential for formation of flammable or volatile environment inside the oven.

D.3 Electrical Service

The oven has been completely tested and checked at ATS before shipment. A power cord 10 feet long is supplied with the oven. The end user is required to supply a plug and receptacle rated for 30 Amp, 240 Volt, single phase electrical service. The customer supplied plug shall be installed by a qualified electrician in accordance with the Electrical Wiring Diagram and all applicable Electric and Safety Codes.

The total power draw of the Pyro-Clean® unit is approximately 6600 watts. The oven heaters draw approximately 16.7 Amps at 240 Volts, and the afterburner heater draws approximately 9.7 Amps at 240 Volts. The oven control circuit is 24VDC and is supplied by a 180W power supply.

The oven shall be connected to a dedicated 30 Amp circuit breaker, and clearly labeled to prevent accidental

shutdown of the oven. Power should be available to the oven at all times, except when electrical service is required. Disconnect the power plug or open the circuit breaker and lock out/tag out the circuit when access inside the control box is required. The oven shall not be positioned as to block or hinder any disconnecting devices.

WARNING: Obey electrical code requirements. To avoid electric shock, the oven and control system must be wired and grounded in accordance with national and electrical code requirements. Use a properly grounded electrical supply of correct voltage and current handling capacity.

WARNING: To avoid personal injury do not use in Class I, II, or Ill locations as defined by the National Electrical Code.

D.4 Installing Unit with Tilt

Install the oven with the front of the unit approximately 1/2 to 3/4 inch higher than the back of the unit. The Oven has 4 adjustable legs to allow for the front-to-back tilt. This helps to prevent any liquid residues from outside of the drain pan from flowing out onto the door gaskets, and will direct them toward the back of the oven interior. The residue material will then be disposed of during the cleaning cycle.

D.5 Location and Venting

CAUTION: Unlike standard industrial ovens, Pyrolytic Ovens have special venting requirements. Read and follow the guidelines in the following sections carefully.

WARNING: Unit should always be operated in a well ventilated area. Refer to and adhere to SDS sheets of product being tested.

For safety and proper operation, the oven must be correctly vented. Standard double walled vent pipe (6 inch I.D.) is recommended. Long runs and use of excessive elbows should be avoided to minimize friction losses to achieve the correct draft. Typically, long runs of flexible vent hose or pipe should be avoided as they often result in very high friction losses and prevent achieving an acceptable draft.

A small section of flexible six inch duct (6 to 8 inches long) is recommended to allow the Draft Inducer to be removed and replaced for final adjustment of the draft (See Section D.7 for draft adjustment). Locate the section of flexible pipe between the rigid 6 inch duct pipe and the 6 inch side of the adapter connected to the top of the Draft inducer. See figure D.4.

Figure D.4: Attach a 6"-8” section of flexible duct to the 4” OD Draft Inducer Outlet using a 4"-6” transition adapter.

The Draft Inducer located on top of the oven generates a negative pressure of about 0.06 in water column (w.c.) at initial cold start, before any vent pipe is added to the exhaust of the draft inducer. It is extremely important that the final draft achieved on the oven is 0.06 in w.c. at initial cold start. The final duct pipe and venting arrangement must achieve this result, regardless of the specifics of how the oven is ducted. Some general guidelines for various possible installations are discussed below.

For questions regarding venting of the oven, consult ATS for recommendations for your specific location. For convenience, the system allows you to turn on the draft inducer to observe the current draft (See the “Manual Screen” section of this manual). Consult ATS if uncertain how to measure the small negative pressures required by the Pyro-Clean®.

Venting to the Outdoors Through Wall or Roof

Standard 6 inch I.D., double walled vent pipe should be used for venting to outdoors for best results. The temperature of the exhaust gases range from 120 to 150 degrees F, slightly hotter than the exhaust from a clothes dryer or other low-heat appliance. Elbows can be used, but should be kept to a minimum to prevent excessive friction losses. A 4 in to 6 in adapter is required to transition from the 4 in Draft Inducer to the vent pipe. This adapter is commonly available from most heat/air conditioning supply houses. A non-restricting vent hood or cap should be used to prevent rain from entering the exhaust pipe.

Outdoor weather conditions can affect draft. Carefully consider your exit location. Additional baffling may be required at your exit point to limit environmental affects on your draft.

Regardless of the final physical arrangement of the vent pipe and cap, it must measure 0.06 inch w.c. of draft at initial cold start.

If sufficient draft cannot be achieved statically, then means to achieve the proper draft must be supplied by an additional powered draft inducer or otherwise. However, it must be emphasized that if the oven exhaust pipe is connected to a device capable of pulling a high draft (negative pressure), then the pressure must be adjusted so it is not too high.

Venting to a Lab Hood or Other Negative Pressure Exhaust System

The Pyro-Clean® requires a small negative pressure of about 0.06 in w.c. at initial cold start to work correctly. Connection of the vent pipe system of the oven to a lab hood or vent system is recommended and acceptable as long as the final measured draft of the oven itself is 0.06 in w.c. at initial cold start.

Do not pipe the oven exhaust directly into the duct work itself of a powered exhaust system, as the suction (negative pressure) may be too strong to permit proper adjustment to the slight negative pressures required.

CAUTION: If the oven is exhausted into a powered vent system such as a lab hood, the hood exhaust system should remain on as long as the oven is on. Do not shut off the exhaust hood, thereby shutting off the exhaust system for the oven.

WARNING: The draft Inducer must be installed as shown in Figure D.3 with the ¼" metal tubing properly connected to enable the Pressure Switch to sense the pressure of the Draft Inducer Blower Motor. The Blower Motor is interlocked via the Pressure Switch to prevent the Oven Heaters from energizing unless the Draft Inducer Blower Motor is in operation.

In the event of a Blower Motor failure, the Pressure Switch will sense the loss of fan pressure, de-energize the oven heater elements, and display an alarm fault to the operator.

D.6 How to Measure Oven Negative Pressure (Draft)

1. Close and latch the oven door.

2. Go to the "Manual Screen" (see "manual screen" section). Observe whether the oven exhibits any draft due strictly to the installed exhaust piping. For example, connection to a hood exhaust might pull a slight negative pressure dependent on the power of the hood system itself.

3. Press the "Draft Inducer" button momentarily to start the oven exhaust blower, and observe the negative pressure achieved inside the oven. The optimum draft is 0.06 inches w.c. at initial cold start. If the exhaust system/duct to which the oven is attached pulls a draft higher than 0.06 inches, then the oven exhaust must be adjusted until the correct draft is achieved. The oven draft has been factory adjusted with the draft inducer running without any exhaust stack. Adding stack to the top of the Draft Inducer will change the draft slightly, adjustments may be required to remain in the proper range.

4. Once the oven exhaust has been properly installed and checked, press the "Draft Inducer" button momentarily to stop the oven exhaust.

CAUTION: DO NOT END A CLEANING CYCLE BY TURNING OFF THE MAIN POWER TOGGLE SWITCH. THIS PREVENTS THE MAIN OVEN EXHAUST FAN FROM RUNNING TO REMOVE THE NORMAL HEAT PRESENT DURING COOL-DOWN. IT WILL ALSO UNLOCK THE DOOR BEFORE COOL DOWN WHICH MAY INTRODUCE AN EXPLOSIVE SITUATION IF THE DOOR IS OPENED.

D.7 How to Adjust Oven Draft

Once the Pyro-Clean® is installed and vented, the oven draft should be measured as described in previous sections. If the draft is not within proper limits, then it must be adjusted. Oven draft is achieved by the venturi effect from air drawn around the Oxidizer Exhaust Tube (See Figure D.5).

Figure D.5: Oxidizer Exhaust Tube

To increase oven draft, increase the height of the oxidizer exhaust tube. To lower oven draft, decrease the height of the oxidizer exhaust tube.

The Draft Inducer must be removed from the top of the unit to allow access down inside the exhaust duct to remove the tube. Changing the height of the tube out of the Oxidizer chamber is accomplished by changing the position of the screw in the side of the tube. The tube has adjustment holes to allow adjustment of the tube height outside of the chamber.

Extract the entire tube from the Oxidizer chamber, then reposition the screw to raise or lower the tube height. The Draft Inducer must be replaced and restarted to measure the oven draft after any changes to the tube height. See Figures D.1 & D.5 for tube location.

It is important to recognize that Pyro-Clean® ovens manufactured by ATS are not ordinary ovens. Pyro-Clean® systems are specialized, high-temperature systems specifically designed and built for thermal cleaning of valuable objects such as lab glass or metal parts. When organic residues are on the parts being cleaned, pyrolysis gases are created during the cleaning process.

If the oven pressure is positive instead of slightly negative, these pyrolysis gases may escape into the room and smoke or odor will be observed.

If the oven pressure is too highly negative, then excessive air is drawn into the oven (even though it is tightly sealed). This excessive leakage rate can prevent the oven from reaching its normal setpoint (or struggle to reach its setpoint) and/or ignition or explosion of any combustible, pyrolysis gases may occur due to high oxygen levels caused by excessive draft and leakage.

WARNING: Unit should always be operated in a well ventilated area. Refer to and adhere to SDS sheets of product being tested.

WARNING: Follow manufacturer’s directions for proper draft settings, improper draft may create potential for formation of flammable or volatile environment inside the oven.

D.8 Pressure Switch for Draft Inducer Blower Motor

The Pyro-Clean® is equipped with a pressure sensing switch mounted inside the main control box which senses the pressure generated by the Draft Inducer when it is running. This pressure switch is interlocked to the oven heaters so they cannot energize when the Draft Inducer blower motor is not running. If the pressure switch does not close, then the power relay for the oven heater will not receive power.

The Draft Inducer pressure switch is connected to the Draft Inducer with a short piece of 1/4” metal tubing. This tubing must be connected for the pressure switch to sense that the blower motor is running (Ref Figs D.2-D.3).

E. Software Overview

E.1 Software Screen Map

Figure E.1 shows the Pyro-Clean®'s software screens.

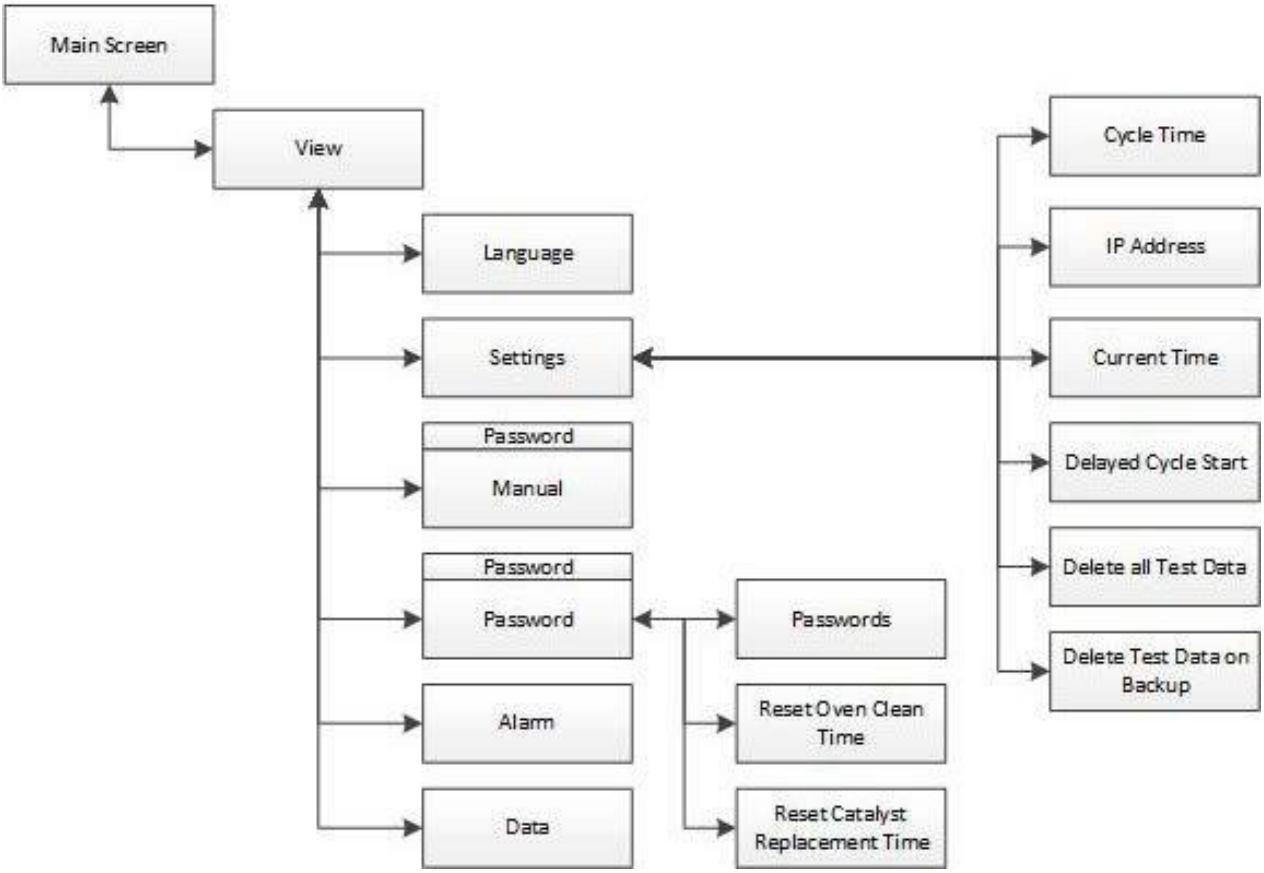


Figure E.1: Pyro-Clean® Software Screen Map

E.2 Main Screen

Figure E.2 shows the Main Screen that is displayed when the Pyro-Clean® is started. It allows you to setup and run oven cycles.

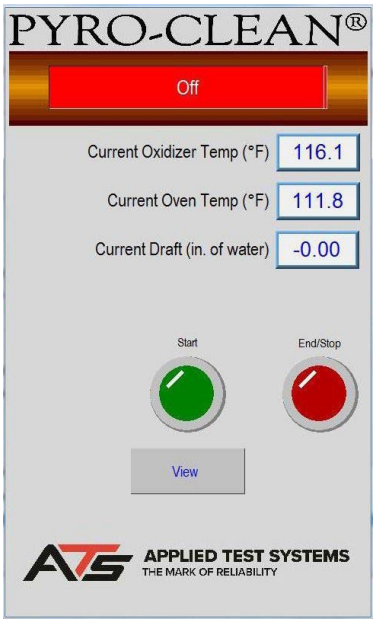


Figure E.2: Main Screen

This screen will show values for Oxidizer Chamber Temperature, Oven Temperature, and Current Draft. It also has several controls to set-up and run the oven.

Start Button

Used to tell the system that parts are loaded, and to begin the oven cycle.

End/Stop Button

Used to tell the system to finish the cycle. It can also be used anytime the oven is in cycle to stop the cycle. When the run cycle has finished this button will blink to show the cycle is complete. If this button is pressed anytime that the oven is hot the system will go into cool down before you can open the door.

Alarm Button

If the system has an Alarm, Warning, or Fault the Alarm Button will be displayed and the Start Button is hidden. This can be seen in Figure E.3. The operator will have to press the Alarm Button to go to the alarm screen and clear the alarm condition before the system can start another cycle.

View Button

Used to get to all other screens in the system for Set-up. This will be hidden and a Graph Button will be displayed when a cycle is running.

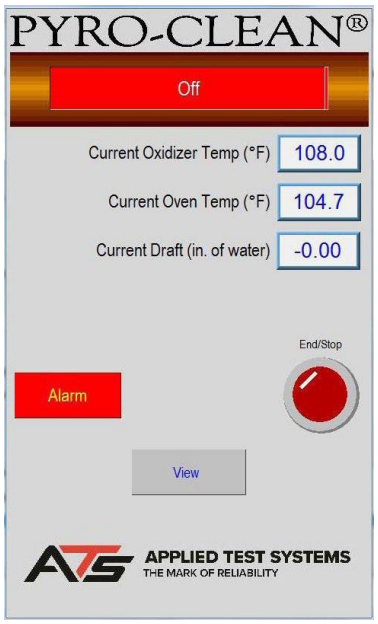


Figure E.3: Main Screen, Alarm State

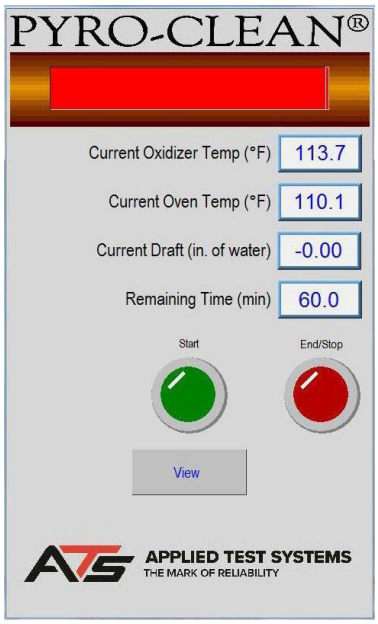


Figure E.4: Main Screen, Delay Start State

Figure E.4 illustrates what the Main Screen looks like when the system is in delay start state. Note the Remaining Time displayed. This will show up for the Preheat Delay, Oven Soak, and the Run Cycle states and will display the time remaining for that part of the cycle. The oven soak time may restart several times until it becomes stable at temperature.

State Status Indicator Bar

Near the top of the display is a status bar that will show the current state of the oven cycle. Below are the different states in the order that they usually run.

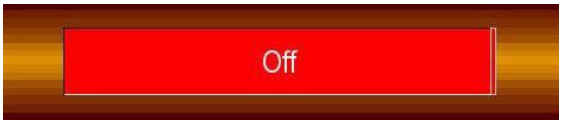


Figure E.5: Off State Status Bar

Figure E.6: Oxidizer Preheat State Status Bar

Off State

Indicates that the system is sitting idle. No heat or cycle is running.

Oxidizer Preheat

Indicates that the oxidizer chamber is heating up. The system will stay here until the chamber is at temperature and stable.

Oven Soak

Indicates the oxidizer chamber is stable at temperature, after which the oven starts to soak temperature. It is at this stage that “smoke” is generated to burn off in the oxidization chamber. The Oxidization chamber and the oven will interact so that the oxidization chamber is not overloaded. The system will stay here until the interaction dies down and the oven is at soak temperature and stable.

Figure E.7: Oven Soak State Status Bar

Figure E.8: Run Cycle State Status Bar

Run Cycle

Starts when the oven is at the soak temperature and stable. The oven will change to the cycle temperature and sit in this state until the cycle time has expired.

Cool Down

Starts when the run cycle has timed out. The oxidizer chamber and oven shut off and start to cool down. The system will stay here until the oven drops below the cool down temperature.

Figure E.9: Cool Down State Status Bar

Figure E.10: Cycle Finished State Status Bar

Cycle Finished

Starts when the oven temperature has dropped below the cool down temperature and the system is waiting for the operator to press the End Button and remove the parts.

CAUTION: When the oven unlocks to allow the removal of parts, remember that they are still 500°F and you will need protective equipment to handle them.

Delay Start

Indicates the system has been set up to start the oven cycle automatically after a time delay.

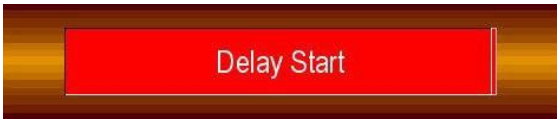


Figure E.11: Delay Start State Status Bar

E.3 View Screen

Figure E.12 shows the View Screen. It is shown anytime the View Button is pressed on the Main Screen. It allows access to the rest of the screens in the system.

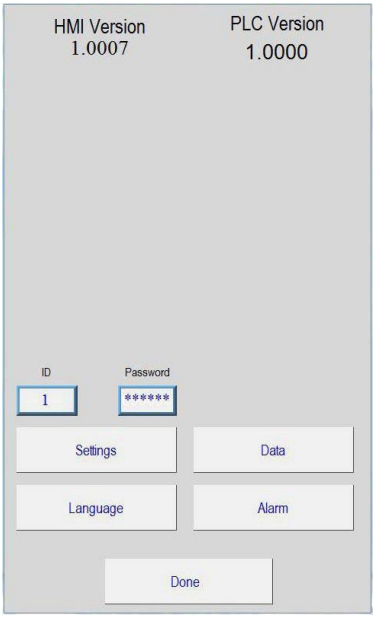


Figure E.12: View Screen

NOTE: If the system is not idle this button is not visible and you will not be able to get to this screen to make changes.

The screen will show the current version of the software in the PLC and HMI. This is very important information, and is most often asked for when calling into ATS service.

ID

A user ID should be set to the user access you wish to use.

Password

Associated with the User ID and used to access other screens. When the correct ID and Password are entered other buttons (colored on the above screen) will be displayed.

Manual Button

Will not be displayed until the correct ID and Password have been entered. Once it is displayed, pressing it will go to the manual screen. (Default ID: 1, Password: 111111).

Passwords Button

Will not be displayed until the correct ID and Password have been entered. Once it is displayed, pressing it will go to the password screen.

Standardize Button

Will not be displayed until the correct ID and Password have been entered. Once it is displayed, pressing it will go to the standardize screen. Standardize access is reserved for ATS Service use only.

Language, Settings, Data, and Alarm Buttons

Each take you to their respective screens which are described later in this section.

Done Button

Returns you to the Main Screen.

E.4 Language Screen

Figure E.13 shows the Language Screen that is shown when you press the Language Button on the View Screen. It allows you to set the language used in all the screens.

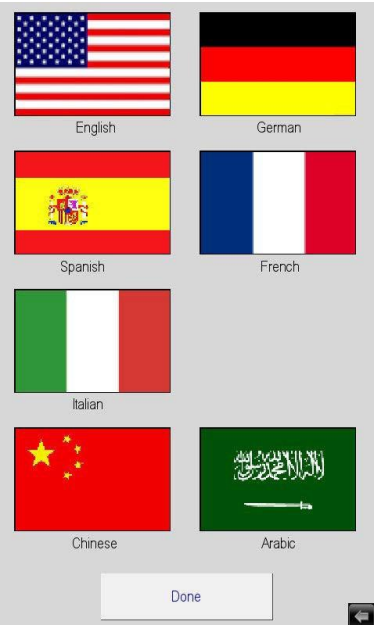


Figure E.13: Language Screen

Simply select your language of choice then press the Done Button to go back to the View Screen

E.5 Settings Screen

Figure E.14 shows the Settings Screen. It is shown when the Settings Button is pressed on the View Screen. It allows set up of the system.

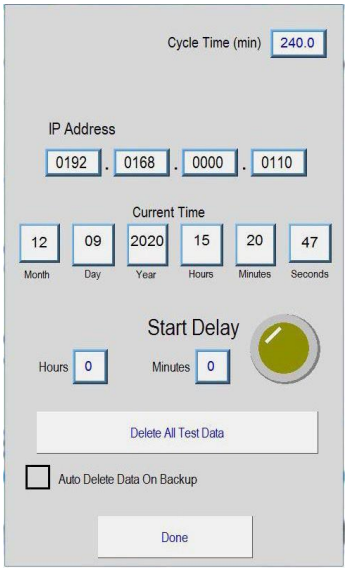


Figure E.14: Settings Screen

Cycle Time

The amount of time the oven sits at cycle temperature before it shuts off and goes into cool down.

IP Address

Used to allow someone at a remote location to monitor the system using a VNC viewer program.

Current Time

Allows the operator to set the current time of the system. This affects the oven clean and catalyst replacement warning times. It is also used for alarm and data logging times.

Start Delay

Used to allow the system to be set up to start automatically after a time delay. Just enter the Hours and Minutes you wish to wait before oven start and press the yellow button. The button will light to show that a delay has been set. The delay button is a toggle switch, so to turn off a delay that has been started just press the button again. Note the status of the system will show Delay Start when it is active and the remaining time before cycle start is shown.

Done Button

Will return you to the View Screen.

E.6 Manual Screen

Figure E.15 is the Manual Screen. It is shown when the Manual Button is pressed on the View Screen. It allows trouble shooting of the system.

Caution should be used as all system safety features are disabled during Manual operation.

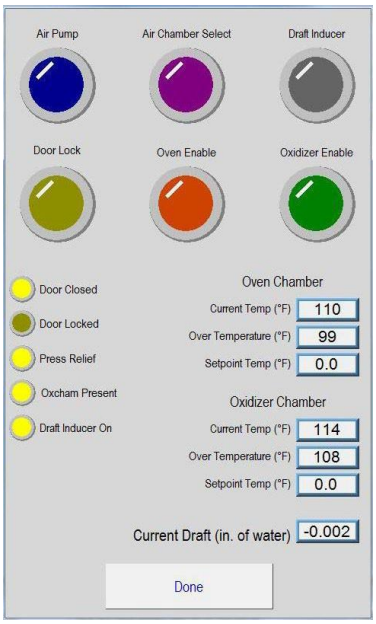


Figure E.15: Manual Screen

Air Pump, Air Chamber Select, Draft Inducer, Door Lock, Oven Enable, and Oxidizer Enable Buttons

Allow you to turn individual sub-systems on and off to test them.

Yellow Indicators

Show which inputs the system sees.

Functionality Checks

Show the current temperature and over temperature being reported for the oven and oxidizer chambers.

1. Door lock needs to be enabled to run Draft Inducer, Oxidizer Enable and Oven Enable.
2. Check to see if the Door Closed LED is lit yellow when the door is closed
    - Should it be dark:
        - Door is open or ajar
        - Door is not detected by door sensor
            - Side cabinet will need to be adjusted closer to door.
3. Door Lock: This button will engage the door bolt
    - When engaged the door locked will be lit
    - Should it not engage, a door Fault will occur, door light Led will not turn on.
        - Check the alignment of the door bolt to the door hole
            - The hole is adjustable, the bolt needs to have no obstruction to fully engage.

4. Air Pump: When engaged, will turn on air pump
5. Air Chamber Select: Will actuate the solenoid to change the direction of air flow.
    - Listen for the solenoid to actuate, a click should be heard and a pitch change will occur as well if the air pump is on.
6. Draft Inducer: When pressed, will engage the Draft Fan
    - within 5 seconds the Draft inducer on light will turn on.
    - A measurement of water column should be seen in the current draft field.
    - Should the Draft Inducer on light not turn on, or no draft is detected, a draft fault will occur.
        - Draft needs to be set.
        - Fan needs to be plugged in
        - Check Fuse 1& Fuse 2
        - Check air tube for blockage, kinks, or is disconnected.
7. Oxidizer Enable: This will pull in the contacts for the Oxidizer
    - you should be able to see the contacts pull in when pressed
    - If a temperature is entered in the Oxidizer Chamber set point(Max 500F) it will begin to heat to that temperature.
        - The draft inducer and door lock Must be enabled prior to enabling Oxidizer Enable.
    - Should the contacts not pull in a Contactor fault will occur
8. Oven Enable: This will pull in the contacts for the Oven.
    - You should be able to see the contacts pull in when pressed.
    - If a temperature is entered in the Oven Chamber set point(Max 500F) it will begin to heat to temperature.
    - The draft inducer and door lock Must be enabled prior to enabling Oven Enable.
    - Should the contacts not pull in a Contactor fault will occur.
9. Pressure relief: when lit this indication represents that the over-pressure switch is making contact with the pressure plate.
    - Should it be unlit, check the pressure plate that its making contact with the switch.
    - Check the switch, if its stuck in the open position.
10. OXpresent: Identified input that an Oxidizer is present
    - If not lit Oxidizer oven will be disabled.

Oven Chamber and Oxidizer Chamber

Current Temperature - the current reading from the thermocouple from that chamber
Over-Temperature - the current reading from the over-temperature thermocouple from that chamber
Set-point Temperature - these values are locked at a maximum value of 500° F to eliminate the risk of explosion.

NOTE: Should there be a temperature spread greater than 20° F between the current temperature and the over-temperature, check thermocouple type through the RMC.

Current Draft

Shown to help in the adjustment of the draft tube during ventilation set-up.

Done Button

Will return you to the View Screen.

E.7 Data Screen

Figure E.16 shows the screen that is displayed when the Data Button is pressed on the View Screen. Tabular data from the last run is initially shown. Other run files stored in the sytem can be selected on the right.

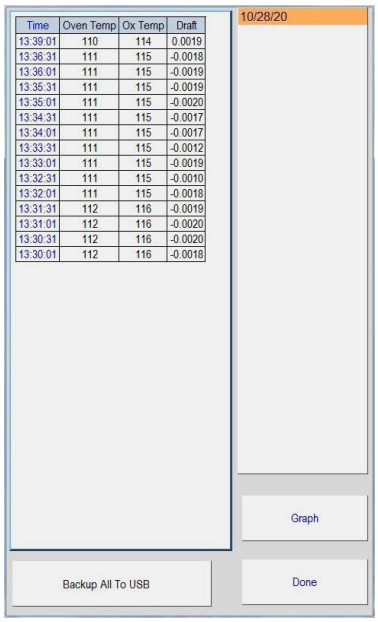


Figure E.16: Data Screen

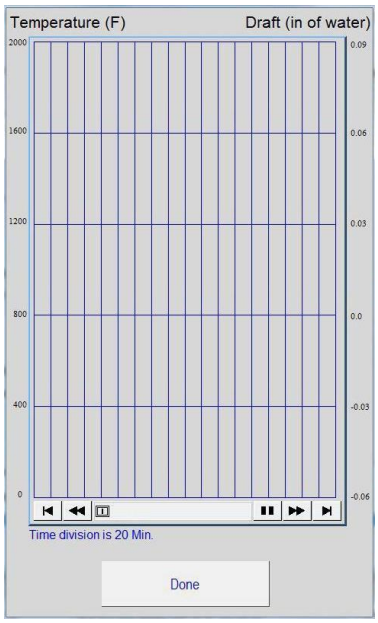


Figure E.17: Graph Screen

Graph Button

Will display a graph, like the one in Figure E.17, of the currently selected data log file.

Backup All to USB

Allows the operator to save all the log files currently stored in the system to a USB drive.

Done Button

Will return you to the View Screen.

E.8 Alarm Screen

Figure E.18 shows the screen that is displayed when the Alarm Button is pressed on the View Screen. Any alarm that has occurred and has not been reset will be listed.

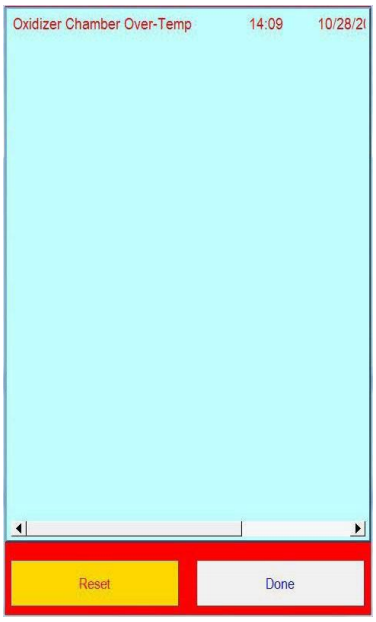


Figure E.18: Alarm Screen

Reset Button

Used to clear active alarms.

Backup All to USB

Will display a screen showing the system's alarm history. the list can be saved to a USB drive by using the Backup All to USB button on this screen.

Done Button

Will return you to the View Screen.

F. Operation

F.1 Important Operation Notifications

There are several notifications that may appear when operation of the Pyro-Clean® is initiated. These are broken into three categories of severity: warnings, alarms, and faults. **DO NOT IMMEDIATELY SHUT THE MACHINE DOWN WHEN THESE NOTIFICATIONS APPEAR**. Allow unit to continue cycle to completion. If the unit is required to shut down, it will do so on its own.

Warnings, alarms, and faults are color coded in yellow, orange, and red. Refer to the list below for descriptions of these common operation notifications. If additional assistance is required, contact the ATS Service Department at +1-724-283-1212.

Warnings (Yellow)

These do not stop the cycle but are things that you may wish to check after it is complete. Do not shut the machine down if these appear. They may indicate:

- 6 Month Clean Warning
- 1 Year Catalyst Replacement Warning
- Low Draft Warning

Alarms (Orange)

These do not stop the cycle but are things that should be checked before next cycle. Do not shut the machine down if these appear. They may indicate:

- Low Draft Alarm

Faults (Red)

These are faults that will automatically stop the current cycle. They must be fixed before next cycle.

- Oven Chamber Over-Temp
- Oxidizer Chamber Over-Temp
- Oven Chamber Over-Press
- Standardization Error
- Door Lock did not Engage
- Draft Inducer Error
- Low Draft Fault

F.2 Initial Start-Up: Empty Load

Do not operate the oven with a load if the correct slight negative draft/pressure in the oven chamber is not achieved.

Refer to Installation Instructions or call the ATS Service Department at +1-724-283-1212 for technical assistance.

1. After the Pyro-Clean® has been installed and properly vented with the correct draft, it is ready to operate. However, it is best to run the oven through a short cleaning cycle with it empty in order to:
    a. Familiarize the operator with the normal operating sequence and location of the controls.
    b. Check that all controls, indicating lights, and components are operating normally.
2. The oven door latch is a compression type, and must be turned completely to the right until the door “pulls up” and is completely latched.
3. When the main power toggle switch is turned on, the indicator light and HMI should power up. For this test only, set the Cycle Time on the Settings Screen to about 10 minutes.
4. To start the empty test run, press the Start Button. The status bar will change to Oxidizer Preheat on the HMI. The oven exhaust fan will be powered at this time and you may hear a slight noise from the exhaust. A small air pump which feeds a stream of air to the oxidizer is started at the same time. The Afterburner heaters come on and you should see the Afterburner temperature begin to rise to its normal set point of 1300°F. Typical heat-up time for the Afterburner to reach 1300°F is about 80 minutes. 10 minutes after the oxidizer reaches 1250°F, the status bar will change to Oven Soak, the oven will turn on, and the door will lock.
5. During an empty run, the oven will heat up to its ramp/soak set-point, typically 900°F and control at this temperature for the stable time of 180 minutes. Then the status bar will change to Run Cycle, and the oven heat up will continue to the normal set-point of the oven temperature controller, 950°F. When the oven temperature reaches 940°F, a timer will start for the cycle time set. When it times out, the status bar will change to Cool Down, and both the oxidizer and the oven will shut off.
6. After the oven has cooled down to below 500°F, the status bar will change to Cycle Finished, and the draft inducer, air pump, and door lock will all turn off. At this point press the End/Stop button to finish the cycle. The door can be opened to allow faster cooling. However, in a normal cleaning cycle for glass or metal parts, it is best to let the oven cool down as much as possible to minimize the handling of hot parts.

F.3 Starting a Normal Load of Dirty Glasswear or Metal Parts

Tips on Loading

The glass or metal parts should have relatively small amounts of organic residues, on the order of grams to a couple pounds. Parts with very heavy residues of combustible organic matter should not be processed in the Pyro-Clean®. A practical limit for the oven is in the range of 1 to 2 pounds of asphalt or other organic residues per load/cycle.

Whenever possible, always load the parts to promote drainage of any visible residues. The oven is furnished with a metal tray on the chamber bottom to catch molten residues which drain off the parts. This will give the best cleaning results. Longer cycle times will virtually always be required if the contaminants are not allowed to drain out of the parts during the pyrolysis cleaning cycle.

The Pyro-Clean® is furnished with two racks (trays) to hold the parts. Both of these racks have a stainless steel wire mesh on the bottom which holds catalyst pellets that help destroy the pyrolysis gases formed during the cleaning cycle. Use both trays during every cycle. Both must not be left out of the oven under any circumstance. A metal drip pan on the bottom of the oven is furnished to catch any drippings. The drain pan helps prevent any plastic or polymer from running down on the oven floor and onto the door gaskets where the residue could cool, harden and tear off the gasket when the door is opened. Always place any parts with the heaviest residues toward the back of the oven to prevent any organic material from dripping on the oven door gaskets.

F.4 Cycle Times for Cleaning

The Pyro-Clean® is equipped with an Automatic Cycle Time Feature which adjusts itself to the load placed in the oven. The cleaning time is limited by the processing speed of the oxidizer. The more asphalt or other organic residues on the parts, the more smoke that will be evolved off the parts during the thermal cleaning process.

The oxidizer is equipped with a temperature sensor and controller which monitors the amount of smoke evolved off the parts and controls the heat-up rate of the oven to prevent the oxidizer from being overwhelmed by too much smoke. The oxidizer control system will cut off the oven heaters if too much smoke is being produced. The oven temperature seeks whatever temperature is necessary to produce the maximum amount of smoke the oxidizer can process. Thus the oxidizer actually controls the heat-up rate if sufficient plastic residues are on the parts. When all of the organic residues are pyrolyzed/vaporized off of the parts, smoke evolution will fall off, allowing the oven temperature to climb to the normal processing temperature of 900°F to finish off the cleaning process.

A cycle time is set on the Settings screen. The Factory setting of 1 hour (3-4 for asphalts) is recommended for most applications. The Cycle Time does not start until the oven temperature reaches within -10°F of the set-point of the Oven Temperature Controller. With a normal set-point of 950°F, the Cycle Time does not start timing until the oven temperature reaches 940°F. This ensures that the dialed amount of time is a true “time at temperature”. For safety reasons, never set the Cycle Time at less than 1 hour. This ensures that volatile, pyrolysis gases are exhausted from the oven before the oven shuts down.

For most organics, pyrolysis and vaporization into smoke will actually begin below 900°F, so it is quite common for the oven temperature to seek a level of about 700 to 800°F while the maximum amount of smoke is being vaporized off of the parts. After the bulk of the smoke is gone, the Oxidizer controller senses this and allows the oven to heat up to process set-point, typically 950°F. For large glassware, the parts themselves may serve as heat-sinks and allow the oven temperature to reach set-point even though the parts are too cool to produce enough smoke to turn off the oven heaters. In this case, the oven temp may reach set-point for 20-30 minutes until the glass parts get hot enough to start significant smoke production. Then the Oxidizer Controller will take control of the cleaning process and limit the oven temperature to that which produces the maximum smoke and processing rate of the Oxidizer. Thus the oven temperature may reach set-point until enough smoke is produced to drive the oven temperature to a lower level. After all the smoke is vaporized away, the oven temperature is then allowed to climb to 950°F and finish the cleaning cycle.

F.5 Cool-Down Before Removing the Glasswear or Metal Parts

When the cycle ends the oven and afterburner heaters shut off, ending the cleaning cycle. The oven exhaust fan continues to run to help remove the heat as the oven and afterburner cool. The oven will need to cool to at least 500°F before the door is unlocked and can be opened. Where possible, it is best to let the oven cool down low enough that the parts can be removed and handled comfortably without special gloves or precautions.

F.6 Additional Operation Precautions

CAUTION: When the oven unlocks to allow the removal of parts, remember that they are still 500°F and you will need protective equipment to handle them.

WARNING: Do not use flammable solvents to clean the oven or use with products other than designed for. Using solvents or products not specified by the equipment manufacturer may create potential for formation of flammable or volatile gas mixtures. Always refer to product SDS or contact the manufacturer.

WARNING: Do not clean any sealed vessel, glass or metal, which could develop explosive forces and rupture inside the oven.

WARNING: Do not overload the oven with parts containing heavy organic residues. The maximum load for the Pyro-Clean Oven is 1 to 2 pounds of polymer or plastic.

WARNING: Always ensure that the trays containing desiccant beads are installed in the oven during operation. Failure to install the desiccant bead trays may create potential for formation of flammable or volatile environment inside the oven.

WARNING: Do not use in the presence of flammable or combustible materials; fire or explosion may result. This device contains components which may ignite such materials.

CAUTION: Do not clean / attempt to remove silicon materials in the oven as it will poison the catalytic system of the oven (and afterburner, if so equipped).

CAUTION: All supporting and contacting surfaces must be non-flammable. Do not allow flammable materials to contact the shell.

CAUTION: Do not exceed the maximum operating temperature.

CAUTION: If an emergency shutdown needs to be performed, place ON/OFF switch in the OFF position - Do not disconnect power to perform shutdown.

F.7 Operation Instructions

1. Turn the power switch on the front of the Pyro-Clean® to the ON position. The POWER light located on the front of your oven will light up and the HMI display will power on. The status display will show “Off”.
2. Select “View” on the HMI Main screen.
3. Select “Settings” on the HMI View screen.
4. Verify that the “Cycle Time” is set up to the value you wish. A setting of 2 hours is recommended for most applications. However, for removing asphalts, a setting of 4 to 5 hours is recommended as asphalts are among the more difficult organics to remove.
5. Select “Done” to return to the “View” screen.
6. Select “Done” to return to the “Main” screen.
7. Load the oven with the parts that you wish to clean. Parts should be loaded to promote drainage. Read “The General Overview” section before loading parts to verify what the Pyro-Clean® can clean.
8. Close the oven and latch it.
9. Press the “Start” button to start the oxidizer chamber heating to 1300°F. The draft inducer and air pump will turn on. The status display will change to “Oxidizer Preheat”.

10. Once the oxidizer temperature is stable (1300°F ±50°F for 10 minutes). The oven door will lock and the oven will start to heat to 900°F. The status display will change to “Oven Soak”.
11. In the “Oven Soak” stage, the oven will heat up creating smoke that gets burned off in the oxidizer chamber. If the oxidizer temperature goes over 1500°F it will shut off the oven heat until the temperature goes below 1350°F. It will then turn the oven back on. This cycle will continue back and forth until the smoke generation dies down and the oven temperature is stable (900°F ±10°F for 180 minutes). The oven will then heat to 950°F and the air select will shift the air flow from the oxidizer to the oven. The status display will change to “Run Cycle”.
12. Once the oven gets to cycle temperature (950°F ±10°F) it will sit for the cycle time.
13. Once the cycle time has expired, both the oxidizer and oven chamber heat will turn off and the status display will change to “Cool Down”.
14. When the oven temperature drops below 500°F the draft inducer and air pump will turn off and the oven door will unlock. The status display will change to “Cycle Finished”.
15. At this point press the “End\Stop” button to return the system to “Off”.

CAUTION: When the oven unlocks to allow the removal of parts, the contents and internal components of the oven will still be at 500°F - Use proper Personal Protective Equipment (PPE) to handle them.

WARNING: Be careful when working with equipment at elevated temperatures. To prevent burns, wear proper Personal Protective Equipment (PPE) for accessing oven and removal of hot items.

WARNING: Use caution when opening the oven. Electrically heated equipment can cause severe burns

G. Troubleshooting

G.1 Preface

Any additional issues or system errors should be brought to the attention of the Applied Test Systems Service Department immediately by calling +1-724-283-1212 or emailing service@atspa.com.

DO NOT attempt to independently fix any other system errors. Any additional errors fixed independent of technical support at Applied Test Systems could result in damage to the equipment, or injury on the part of the operator.

G.2 Troubleshooting

WARNING: To prevent electrical shock, use extreme caution when removing covers or panels. Follow your company's electrical safety procedures thoroughly

WARNING: Service to be performed by qualified personnel.

WARNING: Do not open the side panel unless explicitly instructed to do so for troubleshooting purposes.

CAUTION: Before energizing the electrical power to the Pyrolytic Oven, place all controls in the OFF position.

G.3 Troubleshooting Electrical Problems

Refer to the provided ladder wiring diagram and the control box component layout diagram (Figure C.3) to identify components and function. A qualified electrician should find this sufficient to troubleshoot and identify any electrical problems that may occur with the equipment.

The oven electrical wiring diagram identifies locations and ratings of all circuit protection fuses. These should be checked first with any electrical problem.

If assistance is needed to determine the problem, contact Applied Test Systems and ask for technical help.

G.4 Manual Operation to Check Electrical Operation

A manual operation screen is included so that all parts can be controlled manually to check operation and help troubleshoot the system. See Section E.6 for more information.

NOTE: In manual operation the temperature control systems will only allow the temperature to be set to 500°F as a safety precaution.

G.5 Pyro-Clean Alarms

The following is a list of possible Alarm Codes, what triggers each alarm, and possible problem areas.

Alarm	Source	Areas to Check
Oven Chamber Over-Temp	Over-Temp Thermocouple for Oven	1.) Check for signs of combustion in oven. 2.) Check Over Temp setting in Oven Settings menu. 3.) Faulty/Defective Thermocouple. 4.) Problem in Temperature Controller.
Oxidizer Chamber Over Temp	Over- Temp Thermocouple for Oxidizer	1.) Check Data log for evidence of runaway combustion in Oxidizer. 2.) Check Over Temp setting in Oxidizer Settings menu. 3.) Faulty/Defective Thermocouple. 4.) Problem in Temperature Controller.
Oven Chamber Over-Press	Blast door opening –door switch opening. PLC does not receive a signal at DI3 that explosion door is closed.	1.) Check Oven door seals for signs of damage or leaking. 2.) Check positioning of blast door and condition of switch. 3.) Replace oven Trays. 4.) Check wiring for blast door switch.
Door Lock did not engage	Door bolt does not fully extend – travel sensor for solenoid not triggered. PLC does not receive a signal at DI2 that door bolt is fully extended.	1.) Door sagging ,door bolt not aligned with striker plate. Shim door hinges as necessary or adjust striker plate. 2.) Door lock time too short in Oven Settings- should be 5 secs. 3.) Faulty door bolt.
Draft Inducer Error	PLC does not receive a signal at	1) CR6 did not energize

	DI4 that draft fan is running.	2) Test Draft Inducer fan in manual screen. 3) Draft fan not running- check fuses; check that fan is not plugged in. 4) Pressure switch PS1 did not close; check for kinked , disconnected or obstructed air line to PS1; check for plugging or obstruction in draft inducer fan; verify draft fan is running. 5) CR6 is faulty ; override CR6 relay to see if fault clears. 6) Check wiring from CR6 to PLC.
Oven Contactor fault	PLC does not receive a signal at DI5 that Oven Contactor CR2 is closed.	1) Test Oven Contactor in manual screen. Verify contactor is closing when oven enabled. 2) Check wiring between CR2 and PLC. 3) Replace Oven Contactor.
Oxidizer Contactor Fault	PLC does not receive a signal at DI6 that Oxidizer Contactor CR3 is closed.	1) Test Oxidizer Contactor in manual screen. Verify contactor is closing when oxidizer enabled. 2) Check wiring between CR3 and PLC. 3) Replace Oxidizer Contactor.
High Draft Fault	Dwyer Pressure Transducer reads draft of 0.09 or higher for more than 30 seconds during operation.	1) External Draft being introduced- check for any external exhaust fans running . 2) Draft pressure sensor not reading correctly- check that draft displayed is very close to 0.00 in WC when Draft Inducer fan is OFF and oven door is open.
Low Draft Fault	Dwyer Pressure Transducer reads draft of -0.03 or lower for more than 30 seconds during operation. Indicates oven is under a positive pressure condition.	1) Oven Door seals leaking- Check door latch for tightness & oven gaskets for signs of damage. Replace/adjust as necessary. 2) Material in oven

		combusting instead of pyrolyzing- replace catalytic trays.
Low Draft Warning	Dwyer Pressure Transducer reads draft of -0.00 to -0.01 for 30 seconds during operation. Indicates oven is under a positive pressure condition.	1) See Low Draft Fault
Low Draft Alarm	Dwyer Pressure Transducer reads draft of -0.01 to -0.03 for 30 seconds during operation. Indicates oven is under a positive pressure condition.	1) See Low Draft Fault
Oven Input Error	Problem with programming of RMC- should not see.	
Oven Limit Input Error	Problem with programming of RMC- should not see.	
Oxidizer Limit Input Error	Problem with programming of RMC- should not see.	
Oven Limit Error	Problem with programming of RMC- should not see.	
Oxidizer Limit Error	Problem with programming of RMC- should not see.	
Watlow RMC Device Error	Problem with programming of RMC- should not see.	

H. Maintenance

WARNING: Disconnect power prior to performing maintenance. Place Main Power Switch in ‘OFF’ position and disconnect the line cord from the power source before performing any maintenance procedures

WARNING: Service to be performed by qualified personnel.

WARNING: Do not open the side panel unless explicitly instructed to do so for troubleshooting purposes.

WARNING: Do not use flammable solvents to clean the oven or use with products other than designed for. Using solvents or products not specified by the equipment manufacturer may create potential for formation of flammable or volatile gas mixtures. Always refer to product SDS or contact the manufacturer.

CAUTION: Before energizing the electrical power to the Pyrolytic Oven, place all controls in the OFF position.

H.1 Door Seals and Gaskets

The oven door has two gaskets. One is a high temperature gasket which serves both as a seal and a heat barrier to protect the silicone gasket. Periodic replacement of the high temperature gasket is considered necessary routine maintenance. The high temp gasket contains an inner core stainless steel mesh, covered with woven glass fiber. Because of its porous nature, the high temp gasket will gradually absorb condensed smoke or vapors from inside the oven and begin to harden. This gasket can be recycled and used again by removing it, replacing it with a new high temp gasket, and cleaning the old gasket inside the oven at the same time a typical load of glass or metal parts is cleaned. The blackened, old gasket will come out of the oven looking almost new. The gasket can be used again unless it was mechanically torn, ripped, or otherwise damaged during removal.

The silicone gasket mounted on the oven door serves as a second seal for the oven chamber and prevents excessive air leakage inside the oven. Parts should never be loaded such that any molten organic residues drain from the parts, miss the metal pan on the floor of the oven, and run down on the door gaskets. When cool, such material can harden and rip the door gasket off when the door is opened.

H.2 Cleaning the Oven Trays

Both of the two oven trays have a bottom of stainless steel wire mesh containing special catalytic pellets which help destroy the pyrolysis gases inside the oven chamber by reaction with the oxygen in the oven atmosphere. As these trays get dirty and accumulate inorganic ashes, they should be removed and rinsed with water to get the catalyst pellets free of obstruction or coatings which would prevent it from working.

WARNING: Always ensure that the tray containing desiccant beads is installed in the oven during operation. Failure to install the desiccant bead tray may create potential for formation of flammable or volatile environment inside the oven.

H.3 Removal of Ashes and Pigments

Ashes, pigments, dirt, or other inorganic matter left from the cleaning process should be removed as necessary to maintain good housekeeping. Do not allow such material to collect at the door gaskets where it might interfere with a good, tight seal.

H.4 Periodic Empty Tests & “Self-Cleaning” Cycles

Every 3 to 6 months, run an empty test run (cycle) during daytime hours so the operator of the oven can verify that the oven controls are working properly. With no parts in the oven, this test run will also act as a “self-cleaning” cycle and help remove any residual, built-up carbon residues which may be deposited by numerous moderate to heavy loads of organic contaminants.

H.5 Cleaning of Draft Inducer Fan

Periodically, the squirrel cage blower of the Draft Inducer should be blown out with compressed air to remove accumulated dust and lint.

H.6 Automation Direct CLICK PLC, Battery Back-up Feature

The Automation Direct CLICK PLC has a battery back-up feature that will retain data in the SRAM for three years.

Battery Backup (Standard, Analog and Ethernet PLC Units)

All of the CLICK PLC units have a super capacitor to maintain back up data in SRAM. However, the backup period by the super capacitor depends on the CLICK PLC unit type you use.

CLICK PLC Unit	Backup Period by the Super Capacitor
Basic PLC Units Standard PLC Units Analog PLC Units	7 Days
Ethernet Basic PLC Units Ethernet Standard PLC Units Ethernet Analog PLC Units	1 Hour

If you need the CLICK PLC unit to maintain data in the SRAM for longer than the above period after the power is shut off, you must install a battery in the CLICK PLC unit.

NOTE: CLICK Basic PLC units do not have the battery backup feature.

Use battery part number CR2354 (Panasonic or equivalent) (not included with the PLC unit; order battery separately). Typical battery life is 3 years, which includes PLC runtime and normal shutdown periods.

NOTE: Power off the PLC while installing and/or changing the battery.

To install or replace the CR2354 battery:

1. Press the retaining clip on the battery door and swing the battery door open.
2. Install the battery into the coin-type slot with the +, or flat, side out.
3. Close the battery door so that it locks securely.
4. Make a note of the date the battery was installed.

Battery backup is now available.

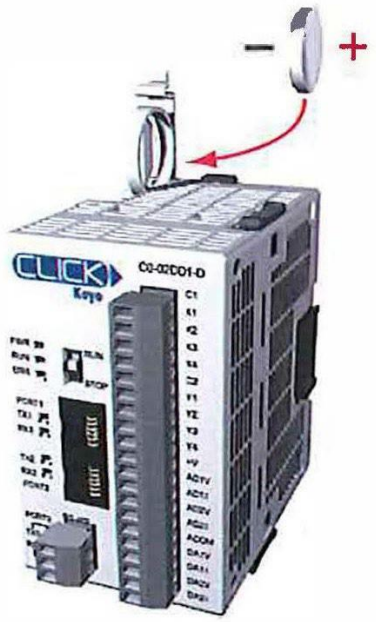


Figure H.1: CR2354 Battery

WARNING: Do not attempt to recharge the battery or dispose of it by fire. The battery may explode or release hazardous materials.

NOTE: The CLICK PLC has a feature that indicates the pre-scheduled battery replacement date has passed. In the CLICK programming software, go to the pulldown menu: Setup > Battery backup Setup.

H.7 Replacement of Parts

When components must be replaced, refer to the Parts List included in this manual for the appropriate descriptions. Consult Factory for current prices. Electrical parts on the oven are warrantied for one year.

WARNING: Disconnect power prior to performing maintenance. Place Main Power Switch in ‘OFF’ position and disconnect the line cord from the power source before performing any maintenance procedures

WARNING: Service to be performed by qualified personnel.

WARNING: Do not open the side panel unless explicitly instructed to do so for troubleshooting purposes.

CAUTION: Installation of electrical devices must be accomplished by qualified personnel and done in accordance with any current local and national codes.

CAUTION: Before energizing the electrical power to the Pyrolytic Oven, place all controls in the OFF position.

Thermocouple Replacement

To replace any of the Thermocouples (TCs) or the Heating Elements:

1. Place all power controls in the ‘OFF’ position to ensure the oven is de-energized, then disconnect the oven from the power source.
2. If the oven is hot, allow it to sufficiently cool before performing maintenance.
3. Remove the back cover of the oven by using an 1/8” allen wrench to remove the 18 button head screws.

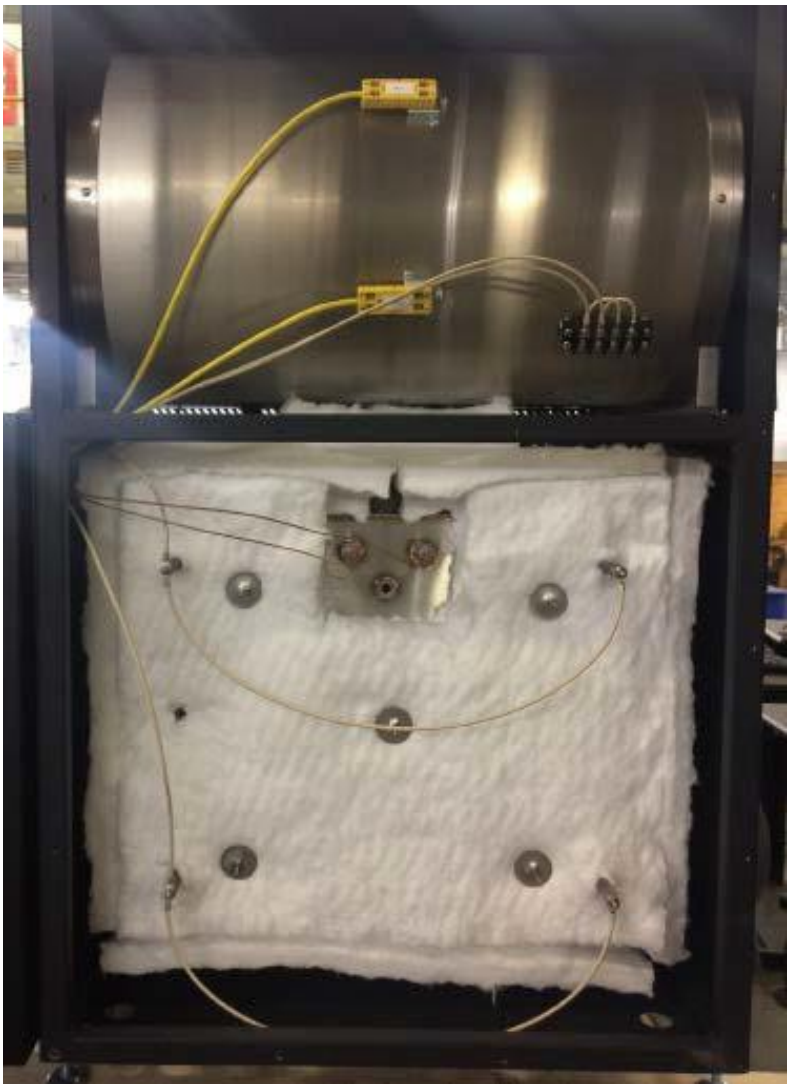


Figure H.2: Rear of Oven with Back Cover Removed

To Remove/Replace the Oven Control Thermocouple (TC):

1. Determine where the TC is connected to the Electrical Terminal Block (Figure C.3, item 13) and disconnect it.
2. Remove the TC wire from the Electrical harness and panduit raceway until is fully free at the rear of the oven.

3. Loosen the retaining nut at the base of the TC and slide the TC out of the TC port.
4. Replace the new TC in the reverse order of removal, being careful not to kink or break the TC wires while routing back to the Terminal Block.
5. Perform Operation Checks in accordance with Section H.9.

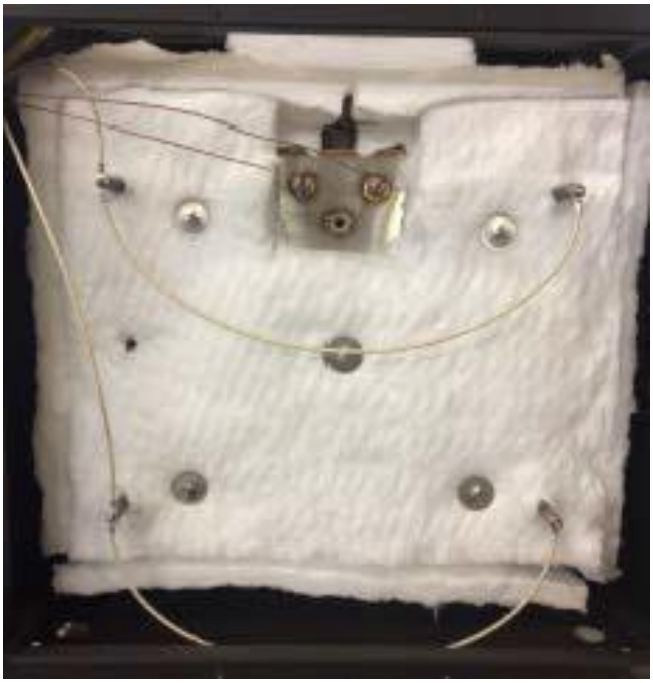


Figure H.3: Oven Assembly

Figure H.4: Thermocouples

To Replace the Hi-limit Thermocouple (TC):

1. The Hi-Limit TC is removed and replaced in the exact same manner as the Oven TC.

To Remove/Replace the Oxidizer Control Thermocouple (TC):

1. Unplug the yellow TC wire connector from the yellow base.
2. Remove the two small retaining screws from the yellow TC base and slide the TC out of the TC port.
3. Replace the new TC in the reverse order of removal, being careful not to kink or break the TC wires while routing back to the Terminal Block.
4. Perform Operation Checks in accordance with Section H.9.

Figure H.5: Oxidizer Furnace Assembly

Figure H.6: Thermocouples

Heating Element Replacement

To replace any of the Thermocouples (TCs) or the Heating Elements,:

1. First, Place all power controls in the 'OFF' position to ensure the oven is de-energized, then disconnect the oven from the power source.
2. If the oven is hot, allow it to sufficiently cool before performing maintenance.
3. Remove the back cover of the oven by using an 1/8" allen wrench to remove the 18 button head screws.

To Replace the Heating Elements:

1. Locate the five insulation retainer tabs on the back ot the oven and carefully pry them off with a pulling and twisting motion. Be careful not to damage them as they will be re-used. If damaged, replacements can be purchased from ATS Service.
2. Tag the heating element power wires to ensure you reconnect them to the proper terminals when you reinstall the elements.
3. Loosen the 3/8" nuts retaining the heating element power wires and disconnect the wires from the heating element studs.
4. Carefully pull the insulation over the heating element studs to expose the heating element retaining nuts.
5. Remove the 1" heating element retaining nuts.

Figure H.7: Heating element connections (4) & insulation retainers

Figure H.8: Heating element connections & insulation retainers (5)

6. Move to the front of the oven and remove the heating element covers from inside the oven by removing the three 1/8” allen head screws from the back edge of each cover. Once the screws are removed, the cover can be slipped off of the front retaining tabs and removed from the oven.

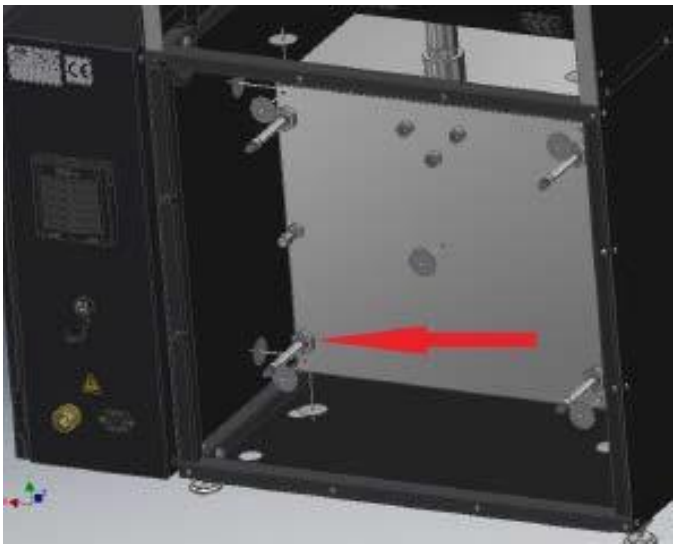


Figure H.9: Heating element 1” retaining nuts (4), shown with insulation removed.

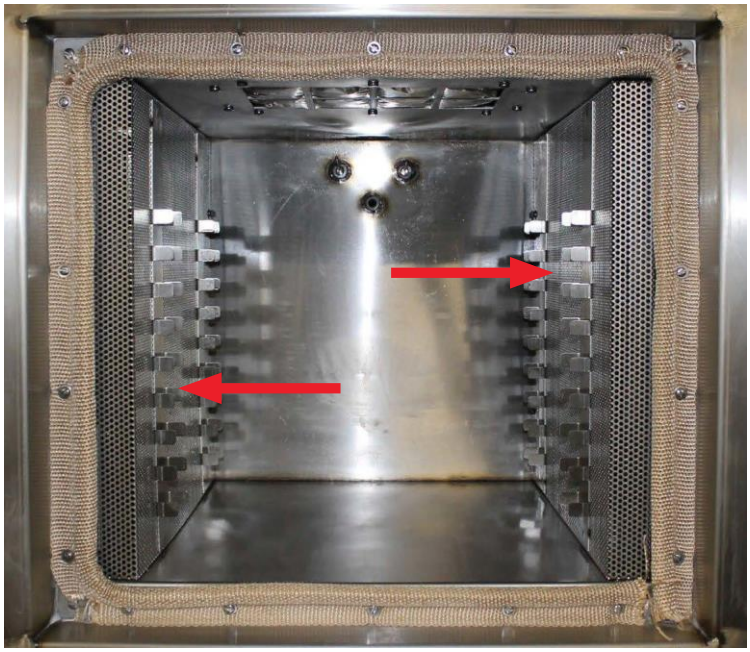


Figure H.10: Heating element covers (2) inside of oven

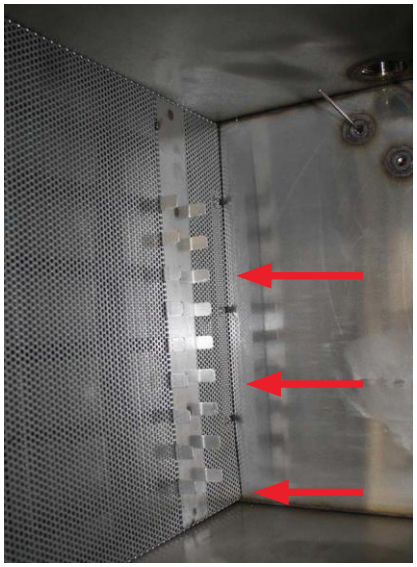


Figure H.11: Heating element covers on left side, retaining screws (3) along rear edge

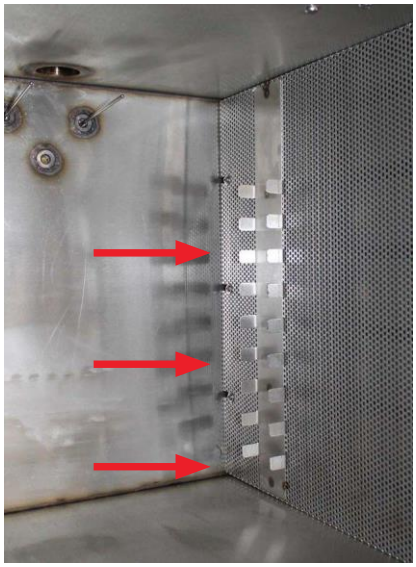


Figure H.12: Heating element covers on right side, retaining screws (3) along rear edge

7. The heating elements are now exposed (see Figure H.13) and can be removed from the oven.

8. Installation is the reverse of removal.
   - Be sure to seat the heating element covers on the front retaining tabs before installing the retaining screws.
   - Tighten the heating element 3/4-16 Hex retaining nuts until snug.
   - Replace the insulation and the insulation retaining tabs.
   - Reinstall the heating element power wires in the same locations they were removed from.
   - Tighten the heating elements power wire #10-32 retaining nuts to 31 in-lbs.

9. Perform Operation Checks in accordance with Section H.9.

Figure H.13: Heating element (right side) shown with cover removed

H.8 Periodic Maintenance

Every Six Months

1. Exchange Hi-Temp door gasket.
   a. The oven door has two gaskets. One is a high temperature gasket that serves both as a seal and a heat barrier to protect the silicone gasket. The high temp gasket contains an inner core stainless steel mesh, covered with woven glass fiber. Because of its porous nature, the high temp gasket will gradually absorb condensed smoke or vapors from inside the oven and begin to harden.

   b. The high temperature gasket can be cleaned and re-used by removing it and cleaning it inside the oven. The soiled gasket will appear almost new after cleaning. It can now be re-used unless it is damaged.

   c. During the cleaning cycle for the gasket, verify that the controls are working properly.
2. Check draft
   a. Turn the power on. Go to Manual screen and start the Draft Inducer.

   b. Move the draft control to make sure the range of draft pressure can be adjusted from at least 0.06 inch w.c. initial cold start.

   c. Leave the draft control in position to give a draft pressure of about 0.06 inch w.c. initial cold start.

   d. Remember, the draft sensor is only a measuring device; it only reads the draft and does not create draft. Also, the draft sensor is set to read a negative pressure in the oven as positive pressure on the screen (essentially it reads backwards).

NOTE: The draft sensor reads a negative pressure in the oven. However, it is displayed as a positive pressure on the screen.

WARNING: Follow manufacturer's directions for proper draft settings, improper draft may create potential for formation of flammable or volatile environment inside the oven.

3. Clean draft inducer blower (exhaust blower)
   a. The squirrel cage blower of the draft inducer should be blown out with compressed air to remove accumulated dust or other debris.
4. Removal of Ashes and Pigments
   a. Ashes, pigments, dirt, or other inorganic matter left from the cleaning process should be removed as necessary to maintain good housekeeping. Do not allow such material to collect at the door gasket(s) where it might interfere with a good, tight seal.
5. Clean the Oven Trays
   a. Both trays contain special catalytic pellets in a stainless steel mesh. The catalyst helps destroy the pyrolysis gases inside the oven chamber by reaction with the oxygen in the oven atmosphere. The trays should be removed and rinsed with water to remove any contaminants, coatings, or obstructions from the catalyst pellets, which may prevent the catalyst from working properly.

   b. Empty the catch tray that is located in the bottom of the oven.

WARNING: Always ensure that the tray containing desiccant beads is installed in the oven during operation. Failure to install the desiccant bead tray may create potential for formation of flammable or volatile environment inside the oven.

7. Clean Electronics Cabinet
   a. Vacuum out any accumulated dust and debris from the electronics cabinet.

Every Twelve Months

Perform all steps identified for 6 month maintenance, plus:

1. Replace catalyst trays
   a. Discard the old trays containing the catalyst and replace them with new ones.

H.9 Operational Checks

After completion of any Service, Maintenance, or Repairs, perform an operational check on the equipment by referring to Section F.2 ‘Initial Start-Up: Empty Load’ of this manual. Observe any Warnings, Alarms, or Faults, and correct any that may be present before placing equipment back into service.

WARNING: Do not operate the oven without the special catalytic trays inside the oven. These trays contain a special catalytic material which helps inert the oven atmosphere and destroys the pyrolysis gases produced during the cleaning process.

WARNING: Do not rinse glassware or metal parts with flammable solvents such as acetone, toluene, etc. and then clean the parts in the oven without allowing the solvents to dry. Flammable solvents such as acetone or toluene will ignite or explode inside the oven if present in sufficient concentration.

H.10 Spare Parts List

The following should be kept on hand for regular maintenance:

- Tray, Stainless Steel, Catalytic, QTY 1
- Thermocouple, Oven Control Type K, QTY 1
- Thermocouple, Oven Hi-Limit Type K, QTY 1
- Thermocouple, Oxidizer Control, Type K, ¼" by 6" long, 36" leads, QTY 1
- Gasket, Door Replacement, Hi-Temp, QTY 1

Part No.	**D**escription
103744	Gasket, Door Replacement, Hi-Temp
101770	Gasket, Door Replacement, Silicone
103216	Thermocouple, Oven Type K
103219	Heater Elements, Model 3 Oven

Part No.	Afterburner (Oxidizer) Parts
Contact ATS	Thermocouple, K, 1/8" by 6" long, 36" leads
102703	Air Pump, Oxidizer

Part No.	**Oven Trays & Pans**
4-14329	Tray, S.S., Catalytic ***2.5 cubic feet unit***
2-9229	Drip Pan, S.S. ***2.5 cubic feet unit***
4-15244	Tray, S.S., Catalytic ***5.2 cubic feet unit***
2-9762	Drip Pan, S.S. ***5.2 cubic feet unit***

H.11 New HMI Software

From time to time a new software version may come out for the HMI. Below are instructions for downloading the new software. The new version of software must be on the root of a flash drive.

1. Power up the machine.
2. Open USB port cover and install flash drive containing the new version of software into the USB port.
3. After a few seconds the menu in Figure H.14 will appear. Choose Download.

Figure H.14: Pop-Up Menu

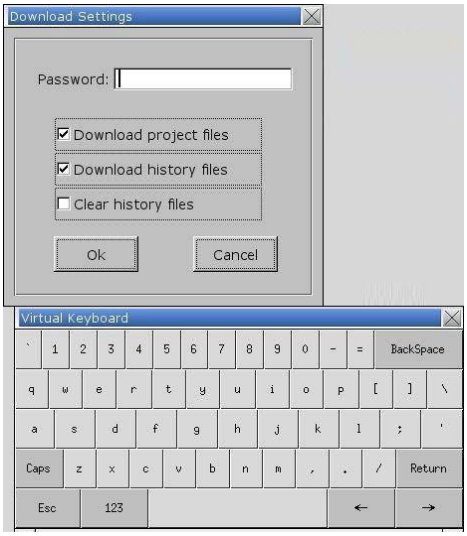


Figure H.15: Second Pop-Up Window

4. Another pop-up menu will appear prompting for a password. Using the keyboard displayed on the screen (Figure H.15), enter 111111. Check the box that indicates Download Project files and uncheck the boxes that indicate Clear History files and Download History files and select OK.
5. Next will appear 2 subdirectories - pccard and usbdisk. Click usbdisk, select disk_a_1, and click OK.
6. The necessary files will now be downloaded.

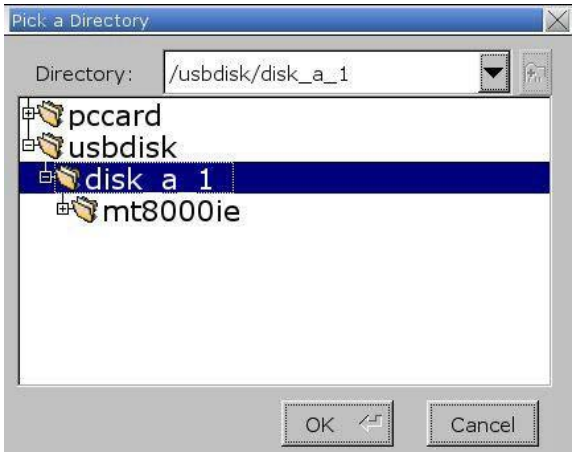


Figure H.16: disk_a_1

7. When done, remove the flash drive and replace the USB port cap.

H.12 New PLC Software

If upgraded or reloaded software is needed for the PLC controller, please contact ATS service for help.

H.13 New Temperature Control Software

If upgraded or reloaded software is needed for the Temperature Control, please contact ATS service for help.

Appendix A: 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 –

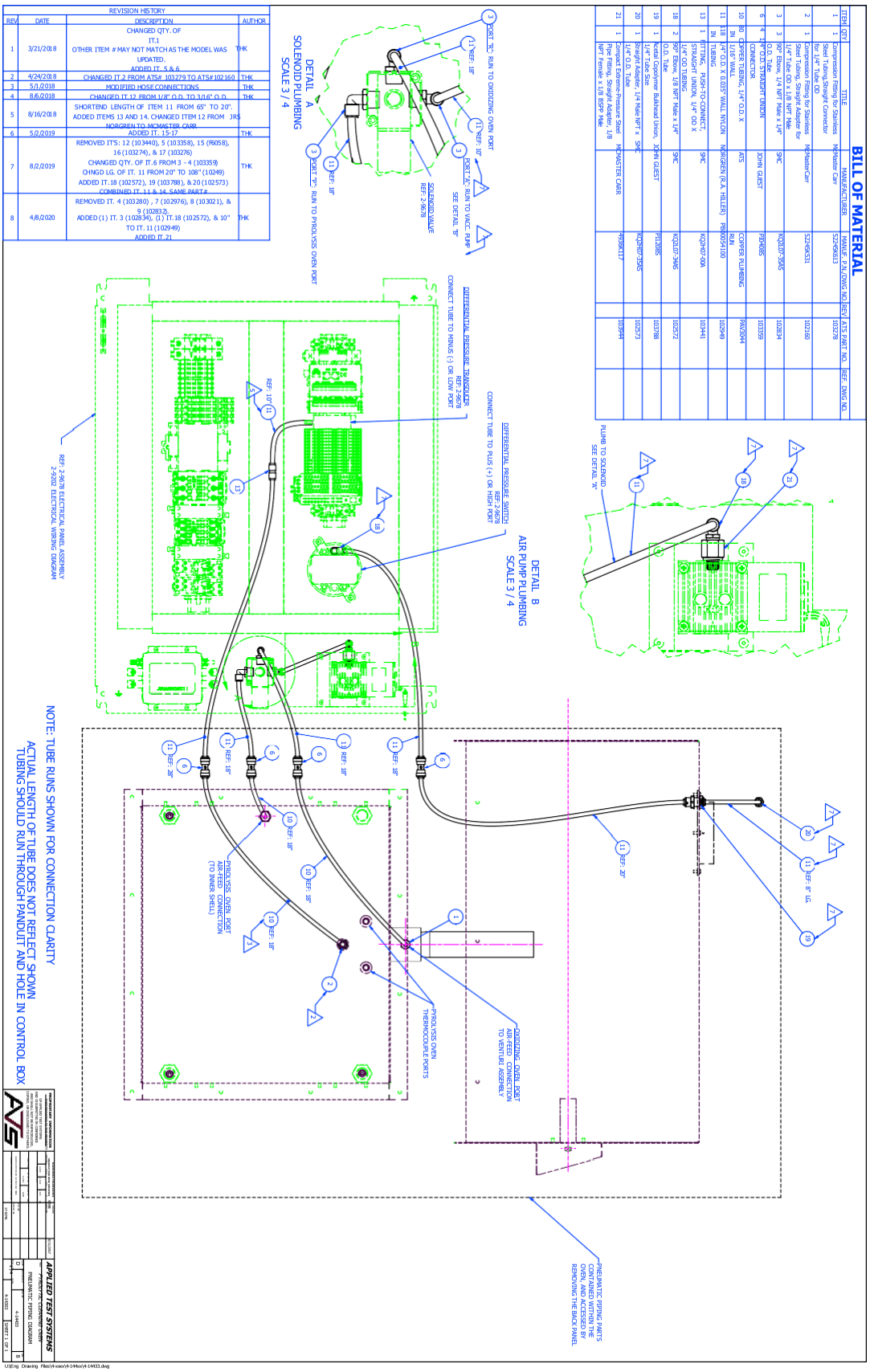
3. Applied Test Systems examination of such equipment discloses to its satisfaction that the defect exists and was not caused by negligence, misuse, improper installation, accident, or unauthorized repair or alteration.

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.

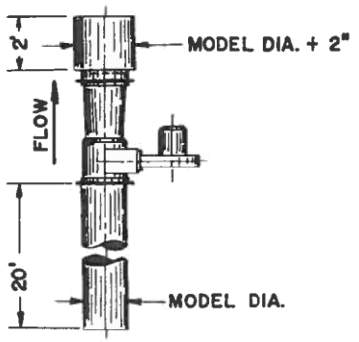
Appendix B: Piping Diagram



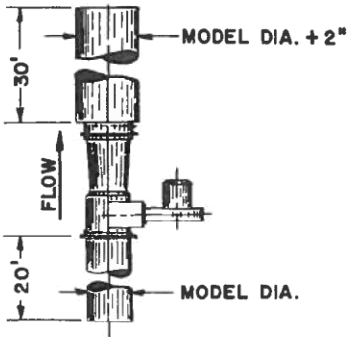
Appendix C: Airflow Capacity Data

	Q-4			
Test Condition	**CFM**	**Negative Static Pressure**		**Draft**
		Open	**Closed**	
#1 Vertical	85	.16	.36	.20
#2 Vertical	75	.12	.365	.16
#3 Vertical	35	.03	.235	.035
#4 Horizontal	70	.10	.35	.13
#5 Horizontal	37	.035	.245	.045
#6 Horizontal	54	.07	.33	.095
#7 Horizontal	31	.025	.22	.035
#8 Horizontal	77	.12	.36	.145

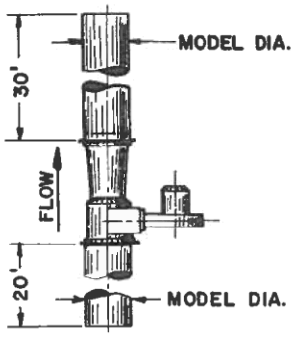
VERTICAL INSTALLATIONS:



TEST CONDITION 1 (VERT.)
VENTING TO ATMOSPHERE.

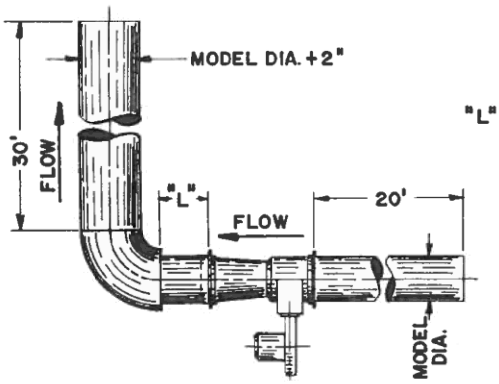


TEST CONDITION 2 (VERT.)
VENTING TO 30' STACK
2" IN DIA. GREATER THAN
DIA. OF QUICKDRAFT.



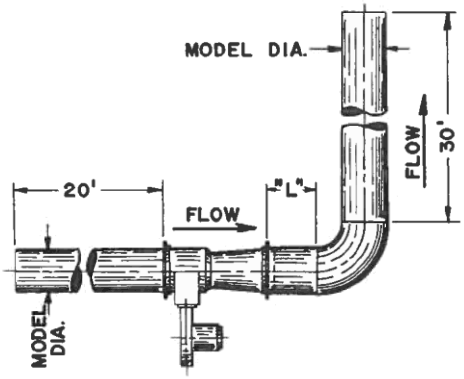
TEST CONDITION 3 (VERT.)
VENTING TO 30' STACK
OF THE SAME DIA. AS
THE QUICKDRAFT.

HORIZONTAL INSTALLATIONS:

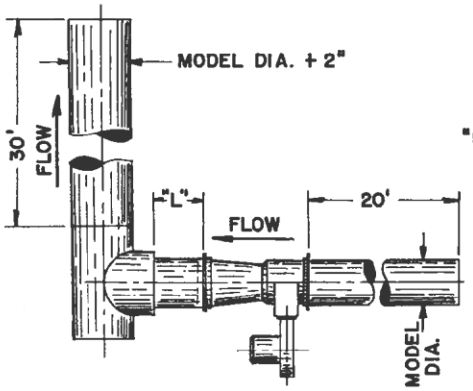


TEST CONDITION 4 (HORIZ.)
VENTING TO 90° ELBOW AND 30' STACK,
BOTH OF WHICH ARE 2" IN DIA. GREATER
THAN DIA. OF THE QUICKDRAFT.

"L" = MODEL DIA.

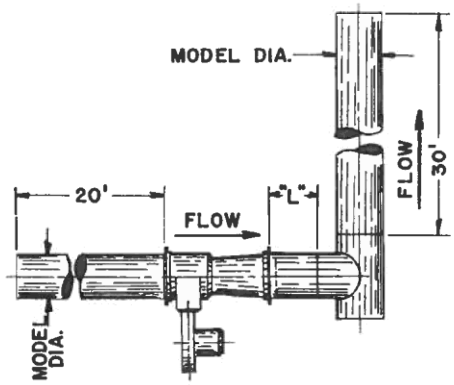


TEST CONDITION 5 (HORIZ.)
VENTING TO 90° ELBOW AND 30' STACK
OF THE SAME DIA. AS THE QUICKDRAFT.



TEST CONDITION 6 (HORIZ.)
VENTING TO T-CONN. AND 30' STACK,
BOTH OF WHICH ARE 2" IN DIA. GREATER
THAN DIA. OF THE QUICKDRAFT.

"L" = MODEL DIA.



TEST CONDITION 7 (HORIZ.)
VENTING TO T-CONN. AND 30' STACK
OF THE SAME DIA. AS THE QUICKDRAFT.

Appendix D: Image Glossary