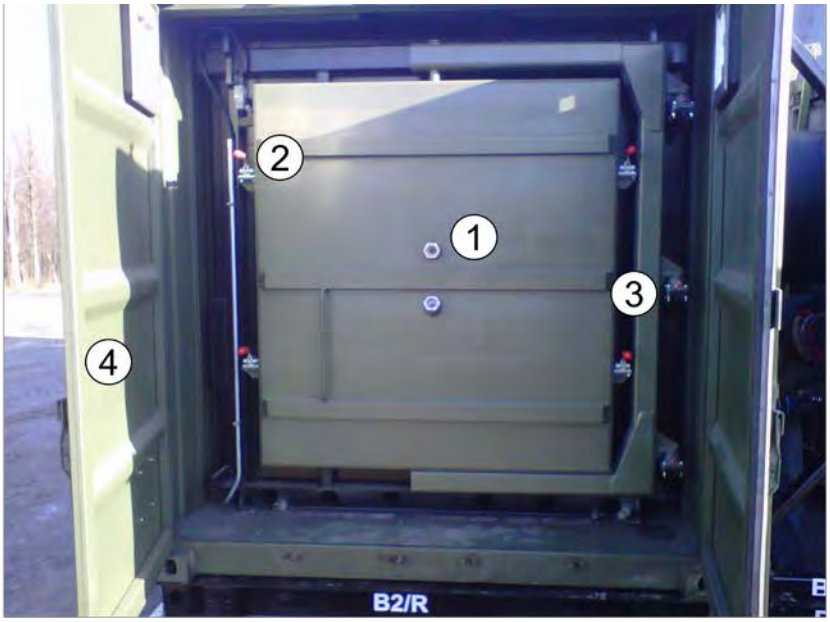
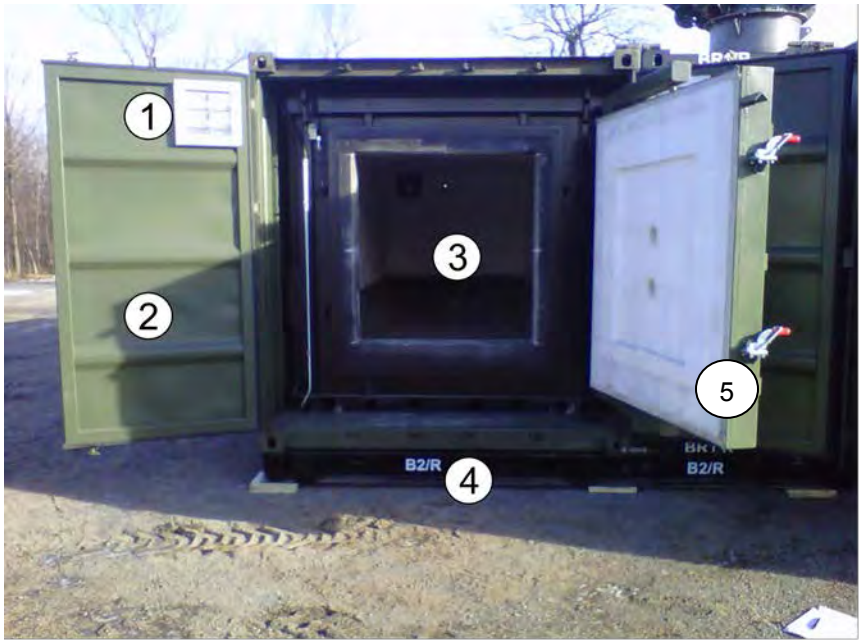


1. Primary Chamber View ports (2)
2. Toggle Clamps (4)
3. Door Bearings (3)
4. Primary Chamber Container Door

Front View: Primary Chamber Container

(with Primary Chamber Door Closed)



1. Container Louver
2. Primary Chamber Container Door
3. Opening into Primary Chamber (loading area)
4. Base frame
5. Toggle Clamps

Front View: Primary Chamber Container

(with Primary Chamber Door Open)

1. **Thermocouple**
2. **Burner (Diesel-fired)**
3. **Primary Chamber Blower/Cooling Fan**

Rear View: Primary Chamber Container

2.2.1.2 #2 Secondary Chamber Container

a. This standard 20' ISO shipping container permanently encloses the **Secondary Chamber.**

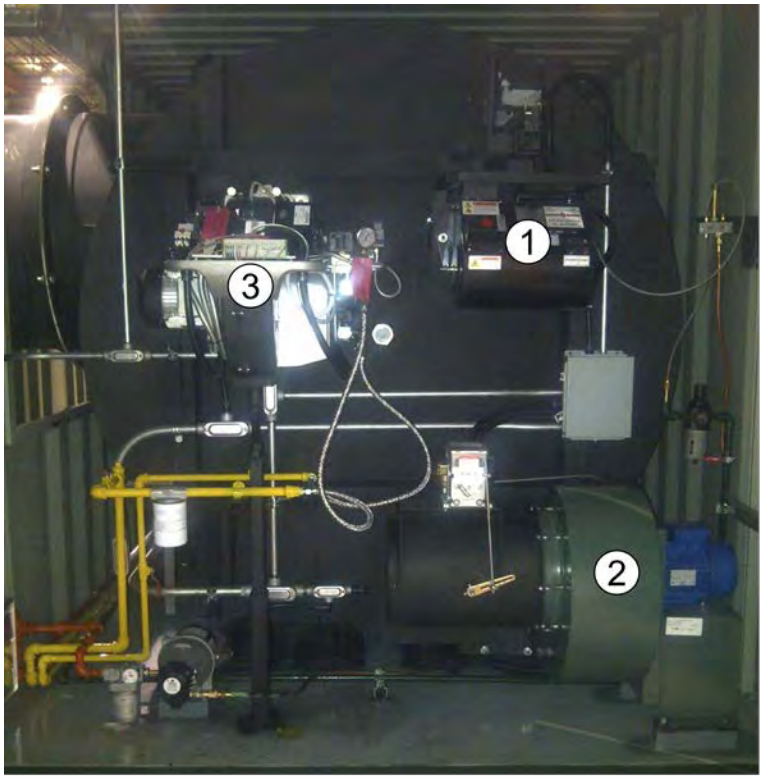
b. This container will be accessed by the Operator on a daily basis. The doors provide access for periodic maintenance and for access during installation and disassembly.

c. The Secondary Chamber including all of its major components and plumbing will be shipped fully assembled within the container, with minimal assembly of interconnections required in the field.

d. The Secondary Chamber includes an access door for inspection and maintenance access for the Secondary Burner

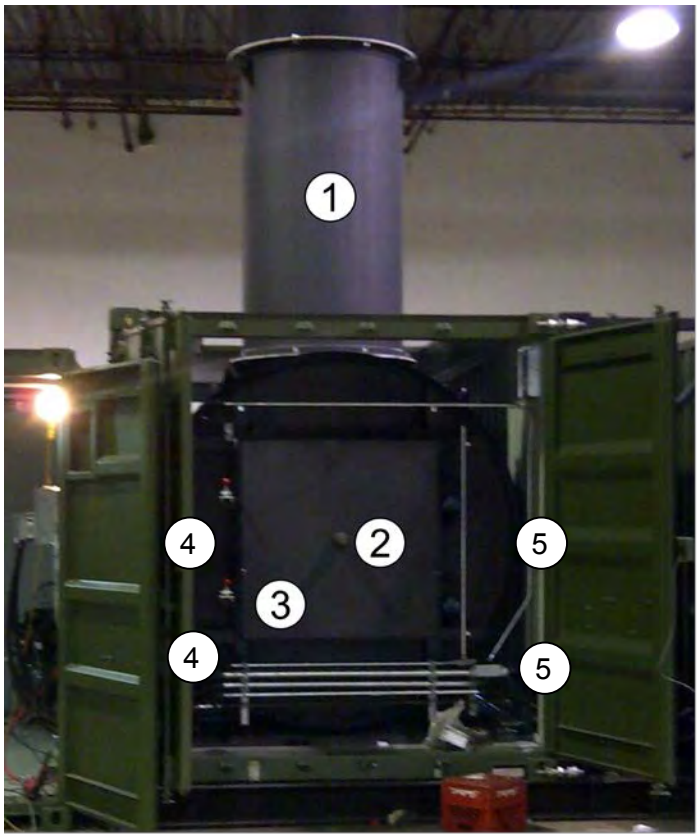
e. This container includes its own air handling system.

f. This container is modified to allow inter connections to the other containers.
   i. Hatch opening for interconnecting duct, Breech between Primary and Secondary Chamber Containers
   ii. Utility Bridge (Secondary Chamber to Primary Chamber) Interface for fuel in, fuel return line out, electrical power in and instrument cables out.
   iii. Utility Bridge (Secondary Chamber to Controls Container) fuel, electrical, instrument and air.



1. Waste Oil Burner
2. Secondary Chamber Blower/Fan
3. Secondary Chamber Burner (Diesel-fired)

Front View: Secondary Chamber Container



1. Stack
2. Secondary Chamber View Port
3. Secondary Chamber Access Door
4. Toggle Clamps (2)
5. Door Bearings

Rear View: Secondary Chamber Container

2.2.1.3 #3 Controls Container

a. This standard 20' ISO shipping container houses the Main Control Panel for the entire **EWS Mobile Incinerator** package.

b. This container will be the main point of operations and control for the entire **EWS Mobile Incinerator** package.

c. This container is modified to allow inter connections to the other containers.
   i. Utility Bridge Interface with Secondary Chamber, fuel, electrical, instrument and air.
   ii. Main power supply connection

1. Main Power Supply Connection 2" (power supply cable and coupling to be supplied by customer)

2. Control Room Door

2.3 SPECIFICATIONS & MATERIALS OF CONSTRUCTION

2.3.1 EWS Mobile Incinerator: Operating Parameters

Operational Parameter	Rating
Incinerator Type	Controlled-air, two-stage
Fuel Type	Main: Diesel; Auxiliary: Waste Oil
Waste load capacity	2000 kg
Batch cycle time	8-10 hours estimate
Factory Pre-set minimum burn time	480 minutes
Cool down cycle	10-12 hours
Pre-set automated cool down cycle operation time	720 minutes

2.3.2 EWS Mobile Incinerator: Technical Specifications

2.3.2.1 Incinerator: Materials of Construction

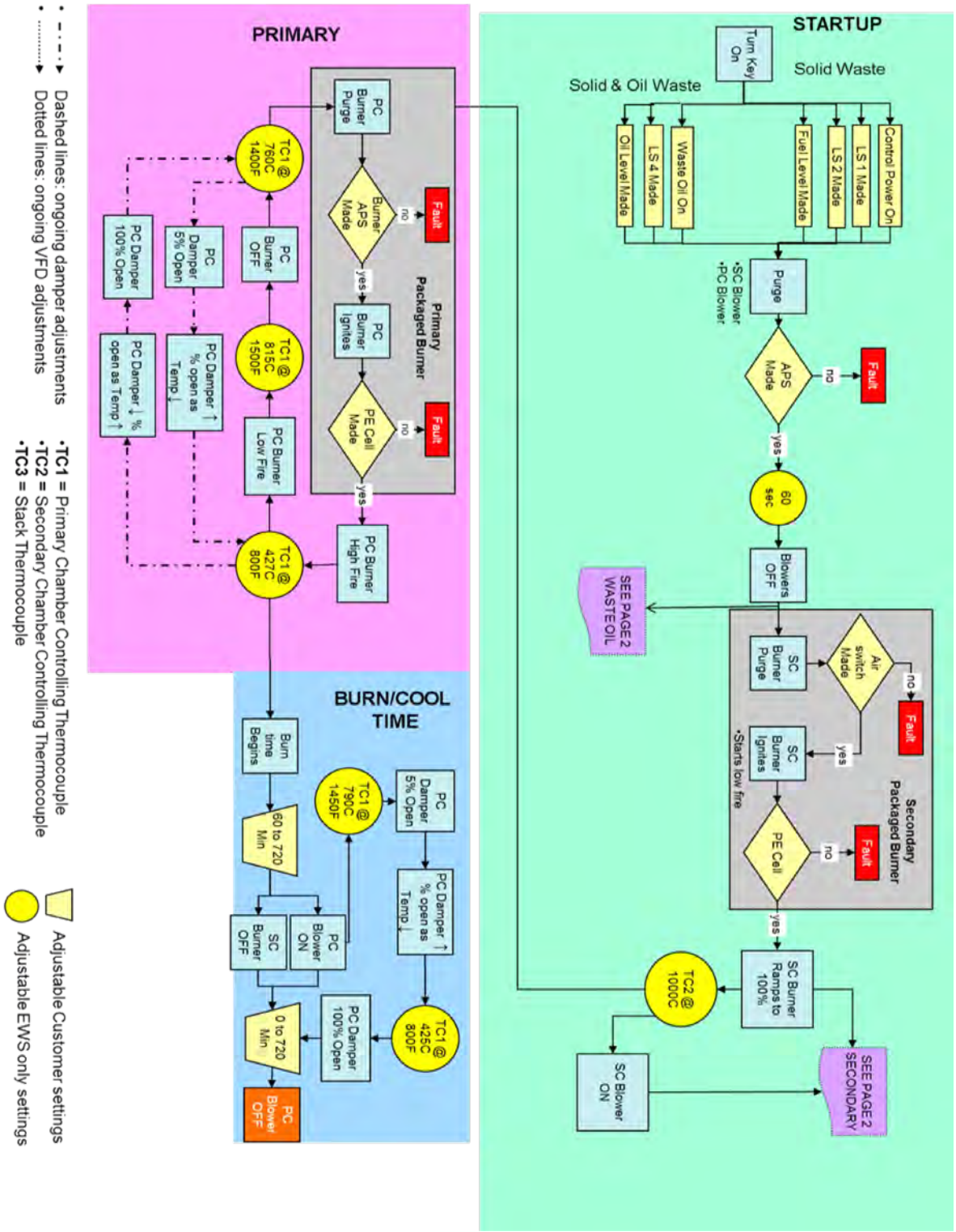
Component	Material of Construction
Incinerator Shell	¼" thick mild steel, welded with continuous bead welds Sand-blasted and painted with rust-inhibiting, high temperature paint
Incinerator Lining – Primary Chamber Floor	Factory cured, reinforced castable monolithic refractory, 6" thick Rated to 1760°C
Incinerator Lining – Primary Chamber walls and roof, Secondary Chamber interior	Ceramic fibre modules, 6" thick Rated to 1200°C Modules are lightweight and are individually anchored to the shell (Heavy, high-strength material not required or desirable in these areas) Highly reflective, does not retain heat against shell Immune to thermal shock from temperature cycling inherent in batch operation
Incinerator Lining – Door jambs, lintels, breech openings, and other penetrations	Factory cured, formed, reinforced castable refractory, 6" thick Rated to 1200°C High-strength, erosion and abrasion resistant material required in the susceptible areas
Fuel Oil Tanks (Diesel & Waste Oil)	Mild steel tank, sand-blasted and coated with corrosion resistant paint. Double-wall construction.

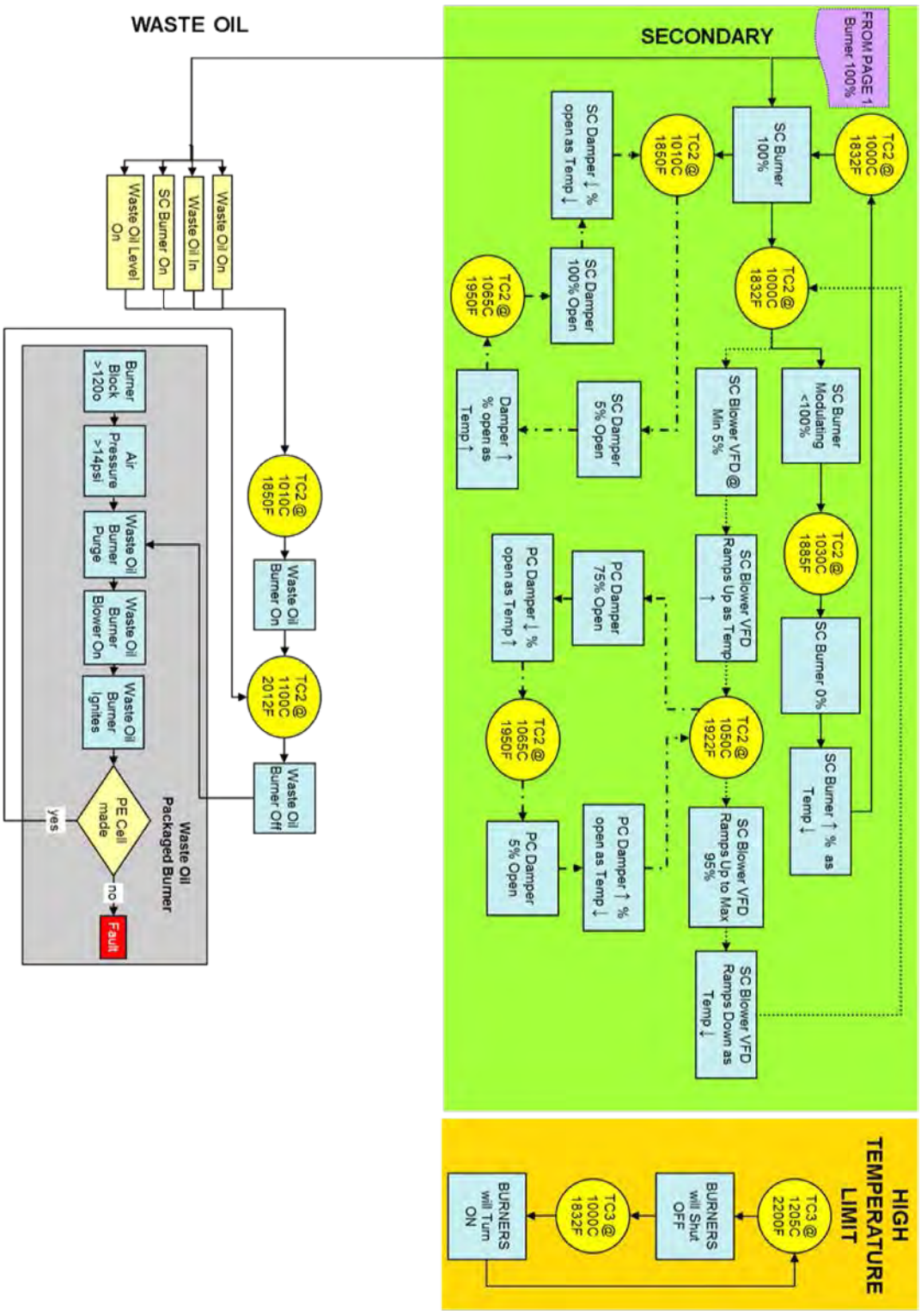
2.3.2.2 Incinerator: Major Components Specifications

Component	Description	Size/Rating
Control System	Single main control cabinet houses all motor starters, breakers and overloads. PLC process controller, Variable Frequency Drive (VFDs) to control Secondary Blower. LCD Operator Interface.	Electrical Power Design Input: 600V, 60 A
Packaged Diesel Fired Burners	Industrial burners each with built-in blower to supply combustion air, oil pump driven by same motor. Burner complete with integral relief valve and filter, fuel pressure gauge, air proving switch and igniters.	Primary Burner Rating: 97/154-395 kW **Motor: 0.7 kW** Secondary Burner Rating: 332/711-1482 kW **Motor: 2.1 kW**
Blowers	Factory run tested packaged design. Fan construction able to withstand high heat environment.	Primary Blower: Flow rate:1700 m^3/h Standard Static Pressure (SP): 31.5 mmH_2O **Motor: 1.12 kW (1.5 HP)** Secondary Blower: Flow Rate:4247 m^3/h Standard SP: 61 mmH_2O **Motor: 1.5 kW (2 HP)** Note: Standard Air, 70°F, 0.075IB/CF (21°C, 1.20 kg/m^3)
Diesel Fuel Tank	Includes all required accessories: vent, drain, level sensor and lifting lugs.	Volume: 2200 litres
Waste Oil Tank	Includes all required accessories: vent, drain, level sensors, heater and lifting lugs.	Volume: 500 litres

2.3.3 EWS Mobile Incinerator: Controls Philosophy

2.3.3.1 EWS Mobile Incinerator Package Central Control System




WASTE OIL
SECONDARY
FROM PAGE 1 Burner 100%
TC2 @ 1000C 1832F
SC Burner 100%
TC2 @ 1010C 1850F
SC Damper ↓ % open as Temp ↓
TC2 @ 1000C 1832F
SC Damper 100% Open
TC2 @ 1065C 1950F
Damper ↑ % open as Temp ↑
SC Damper 5% Open
SC Blower VFD @ Min 5%
SC Burner Modulating <100%
TC2 @ 1030C 1885F
SC Burner 0%
SC Burner ↑ % as Temp ↓
SC Blower VFD Ramps Up as Temp ↑
TC2 @ 1050C 1922F
SC Blower VFD Ramps Up to Max 95%
SC Blower VFD Ramps Down as Temp ↓
PC Damper ↓ % open as Temp ↑
PC Damper 75% Open
TC2 @ 1065C 1950F
PC Damper 5% Open
PC Damper ↑ % open as Temp ↓
HIGH TEMPERATURE LIMIT
TC3 @ 1205C 2200F
BURNERS will Shut OFF
TC3 @ 1000C 1832F
BURNERS will Turn ON
Waste Oil Level On
SC Burner On
Waste Oil In
Waste Oil On
TC2 @ 1010C 1850F
Waste Oil Burner On
TC2 @ 1100C 2012F
Waste Oil Burner Off
Waste Oil Packaged Burner
Burner Block >120o
Air Pressure >14psi
Waste Oil Burner Purge
Waste Oil Burner Blower On
Waste Oil Burner Ignites
PE Cell made
yes
no
Fault

2.4 WASTE PROCESSING CAPABILITIES

2.4.1 EWS Mobile Incinerator Waste Description

The waste types to be processed include: personal domestic waste, kitchen waste, dewatered sewage sludge, paper, packaging, lumber and textiles, documents, occasional tires and clinical medical waste (only gauze and needles). Furthermore, the specification indicates that hazardous materials including batteries will be eliminated from the incinerator waste stream.

2.4.2 Design Waste Assumptions

Quantity	**2000 kg/day**
Density	**160-240 kg/m^3**
Higher Heat Value	**15,150 KJ/kg**
Moisture Content	**Up to 40%**

System capacity of 2000 kg per day is based on the above waste mix assumptions. Waste will be loose, as received and not compacted prior to loading. If high volumes of PET (clear plastic) water bottles are received some compaction is recommended to ensure that the waste mix characteristics are representative of materials presented in the quote AMR-ECO M 2TN.

NOTE

2.4.2.1 Higher heat value materials should be mixed with lower heat value materials to ensure that the average heat value of the batch load is approximately that listed above. Overloading the system with high heat value materials can cause uncontrolled combustion leading to pollution and/or damage to the incinerator system.

2.4.2.2 A batch system capacity is closely related to the waste density. If a large amount of very low density, low weight materials are loaded into the system at one time the volume of the Primary Chamber may limit the capacity to much less than it is rated for. Care should be taken to mix waste materials to ensure the correct density range. Also, materials containing large air spaces such as empty plastic bottles, and cardboard boxes should be flattened before loading.

2.4.2.3 When processing batches of very wet materials the burn cycle time should be increased to accommodate the additional time required to dry the waste before it can combust.

2.4.2.4 Do not load the system with more than 25% by volume of extremely wet materials such as grey water or wet garbage.

2.4.2.5 When possible layer the materials so that the load is a mix of wet and dry, and/or high and low heat value materials.

2.4.2.6 Never load more than approximately 20 litres of high heat value waste such as kitchen grease or used cooking oil as this can lead to an uncontrolled burn.

2.4.2.7 See the list in Section 2.4.4 "Unacceptable Waste Materials" for items that should not be processed in the **EWS Mobile Incinerator**.

2.4.3 Waste Materials Suitable for Processing

Waste Materials Suitable for Processing in the EWS Mobile Incinerator

The following table is a generic description of waste materials that can be processed effectively using this equipment.

Solid Waste	Description	Origin
Food Waste	Food, food packaging and containers, plastic and paper waste from food preparation	Kitchen and dining areas
Domestic waste	General refuse such as paper, plastics, cans, bottles, cardboard, newsprint	Dormitory areas, recreation facilities, office areas, warehouse, plant and production facilities
Packaging	Cardboard boxes, paper, plastic containers, plastic film, styrofoam, poly-weave bags	Inbound supplies to all work areas
Wood waste	Skids, pallets, crates	Construction activity, inbound supplies
Absorbents	Rags, wipes, spill cleanup materials	From all work areas
Filters – Air and Fluid	Filters coated with fine particles and trapped solids, saturated with water or fluids (glycol, lube oils, fuel)	From water treatment facility, or generated at point of maintenance of vehicles, machinery and equipment
Clinical Waste	Bandages, dressings, gloves, swabs, syringes, sharps	Medical clinic or first aid centre
Tires & Rubbers	Tires (only 1 at a time), belts, hoses	From vehicles and equipment maintenance shop
Semi-solid Waste	Description	Origin
Kitchen grease, oils	Solid kitchen fats, grease, used cooking oil in small pails (maximum volume 10 litres per burn)	Kitchen grease traps, fryers

2.4.4 Waste Materials NOT Suitable for Processing

Unacceptable Waste Materials

Waste Type	Examples
Bulky Materials	Automotive or heavy equipment parts such as engine blocks and transmissions
Non-Combustible Materials	Drywall, asbestos, bricks, concrete, soils
Radioactive Materials	Smoke detectors, laboratory wastes
Potentially Explosive Materials	Pressurized vessels including, but not limited to propane tanks, aerosol cans (deodorant, shaving, cleaning, etc) and the like. Actual explosives.
High Alkaline or High Acid Materials	By-products of industrial processes, unrefined fuels.
Solvents	Solvents such as acetone, xylene, methanol

NOTE

All materials of these types are strictly forbidden from processing. It is very important that all materials in these categories are diverted away from the incinerator in-feed. The examples provided are not an exhaustive list of all possible forms of these waste types.

A waste and procurement audit is highly recommended and encouraged to ensure that all sources of heavy metals (especially mercury) are identified and diverted from the incinerator.

2.5 REGULATORY COMPLIANCE

2.5.1 Environmental Regulatory Compliance

The Mobile Incinerator Package is required to operate with air emissions that comply with the regulations as set out by the CCME Canada Wide Standard for Dioxin and Furans.

EWS guarantees compliance of the **EWS Mobile Incinerator** with the stated limits in the CCME Canada Wide Standard for Dioxin and Furans, subject to the conditions outlined below (see Performance Criteria Conditions).

3.0 ASSEMBLY & INSTALLATION INSTRUCTIONS

3.1 GENERAL ASSEMBLY & INSTALLATION INFORMATION

The **EWS Mobile Incinerator** is largely assembled with interconnections and external components to be mounted as required.

3.1.1 Customer Responsibility

3.1.1.1 Provide all foundation work of concrete blocks for the ends of the containers and packed gravel under the frame and tanks

NOTE

a. **Fuel tanks should be out of the way and protected using bollards against accidental impact of mobile equipment (e.g. trucks, etc.)**

b. Foundation requirements between pads to be determined by customer

c. Specific locations to be determined by customer and site restrictions

3.1.1.2 Install I-beams, spacers and equipment using a crane, forklift, come-alongs, hydraulic jacks/hand-pumps, etc.

3.1.1.3 Provide all utility services including connections to the equipment including fuel, electrical, water, air, etc. using basic hand tools.

3.1.1.4 Provide all external thermal insulation and heat tracing when required on incoming and outgoing utilities.

3.1.1.5 Provide proper protection of all equipment from accidental damage or vandalism (bollards, exterior lighting, etc).

3.1.1.6 Perform any touch up painting and cleanup of equipment after assembly.

3.1.1.7 Locate the fuel tank at the specified distances to ensure maximum positive supply pressure on the suction side.

3.1.1.8 Obtain any and all construction, operating and environmental permits and other approvals as may be required in the area of jurisdiction where the equipment is being deployed and operated. EWS will assist in supplying technical information required for these permits to the customer as it relates to EWS equipment.

3.1.1.9 Maintain ample space around all equipment for maintenance, cleaning and safety considerations. A suggested provision would be to provide a minimum of 1.83 meters from all major equipment surfaces and edges. Always allow proper space for the swing radius of the chamber doors including vehicular traffic.

NOTE

Do not scale drawings: If certain dimensions are required which are not shown on drawings, EWS should be contacted for the required dimension. EWS will not be

responsible for any dimensional conflicts resulting from dimensions not shown on a certified drawing. Do not use general sales literature or other general equipment submittals for construction, assembly and/or erection, unless so indicated.

Please note that some of the diagrams and/or photos in this MANUAL are conceptual in nature and may not be exact representations of the equipment purchased.

3.1.2 Preparation Prior to Assembly & Installation

3.1.2.1 Electrical & Fuel Availability

The electrical supply must be the Canadian supply of 600 V 60 Hz, 3 phases. There is one main electrical hook-up opening 2" located on the side of the Controls Container. All electrical connections are distributed from the Controls Container to the Primary Chamber Container and the Secondary Chamber Container.

DO NOT CONNECT THE EXTERNAL POWER SUPPLY TO THE EWS MOBILE INCINERATOR UNTIL ALL INTERNAL ELECTRICAL CONNECTIONS ARE COMPLETE AND THE SYSTEM IS COMPLETELY ASSEMBLED.

The fuel supply connections are located on the Primary Chamber Container and connect the fuel supply to the fuel tank located externally. There are fuel lines between the containers for fuel distribution which are to be connected before the external hook-ups and connections are made.

DO NOT CONNECT THE EXTERNAL FUEL SUPPLY TO THE EWS MOBILE INCINERATOR UNTIL ALL INTERNAL FUEL CONNECTIONS ARE COMPLETE AND THE SYSTEM IS COMPLETELY ASSEMBLED.

3.1.3 Assembly & Installation Overview

3.1.3.1 Specialized Tools and Equipment for Assembly and Installation

The complete assembly of the **EWS Mobile Incinerator** will require 2-3 full time personnel for 2 days. The following list identifies the tools and equipment required to be supplied by the customer in order to proceed with the assembly:

a. Crane
b. Forklift
c. Boom Lift, Scissor Lift and/or Scaffolding
d. Steel Shims
e. Ladder (12')
f. Come-along
g. Hydraulic Jack/pump
h. Level
i. Erection Wrench / Alignment bar
j. Container Clamp 2"-Wrench

k. Sling
l. I-beam Clamp

The following list identifies the consumable items to proceed with the assembly:

a. Anti-Seize Compound (Generic Graphite-Based Anti-Seize Compound)
b. Gasket Spray-on Adhesive (Generic Spray-On Contact Cement)

3.1.3.2 Assembly Overview

The following general steps are the order in which the **EWS Mobile Incinerator** Package needs to be installed. Each step is detailed in the subsequent section.

ORDER OF ASSEMBLY (and detailed in Section 3.1.4)

1) I-Beam & Spacer Base Structure (Base Frame Structure)
2) Connections Between Primary and Secondary Chamber Containers
3) T-Stack Section on Secondary Chamber Container
4) Stacks and opacity monitor
5) Internal Component Connections
6) Internal Connections
7) External Connections

NOTE

Important Notes to Consider Prior to and During Assembly

a. Lifting lugs are provided on the stacks, and major accessories, and should be used in setting these units into position.

b. Do not allow lifting chains or cables to put loads on piping, or mounting flanges as they may be damaged.

c. Avoid dragging lifting gear across painted surfaces.

d. When placing the system into position, be careful not to subject the refractory to mechanical shock, which may result in refractory damage.

3.1.4 Assembly Instructions

3.1.4.1 I-BEAM & SPACER BASE STRUCTURE (Base Frame Structure)

NOTE

For <u>all</u> fasteners used in assembly use regular-grade anti-seize spray to ensure that fasteners will be easily removed when disassembly is required.

NOTE

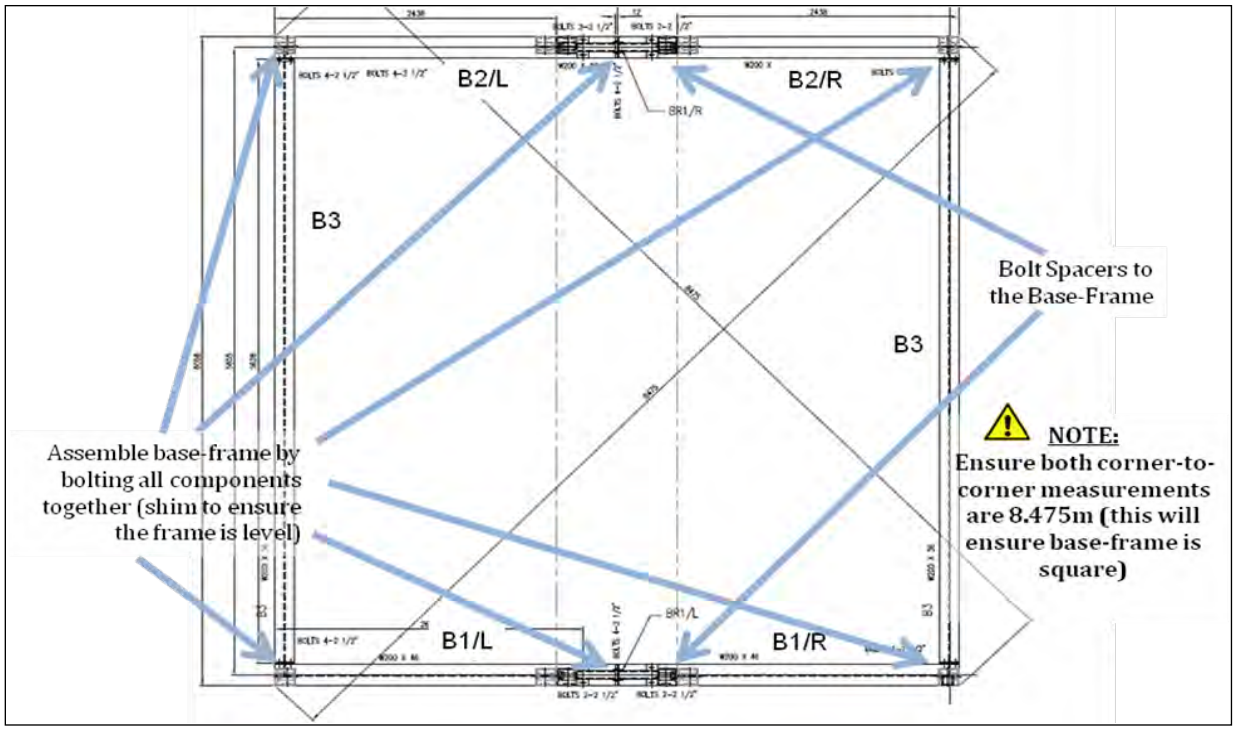
Do not fully torque bolts during initial assembly.

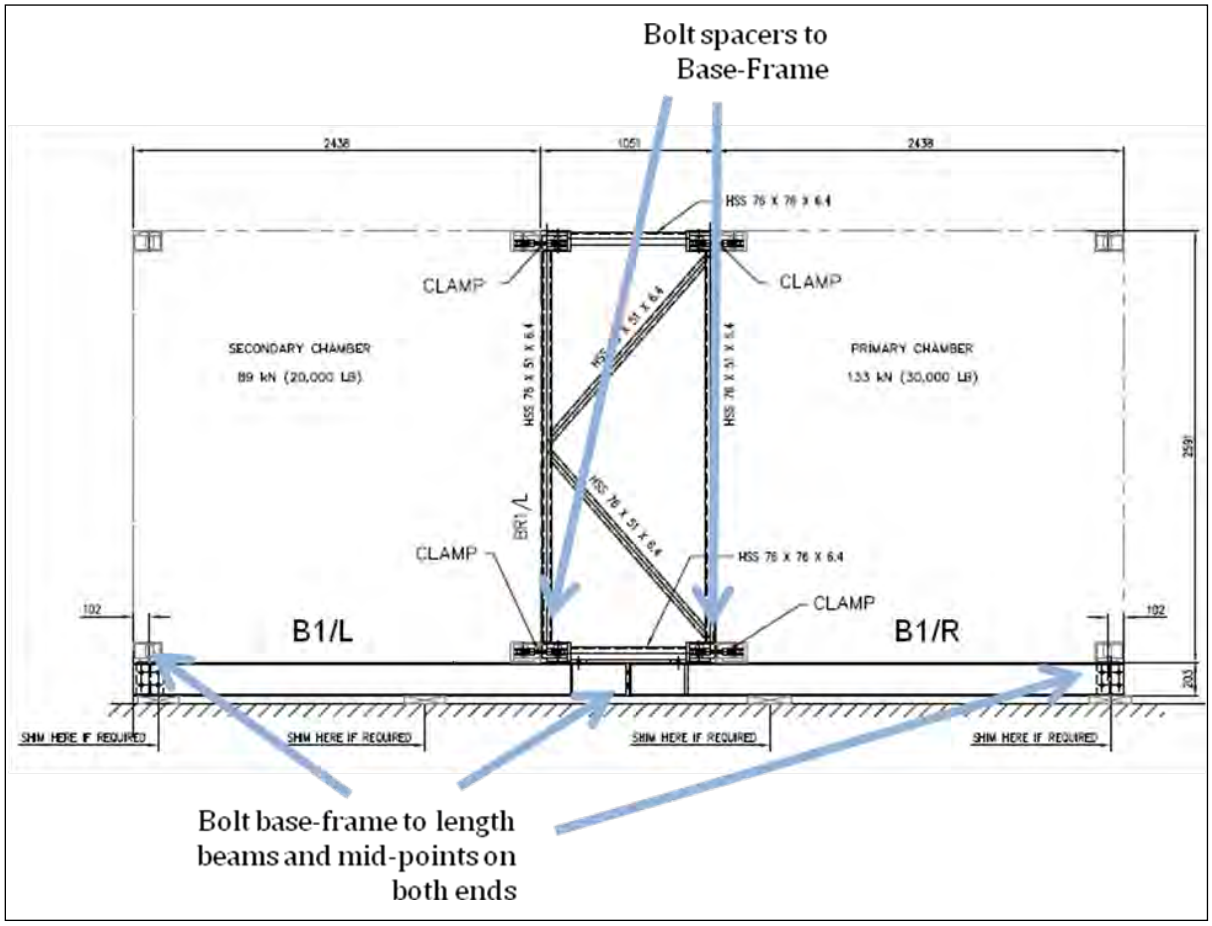
<u>Correct Clamp Installation</u>

When installing the clamps, install in such a manner that the installer pulls back on the

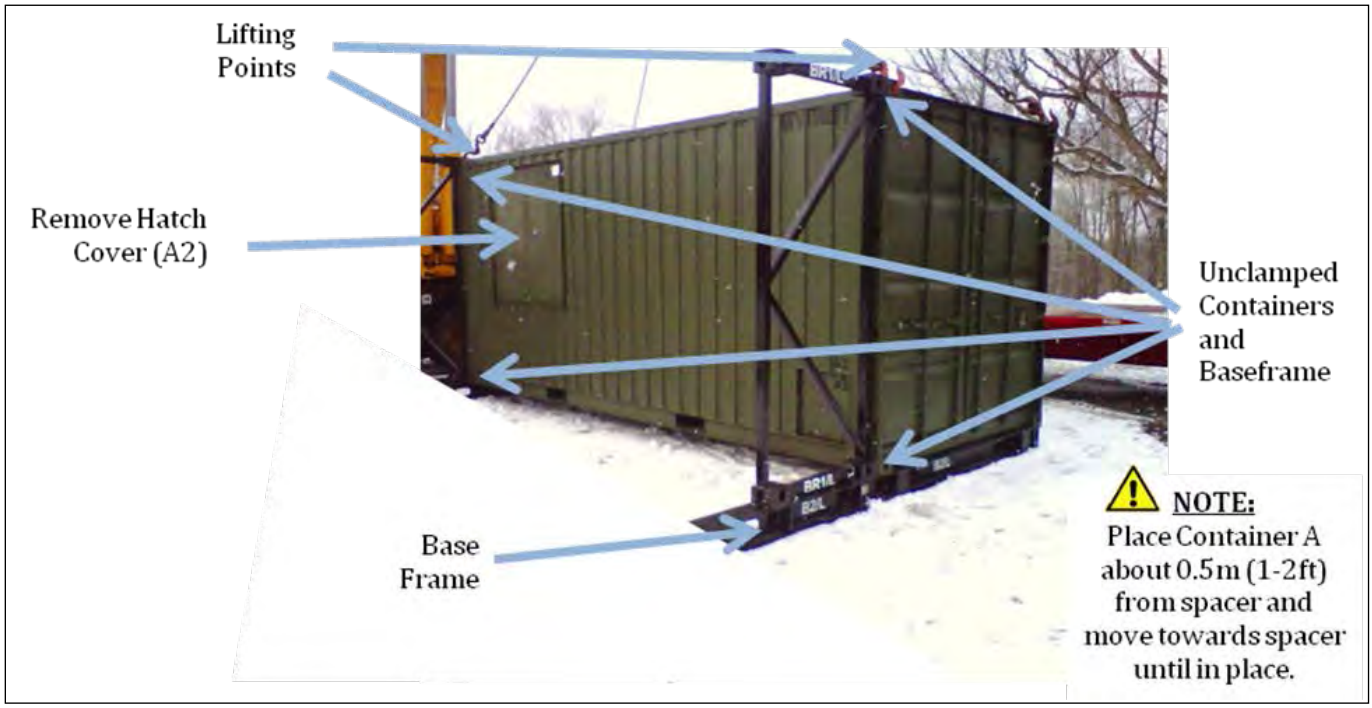
wrench when tightening the clamp. From the installer's perspective, the smaller nut would then be located on the right of the large nut. If it is installed the other way, or during removal, a lift-truck or other lifting device will need to be employed for safety reasons.

Failure to follow the above instructions poses a safety hazard to an installer situated on top of the Primary Container as they would need to push forward to tighten or loosen the clamp.



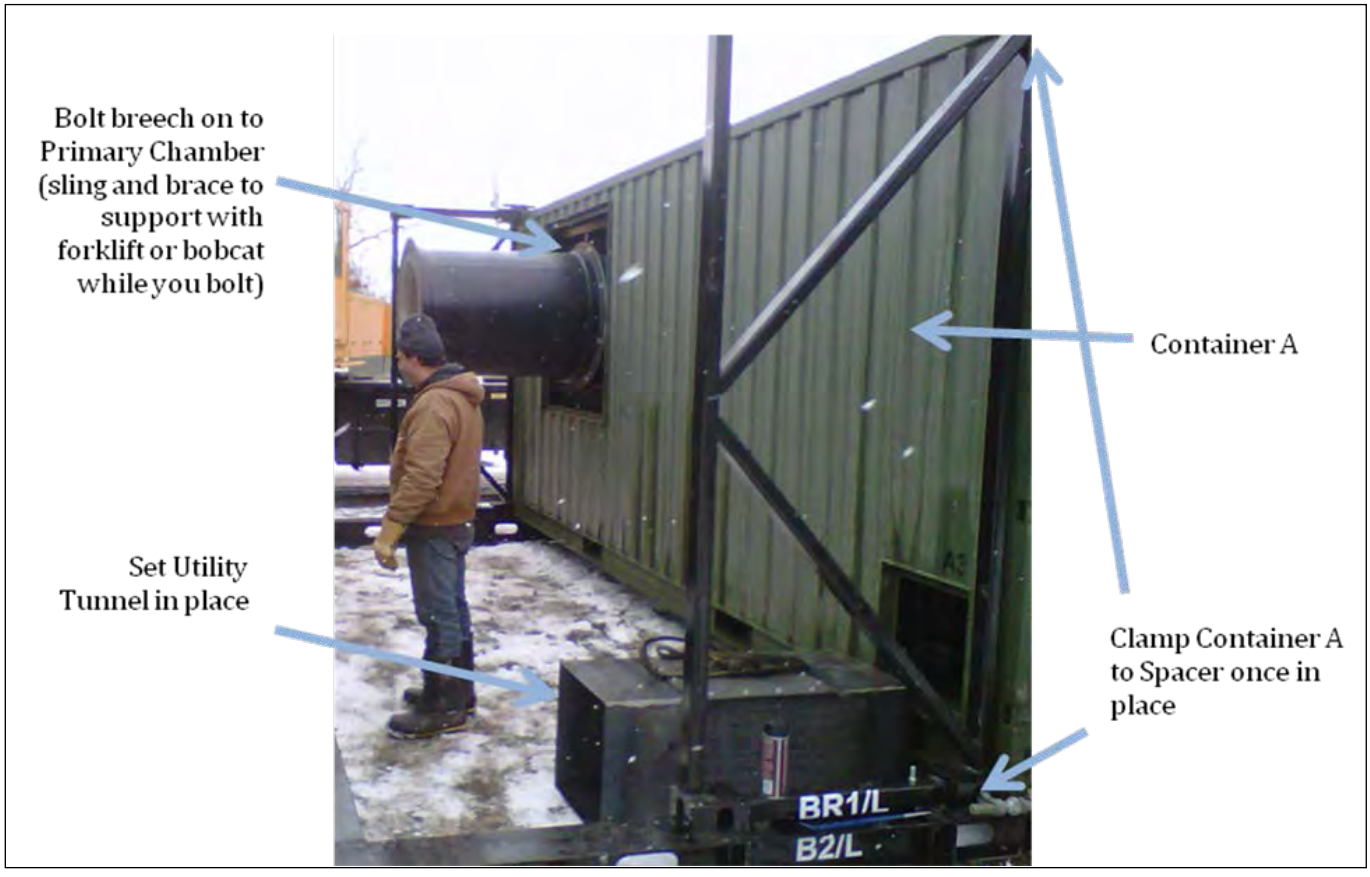


3.1.4.2 CONNECTIONS BETWEEN PRIMARY AND SECONDARY CHAMBER CONTAINERS



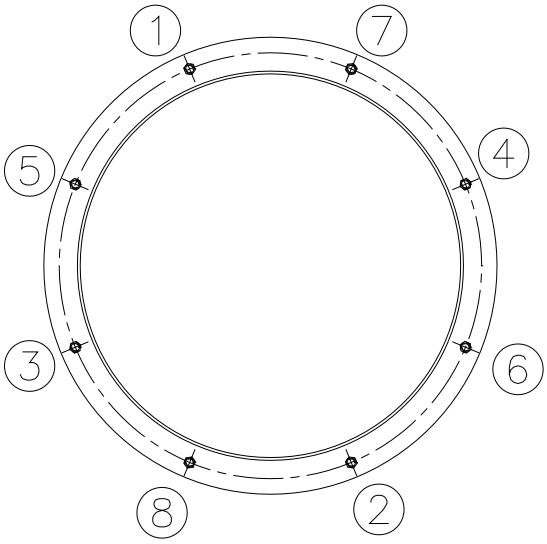
Gasket adhesive spray being applied

Correctly Installed Gasket



NOTE

Once breech flanges are aligned and together bolt flanges together using the numerical order described in the pattern below.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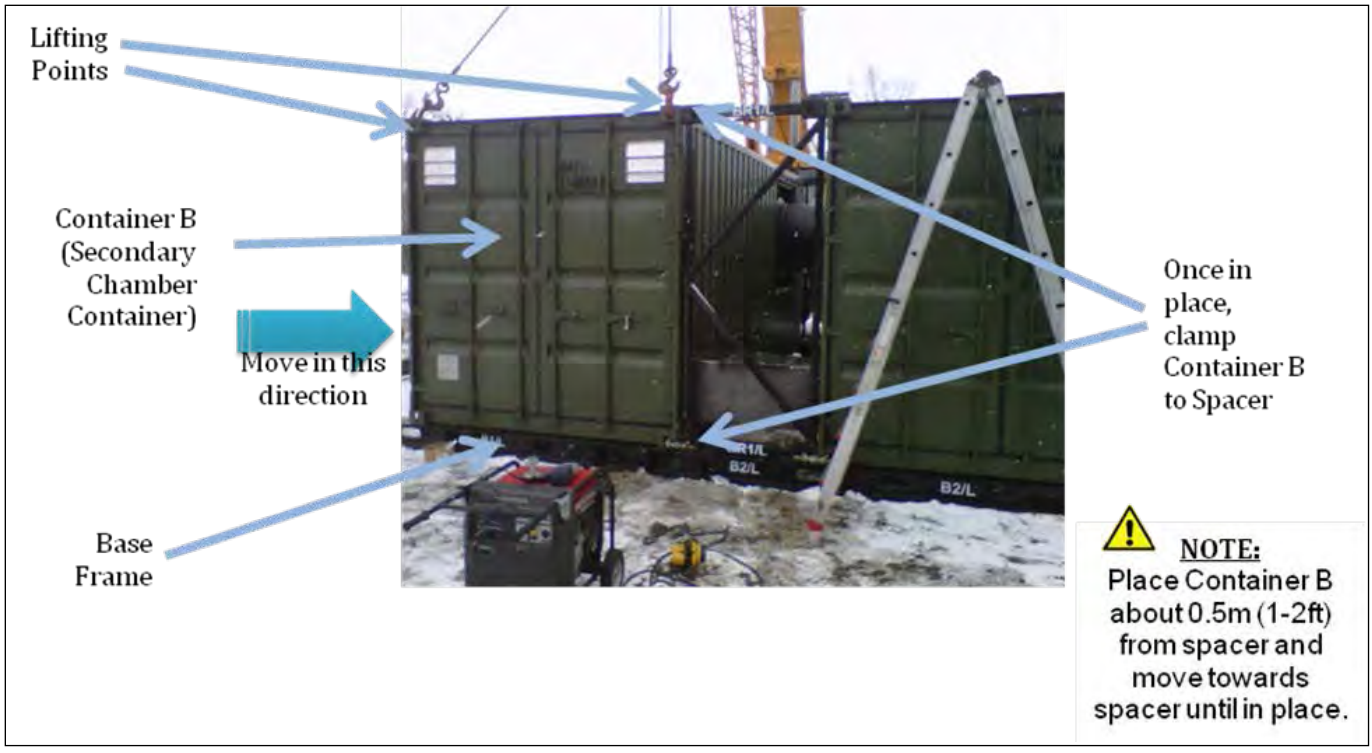
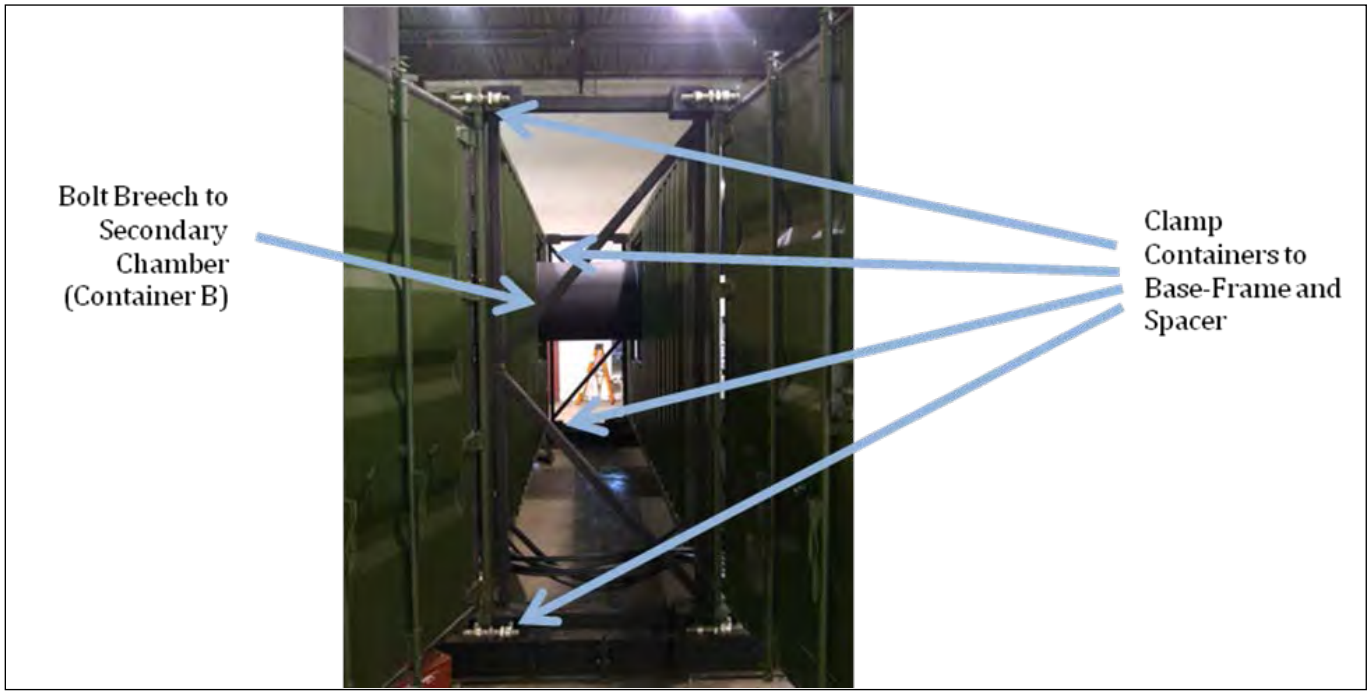
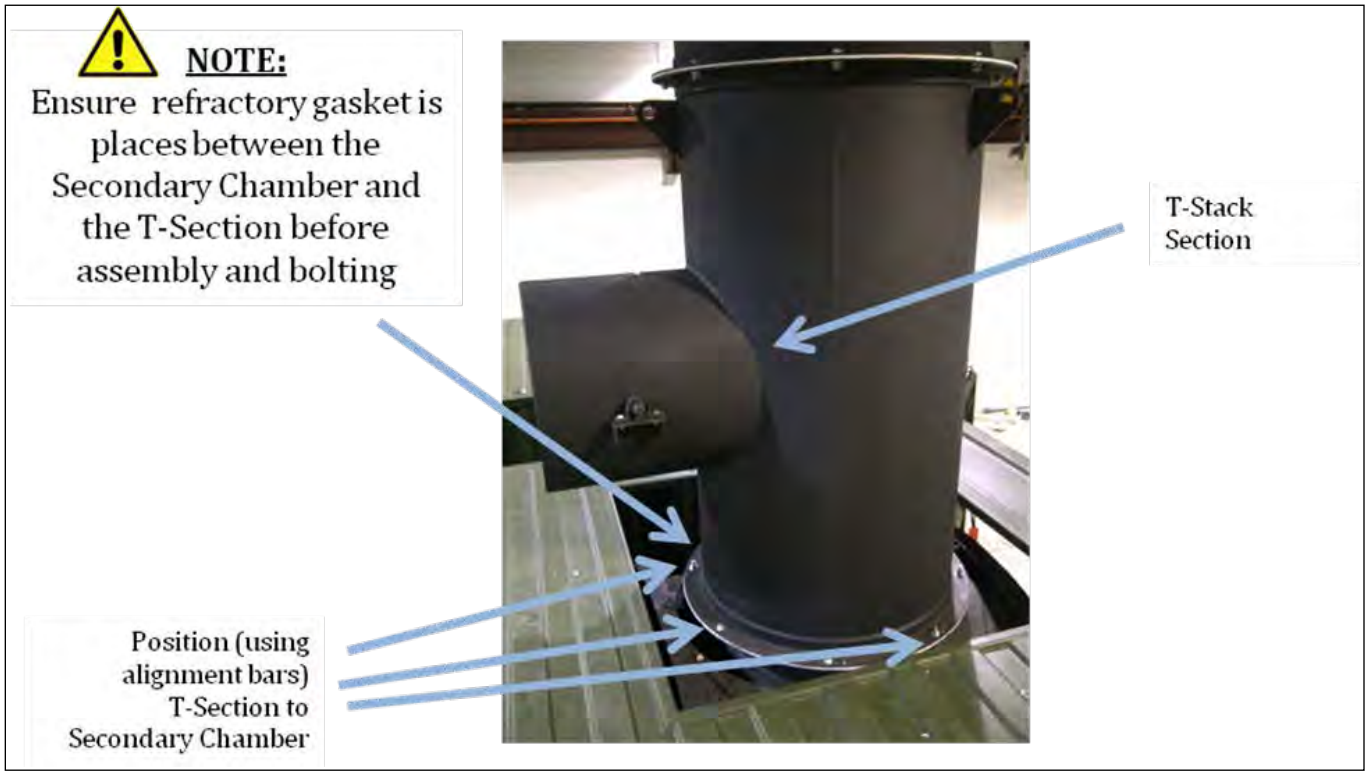
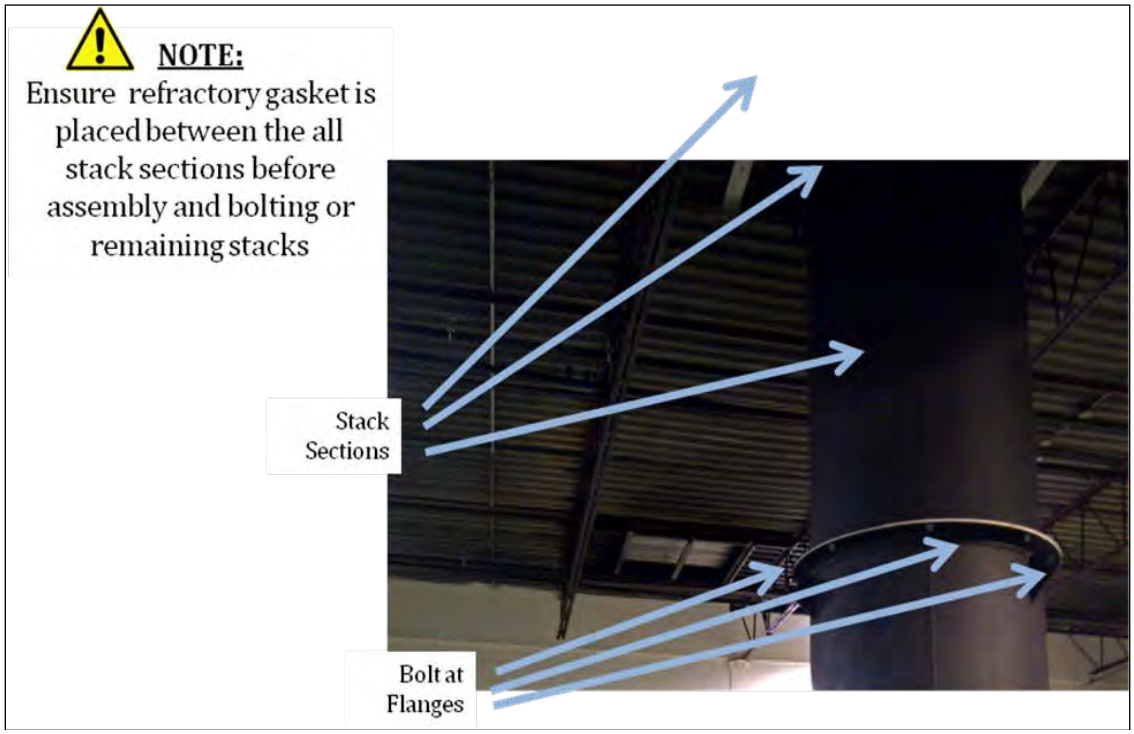
7
5
4
3
6
8
2


Lifting Points
Container B (Secondary Chamber Container)
Move in this direction
Base Frame
Once in place, clamp Container B to Spacer
NOTE:
Place Container B about 0.5m (1-2ft) from spacer and move towards spacer until in place.



3.1.4.3 T-STACK SECTION AND SECONDARY CHAMBER CONTAINER





NOTE

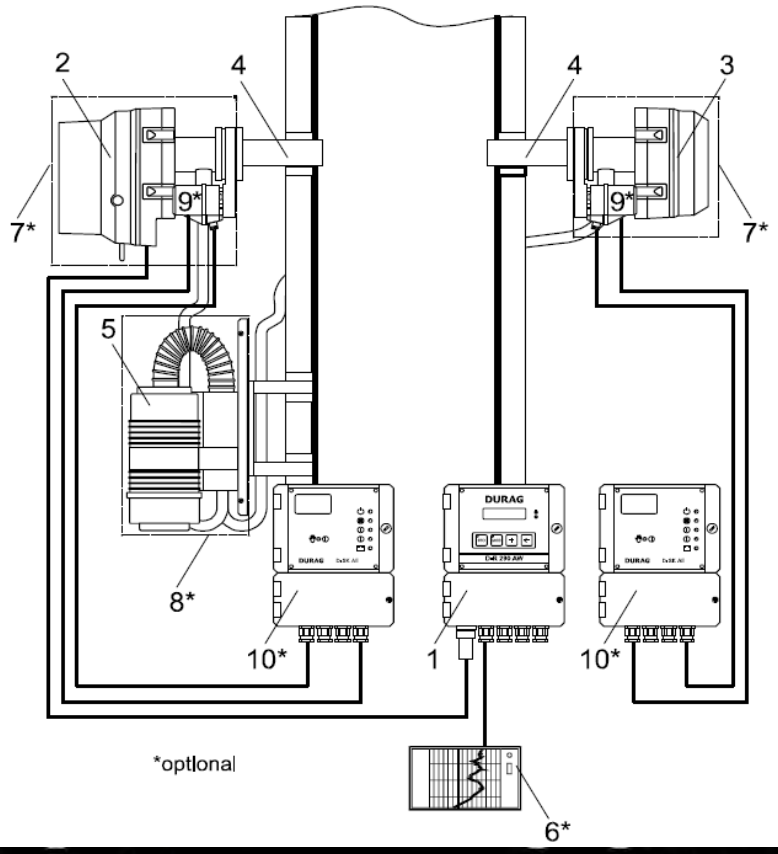
One of the washers must be a lock washer.

3.1.4.4 OPACITY MONITOR

The sensors and purge air unit of the opacity monitor are shipped unassembled and in boxes.

The sensor's mounting flanges are pre-installed in the stack section and the bracket for the purge air unit are installed in the T –stack.

The Control Unit D-R 290 AW is installed inside the Secondary chamber container and pre-wired to the PLC



	Standard		* Optional
1	Control unit, D-R 290 AZ (stack display) Or D-R 290 AW (evaluation unit)	6	Customer supplied recorder or data logging system
2	Transceiver, D-R 290 MK	7 & 8	Weather Hood, US built systems use one
3	Reflector, D-R 290 R1 or R2		Large weather hood for blower and optics
4	Mounting flange, D-R 280 E	9	Fail-safe shutters
5	Purge air unit	10	Fail-safe shutter control electronics

Install the Transceiver and Reflector in the flanges provided in the stack section

Install the Purge Air Unit in the bracket provided in the T-Stack

Connect the Transceiver to the Control unit

Connect power to the Purge Air Unit

3.1.4.5 INTERNAL COMPONENT CONNECTIONS

Flexible conduit in Container 2 (secondary chamber)

Feed flexible conduit from container 2 to containers 1 and 3 through the openings connecting the containers

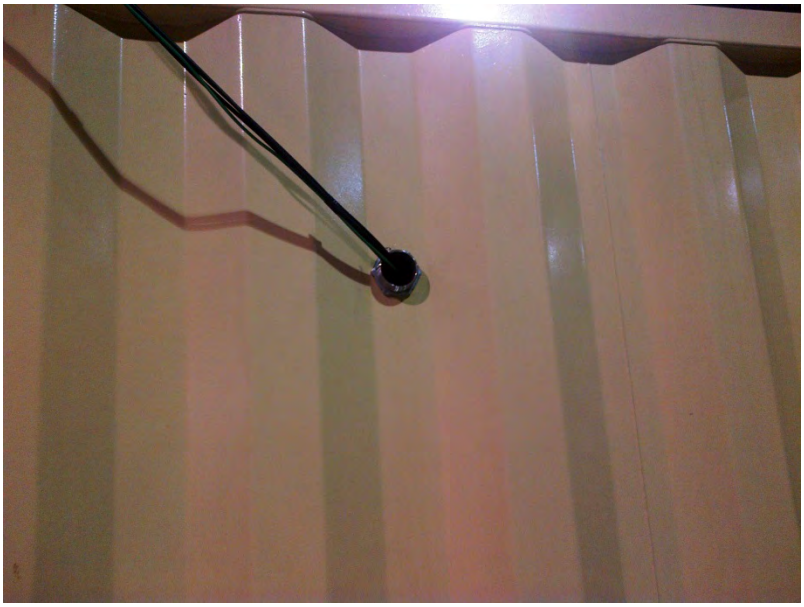
Junction Boxes in container 3 (control container)

Connect each flexible conduit to the correspondent Junction Box (i.e. JB1 conduit with JB1 box) wire the terminal block inside the junction box following the labels on both the wires and the terminal block

Junction Boxes in container 1 (primary chamber)

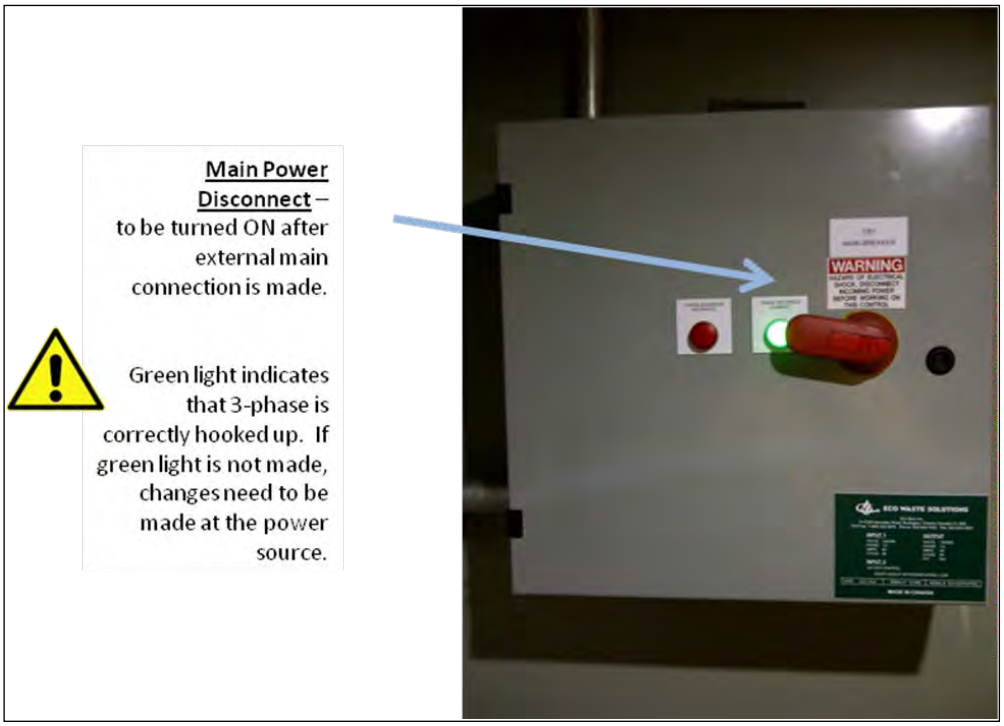
Complete all Junction boxes in both Container 3 and Container 1

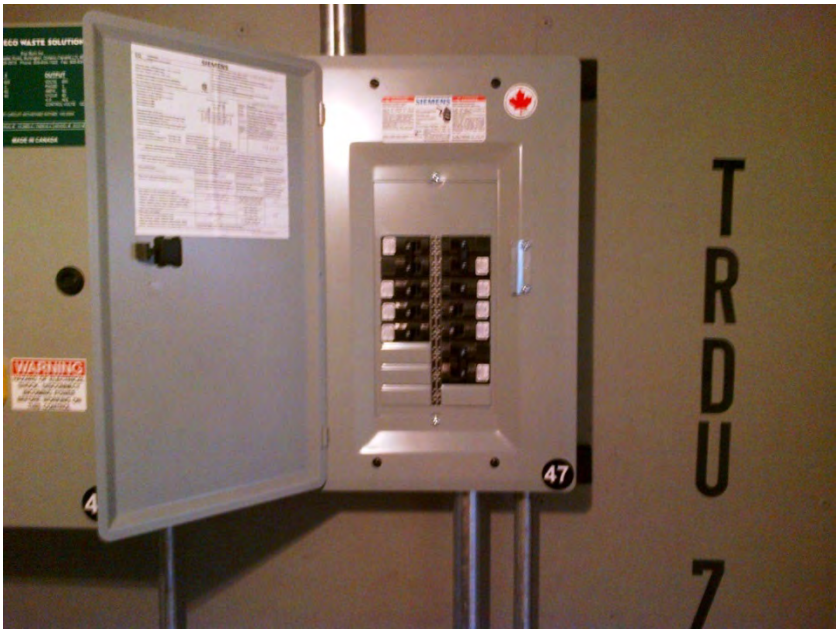
DO NOT CONNECT THE ELECTRICAL UNLESS THE MAIN SUPPLY FROM THE SITE HAS BEEN INTERRUPTED AND THE INCINERATOR BREAKERS ARE IN THE OFF POSITION



2” opening for power supply in container 3

Feed the 600v 40Amp 60Hz power through the 2” opening in container 3 (power supply cable and 2“coupling to be provided by the customer) and connect the wires to the Main Disconnect. The main supply from the site can be turned on now.





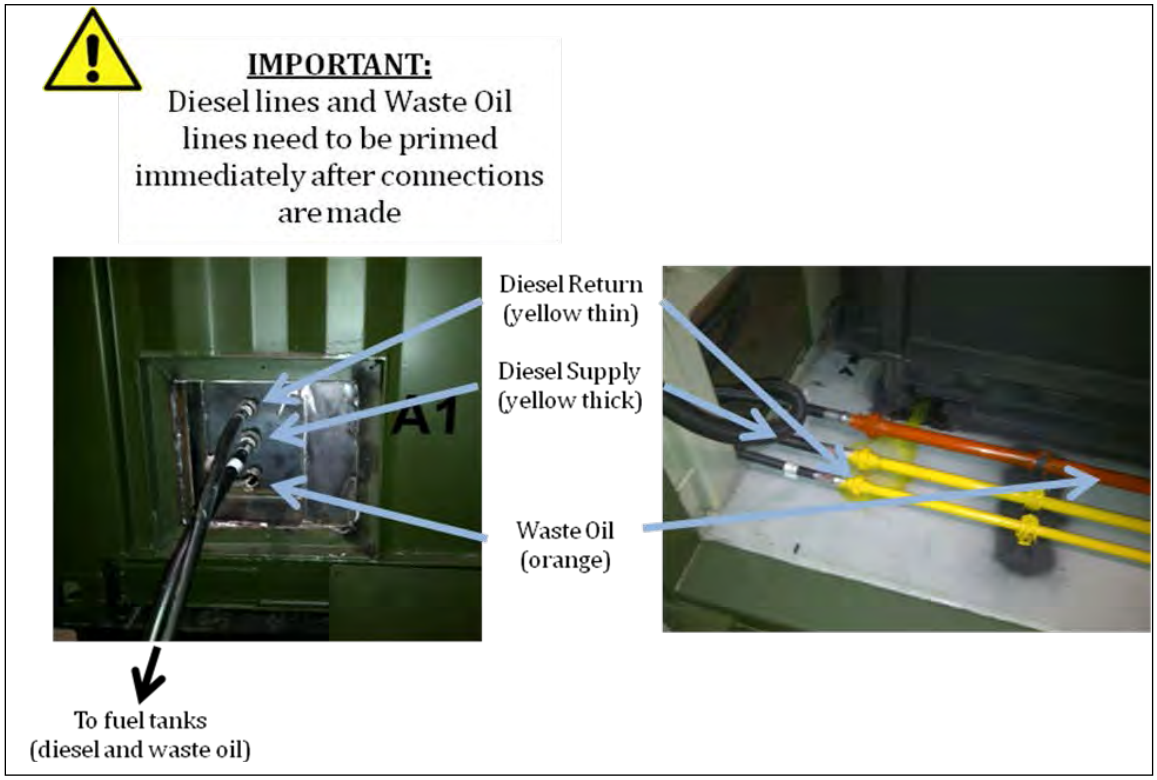
Switch on all incinerator breakers in the Breaker Panel

Control Panel Power On– turn on the power to the Control Panel.

3.1.4.6 INTERNAL CONNECTIONS

Compressed air quick connect for Waste Oil Burner

Connect the air hose from the Waste oil Burner to the quick connect fitting



Feed wires for the tanks' level sensors and waste oil tank heater from the tanks through the opening beside the hose adaptors and connect to the junction boxes

3.2 DISASSEMBLY INSTRUCTIONS

3.2.1 General Disassembly Information

The customer's personnel and/or contractors are responsible to:

3.2.1.1 Perform disassembly according to instructions provided by EWS in this *Manual*.

3.2.1.2 Disassemble I-beams, spacers and all incinerator component equipment using a crane, forklift, come-alongs, hydraulic jacks/hand-pumps, etc…

3.2.1.3 Disconnect all utility services including connections to the equipment including fuel, electrical, water, air, etc. using basic hand tools prior to disassembly

NOTE
Do not scale drawings: If certain dimensions are required which are not shown on drawings, EWS should be contacted for the required dimension. EWS will not be responsible for any dimensional conflicts resulting from dimensions not shown on a certified drawing. Do not use general sales literature or other general equipment submittals for construction, assembly and/or erection, unless so indicated.

Please note that some of the diagrams and/or photos in this FACILITY MANUAL are conceptual in nature and may not be exact representation of equipment purchased.

3.2.2 Preparation Prior to Disassembly

NOTE
DO NOT DISCONNECT THE INTERNAL ELECTRICAL CONNECTIONS UNTIL THE EXTERNAL POWER SUPPLY TO THE MOBILE INCINERATOR HAS BEEN SAFELY DISCONNECTED.

NOTE
TURN POWER OFF AT CUSTOMER SUPPLIED GENERATORS

The fuel supply connections (diesel and waste-oil) are located on the Primary Chamber Container and disconnect the fuel supply from the fuel tanks located externally. There are fuel lines between the containers for fuel distribution which are to be disconnected after the external hook-ups and connections have been disconnected.

NOTE
DO NOT DISCONNECT THE INTERNAL FUEL CONNECTIONS UNTIL THE EXTERNAL FUEL SUPPLY TO THE MOBILE INCINERATOR HAS BEEN DISCONNECTED.

3.2.3 Disassembly Overview

3.2.3.1 Specialized Tools and Equipment for Disassembly

The complete disassembly of the **EWS Mobile Incinerator** will require 2-3 full time personnel for 2 days. The following list identifies the equipment required to be supplied by the customer in order to proceed with the disassembly:

a. Crane
b. Forklift
c. Scissor Lift
d. Shims
e. Ladder (12')
f. Come-along
g. Hydraulic Jack/pump
h. Level
i. Erection Wrench / Alignment bar
j. Container Clamp 2-Wrench
k. Sling
l. I-beam Clamp

3.2.3.1 Disassembly Overview

The following general steps are the order in which the **EWS Mobile Incinerator** Package needs to be disassembled. Each step is detailed in the subsequent section.

ORDER OF DISASSEMBLY (as detailed in Section 3.2.4)

3.2.4.1 External Disconnections
3.2.4.2 Internal Disconnections
3.2.4.3 Internal Component Disconnections
3.2.4.4 Removal of opacity monitor
3.2.4.5 Removal of Stack Sections
3.2.4.6 Disassembly and Removal of Containers from Base Frame Structure
3.2.4.7 Disassembly of Base Frame Structure

NOTE

Important Notes to Consider Prior to and during Disassembly

a. Lifting lugs are provided on the stacks, and major accessories, and should be used when disassembling the incinerator

b. Do not allow lifting chains or cables to put loads on piping, or mounting flanges as they may be damaged.

c. Avoid dragging lifting gear across painted surfaces.

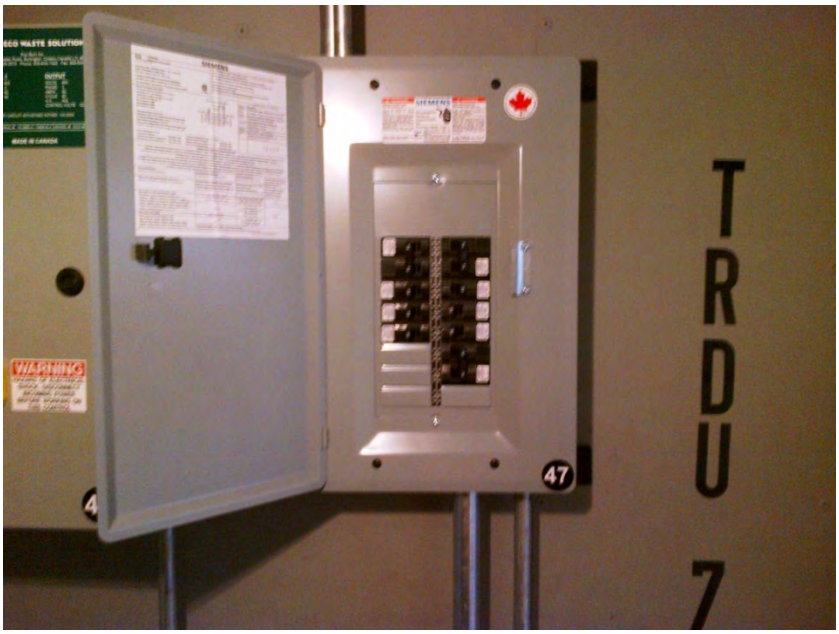
d. When removing the system from its position, be careful not to subject the refractory to mechanical shock, which may result in refractory damage.

3.2.4 Disassembly Instructions

3.2.4.1 EXTERNAL CONNECTIONS

Control Panel Power Off – turn off the power to the Control Panel.

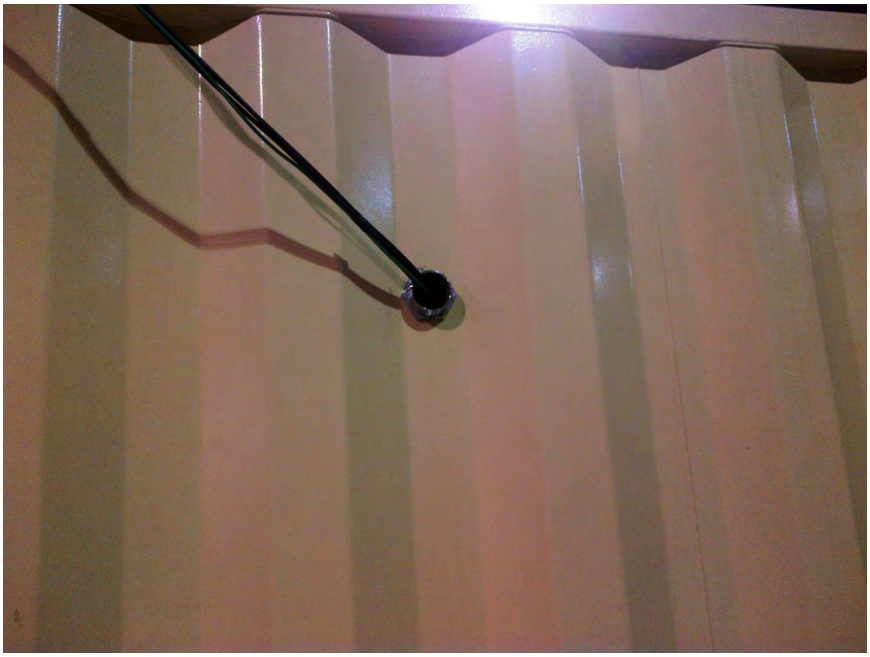
Main Power Disconnect – to be turned OFF before disconnecting any external or internal connections.



Switch off all breakers in the Breaker Panel

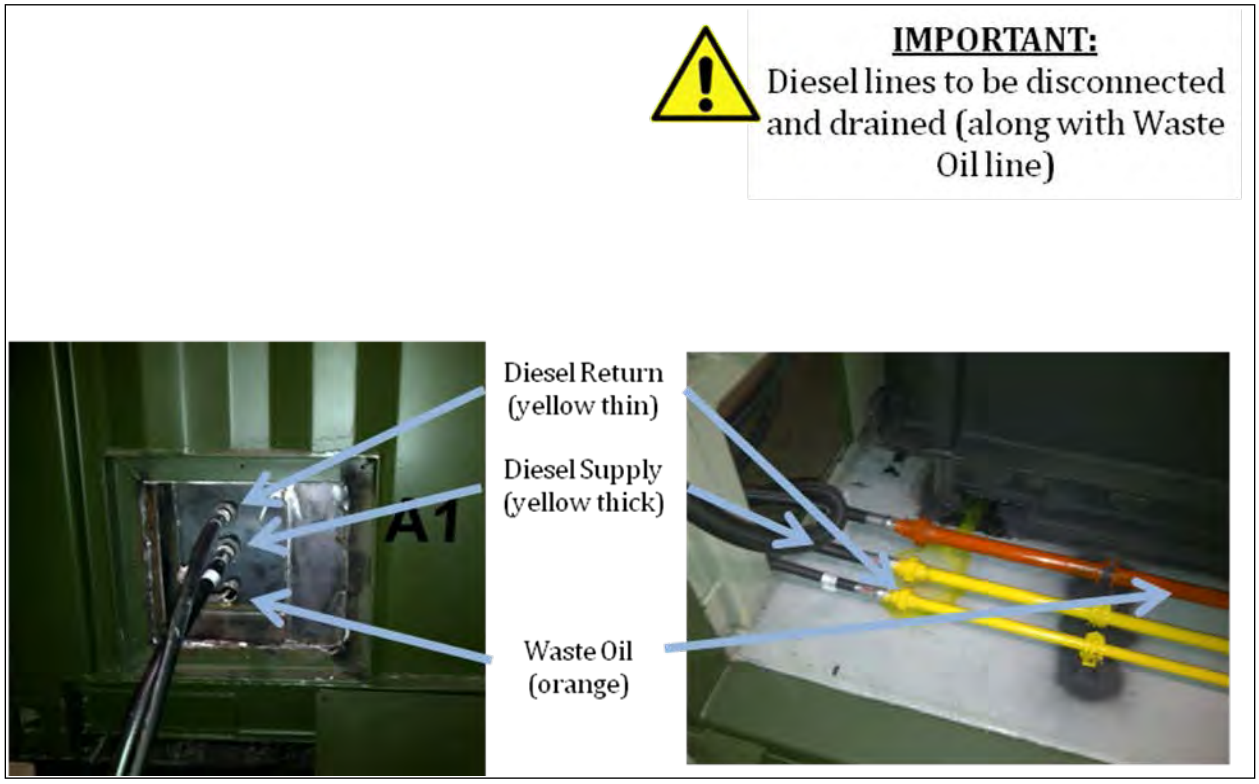
DO NOT DISCONNECT THE ELECTRICAL UNLESS THE BREAKERS ARE IN OFF POSITION

DO NOT DISCONNECT THE MAIN POWER FEED UNLESS THE MAIN SUPPLY FORM THE SITE HAS BEEN INTERRUPTED



2” opening for power supply in container 3

Disconnect the wires to the Main Disconnect and remove the 600v 40Amp 60Hz power through the 2” opening in container 3



Disconnect wires to the tanks level sensors and waste oil tank heater from the junction boxes and remove then through the opening beside the hose adaptors.

3.2.4.2 INTERNAL CONNECTIONS

Junction Boxes in container 1 (primary chamber)

Junction Boxes in container 3 (control container)

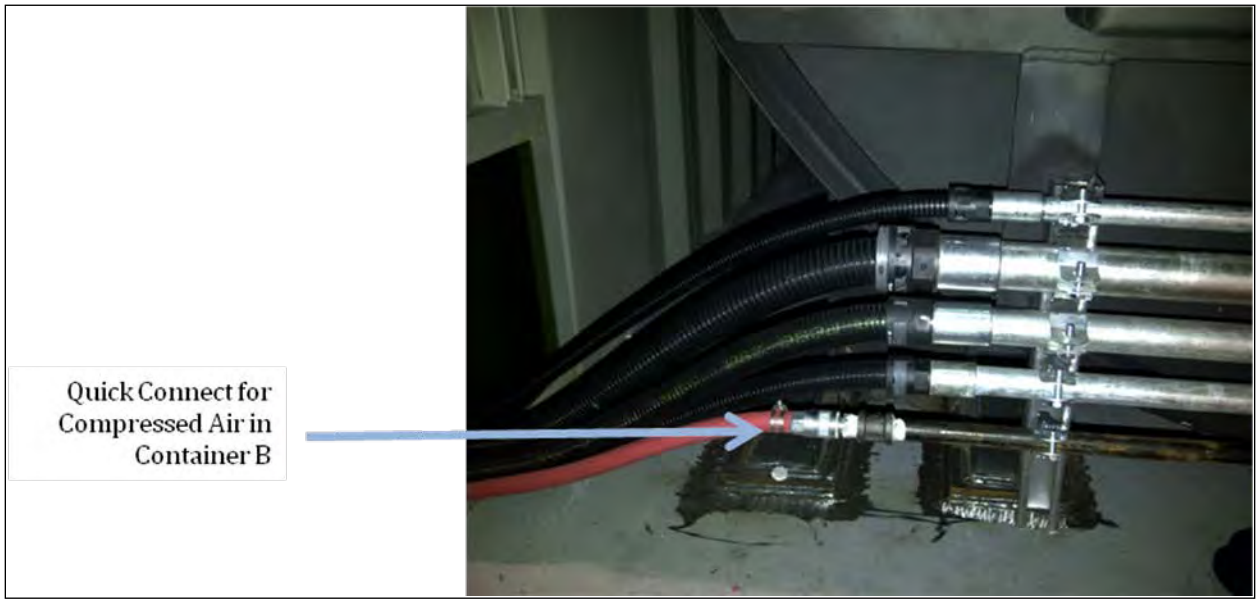
Disconnect the wires from the terminal block inside every junction box in both Container 1 and 3, replace any wire labels and conduit labels missing or damaged

Flexible conduit in Container 2 (secondary chamber)

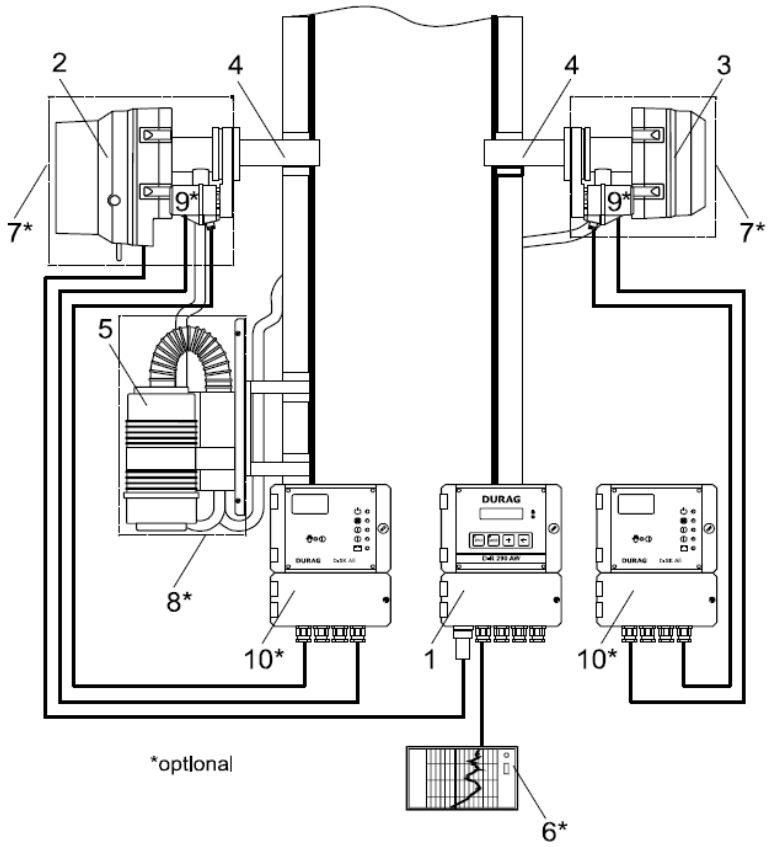
Pull the flexible conduit from container 1 and 3 into container 2 through the openings connecting the containers

Compressed air quick connect for Waste Oil Burner

Disconnect the air hose for the Waste oil Burner from the quick connect fitting



3.2.4.3 REMOVAL OF OPACITY MONITOR



	Standard		* Optional
1	Control unit, D-R 290 AZ (stack display) Or D-R 290 AW (evaluation unit)	6	Customer supplied recorder or data logging system
2	Transceiver, D-R 290 MK	7 & 8	Weather Hood, US built systems use one
3	Reflector, D-R 290 R1 or R2		Large weather hood for blower and optics
4	Mounting flange, D-R 280 E	9	Fail-safe shutters
5	Purge air unit	10	Fail-safe shutter control electronics

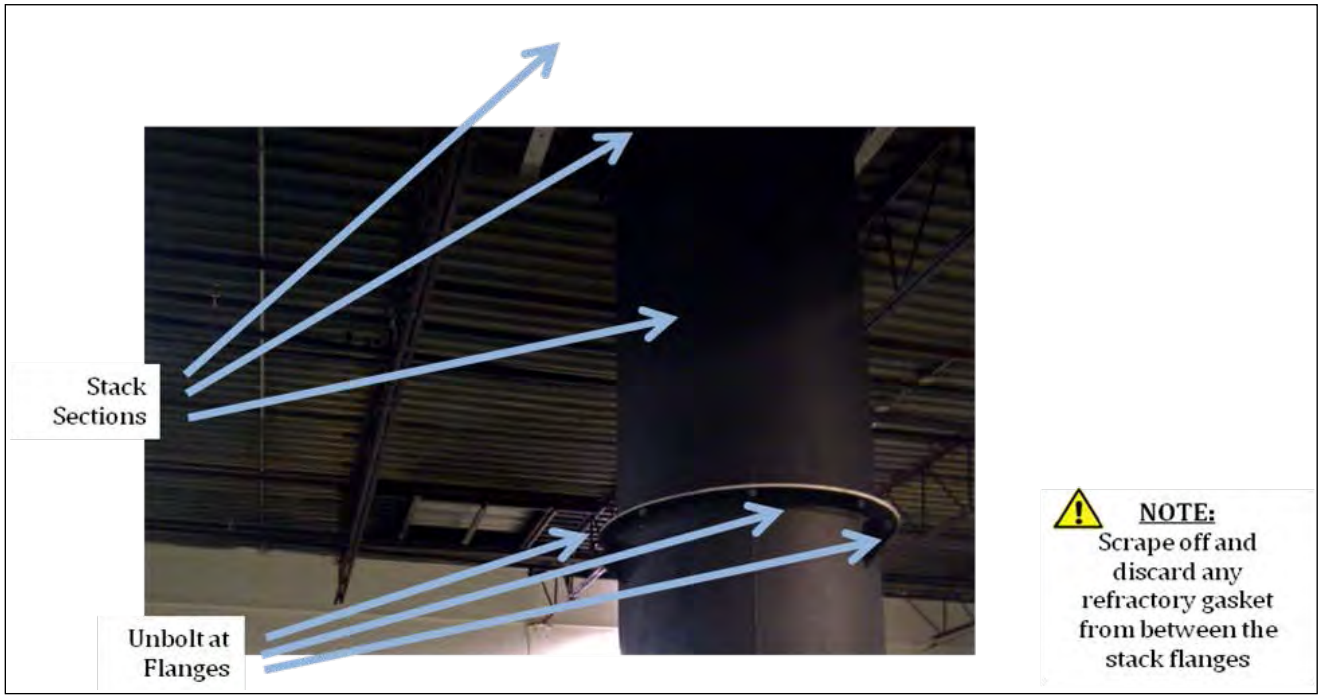
Disconnect power to the Purge Air Unit

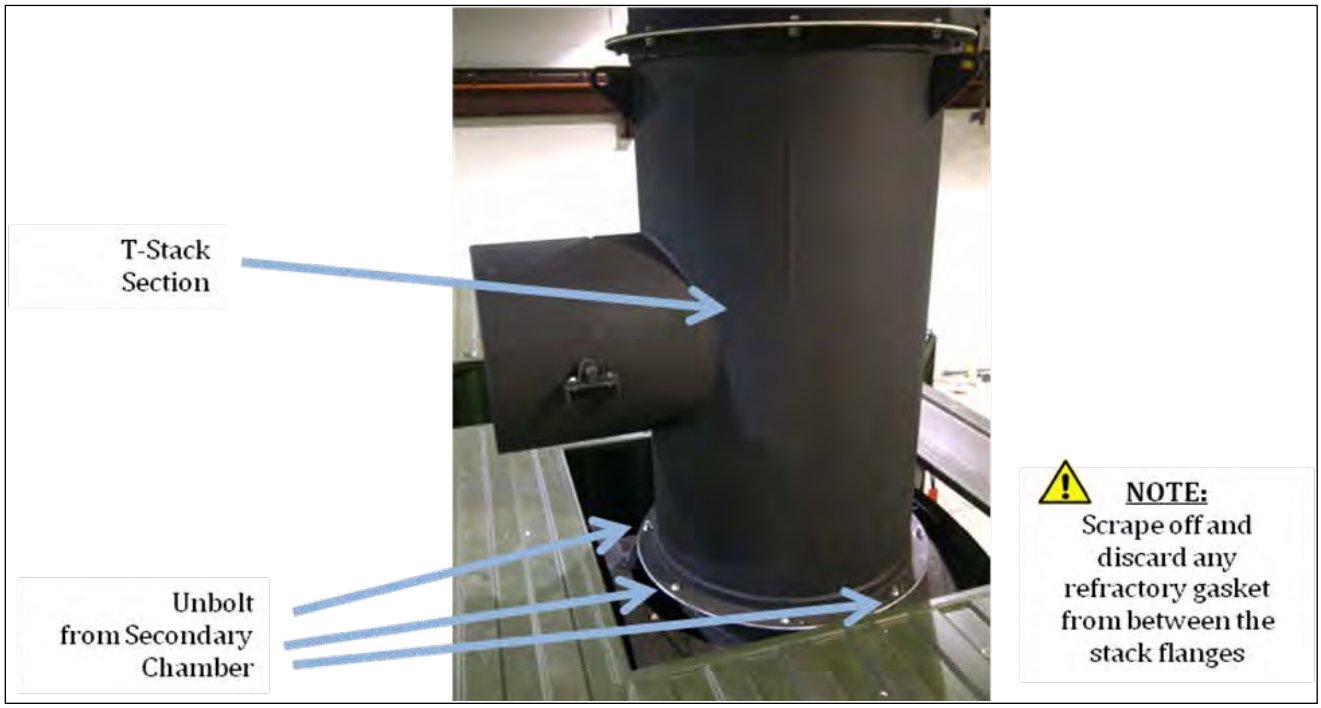
Disconnect the Transceiver to the Control unit

Uninstall the Purge Air Unit in the bracket provided in the T-Stack

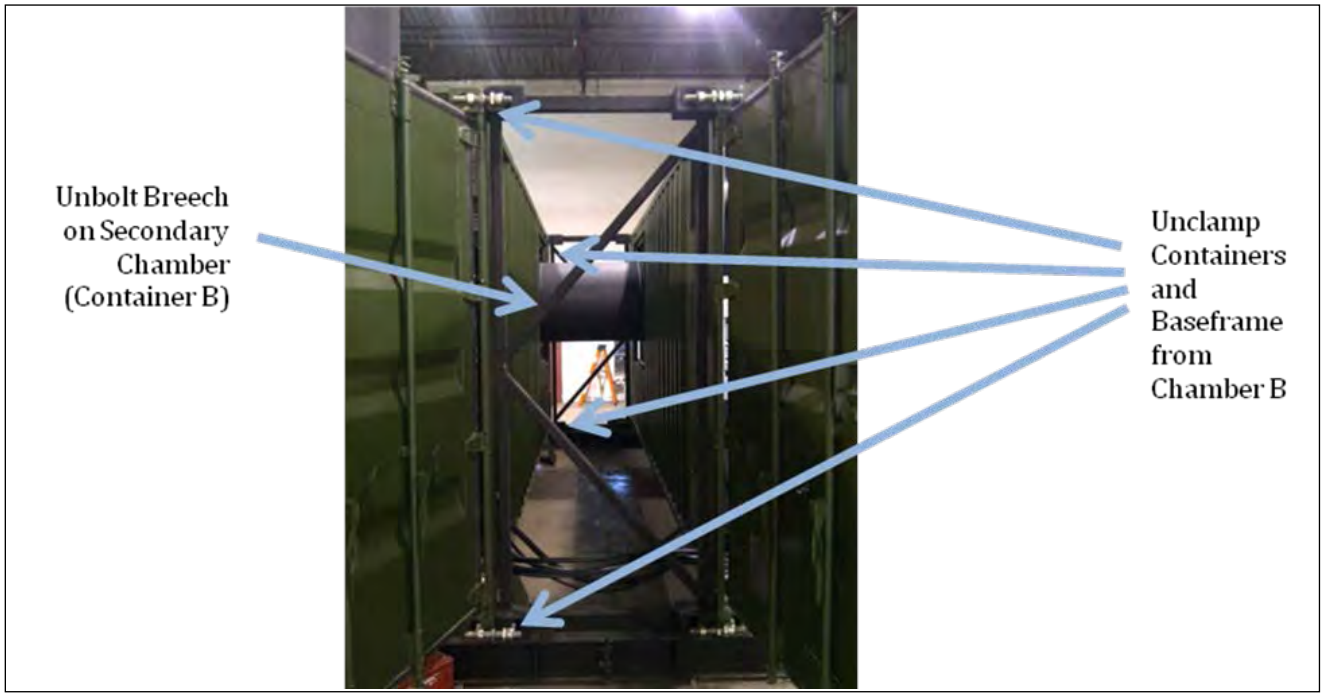
Uninstall the Transceiver and Reflector in the flanges provided in the stack section

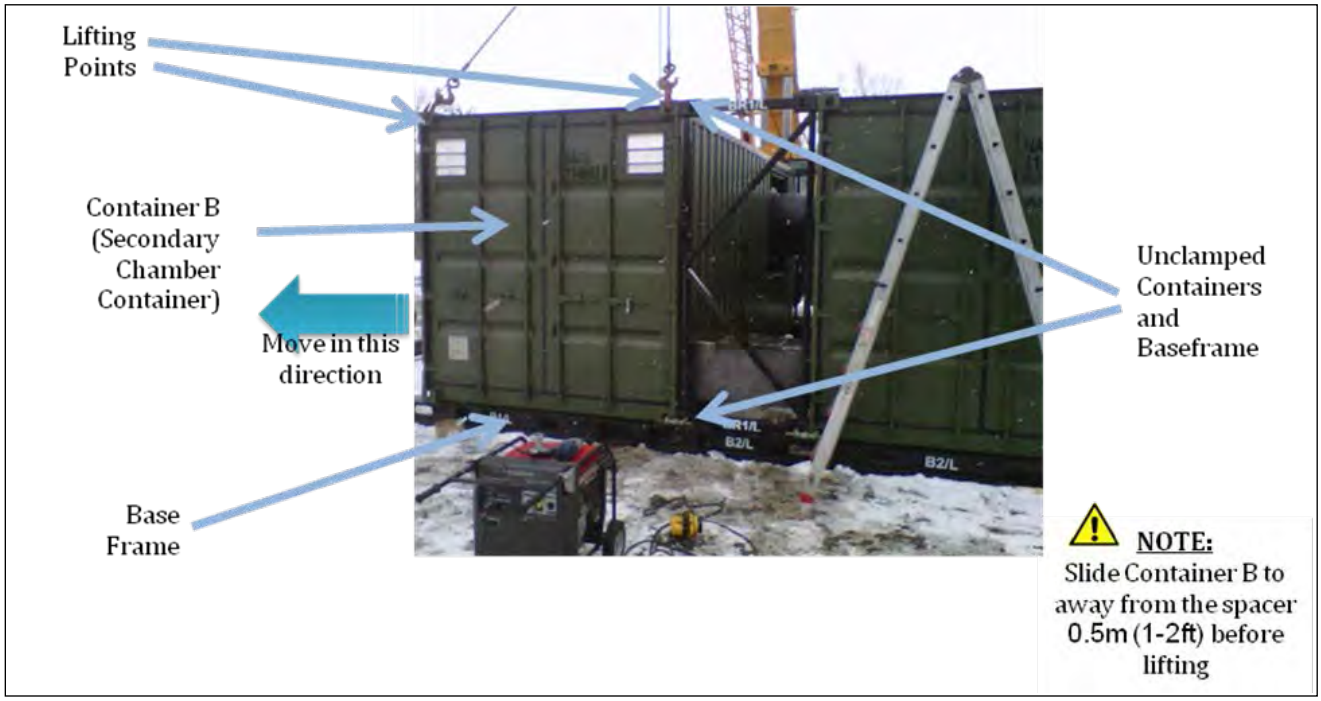
3.2.4.4 REMOVAL OF STACK SECTIONS



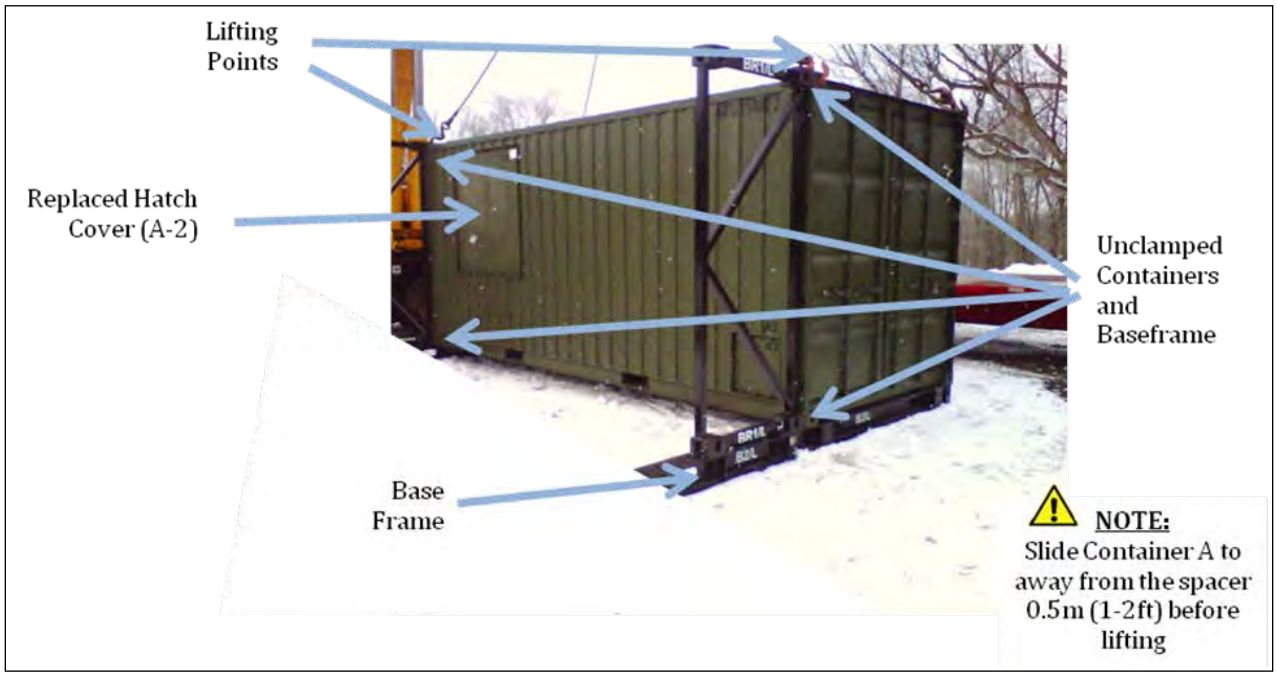


3.2.4.5 DISASSEMBLY AND REMOVAL OF CONTAINERS FROM BASE FRAME STRUCTURE

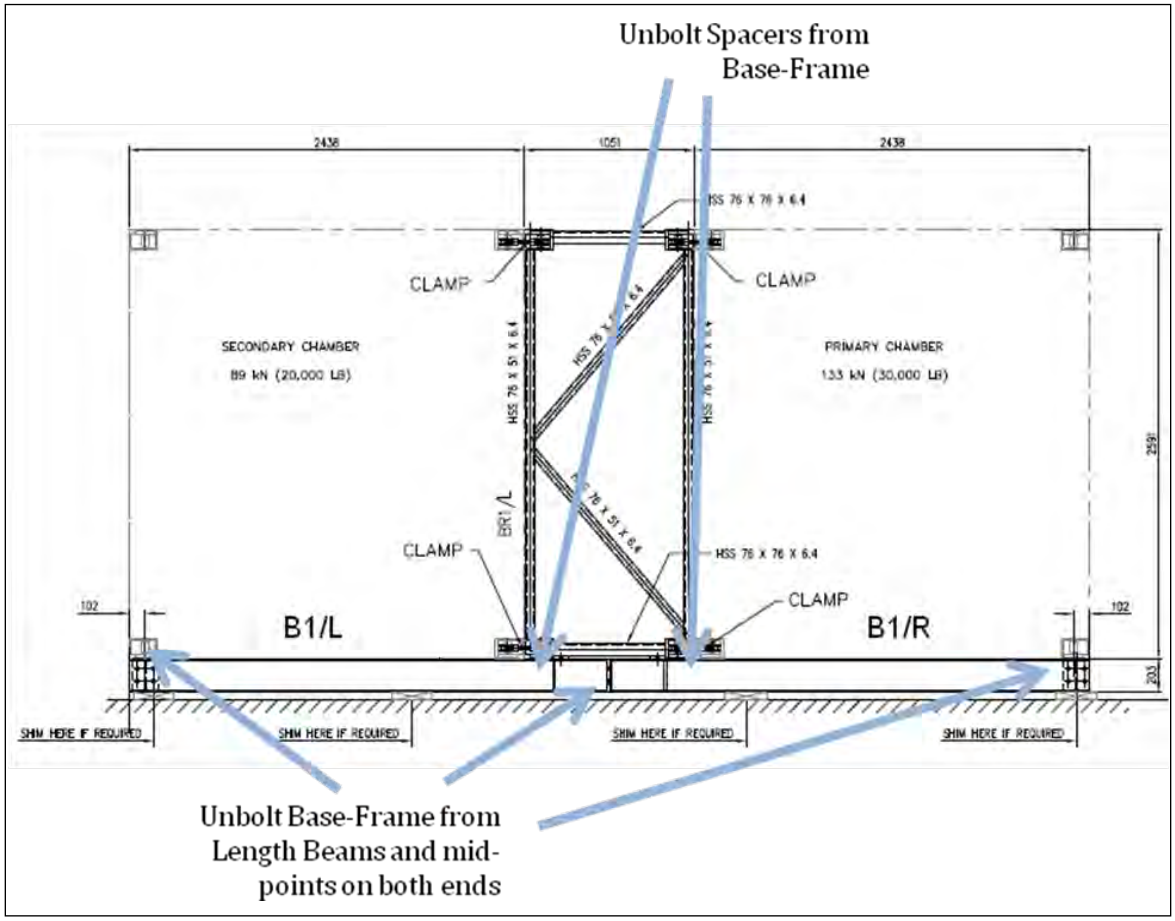

Unbolt Breech on Secondary Chamber (Container B)
Unclamp Containers and Baseframe from Chamber B

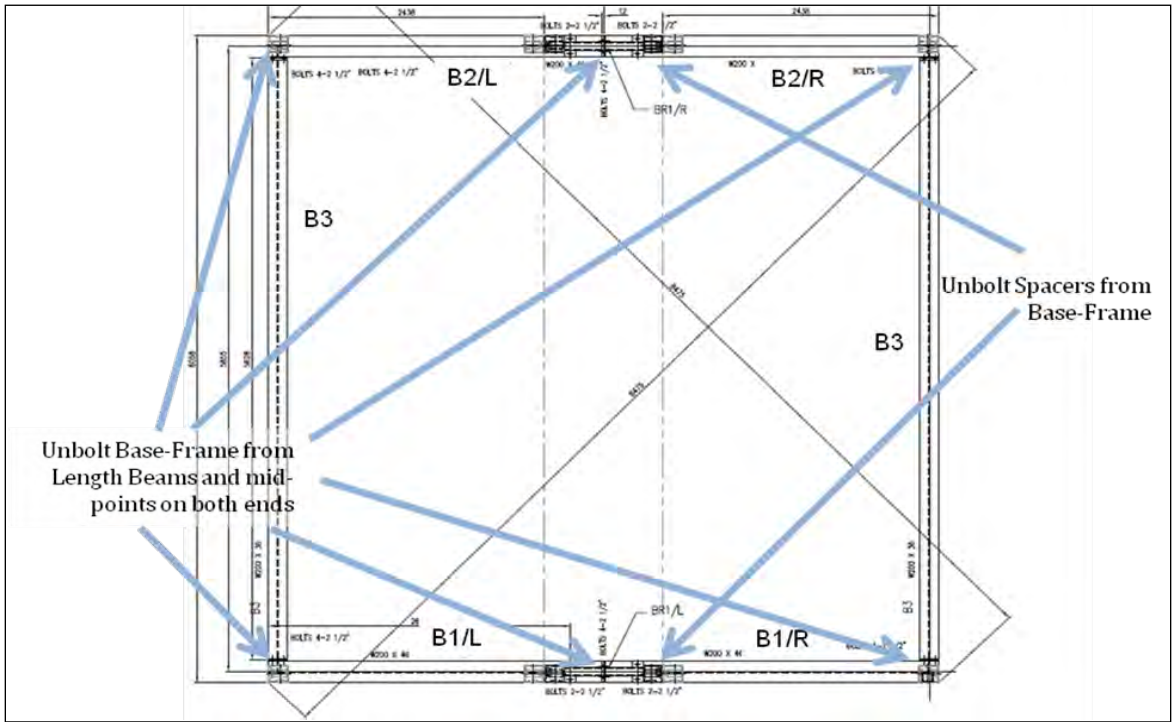

Lifting Points
Container B (Secondary Chamber Container)
Move in this direction
Base Frame
Unclamped Containers and Baseframe
NOTE:
Slide Container B to away from the spacer 0.5m (1-2ft) before lifting


Unbolt Breech on Primary Chamber (sling and brace to support with forklift or bobcat)
Container A
Remove Utility Tunnel
Unclamp Containers and Base-frame from Container A
BR1/L
B2/L


Lifting Points
Replaced Hatch Cover (A-2)
Unclamped Containers and Baseframe
Base Frame
NOTE:
Slide Container A to away from the spacer 0.5m (1-2ft) before lifting

DISASSEMBLY OF BASE FRAME STRUCTURE





Miscellaneous Final Items:

- Replace all remaining hatch covers on Containers A, B and C
- Pack all remaining parts for shipment:
  Nuts, bolts and washers
  Stacks, t-section and breech on marked skids
  I-beams and spacers from the base-frame
  Fuel and Waste Oil tanks

3.2.4.6 PREPARATION FOR STORAGE AND WHILE IN STORAGE

The following items will be required for final packing and storage:

- Lubricant (Lithium Spray Grease)
- Standard Grease (Mobilgrease 28)
- Silicone (MONO Ultra)
- Desiccant (Shipping Container Desiccant)

1. **Primary Chamber Container (1) and Secondary Chamber Container (2):**

General

a. Place desiccant bags under chambers and replace every 6 months

b. Lubricate door frames (hinges and bearings) using standard grease.

c. Place desiccant bags in the Primary and Secondary Chambers and replace every 6 months.

d. Seal all container openings with silicone rubber caulking (Sealastic® or equal - block to discourage pilfering).

Ventilation and Exhaust Fans

e. Coat coupling and all external machined parts with standard grease.

f. Spray light penetrating oil on fan wheel.

g. For long term or outdoor storage, mounted bearings should be re-greased and wrapped with plastic for protection. Rotate the fan wheel by hand at least every two weeks to redistribute grease on internal bearing parts. Each month the bearings should be purged with new grease to remove condensation, since even a filled bearing can accumulate moisture. Use caution when purging, as excessive pressure can damage the seals. Rotate the shaft while slowly adding grease. Place desiccant bag in fan housing and replace every 6 months.

Fan and Pump Motors

h. Spray light penetrating oil on the shafts of the motors.

i. Fill bearing housing with grease containing five percent rust-preventive concentrate.

j. Coat all exposed machined parts with standard grease

k. Do not rotate motors

2. **Controls Container (3)**

Air Compressor

a. Purge compressor cylinders of hydrocarbons.

b. Blank compressor suction and discharge.

c. Fill crankcase, cooling water jacket and valves with oil containing five percent rust-preventive concentrate. Allow space for thermal expansion.

d. Coat all exposed machined parts with standard grease.

e. Top-up oil level in the cooling water jacket.

f. Controls container must be stored in a climate-controlled building during this period to protect the PLC and instrumentation from freezing temperatures or fluctuations in temperature that go below the dew point. No components will require special attention if the container is stored in a building kept above the dew point temperature (e.g. above 15°C at less than 35% relative humidity).

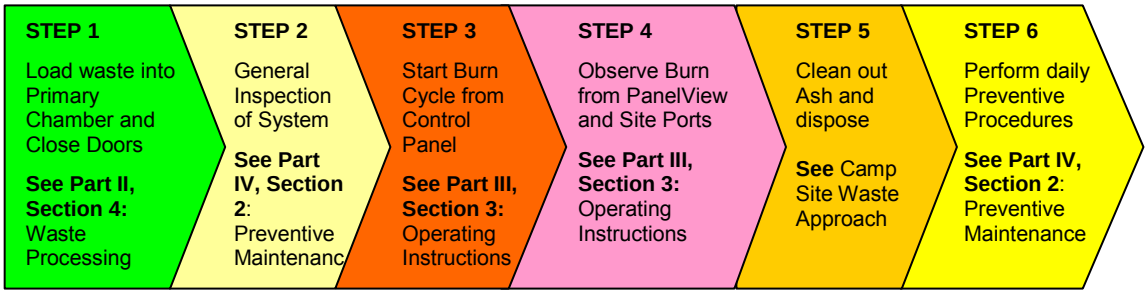
3.2.4.7 PACKING SKIDS AND CRATES IN CONTAINERS

1. Prior to shipment ensure all components are strapped and fastened within the container.

2. If all above items were followed for the preparation and while in storage, the system should be ready for shipment and usage.

3.3 OPERATING INSTRUCTIONS

The operation of the Mobile Waste Incinerator package follows 6 general steps that take place over a 24 hour period.



This section focuses on Steps 3 and 4 and how to start the system and monitor it during operation, however it is assumed that the waste is properly loaded with the weight, density and type stated in Part II Section 4. It is also assumed that the waste is loaded after the ash has been removed from the previous burn cycle and any daily maintenance routines have been completed.

3.3.1 Operator Interface

3.3.1.1 Control Panel Components

1. Main Disconnect Switch
2. Panel View Operator Panel
3. Control Power ON
4. Emergency Stop Button
5. Ethernet Ports

1. Main Disconnect Switch : Controls all power to the system.

2. PanelView Operator Interface ("PanelView"): Displays various screens reflecting system performance.

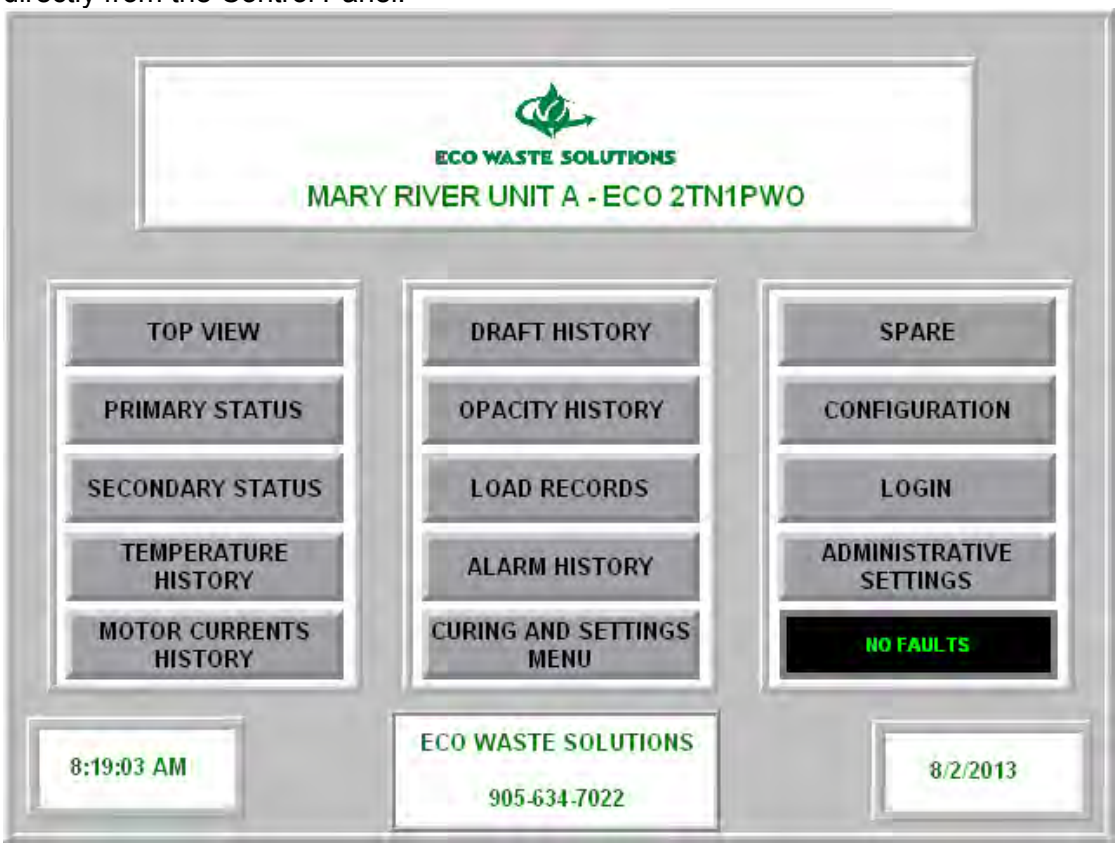
3. Control Power On:
   1 – Green light indicates the control power in the panel is on;
   2 – Pushing this button if the E-stop is out will turn on the control power.

4. Emergency Stop Keylock Button: Stops the current burn cycle in progress and disables the ability to restarting it.

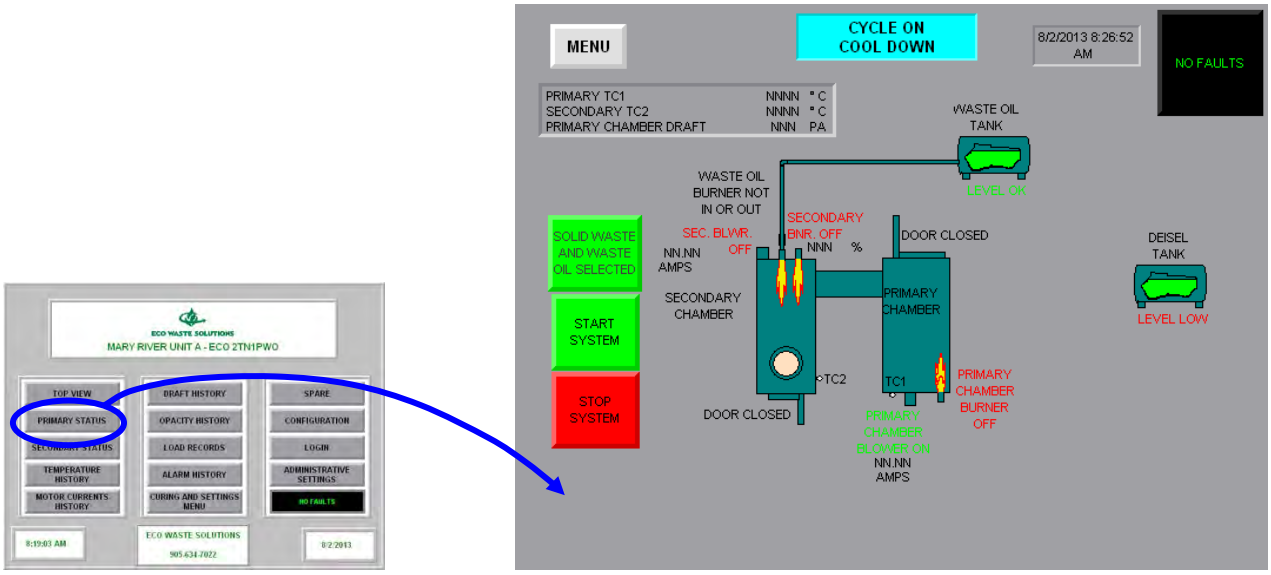
5. Ethernet Port: Port used to download system historical usage data.

3.3.1.2 Operator Interface

The PanelView Operator Interface controls the operation of the mobile incinerator package directly from the Control Panel.

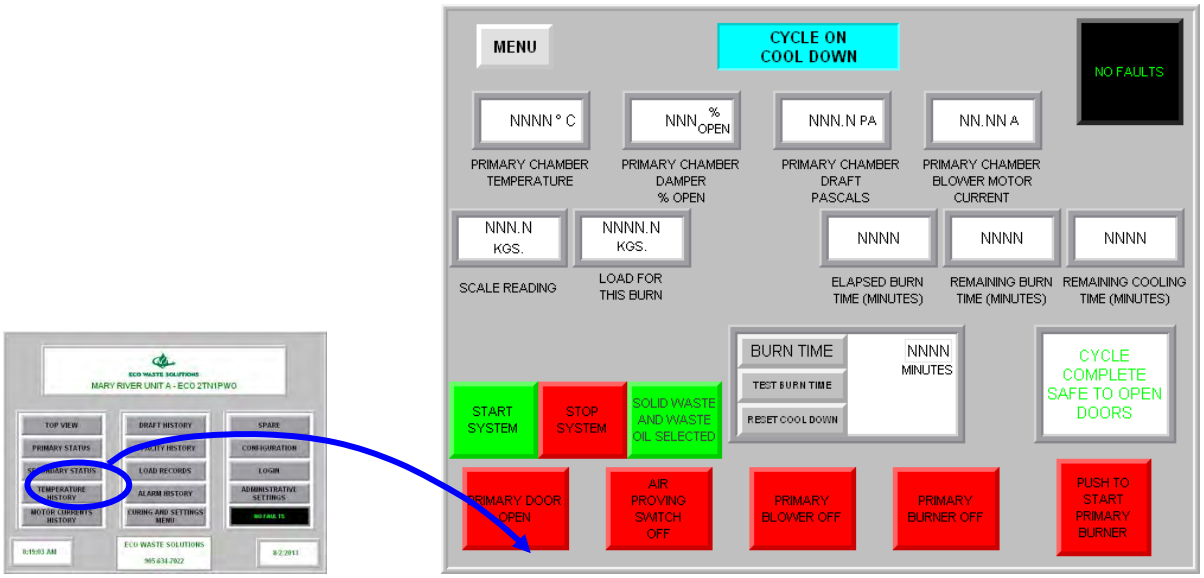


The main screen displays all the available options for viewing the system in operation. The PanelView is a touch-screen and items can be selected by touching them on the screen.



When the **TOP VIEW** button is selected, an overview of the incinerator and related components are displayed. This shows key temperatures, flows, and other indicators of what is happening in the process in a real-time basis.

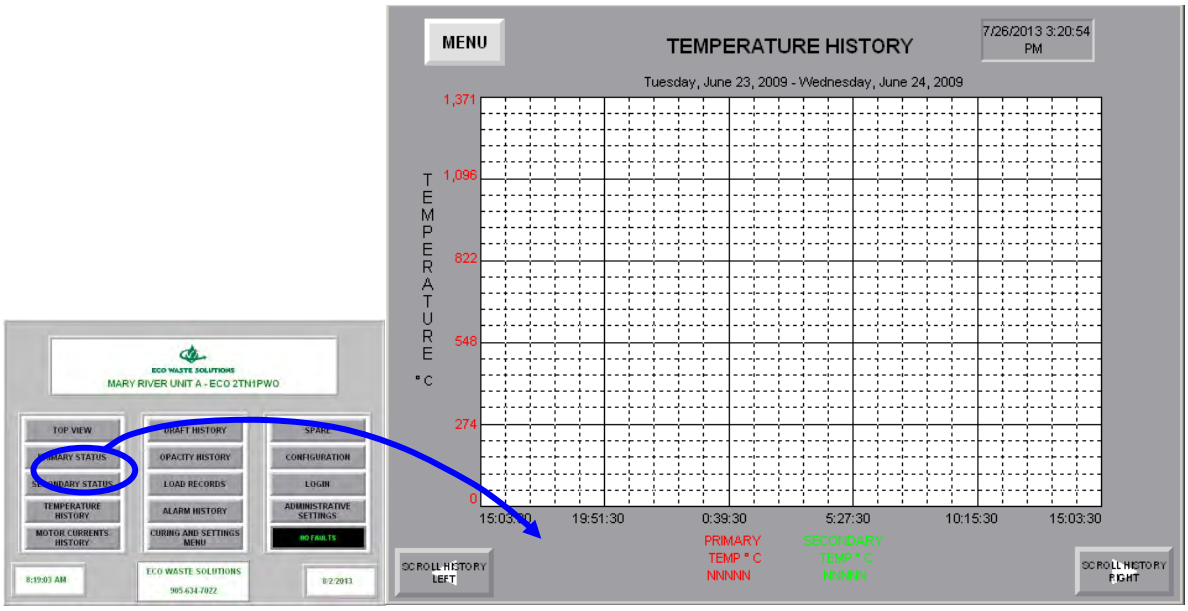
The system will not start if there are alarms or faults present. To clear (acknowledge faults) At any time, touch or press **MENU** to go back to the main screen.



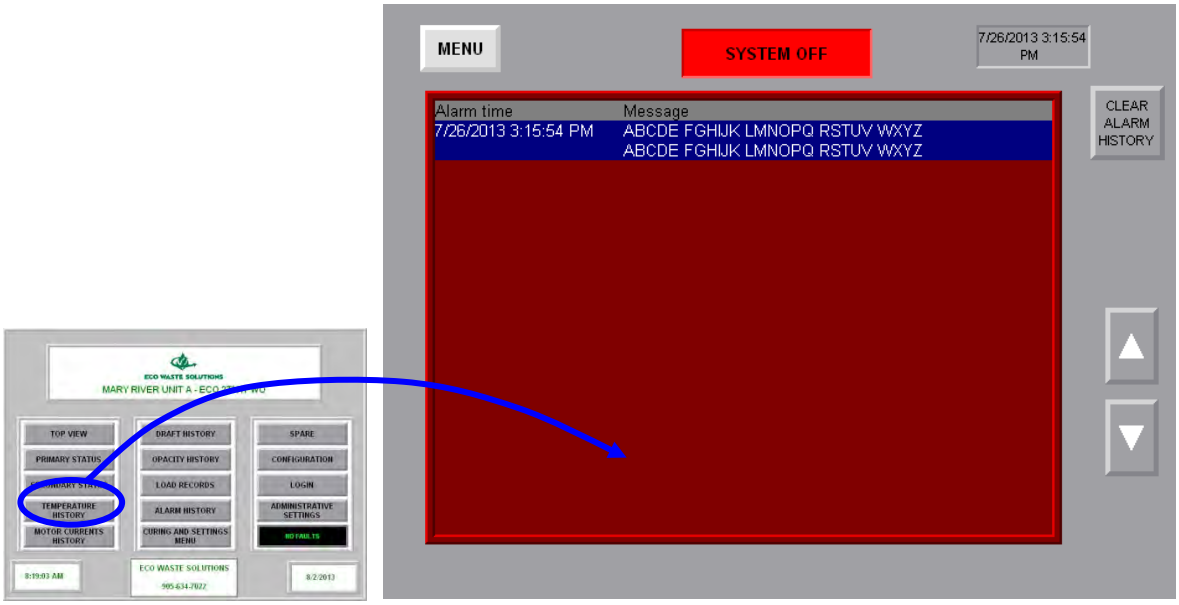
When the PRIMARY or SECONDARY SYSTEM STATUS is selected from the Main Menu a screen (above) will display the status of all the operating parameters of the respective chamber such as the temperatures and the time remaining in the cycle as well as displaying other informational items such as status of the door and blowers, etc.

The operator can change the burn time of the cycle by selecting “BURN TIME” and entering a time (in minutes). The operator may do this over time to either prolong the burn time, or decrease the burn time depending on the waste mix. (E.g. a very wet batch of garbage will take more time than a dryer batch of waste).

At any time, touch or press **MENU** to go back to the main screen.



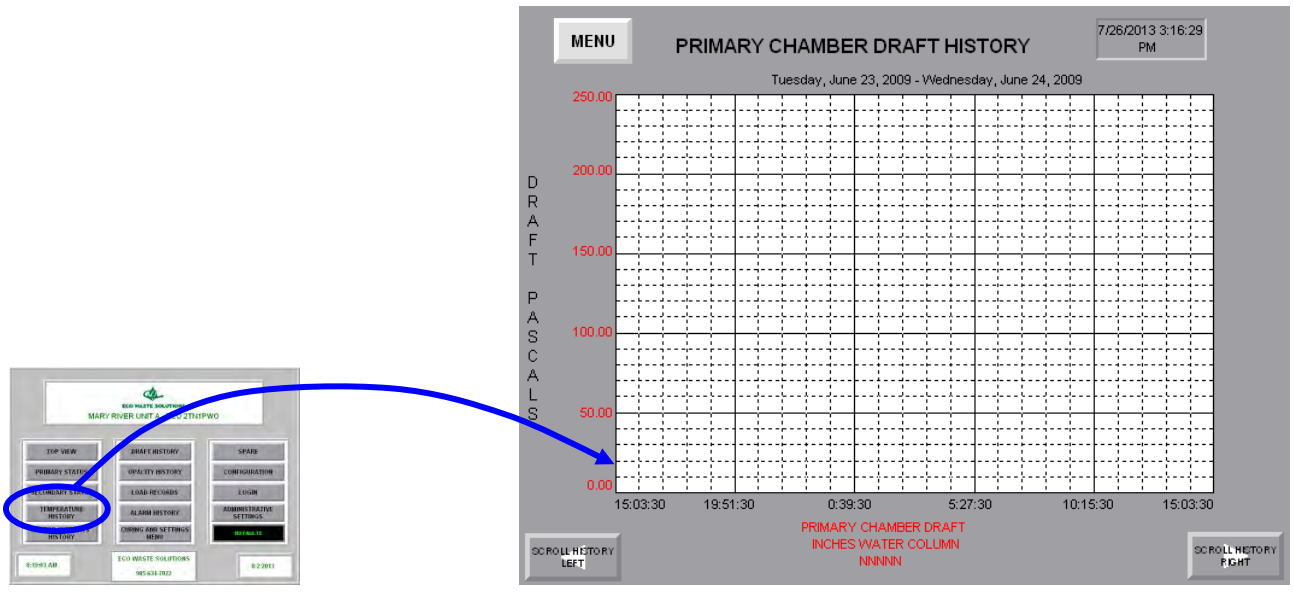
When the **TEMPERATURE HISTORY** is selected the screen will display the temperature history for the last burn showing various temperatures throughout the system. This information is stored for 30 days.



When **ALARM HISTORY** is selected the screen displays the last 25 faults with the date & time of occurrence. The operator can press the CLEAR ALARM HISTORY to clear all of the faults. The operator can also clear individual alarms by selecting them on-screen and pressing the ACKNOWLEDGE button.

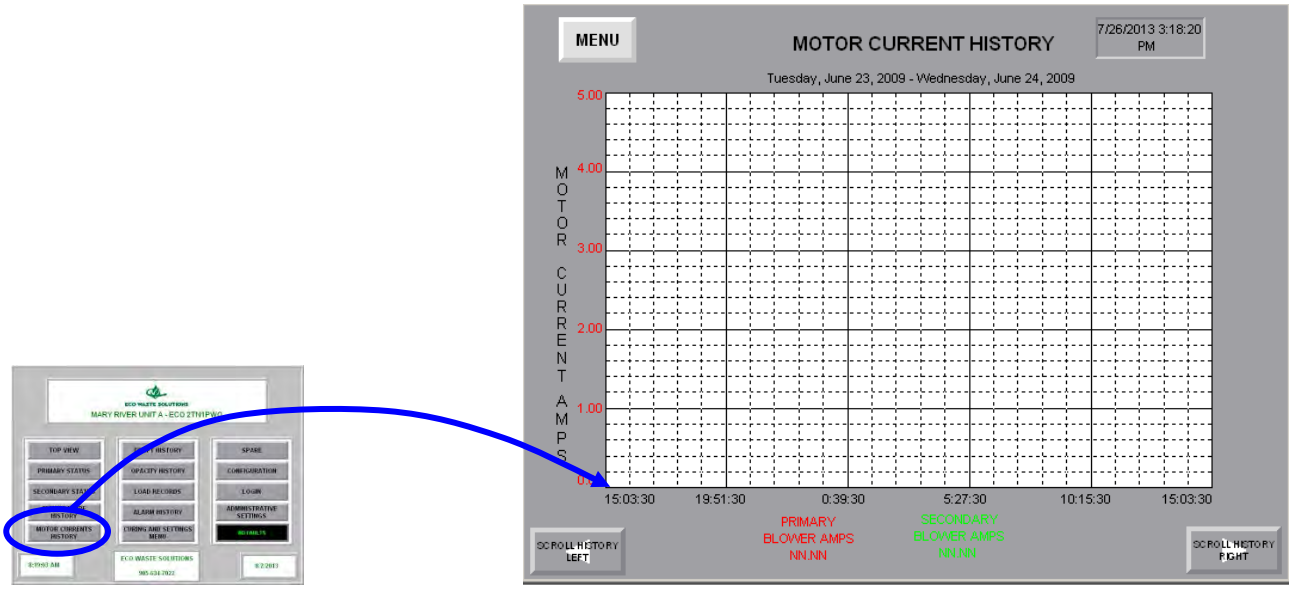
The operator can select **ALARM COUNT**, and view the specific number of alarm faults.

At any time, touch or press **MENU** to go back to the main screen.



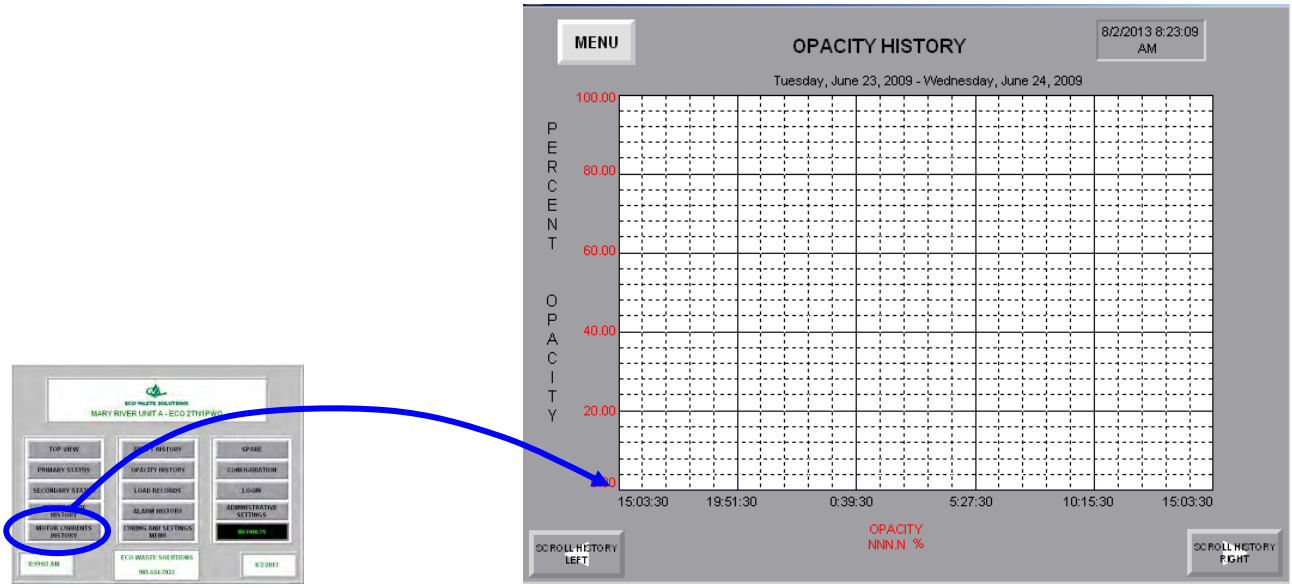
When the **DRAFT HISTORY** is selected the screen will display the draft history for the last burn showing data throughout the system. This information is stored for 30 days.

At any time, touch or press **MENU** to go back to the main screen.



When the **MOTOR CURRENT HISTORY** is selected the screen will display the motor current history for the last burn showing data throughout the system. This information is stored for 30 days.

At any time, touch or press **MENU** to go back to the main screen.



When the **OPACITY HISTORY** is selected the screen will display the opacity current history for the last burn showing data throughout the system. This information is stored for 30 days.

At any time, touch or press **MENU** to go back to the main screen.

3.3.1.3 Starting the Cycle

To start the burn cycle, ensure that the waste is loaded into the system according to the waste mix described in Part II Section 4 and not blocking the burner cone or area where the flame will be directed into the Primary Chamber. Make sure the door is clamped in all places on the Primary Chamber.

At the control panel, on the Panel View press the “Start System” button and the system will initiate the Purge Cycle, followed by the Burn Cycle and then ending with the Cool Down Cycle.

3.3.1.4 Purge Cycle

This is the first step in the burn cycle and is in place for safety reasons. The purge exhausts potentially explosive gases that could be remaining in the system and burners. The primary and secondary blowers will run to purge both chambers. The primary and secondary blower indicators on the Top View screen on the Operator Interface will say “Primary Chamber Blower On” and “Secondary Blower On”

3.3.1.5 Burn Cycle

When the purge is finished the Secondary Burner will come on and for safety reasons will perform a purge and then ignite. Once the Secondary Chamber temperature reaches 1000°C the Primary burner will purge and then ignite. The burn cycle time will start when the Primary Chamber temperature reaches 427°C

The Secondary Burner will modulate to maintain Secondary temperature. If the Secondary Chamber starts getting too hot the Secondary damper opens and the blower will increase in speed to assist with cooling. When the secondary chamber cools down the damper will start to close again.

When the waste in the Primary chamber starts to burn hot enough, the primary burner turns off (815^{o}C) and stays off. When the waste can no longer sustain the temperature in the Primary chamber, the primary burner will come back on (760^{o}C). This will continue until the remaining burn time reaches zero.

When the burn time reaches zero, the system will enter the cool down cycle. The Primary chamber and Secondary chamber burners turn off; the secondary chamber blower turns off and the primary blower starts and runs until the cool down cycle is complete. The cool down cycle is complete after the cool down timer has timed out.

3.3.1.6 Using Historical Charts

a. Go to the Main Screen of the control panel operator interface.
b. Select the historical chart you want to view (e.g. Temperature, Draft, etc).
c. Once the desired chart appears the “buttons” on the bottom left and right of the screen can be used to scroll through to previous days’ information by selecting them and holding down.
d. Once the desired date is selected the graph will be on the screen indicating the time and specific data trends (e.g. Temperature, Draft, etc) of the burn.

3.3.1.7 Retrieving Data from the PLC

a. Once a week or when the warning message appears the data will need to be downloaded.

b. Go to the laptop supplied with the equipment. *DO NOT* turn the computer on.

c. Connect the Ethernet cable to the computer.

d. Plug the Ethernet cable into the Ethernet port on the front of the control panel.

e. Turn on the laptop.

f. The laptop will start up and ask for a password. The password has been set to: **ecowaste** and is case sensitive.

g. Once the password has been accepted RSLinx will start automatically.

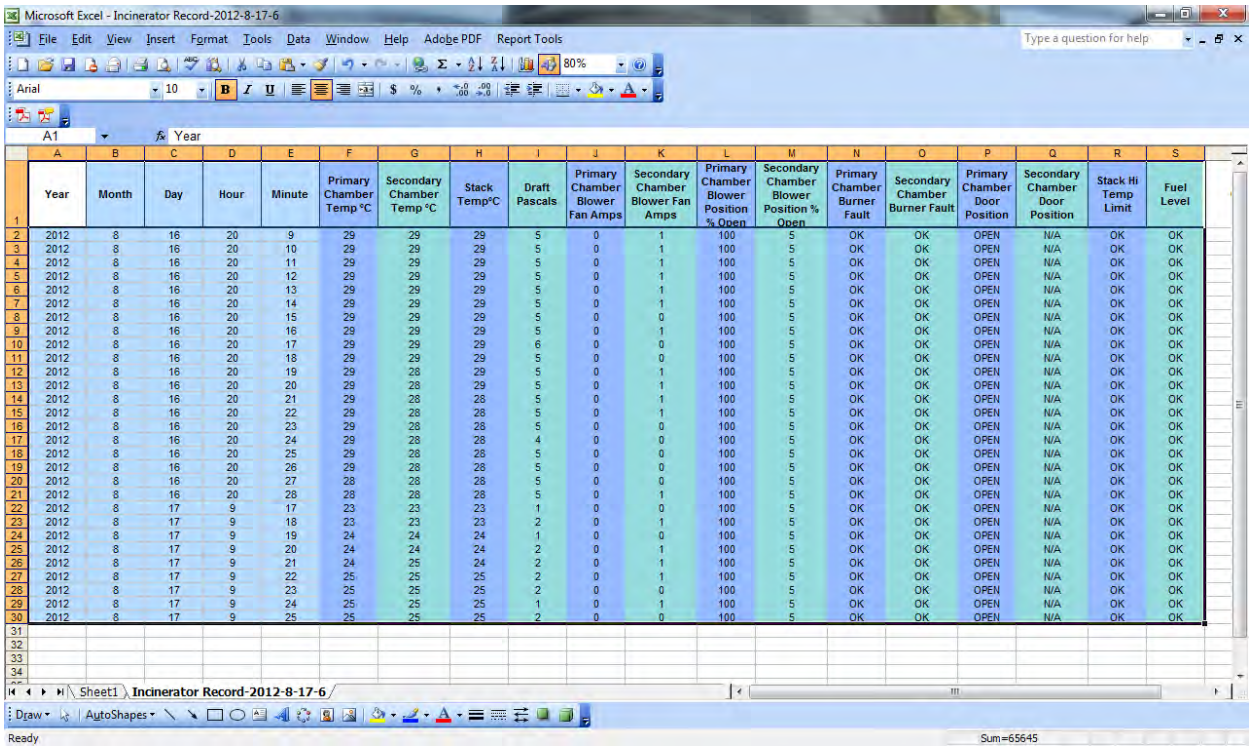
h. When RSLinx has finished starting up the screen can be minimized.

i. On the desktop there is an Excel File called **"Incinerator Data Logging"**. Double click this icon and Excel will open and automatically begin downloading the data from the PLC.

j. A full data file will take approximately 2 hours to complete download.

k. Once the data has been downloaded it will close Excel and save the downloaded data to a folder on the C: drive called C:/Incinerator Data Logging. The data can be printed from Excel as needed.

The data logging file will look like this in Excel



Microsoft Excel - Incinerator Record-2012-8-17-6

Year	Month	Day	Hour	Minute	Primary Chamber Temp °C	Secondary Chamber Temp °C	Stack Temp°C	Draft Pascals	Primary Chamber Blower Fan Amps	Secondary Chamber Blower Fan Amps	Primary Chamber Blower Position % Open	Secondary Chamber Blower Position % Open	Primary Chamber Burner Fault	Secondary Chamber Burner Fault	Primary Chamber Door Position	Secondary Chamber Door Position	Stack Hi Temp Limit	Fuel Level
2012	8	16	20	9	29	29	29	5	0	1	100	5	OK	OK	OPEN	N/A	OK	OK
2012	8	16	20	10	29	29	29	5	0	1	100	5	OK	OK	OPEN	N/A	OK	OK
2012	8	16	20	11	29	29	29	5	0	1	100	5	OK	OK	OPEN	N/A	OK	OK
2012	8	16	20	12	29	29	29	5	0	1	100	5	OK	OK	OPEN	N/A	OK	OK
2012	8	16	20	13	29	29	29	5	0	1	100	5	OK	OK	OPEN	N/A	OK	OK
2012	8	16	20	14	29	29	29	5	0	1	100	5	OK	OK	OPEN	N/A	OK	OK
2012	8	16	20	15	29	29	29	5	0	0	100	5	OK	OK	OPEN	N/A	OK	OK
2012	8	16	20	16	29	29	29	5	0	1	100	5	OK	OK	OPEN	N/A	OK	OK
2012	8	16	20	17	29	29	29	6	0	0	100	5	OK	OK	OPEN	N/A	OK	OK
2012	8	16	20	18	29	29	29	5	0	0	100	5	OK	OK	OPEN	N/A	OK	OK
2012	8	16	20	19	29	28	29	5	0	1	100	5	OK	OK	OPEN	N/A	OK	OK
2012	8	16	20	20	29	28	29	5	0	1	100	5	OK	OK	OPEN	N/A	OK	OK
2012	8	16	20	21	29	28	28	5	0	1	100	5	OK	OK	OPEN	N/A	OK	OK
2012	8	16	20	22	29	28	28	5	0	1	100	5	OK	OK	OPEN	N/A	OK	OK
2012	8	16	20	23	29	28	28	5	0	0	100	5	OK	OK	OPEN	N/A	OK	OK
2012	8	16	20	24	29	28	28	4	0	0	100	5	OK	OK	OPEN	N/A	OK	OK
2012	8	16	20	25	29	28	28	5	0	0	100	5	OK	OK	OPEN	N/A	OK	OK
2012	8	16	20	26	29	28	28	5	0	0	100	5	OK	OK	OPEN	N/A	OK	OK
2012	8	16	20	27	28	28	28	5	0	0	100	5	OK	OK	OPEN	N/A	OK	OK
2012	8	16	20	28	28	28	28	5	0	1	100	5	OK	OK	OPEN	N/A	OK	OK
2012	8	17	9	17	23	23	23	1	0	0	100	5	OK	OK	OPEN	N/A	OK	OK
2012	8	17	9	18	23	23	23	2	0	1	100	5	OK	OK	OPEN	N/A	OK	OK
2012	8	17	9	19	24	24	24	1	0	0	100	5	OK	OK	OPEN	N/A	OK	OK
2012	8	17	9	20	24	24	24	2	0	1	100	5	OK	OK	OPEN	N/A	OK	OK
2012	8	17	9	21	24	25	24	2	0	1	100	5	OK	OK	OPEN	N/A	OK	OK
2012	8	17	9	22	25	25	25	2	0	1	100	5	OK	OK	OPEN	N/A	OK	OK
2012	8	17	9	23	25	25	25	2	0	0	100	5	OK	OK	OPEN	N/A	OK	OK
2012	8	17	9	24	25	25	25	1	0	1	100	5	OK	OK	OPEN	N/A	OK	OK
2012	8	17	9	25	25	25	25	2	0	0	100	5	OK	OK	OPEN	N/A	OK	OK

3.3.2 Procedure before Start Up

The operating instructions are to occur once the assembly of the system is completed and inspected. Before you continue with the operating instructions ensure that the following items are completed:

a. All physical components attached and bolted
b. All internal electrical connections are completed
c. All internal fuel and air connections are completed
d. All external fuel lines have been connected (tanks to container)

NOTE

Before connecting the external electrical connection, ensure that all internal electrical connections have been made

Once all the above activities and the assembly instructions have been completed, follow the procedure outlined below:

3.3.2.1 Located in the control room of the Controls Container turn on the power on the Main Disconnect

a. If red light is illuminated, change the phase on customer-supplied power. DO NOT TRY CHANGING THE PHASE ON EWS SUPPLY.

b. If green light is illuminated, power supply and phasing are confirmed and start-up procedures can be continued

3.3.2.2 Turn lights on, located in the auxiliary power breaker panel

3.3.2.3 Turn exhaust fan on, located at the auxiliary power breaker panel

a. If outside ambient temperature < 5˚C: Turn heater on from the auxiliary power breaker panel because the temperature in Controls side of container must be > 5˚C

3.3.2.4 Turn on remaining breaker in auxiliary panel

3.3.2.5 Once the Human Machine Interface (HMI) (Panel View) is running and power sequence is correct push the “Control Power On” button.

3.3.2.6 Ensure there is power supply to all containers by selecting the Top View from Panel view and check:

a. All temperature readings (if 1371˚C is displayed the thermocouple is not connected or is faulty.)

b. That the Primary and Secondary Chamber door position on screen is the same as on the system, if shown incorrectly check limit switch

3.3.2.7 Fill fuel tank and the Waste Oil Tank if the planned burn is with waste oil

NOTE **ONLY DIESEL FUEL CAN BE STORED IN THE DIESEL FUEL TANK**

Before filling the tank ensure:

a. The storage tank is in good condition, e.g. tank shall not exhibit severe rusting, apparent structural defects or deterioration.

b. No leaking visible. If leaking is detected perform the following clean-up steps:
   i. Stop the release
   ii. Contain the released fuel
   iii. Clean up and properly manage the released fuel as per best environmental standards
   iv. Repair or replace the leaking tank prior to returning it to service.

c. Inspect the bottom of tank for sludge formation. Perform the following steps.
   i. Remove fuel tank access cover.
   ii. Do a visual inspection of the inside of the tank, clean if necessary. A drain valve is located at the bottom of the tank to assist with cleanout. Ensure the drain valve is in place before filling.
   iii. Ensure valve is closed
   iv. Fill the tank through the access.

NOTE

Load the oldest liquid inventory first. Long term storage may result in the formation of sludge or the growth of soluble and insoluble bacteria that can clog the downstream filters.

When the tank is full, do a “walk around” of the tank and inspect tank for leaks and structural defects.

3.3.2.8 Ensure all ball valves are in the open position.

3.3.2.9 Physically prime the Primary Burner located in the Primary Chamber container

a. Using scaffolding, a scissor-lift, or another safe method of elevation, prime the fuel line by inserting a funnel into the opening where the line meets the connector to the tank. Fill using a 20 L diesel fuel container until the line is devoid of air, taking care to avoid spillage.

b. **Before starting the burner, make sure that the tank return line is not clogged.**

c. The pump leaves the factory with the by-pass closed.

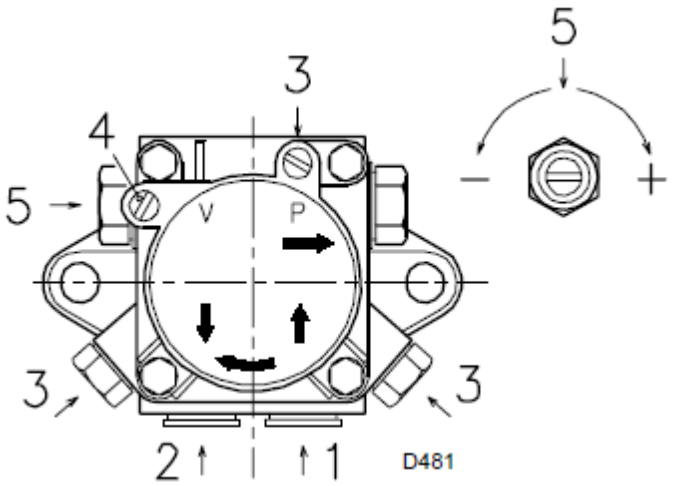


Figure A

d. In order for self-priming to take place, one of the screws (#3) must be loosened in order to bleed off the air contained in the suction line; see Figure A (above) of the pump. Start with switch #1 see Figure B (below) in the "ON" position. The pump must rotate in the direction of the arrow marked on the cover.

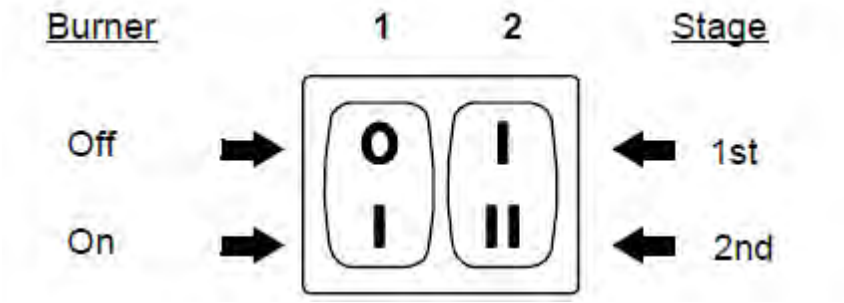


Figure B

e. The pump can be considered to be primed when the light oil starts coming out of the screw #3 see Figure A (above). Stop the burner: switch #1 see Figure B (above) set to "OFF" and tighten the screw #3 see Figure A (above). The time required for this operation depends upon the diameter and length of the suction tubing. If the pump fails to prime at the first starting of the burner and the burner locks out, wait approx. 15 seconds, reset the burner (by pressing the reset button, red illuminated button on the control box), and then repeat the starting operation as often as required. And so on.

f. After 5 or 6 starting operations allow 2 or 3 minutes for the transformer to cool.

g. Do not let extraneous light hit the photocell or the burner will lock out; the burner should lock out anyway about 10 seconds after it starts.

h. **NOTE The pump is full of fuel when it leaves the factory. If the pump has been drained, fill it with fuel through the opening on the vacuum meter prior to starting; otherwise, the pump will seize.**

i. Whenever the length of the suction piping exceeds 20-30 meters, the supply line must be filled using a separate pump

3.3.2.10 Physically prime the Secondary Burner located in the Secondary Chamber container

a. Before starting the burner, make sure that the tank return line is not clogged. Obstructions in the line could cause the sealing organ located on the pump shaft to break.

b. In order for self-priming to take place, screw #3 see Figure C (below) of the pump must be loosened in order to bleed off the air contained in the suction line.

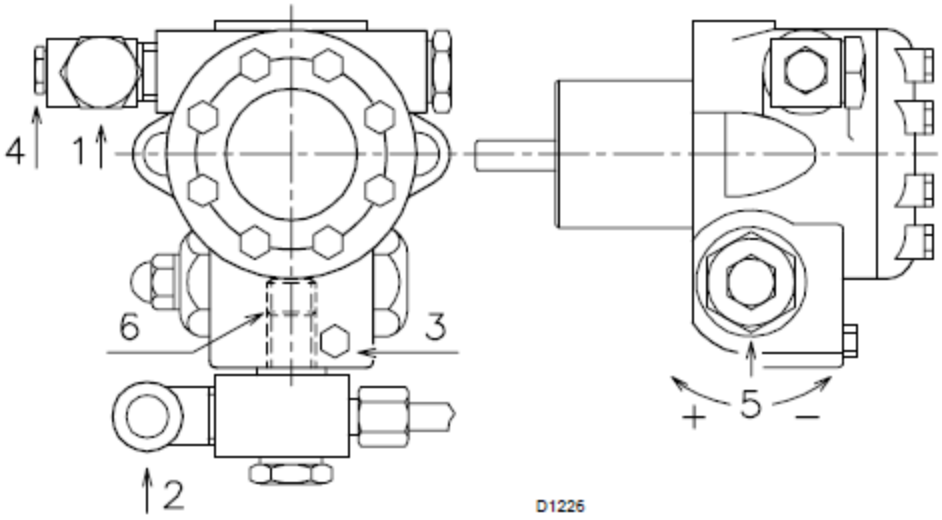


Figure C

c. Start the burner by closing the control devices with switch #1 in Figure D (below) in the "MAN" position. As soon as the burner starts, check the direction of rotation of the fan blade, by looking through the flame inspection window.

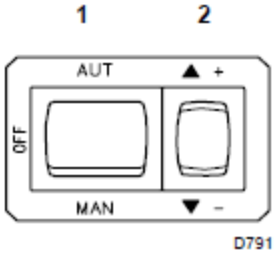


Figure D

d. The pump can be considered primed when the light oil starts coming out of screw #3 in Figure C (above). Stop the burner: switch #1 in Figure D (above) set to "OFF" and tighten screw #3 in Figure C (above). The time required for this operation depends upon the diameter and length of the suction tubing. If the pump fails to prime at the first starting of the burner and the burner locks out, wait approx. 15 seconds, reset the burner, as often as required. After 5 or 6 starting operations allow 2 or 3 minutes for the transformer to cool.

e. **NOTE The pump is already full of fuel when it leaves the factory. If the pump has been drained, fill it with fuel through the opening on the vacuum meter prior to starting; otherwise, the pump will seize**.

Whenever the length of the suction piping exceeds 20-30 meters, the supply line must be filled using a separate pump.

3.3.3 First Time Use (WILL ONLY BE PERFORMED ON SYSTEM ONCE)

NOTE:
This is to be performed the first time the system is ever used; it will only be required to be done once.

3.3.3.1 From Panel View Main Screen select Curing.

3.3.3.2 From the Curing menu select Curing Status push the following buttons to set up the curing for Primary and Secondary Chamber “Push to enable Primary Curing” and push “Push to enable Secondary Curing”

3.3.3.3 From Panel View press Start Cure

3.3.3.4 The system will start the curing process which takes 24 – 30 hours

3.3.3.5 If the curing cycle is interrupted reset the curing cycle from the Curing Status screen

3.3.3.6 The cycle will restart from where it got interrupted.

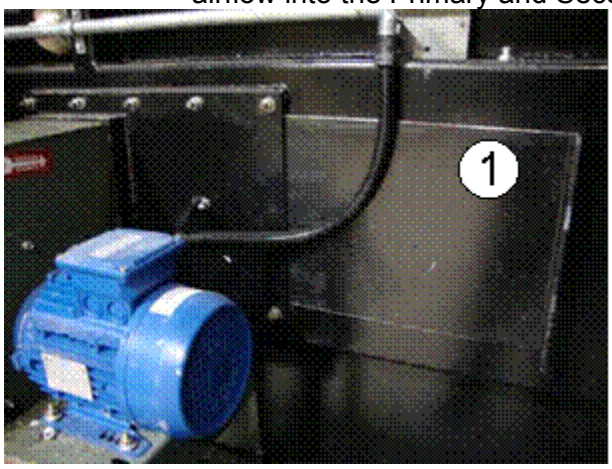
3.3.4 Standard Operating Procedures

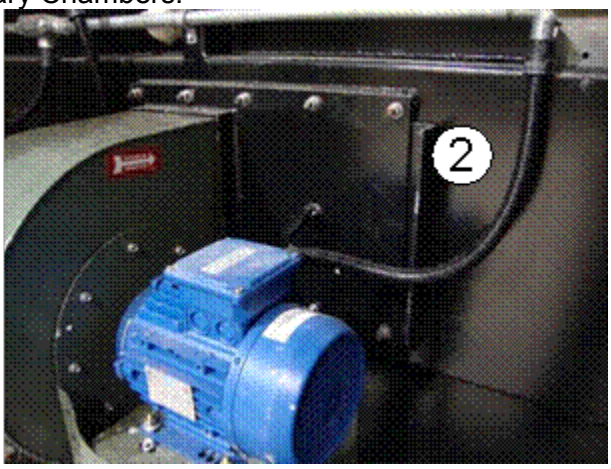
The following section details the procedures for the operation of the incinerator.

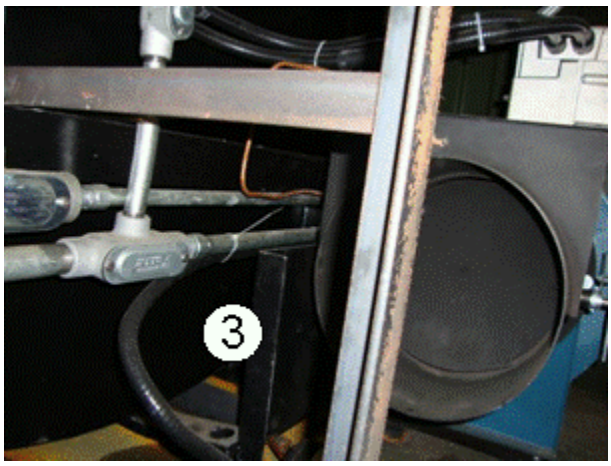
3.3.4.1 System Start up (solid waste only)

a. Drain the air compressor before starting system

b. Ensure that manual slide gates for each blower are in the open position for free airflow into the Primary and Secondary Chambers.





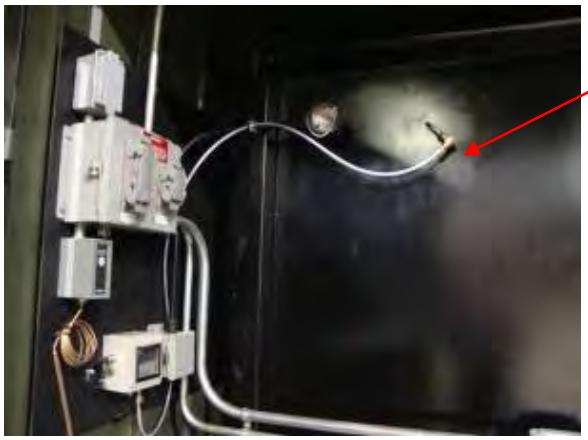


1. Primary Chamber blower Manual Slide Gate Open Position
2. Primary Chamber blower Manual Slide Gate Closed Position
3. Secondary Chamber blower Manual Slide Gate Open

c. Visually inspect the burner hoses to ensure that there are no fuel leaks. Check to see if lines are brittle or cracked, check for any oil spills near the burner, which would indicate a leak.

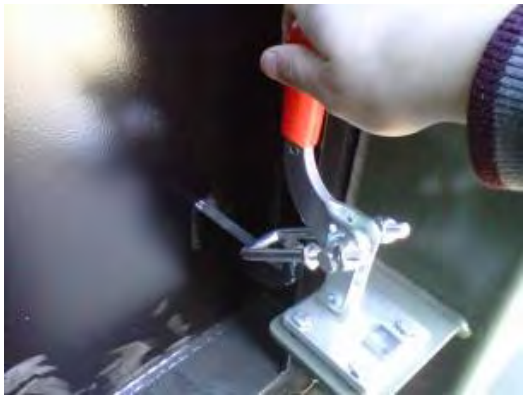
d. Ensure all valves are in the open position (supply and return)

e. Ensure the draft gauge hose connection is tight and sealed. This is a copper tubing located in the back upper corner of the Primary Chamber.



Draft Gauge Hose connection

f. Unlatch all four clamps on the Primary Chamber door, open and secure in the open position



g. Ensure that the Primary Chamber has been cleaned out, and the Chamber floor is cool (less than 40°C).

NOTE
If the floor is hotter than this temperature the waste may spontaneously catch on fire during loading.

h. Weigh the waste on scale and begin loading the Primary Chamber from the front (or hand bomb as required).

NOTE
In the event that some waste is loaded by hand do not deliberately throw the waste towards the sides of the Primary Chamber. Doing so will damage the ceramic blanket refractory.

NOTE
When loading the waste loading avoid contact with refractory (wall modules, door jams, sills, lintel, etc)

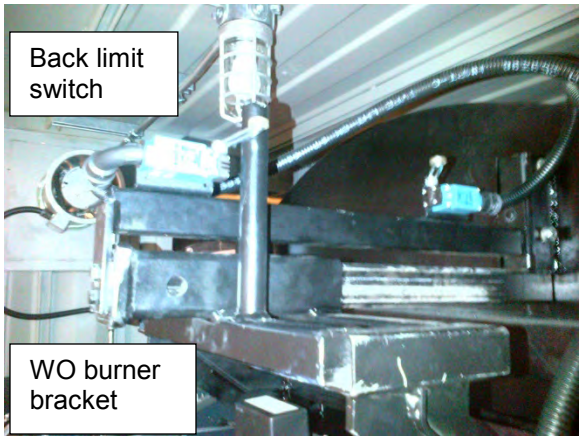
NOTE
Load only the waste stream that the unit has been rated for see Facility Manual Part II Section 4 Waste Processing Capabilities.

NOTE
Do not load the Primary Chamber above its rated capacity by weight

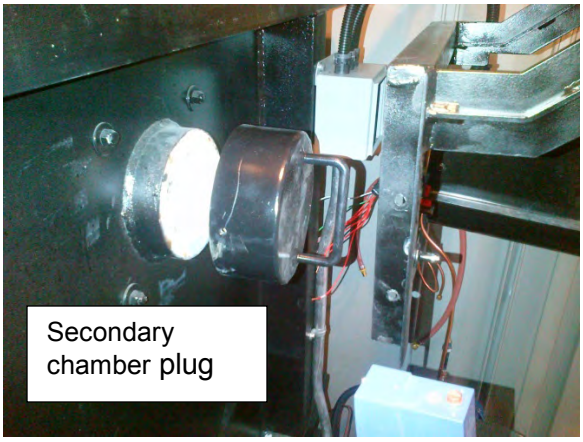
NOTE
Do not load the Primary Chamber such that the breech section is blocked in any way

i. Close the Primary Chamber access door by clamping each latch until it is tight

j. Ensure that the waste oil burner is all the way out (limit switch in the back of the bracket activated), insert the waste oil plug in place and insert the locking pin to avoid burner from swinging



Waste oil all the way out limit switch made



Secondary chamber plug being installed

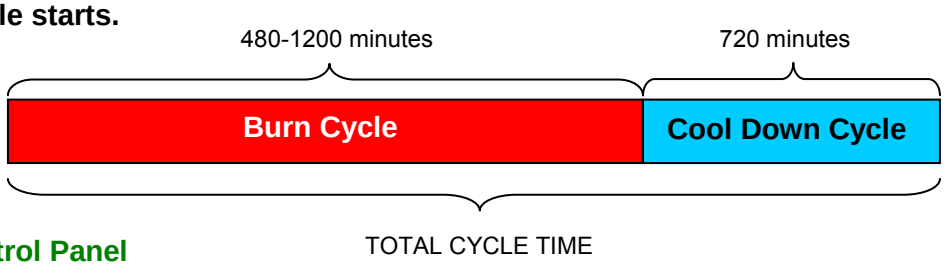
Waste oil burner secured with pin

k. Proceed to the Control Panel on the HMI Panel View, from the Top View menu choose solid waste only.

The burn time will be set to the previous burn, if you wish to change the set time, proceed to the Primary Status screen and click on the BURN TIME button. The minimum number of minutes you can enter is 480 (8 hours). When you have finished, the time will be displayed in minutes beside the BURN TIME button

NOTE

The burn time value (in minutes) determines the length of the burn cycle before cool down cycle starts.



Main Control Panel

l. On the Main Control Panel press “Start” on HMI (Panel View). The following steps will automatically take place, controlled by the Control Panel:

i. The Primary Blower and Secondary Blower will purge the system for 2 minutes
ii. The Secondary Burner will purge for safety, and upon completion will ignite
iii. Once the Secondary Chamber temperature reaches 1000°C, the Primary Burner will purge for safety and upon completion with ignite
iv. The Burn time will start counting down when the temperature in the Primary Chamber reaches 427°C

NOTE

The Control System will maintain proper operating conditions and will provide continuous monitoring capability

v. After the burn cycle is completed, the system will automatically enter the Cool Down cycle and the following will be shown on the system status:
- Primary Chamber & Secondary Chamber burners OFF
- Secondary Chamber Blower OFF
- Primary Modutrol 100% open
- Primary Blower ON

vi. Once fully cooled and the temperature is below 90°C, proceed to the Primary Chamber Clean Out procedures

NOTE

System drains and exhausts should discharge at atmospheric pressure. In order to prevent inaccurate readings or instrument damage, do not allow the discharge side to back up or freeze.

3.3.4.2 Clean Out

Operators responsible for loading and cleaning out incinerators shall wear appropriate protective equipment, including dust masks, heavy gloves and safety shoes with puncture-proof toes and soles to avoid injury. Although the ash from the system is considered sterile and will not contain microorganisms, it may contain a quantity of sharp objects, such as broken glass and other sharps which may not be fully destroyed in the burning process, and may thus still pose a hazard to persons who clean out the ash and residues. Also removing the ash does create dust particles in the air. Dust shall not be inhaled. The operator shall wear dust protection safety gear.

When the internal temperature of the Primary Chamber has cooled to less than 90°C, lock out the power to the system on the Main Control Panel by moving the main disconnect to the “OFF” position.

a. Unlock all door latches on the access door to the Primary Chamber

b. While standing in front of the Primary Chamber door, slowly open the door to its fully open position. Secure Primary Door in the open position.
c. Inspect the interior for wear and inspect around the door seals to ensure the door will maintain a tight seal upon closure
d. Check the air inlet holes and remove any obstructions if necessary.

e. Inspect the door seals to ensure there are no gaps between the door gasket and the door jamb

f. Close the Primary Chamber access door by clamping each latch until it is tight

g. Clean the inspection view port (glass) with a mild soap and water. To clean the view port, unscrew it by hand and re-tighten by hand.

3.3.4.3 Burning Waste Oil

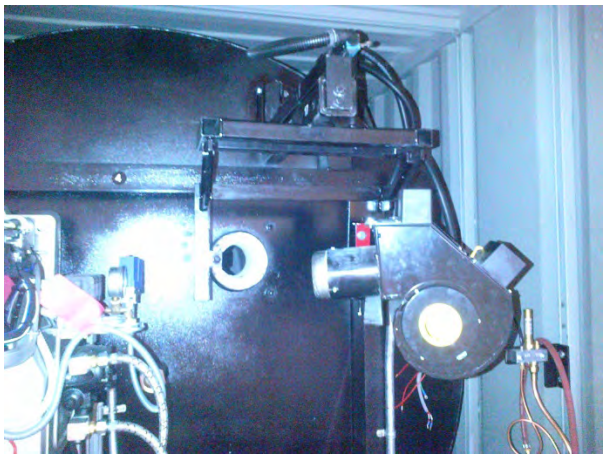
Do not use this incinerator to burn waste oil only. Always burn a complete load of solid waste when burning waste oil

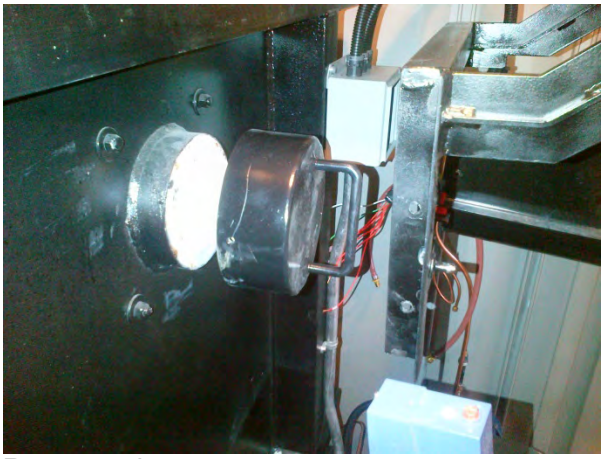
a. Follow all the procedures to load the primary chamber as per procedure 3.3.4.1 above.

Ensure the waste oil valve is opened (by the tank).

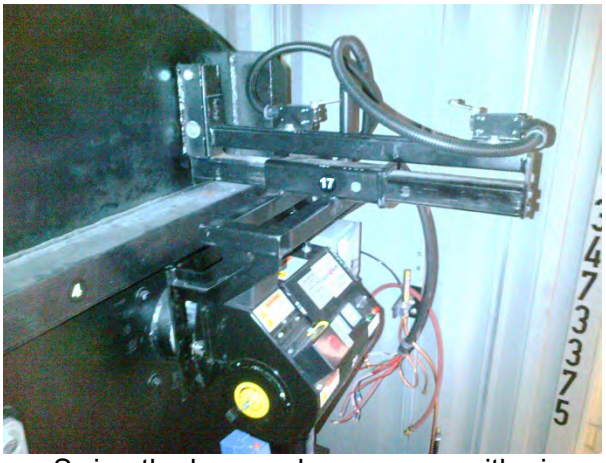
b. Ensure that the secondary chamber plug is removed, the burner cannot swing open by locking the pin and the waste oil burner is all the way in (limit switch in the front of the bracket activated).

With the burner all the way out remove pin


Swing the burner open



Remove plug



Swing the burner close, secure with pin and push all the way in until front limit switch is made

c. Proceed to the Control Panel on the HMI Panel View, from the Top View menu choose Solid Waste and Waste Oil.

3.3.5 Start up

3.3.5.1 After Shut Down (Emergency)

a. Once the power is restored main disconnect back on

b. The Operator Interface and PLC will begin a boot up procedure

c. Wait until the HMI on the control panel has booted up before turning the control power to the panel back on by pressing the Control Power ON button

d. When the power is restored to the Main Control Panel, the button should illuminate.

e. If the system was interrupted during a burn cycle, restart the system by pressing “Start” on HMI. If the system was interrupted during cool down, it will resume the cycle where it left off.

3.3.5.2 After Power Failure

a. On the main menu of the Panel View (HMI), press the Configuration Key and the application will now shut down. (This will take 1-2 minutes).

b. There will be a GREY screen with a number of Touch Buttons.

c. Press the “RUN (F1)” button on this screen.

d. The application will now restart. (This will take approximately 1-2 minutes)

e. When it is up and running, the system is now ready for operation

NOTE

In the event of a power shut down to the system, the control panel must be re-started from the HMI Panel View:

3.3.6 Dealing with Warnings and Faults

3.3.6.1 Troubleshooting

The burn cycle will not start if one of the following conditions exists

a. The Systems is in the “cool down” part of the cycle. Wait until the “cool down” cycle is complete.

b. There is a fault in the system as indicated on the Panel View.

c. Loss of Power due to any one or more of the following:

i. The main disconnect (see image) is off or there is no electrical power. Turn on the disconnect switch or check why there is no power.

ii. An open breaker. Check the breakers and replace any that are defective.

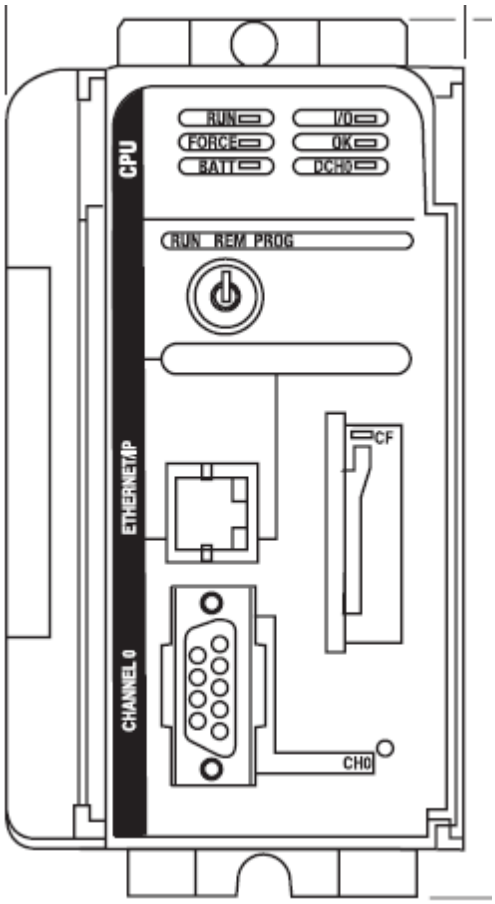
iii. The emergency stop is pushed in. Twist the emergency stop button to unlock, and then push the control power on button. The control power button should now be illuminated.

d. If on the “Top View” screen on the HMI the primary door is not closed, the door has not been shut properly. Adjust the limit switch lever arm if necessary. Check the limit switch and that the wiring is in working order.

e. If on the “Top View” screen on the HMI the secondary door is not closed, the door has not been shut properly. Adjust the limit switch lever arm, if necessary. Check the limit switch and that the wiring is in working order.

f. If fuel tank is low, system will not start. Tank on the HMI will be red, indicating the level is low and needs to be filled.

g. PLC Processor Problem



i. Check the run light on the PLC processor. If the run light is on, the PLC is ready.

ii. “OK light” is green = Controller is OK

iii. “OK light” is Red Flashing = this is a recoverable fault, check the PLC processor. This fault is very unlikely to occur.

iv. OK light is Red = this is a non-recoverable controller fault. Cycle Power. The OK LED should change to flashing red. If LED remains solid red, repl*ace the PLC. This fault is very unlikely to occur.*

v. *"Default Channel Zero (DCH0) light" is green = this indicates the PLC processor has lost the* program. The PLC is equipped with a flash card that will automatically load the program back onto the PLC

3.3.6.2 Possible Problems/Causes/Solutions

Problem	Causes	Solutions
Blower Fails to start	Breaker tripped	Turn power off at Main Disconnect Open Panel and check which breaker has tripped, turn back on
	Motor starters or contactor coil is burnt out	Locate contactor for blower and visually observe if the contactor is pulled in. Use a multi meter to check for voltage across the coil If there is voltage across the coil and the contactor is not pulled in, replace the contactor. *See Part IV Section 4 CMI 4.4.4/01-001G*
Secondary Burner won't ignite	Bad Electrodes	*Refer to Part IV Section 2 Preventive Maintenance Instructions (PMI) 01/02-002.D.01*
	Low Oil Pressure	Adjust pressure setting on burner pump by turning the screw located at the bottom of the pump. Turn clockwise to increase pressure and counter clockwise to decrease pressure.
	Fuel Line Leak	Visually inspect the lines for the leak Tighten any fittings that are near the leak
	Door Switch not making contact	Make sure main door is closed and latched shut Make sure limit switch is hitting striker plate.
	Bad Thermocouple	Replace thermocouple see Section IV Part 4 CMI 4.4.1/05-002A
Primary Burner won't ignite	Bad Electrode	*Refer to Part IV Section 2 PMI 01/02-002.D.01*
	Low Oil Pressure	Adjust pressure setting on burner pump by turning the screw located at the bottom of the pump. Turn clockwise to increase pressure and counter clockwise to decrease pressure.
	Fuel Line Leak	Visually inspect the lines for the leak Tighten any fittings that are near the leak
	Door Switch not making contact or broken	Make sure main door is closed and latched shut. Make sure limit switch is hitting striker plate.

Problem	Causes	Solutions
	Secondary temperature not at 1000°C	Wait until Secondary temperature is at 1000°C and try again
	Burner main switch is turned off	Turn switch on
	Burner alarm has been tripped	Acknowledge burn alarm and then hit the reset button on control panel
Persistent Black Smoke	Insufficient air supply to Secondary Chamber to completely consume emissions	Check to ensure combustion air blower/damper assembly is operating properly.
	Secondary Chamber is not hot enough.	Check that the Secondary temperature is operating at required temperature set point.
	Overloading or loading highly volatile material	Decrease load size on next batch (confirm by weighing), ensure the waste mix is correct.
	Burner failure	Check burner operation – if no flame or a poor flame is visible through the flame view port adjust air/fuel ratio
	Operation at too high a Primary Chamber temperature	Check/decrease primary chamber combustion air
Smoke coming out of Primary	Too much air	Check dampers on primary blower
	Too much volatile material loaded	Decrease load size on next batch (confirm by weighing), ensure the waste mix is correct.
	Primary Chamber temperature too high	Waste loaded may not be a good mix of heat value
Too much fuel usage	Too much secondary combustion air	Check/reduce secondary combustion air
	Too much air infiltration	Reduce air flow by adjusting the damper
	Fuel leakage	Check fuel trains and burners for fuel leakage
	Wet waste	Spread wet waste with other waste through several loads – do not charge all of the wet waste at one time
	Excessive draft	Check/reduce draft – check door seals and other seals for leakage adjust damper
	Burner setting too high	Check air/fuel mix
Waste Oil Burner		
Pump fails to start	Breaker tripped	Switch Breaker into off position and then switch to on position again. If breaker continues to trip, check for short in the system.
	Motor Starter	Check motor starter
	Overload	Reset overload

Problem	Causes	Solutions
Waste Oil Nozzle not turning on	A ball valve is closed	Ensure all ball valves are open.
	Solenoid Valve has failed	Diagnose if valve has failed. Replace if necessary See Part IV Section 4 CMI 4.4.5/02-003B (page 451)
	Fuel Leak	Check all pipes and hoses
	Secondary Chamber not at temperature	Wait until Secondary Chamber reaches 982°C.
System will not start when Solid is selected	Waste Oil burner is inserted into the back of the Secondary Chamber	Remove Waste Oil burner assembly from the Secondary Chamber.

3.3.6.3 In Case of Alarm

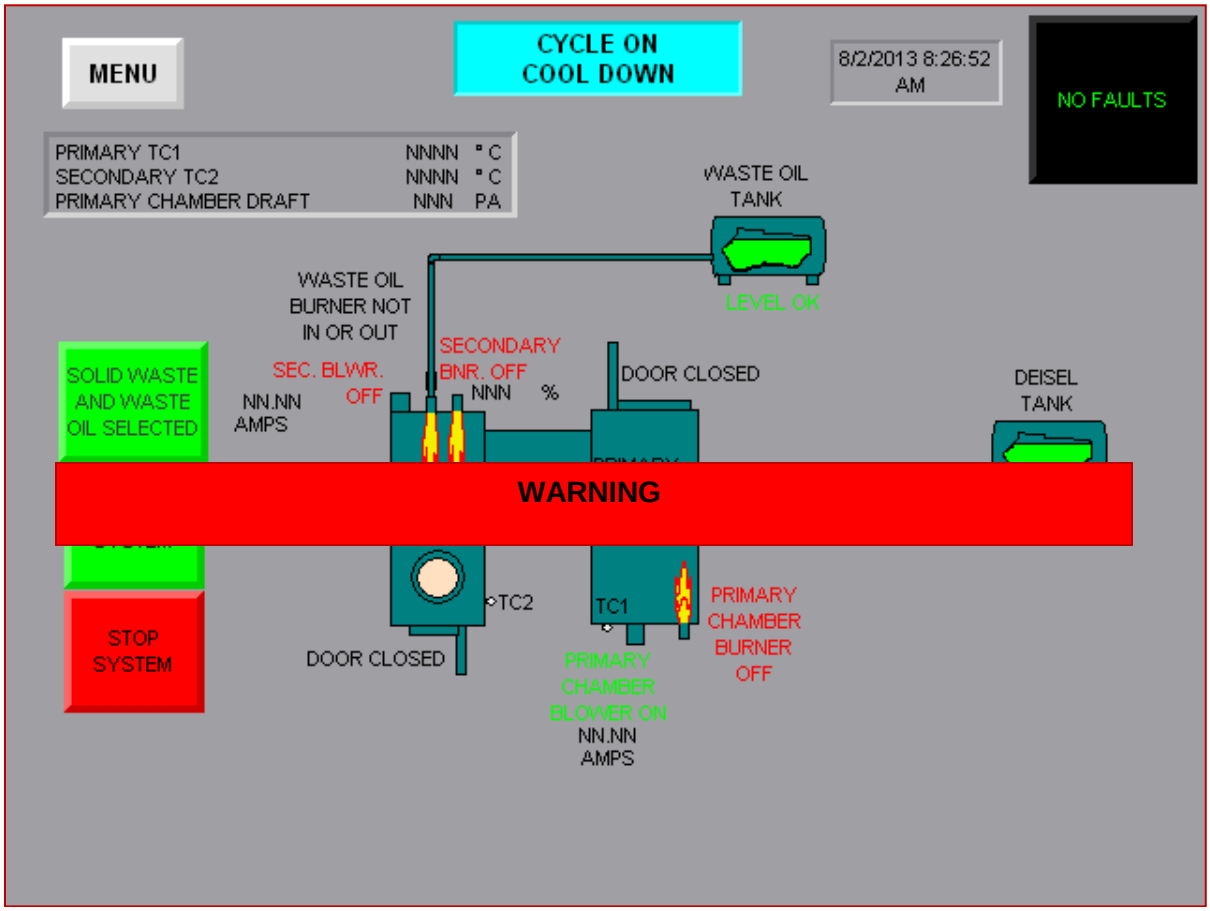
IF BURN IS IN PROGRESS DO NOT HIT EMERGENCY STOP BUTTON ON MAIN CONTROL PANEL.

a. Go to the manual slide gates on the Primary Chamber, located just after the blower, and close them all the way. This will help to put the fire in the chamber out.

b. Check alarms to see what the problem is.

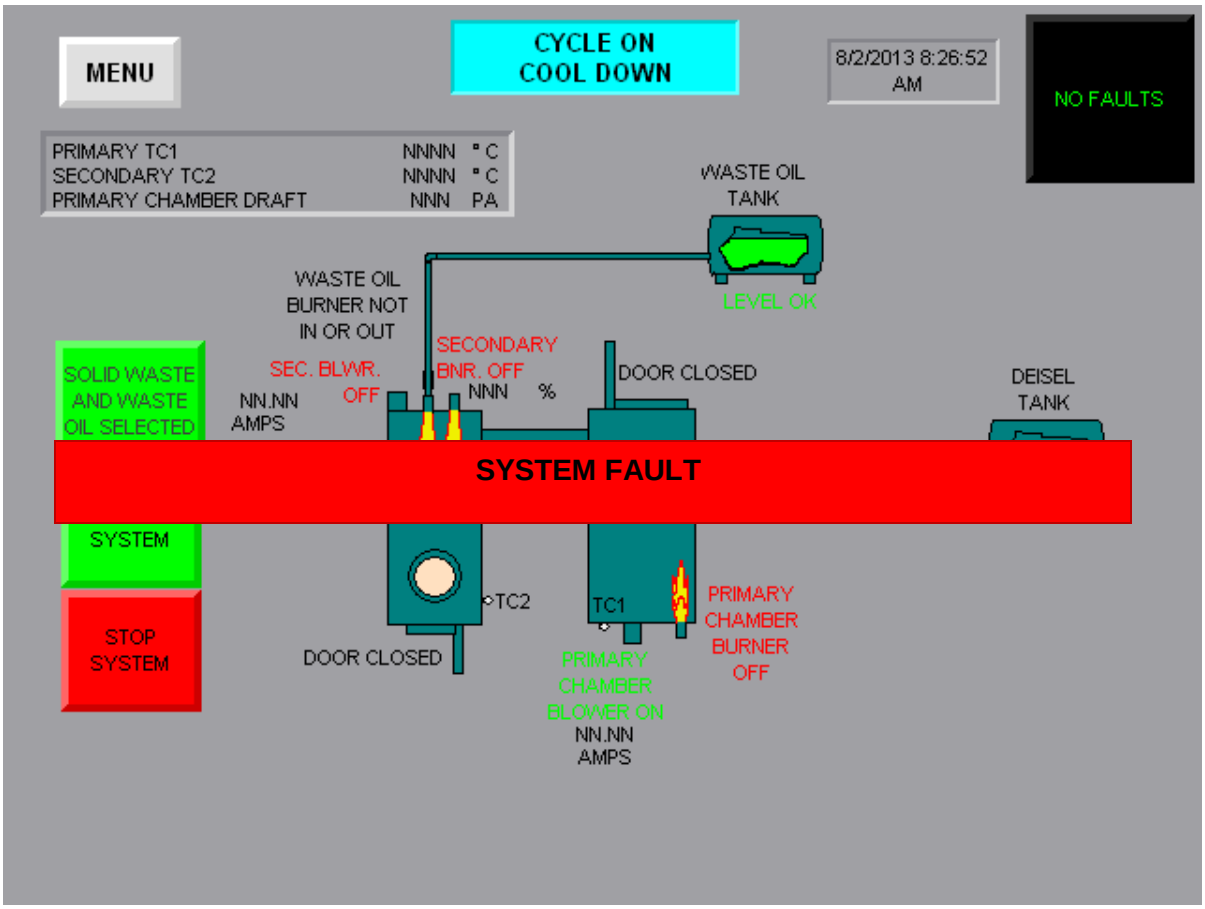
c. Do not open the doors of the Primary Chamber unless the temperature inside the chamber is below 90°C

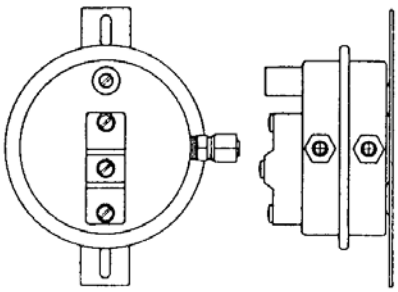
3.3.6.4 System Warnings

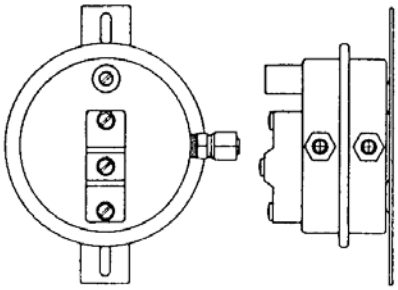


Warnings indicate that a non critical value or device has malfunctioned and requires an operator to review what may be causing this to occur. If not resolved some of the warnings may become a fault.

3.3.6.5 System Faults



ALARM	SOLUTION
The Primary Chamber thermocouple has faulted	Refer to *Part IV Section 2 PMI 05-002.W.01*
The Secondary Chamber thermocouple has faulted	Refer to *Part IV Section 2 PMI 05-002.W.01*
The primary burner is faulted	The primary burner has failed to light when it received a signal telling it to start. To reset the burner, press the reset button located on the Burner and look into sight glass for ignition:
	Check that the pressure is 1378 kPa
	If a spark is present and burner won't ignite: • Check fuel lines for leaks • Check that fuel pump is not clogged
	If no spark is present: • Clean electrodes
The secondary burner is faulted	The secondary burner has failed to light when it received a signal telling it to start. To reset the burner, press the reset button located on the Burner and look into sight glass for ignition:
	If a spark is present and burner wont ignite: • Check fuel lines for leaks • Check that fuel pump is not clogged
	If no spark is present: • Clean electrodes
The system has shut down due to primary blower low air flow.	Visually examine the primary blower for any obstructions that may be causing low air flow
	Check slide gate located between Primary chamber and blower, ensure it is open.
	Check damper assembly, ensuring modutrol crank arm is still connected and that butterfly damper is open, allowing air flow.
	Air proving switch may be defective. See *Part IV Section* 4 CMI 4.4.4/01-001A & 02-002A
	There are two ports on the air proving switch marked V and P. Ensure the inlet tube is attached to the port marked “P” for pressure. V stands for vacuum. Ensure the “V” port is open to atmosphere and is not blocked
	If no air restriction is observed (i.e. blockage in the tube) change the air proving switch see *Part IV Section* 4 CMI 4.4.4/01-001A & 02-002A
The primary blower motor breaker is tripped or open.	Turn power off on Control panel by turning the Main Disconnect to the off position CB1

ALARM	SOLUTION
	Open the main control panel and switch break switch to off and then to the on position “CB9”
The system has shut down due to secondary blower low air flow.	Visually examine the primary blower for any obstructions that may be causing low air flow
	Check slide gate located between Secondary chamber and blower, ensure it is open.
	Check damper assembly, ensuring modutrol crank arm is still connected *(if not see Part IV Section 2 PMI 01/02-001.W.01 Damper Crank Arm)* and that butterfly damper is open, allowing air flow.
	Air proving switch may be defective. See *Part IV Section* 4 CMI 4.4.4/01-001A & 02-002A
	There are two ports on the air proving switch marked V and P. Ensure the inlet tube is attached to the port marked “P” for pressure. V stands for vacuum. Ensure the “V” port is open to atmosphere and is not blocked
	If no air restriction is observed (i.e. blockage in the tube) change the air proving switch see *Part IV Section* 4 CMI 4.4.4/01-001A & 02-002A
The Secondary blower motor breaker is tripped or open.	Turn power off on Control panel by turning the Main Disconnect to the off position
	Open the main control panel and switch the breaker to off and then to the on position “CB10”
The Secondary blower variable frequency drive is faulted.	Push fault reset button on the Panel view
	If fault persist check the error code on the variable frequency drive and check OEM manual for troubleshooting alarm.
The burner fuel level is low.	Add fuel to the fuel tank and the alarm should reset itself
	If alarm persist replace the low level switch *as per* See *Part IV Section* 4 CMI 4.4.3/01-002G & 02-002G
Selected Solid & Waste Oil The waste oil burner is not in.	Check to see if the waste oil burner is pushed all the way into the Secondary Chamber. • Push waste oil burner all the way in, ensuring it makes contact with the limit switch • If the waste oil burner is all the way in and making contact with the limit switch, replace the limit switch. See Part IV Section 4 CMI 4.4.1/05-005A (page 436)

ALARM	SOLUTION
Solid Waste Only Selected The waste oil burner is not out.	Check to see if the waste oil burner is pulled all the way out of the Secondary Chamber • Pull waste oil burner all the way out, ensuring it makes contact with the limit switch • If the waste oil burner is all the way out and making contact with the limit switch, replace the limit switch. See Part IV Section 4 CMI 4.4.1/05-005A (page 436)
The waste oil burner is faulted.	The waste oil tank is empty, fill tank
	Check that the instrument air is going to the burner check the air pressure gauge on the burner and adjust regulator if necessary.
	Check that the fuel pump is in working condition
	Check that the waste oil breaker is not tripped “CB15”

4.0 MAINTENANCE INSTRUCTIONS

4.1 SUMMARY OF PREVENTIVE MAINTENANCE INSTRUCTIONS

IF APPLICABLE: The air compressor pump is shipped with break-in oil which should be changed after the first 8 hours of operation.

4.1.1 Daily Maintenance

Freq.	Routine	Component	Description
Daily	Inspection & Cleaning	Burners	Clean electrodes & HT Leads.
Daily	Inspection & Cleaning	Burners	Inspect fuel lines for leaks.
Daily	Inspection & Cleaning	Burners	Inspect nozzles in burners.
Daily	Inspection & Cleaning	Refractory	Check inside the Chambers for shrinkage or any exposed metal.

4.1.2 Weekly Maintenance

Routine	Component	Description
Inspection & Cleaning	Air compressor	Check oil level
Inspection & Cleaning	Air compressor	Check air filter
Inspection & Cleaning	Air compressor	Pull ring on safety valve and allow the ring to snap back to normal position (Check for free operation of the safety valve)
Inspection & Cleaning	Blowers and Assembly	Modutrol crank arm connected to damper.
Inspection & Cleaning	Blowers and Assembly	Slide gates are open.
Inspection & Cleaning	Burners	Clean photocell / UV Detector
Inspection & Cleaning	Burners	Clean the glass on the flame inspection window.
Inspection & Cleaning	Burners	Check diffuser disc.
Inspection & Cleaning	Waste Oil Burner Filter	Clean the canister filter
Inspection & Cleaning	Thermocouples	Remove and clean thermocouples as necessary – inspect for damage. Replace if necessary.

4.1.3 Monthly Maintenance

Routine	Component	Description
Inspection & Cleaning	Air compressor	Check all fasteners for proper tightness.
Inspection & Cleaning	Blowers and Assembly	Check the fan wheel for any wear or corrosion, as either can cause catastrophic failures
Inspection & Cleaning	Burners	Check flexible hoses to make sure that they are still in good condition.
Inspection & Cleaning	Burners	Pump delivery pressure must be stable. If the pressure is found to be unstable or if the pump runs noisily see manual for details.
Inspection & Cleaning	Burners	Check that no dust has accumulated inside the fan or on its blades.
Inspection & Cleaning	Burners	Check that all parts of the combustion head are in good condition, positioned correctly, free of all impurities, and that no deformation has been caused by operation at high temperatures.
Inspection & Cleaning	Refractory	Check the refractory in the Secondary Chamber for shrinkage, anything greater then 1.2cm should be patched (i.e. gaps between modules exposing metal surface)
Inspection & Cleaning	Waste Oil	Visually check all electrical components
Inspection & Cleaning	Waste Oil	Remove heater element from casing and inspect for build-up. Clean any deposits. When reinstalling the heater element always ensure the bundle will be restarted immersed. NEVER use the inline oil heater dry

4.1.4 Quarterly Maintenance

Routine	Component	Description
Lubrication Service	Air compressor	Change the oil
Inspection & Cleaning	Blowers and Assembly	Lubricate all bearings – lubrication intervals depend on operating speed (RPM). Clean cooling fan on motors.
Inspection & Cleaning	Blowers and Assembly	Check the V-belt drive (Secondary Blower) for proper alignment and tension (see manual). If belts are worn, replace them as a set, matched within manufacturer's tolerances.
Inspection & Cleaning	Burners	Check all components for heat damage.
Inspection & Cleaning	Refractory	Inspect door gasket for damage or heat damage. Replace segments, if necessary. Doors must close tightly and securely.
Inspection & Cleaning	Refractory	Check all refractory for damage. Patch or replace as needed. Patch if modules show a little gap and replace modules if the modules have shrunk excessively (greater than 1")
Inspection & Cleaning	Paint	Maintain paint exterior to protect metal from heat damage

4.1.5 Yearly Maintenance

Routine	Component	Description
Detailed Maintenance	Refractory	Replace door gasket
Inspection & Cleaning	Electrical	Check the limit switch

4.1.6 Level 2 and Level 3 Maintenance

Please refer to the OEM Manual for additional information regarding maintenance instructions for Level 2 and Level 3.

Periodicity	Level of Repair	Routine	Component	Description
24 Monthly	3	Detailed Maintenance	Refractory	Replace the door sills on Primary Chamber
24 Monthly	3	Detailed Maintenance	Refractory	Replace the door sills on Secondary Chamber
60 monthly	3	Detailed Maintenance	Refractory	Relining of Secondary Chamber.
60 monthly	3	Detailed Maintenance	Refractory	First stack section to be relined.
60 monthly	3	Detailed Maintenance	Fuel Tanks	Inspect Fuel tanks

4.2 PREVENTIVE MAINTENANCE INSTRUCTIONS

The following preventive maintenance instructions (PMI) are to be read in conjunction with the IPDs found in Section 4.3.

4.2.1 Instruction Classification

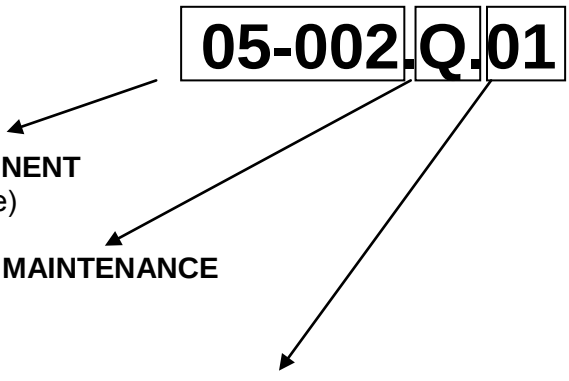
Each component is associated with an identification number, see table below:

System Component	Identification number
Primary Blower	01-001
Secondary Blower	02-001
Primary Burner	01-002
Secondary Burner	02-002
Air Compressor	03-001
Waste Oil Burner	02-003
Main Control Panel	03-010
Refractory	05-001
Thermocouple	05-002
Paint	05-003
Electrical	05-004
Limit Switch	05-005

To differentiate if the instruction is weekly, monthly, quarterly or yearly, the above identification number will be followed by a letter:

Daily: D
Weekly: W
Monthly: M
Quarterly: Q
Yearly: Y

For example**,**



SYSTEM COMPONENT
(eg. Thermocouple)

FREQUENCY OF MAINTENANCE
(eg. Quraterly)

MAINTENANCE INSTRUCTION NUMBER
(eg. Maintenance Routine #1)

4.2.2 Zero Mechanical State & Lock Out Instructions

Proper maintenance of the equipment is essential to ensure long term, reliable operation of the EWS model Incinerator. The preventive maintenance instructions are outlined in this section of the Facility Manual.

NOTE
The warranty will become void if proper maintenance is not performed as instructed.

4.2.2.1 Safety

During maintenance of the EWS mobile incinerator, it is very important to be aware of special hazards. Two safety programs are described in the following sections:

1. Zero Mechanical State
2. Power Lock Out Instructions

Failure to comply with these instructions during maintenance could result in injury or death. The responsibility for implementation of a comprehensive safety program rests with the operating staff and supervision. The safety instructions in this Facility Manual should be considered only as a starting point for the safety program at site.

ACCIDENTS CAN BE PREVENTED
A CAREFUL WORKER IS THE BEST SAFETY DEVICE

4.2.2.2 Zero Mechanical State

Zero Mechanical State (ZMS) exists when the possibility of an unexpected mechanical movement has been eliminated. During maintenance, it is mandatory to totally deactivate the incinerator so that there is no possibility of an unexpected machine movement. Power lock-out, described in the next section, is commonly used for this purpose. Most machines are powered by electrical, hydraulic or pneumatic drives. Energy may be stored in a shutdown machine in various ways: Air pressure in a cylinder, hydraulic fluid stored in pressurized hoses, or machine members whose weight can generate fluid pressure. Therefore, just cutting off the electrical power may not be enough to neutralize all power sources. Certain maintenance instructions at site should require ZMS condition as a matter of course.

4.2.2.3 Zero Mechanical State (ZMS) Checklist

1. Every electrical power source to the incinerator must be cut off and locked out (to prevent others who may not be aware of maintenance work from turning the power back on inadvertently).
2. Ensure that the mechanical potential energy of the incinerator is at its lowest practical value so that opening of pipe, tubing, hose or actuation of any valve will not produce an unexpected movement that could cause injury.

3. Check that there is no pressurized fluid (air, oil, gas or other) trapped in the incinerator lines, cylinders or other components. This will ensure that there will be no incinerator motion when a valve is actuated.

4. Secure loose or freely moving parts so that there is no possibility of accidental movement.

4.2.2.4 Power Lock Out Instructions

Unexpected operation of electrical equipment started by automatic or manual remote control may cause injuries to persons who happen to be nearby. For this reason, when repair work is to be done on motors or other electrical equipment the circuit should be opened at the switch box and the switch pad locked in the OFF position. Tag the switch with a lock out tag indicating who must be contacted before the power is turned back on again.

BECAUSE OF THE SEVERE CONSEQUENCES, INCLUDING DEATH, OF NOT PROPERLY LOCKING OUT ELECTRICITY SUPPLIES DURING MAINTENANCE, THE SUPERVISOR SHOULD ENSURE THAT THERE IS ONLY 1 KEY FOR THE LOCK USED TO LOCK OUT THE POWER SUPPLY.

For identification, locks may be color coded to indicate different crews or shifts.

The Supervisor should maintain the master key and list of key numbers, and should keep an extra key to each lock for his department. The master key should not be loaned out under any circumstances.

No matter what method is used to lock out power, strict discipline and constant supervision should be employed during any equipment maintenance work.

4.2.2.5 Power Lock Out Checklist

1. Alert the operator of the equipment.

2. Before starting the work on an engine, motor, line shaft or other power transmission equipment or power-driven machine, make sure it cannot be set in motion without your knowledge.

3. Place your own padlock on the control switch, lever, or valve, even if someone has locked the control panel before you. You will not be protected unless you put your own padlock on it. (Another maintenance person could remove their lock and then someone else could start the equipment if they were not aware of maintenance work being done.)

When you are finished working, remove your own padlock. Never permit someone else to remove it for you. Be sure you are not exposing someone else to danger by removing your padlock.

4.2.3 Daily Instructions

Primary & Secondary Chamber Burners: (01-002.D & 02-002.D)

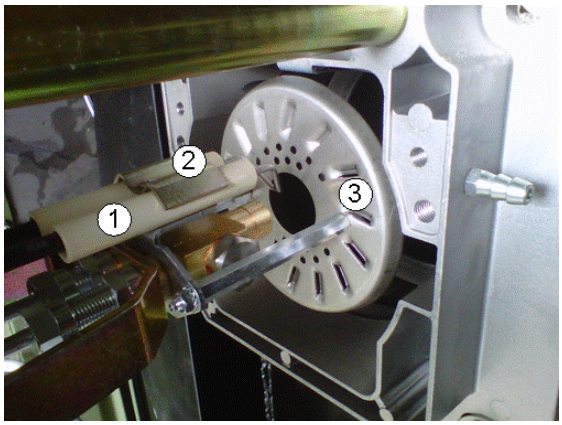
Do not store flammable or hazardous materials in the vicinity of fuel burning appliances.

Improper installation, adjustment, alteration, service or maintenance can cause property damage, personal injury or death.

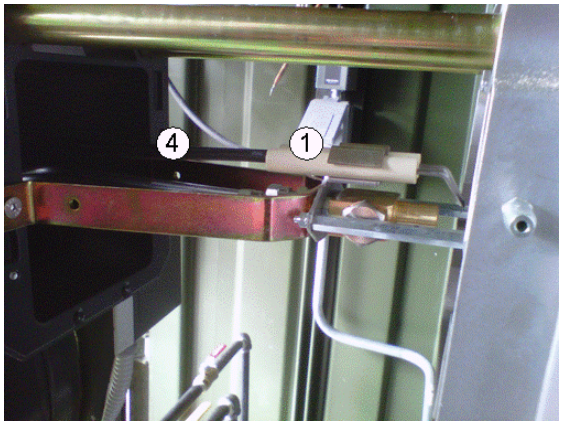
Burner shall be installed and maintained in accordance with manufacturer's requirements as outlined in the Burner manual, local codes and authorities having jurisdiction.

INSTRUCTION 01/02-002.D.01: INSPECTING AND CLEANING ELECTRODES AND HT LEADS

1. Remove the cover from the Burners as described in 01-002.W.01 and 02-002.W.01.
2. Inspect the electrodes for any soot build-up.



1. Electrode
2. U-bolt
3. Diffuser Disc

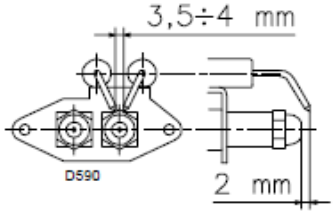


4. HT Leads

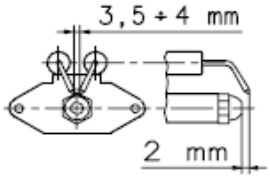
3. Clean/wipe down the ignition electrode with a cloth should there be a build-up of soot.

NOTE Do not use sand paper as this will increase the deposit of future soot.

4. If electrodes are damaged remove the screws and u-bolt (see above photo) and install new electrodes. When reinstalling the electrodes make sure that they are positioned as shown below.
5.



Primary Burner



Secondary Burner

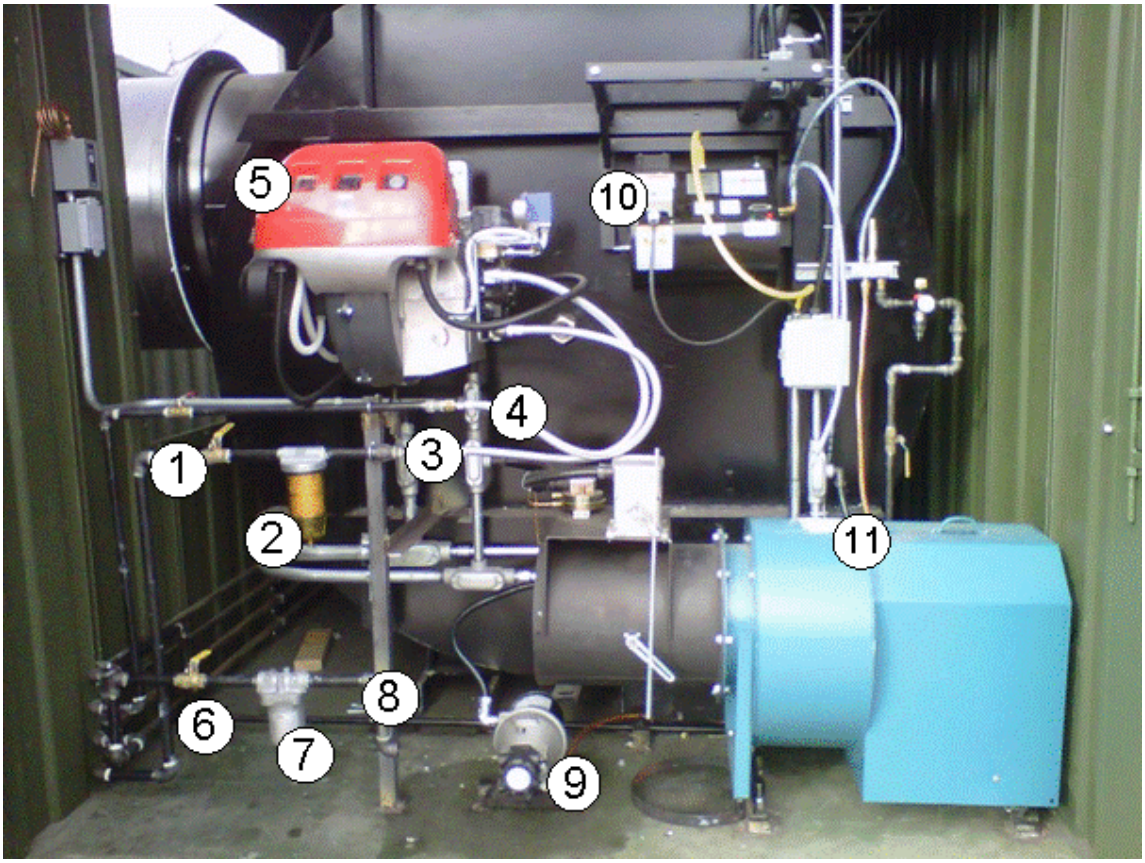
Check the High Temperature (HT) Leads for any heat damage. If HT Leads are severely damaged (i.e., you can see the wire beneath the sheathing) then replace. (See *Part IV Section 4 CMI 4.4.3/01-002A & 4.4.3/02-002A)*

INSTRUCTION 01/02-002.D.02: INSPECTING THE FUEL LINES

1. Visually inspect all fuel lines to the Primary and Secondary Burner as well as to the Waste Oil burner for any leaks.

2. The Primary and Secondary Burner have two oil lines, one feed and one return. The Waste Oil Burner only has one feed line.

3. If any leaks are observed tighten or replace the fitting where the leak is occurring



1. Fuel In Ball Valve
2. Fuel Filter
3. Fuel Line In
4. Fuel Line Out
5. Secondary Burner
6. Waste Oil Ball valve
7. Waste Oil Filter
8. Waste Oil Line In
9. Waste Oil J-pump
10. Waste Oil Burner
11. Secondary Blower

INSTRUCTION 01/02-002.D.03: INSPECT AND CLEAN BURNER NOZZLES

Primary Burner:

1. Remove the burner cover as outlined in 01/02-002.W.01 REMOVAL OF BURNER COVERS
2. Remove the centre retaining bolt.
3. Slide burner out.
4. Check nozzle. If there is carbon, remove the nozzle and clean.
5. Reinstall or replace if necessary

Secondary Burner:

1. Remove the burner cover as outlined in 01/02-002.W.01 REMOVAL OF BURNER COVERS
2. Remove the 4 retaining bolts on either side of the burner.
3. Slide burner out.
4. Check nozzle. If there is carbon, remove the nozzle and clean.
5. Reinstall or replace if necessary

Refractory: (05-001.D)

When working with the refractory make sure you use the proper tools; wear goggles, approved dust mask and gloves

INSTRUCTION 05-001.D.01: INSPECTING THE REFRACTORY

Ensure power is locked out.

Please follow all instructions outlined in *Section 4.2.2 Zero Mechanical State & Lock Out Instructions.*

1. Open Primary Chamber door by unlatching all four clamps.
2. Tie-off door to open position to ensure that it will not close unintentionally.
3. Enter Primary Chamber and check the refractory for shrinkage, any gap between the modules greater than 2.5 cm should be patched with the blanket refractory
4. Check for any exposed metal between the modules, if metal is exposed make sure to patch area with blanket material or new module (*Part IV Section 4 CMI 4.4.2/05-001A & 4.4.2/05-001B)*

4.2.4 Weekly Instructions

Primary & Secondary Chamber Blowers: (01-001.W & 02-001.W)

Do not attempt any maintenance on a fan unless the electrical supply has been completely disconnected and locked.

Please follow all instructions outlined in *Section 4.2.2 Zero Mechanical State & Lock Out Instructions.*

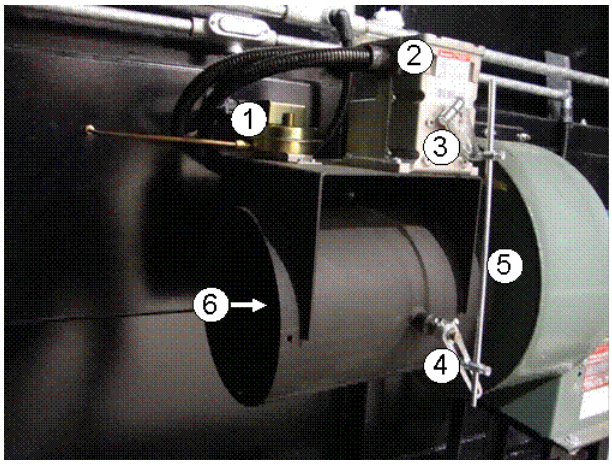
A fan can windmill despite removal of all electrical power therefore, take extra care when working with fans in the system.

The rotating assembly should be blocked securely before attempting maintenance of any kind.

INSTRUCTION 01/02-001.W.01: DAMPER CRANK ARM

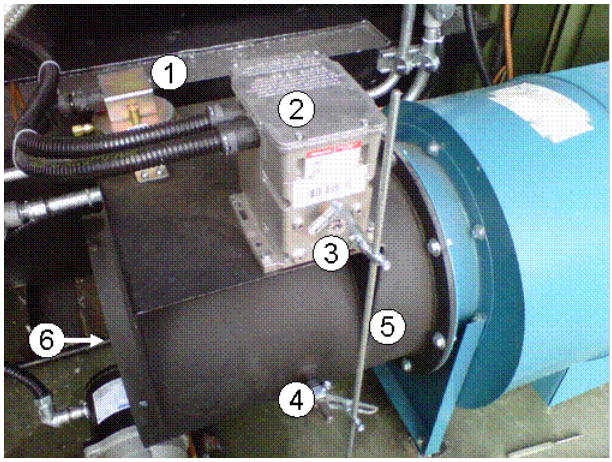
Check to see that the damper crank arm is connected to the damper and the rod.

Ensure mechanical linkage on damper is tight, if loose tighten with wrench.



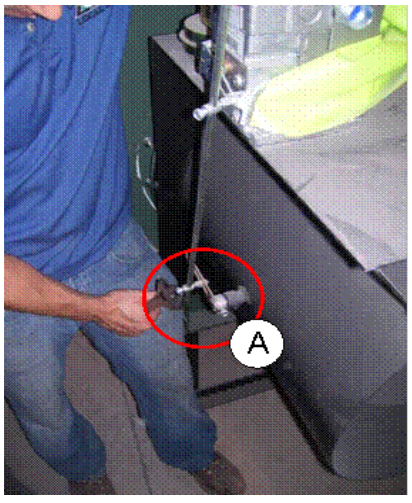
PRIMARY BLOWER

1. Air Proving Switch
2. Modutrol Motor
3. Motor Crank Arm
4. Damper Crank Arm
5. Rod
6. Damper



SECONDARY BLOWER

1. Air Proving Switch
2. Modutrol Motor
3. Motor Crank Arm
4. Damper Crank Arm
5. Rod
6. Damper



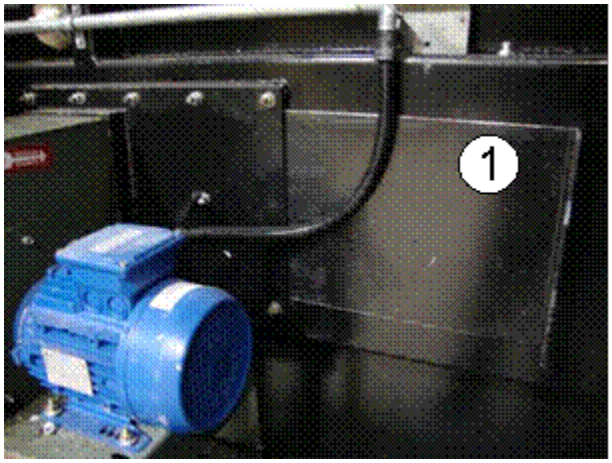
A. Damper Crank arm and connection to Damper and Rod

INSTRUCTION 01/02-001.W.02: SLIDE GATES

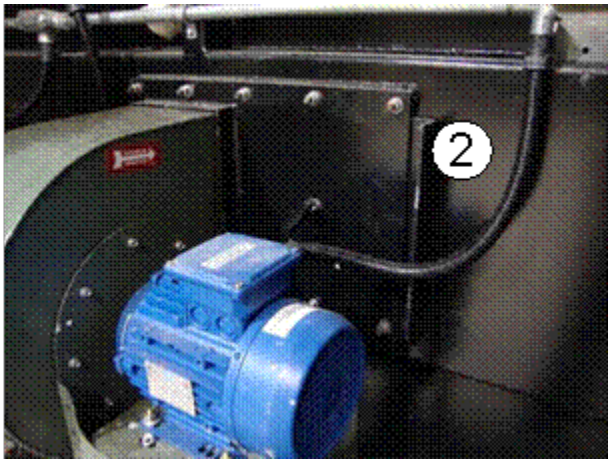
Check to see if slide gates move freely.

1. Move slide gate in and out to ensure free movement. If sticking, use lubricant to loosen. Lubricant should be rated for a high temperature (>150°F) application.

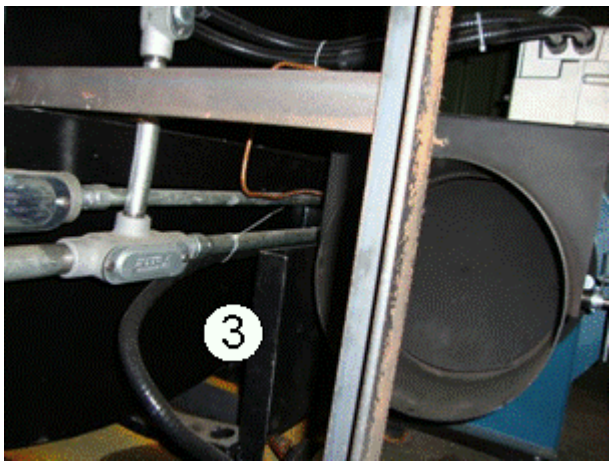
2. Gates must be opened to allow under fire air to enter the chamber. They should only be closed to reduce air in abnormal operating conditions.



1. Primary Chamber Slide Gate Open



2. Primary Chamber Slide Gate Closed



3. Secondary Chamber Slide gate Open

Primary & Secondary Chamber Burners: (01-002.W & 02-002.W)

 **Do not store flammable or hazardous materials in the vicinity of fuel burning appliances.**

Improper installation, adjustment, alteration, service or maintenance can cause property damage, personal injury or death.

Burner shall be installed and maintained in accordance with manufacturer's requirements as outlined in the Burner manual, local codes and authorities having jurisdiction.

INSTRUCTION 01/02-002.W.01: REMOVAL OF BURNER COVERS

Switch off the electrical power. Please follow all instructions outlined in *Section 4.2.2 Zero Mechanical State & Lock Out Instructions.* Cover must be removed to perform maintenance on burners.

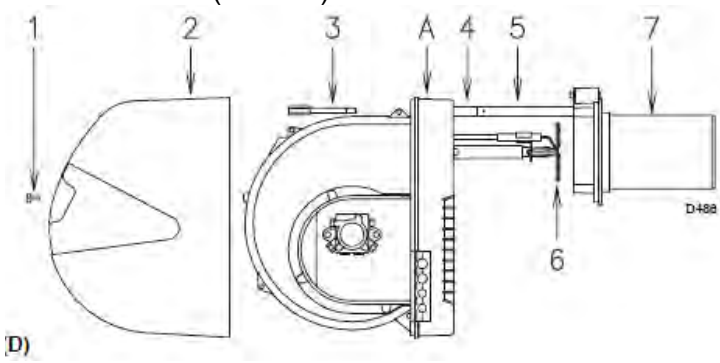
To remove the cover and to pull out the Primary or Secondary Burner, follow instructions below:

1. Loosen screw (Item #1, in the following diagrams) and withdraw the cover (Item #2, in the following diagrams)

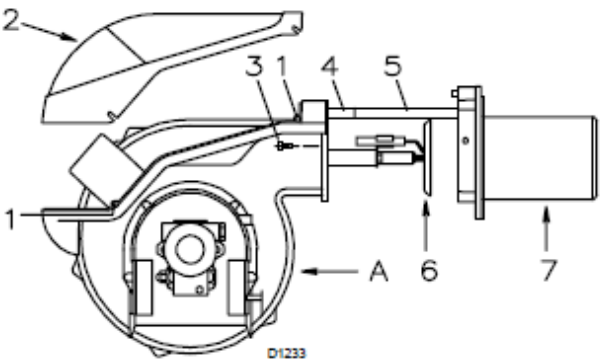
2. Primary Burner has one screw to remove the cover. The Secondary Burner has four screws to remove the cover.

3. Remove bolt (Item #3) for the Primary Burner, or screws (Item #3) for the Secondary Burner.

4. Pull (Part A) backwards keeping it slightly raised to avoid damaging the diffuser disk (Item #6).



Primary Burner has 1 screw



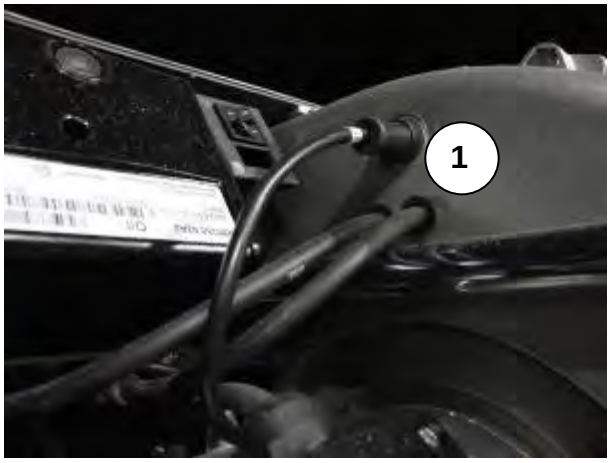
Secondary Burner has 4 screws (2 on each side)

Primary

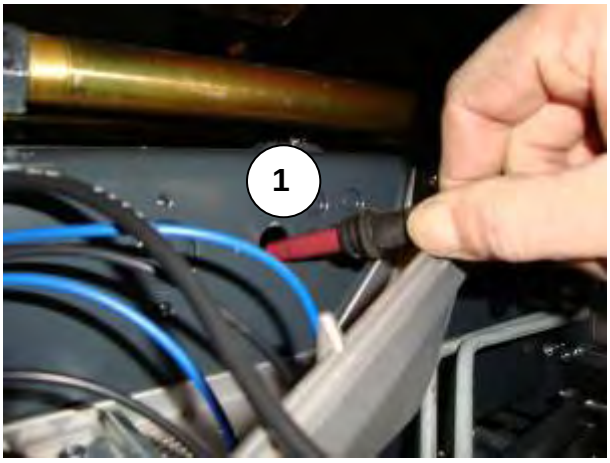
Secondary

INSTRUCTION 01/02-002.W.02: CLEANING THE PHOTO CELL AND U.V. DETECTOR

1. Remove the cover from the Burners as described in Instruction 01/02-002.W.01.
2. Clean Photo Electric (P.E) cell with a wet cloth
3. P.E. cell (Item #1 on the Primary Burner photo) (Item #1 on the Secondary Burner photo) can be removed by pulling it outward forcefully. Ensure you take note of the position of the eye while removing, this will help when reinstalling.
4. Once cleaned insert P.E. cell back into position ensuring the eye is not facing directly into the chamber (where the flame will be) but on the same angle as before it was removed.
5. Reinstall burner cover.



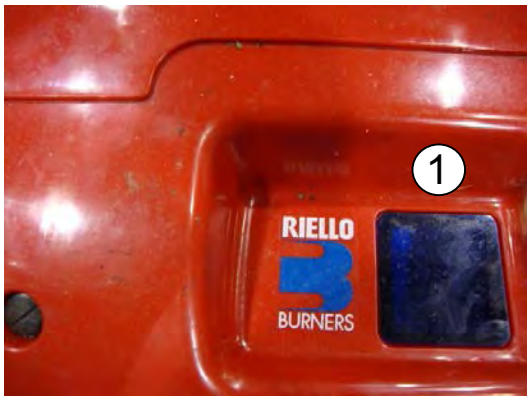
Primary Burner PE Cell

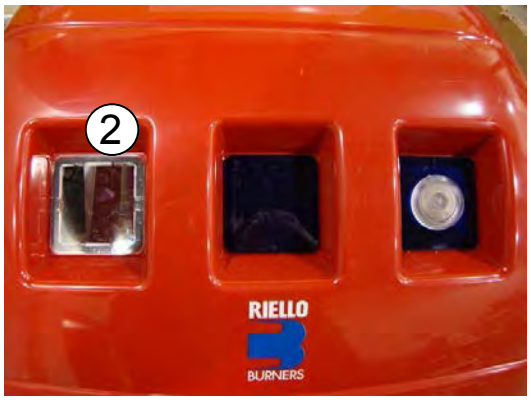


Secondary Burner

INSTRUCTION 01/02-002.W.03: CLEANING THE INSPECTION WINDOWS

Clean the inspection windows with a wet cloth.

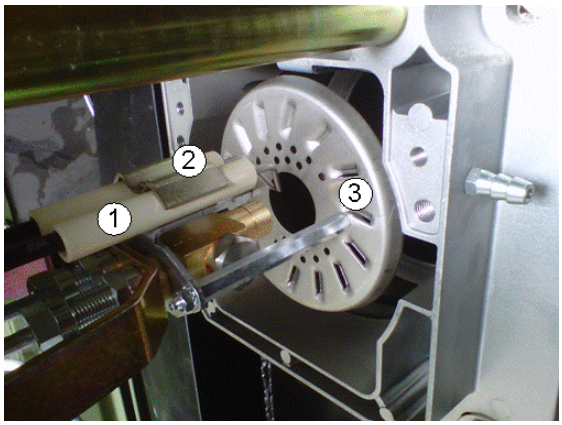




1. Primary Burner Inspection Window
2. Secondary Burner Inspection Window

INSTRUCTION 01/02-002.W.04: INSPECTING THE DIFFUSER DISC ASSEMBLY

1. Remove the cover from the Burners as described in 01/02-002.W.01.
2. Check the diffuser disc assembly and the diffuser disc for any heat damage
3. If any heat damage, deformation or excess rust is noted, replace. (*Part IV Section 4 CMI 4.4.3/01-002B)*



1. Electrode
2. U-bolt
3. Diffuser Disc

Air Compressor: (03-001.W)

INTAKE AIR. Can contain carbon monoxide or other contaminants. Will cause serious injury or death. This air compressor is not designed, intended or approved for breathing air. Compressed air should not be used for breathing air application.

HAZARDOUS VOLTAGE. Can cause serious injury or death. Disconnect power and bleed pressure from the tank before servicing.

MOVING PARTS. Can cause serious injury. Do not operate with guards removed. Machine may start automatically. Disconnect power before servicing.

HOT SURFACES. Can cause serious injury. Do not touch. Allow to cool before servicing. Do not touch hot compressor or tubing.

HIGH PRESSURE AIR. Bypassing, modifying or removing safety/relief valves can cause serious injury or death. Do not bypass, modify or remove safety/relief valves. Do not direct the air stream at body. Rusted tanks can cause explosion and severe injury or death. Drain tank before each use. Drain valve located at bottom of tank.

RISK OF BURSTING. Use only suitable air handling parts acceptable for pressure of not less than the maximum allowable working pressure of the machine.

Before maintenance is performed on electrical or rotating equipment make sure that the appropriate electrical disconnects are locked out/tagged out. Before removing the vessel access ports make sure that the equipment is off and cool.

NOTE
Too much or too little oil will harm the compressor.

INSTRUCTION 03-001.W.02: INSPECTING AIR FILTERS IN AIR COMPRESSOR

1. Remove both filter covers
2. Gently grab filter element and remove.
3. Visually inspect filter for damage or dirt.
4. If damaged, replace the filter. If dirty, blow out the filter with compressed air.
5. Reinstall the filters and their covers

INSTRUCTION 03-001.W.03: CLEANING AIR COMPRESSOR & CHECKING SAFETY VALVE

Cleaning

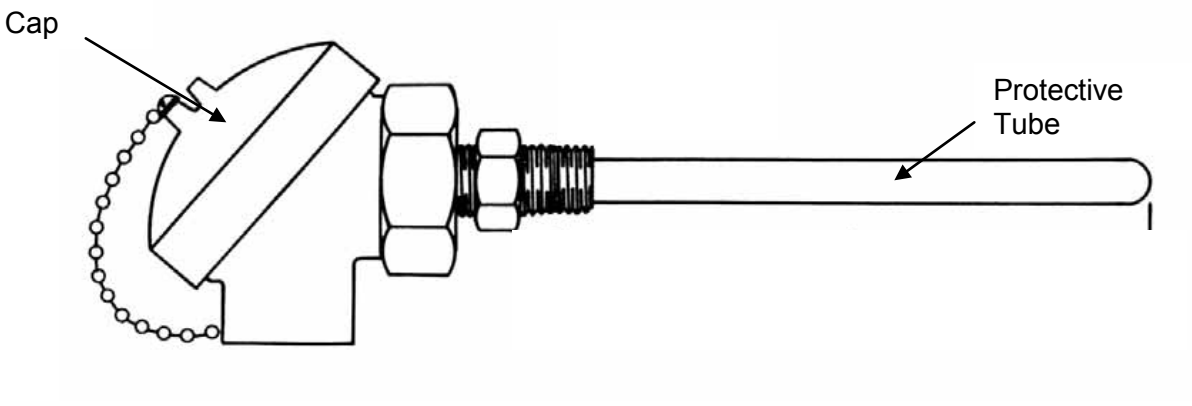
A dirty compressor will cause abnormally high temperature and result in oil carbonization on valve components. Clean all external parts of the compressor with compressed air. Concentrate the cleaning on the external fins where dirt can accumulate as cooling air is forced across them.

Check Safety Valve

1. Check the safety valve manually by pulling ring or lever to make sure that it moves freely and is not siezed.
2. Allow the ring to snap back to normal position.

Thermocouple: (05-002.W)

When working with electrical components, ensure lock out instructions are being followed.

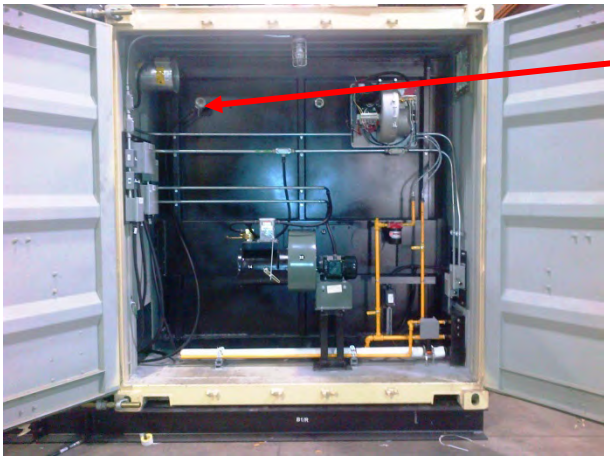


Thermocouple Assembly

Thermocouple Element

INSTRUCTION 05-002.W.01: INSPECT THERMOCOUPLE FOR DAMAGE

Turn main power to the system off - Remove thermocouple and visually inspect for damage. If damaged, see *Part IV Section 4 CMI 4.4.1/05-002A*



1. Primary Thermocouple (TC1)

2. Secondary Thermocouple (TC2) on Secondary Chamber Container

4.2.5 Monthly Instructions

Primary & Secondary Chamber Blowers: (01-001.M & 02-001.M)

Do not attempt any maintenance on a fan unless the electrical supply has been completely disconnected and locked. In many cases, a fan can windmill despite removal of all electrical power. The rotating assembly should be blocked securely before attempting maintenance of any kind.

Please follow all instructions outlined in *Section 4.2.2 Zero Mechanical State & Lock Out Instructions.*

INSTRUCTION 01/02-001.M.01: CHECK FAN WHEEL

1. Check the fan wheel for any wear or corrosion, as either can cause catastrophic failures, if left in operation.
2. The wheel can be accessed one of two ways.
   a. Remove the blower assembly from the unit and look down the outlet of the blower.
   b. Remove the damper assembly from the inlet of the blower and inspect by looking through the inlet of the blower.
3. Check also for the build-up of material which can cause unbalance resulting in vibration, bearing wear and serious safety hazards.
4. Clean the wheel as required.
5. If replacement is necessary follow these steps:

   a. Remove damper assembly from the unit

   b. Remove the blower assembly

   c. Remove the blower housing around the wheel

   d. Loosen all set screws that are located on the wheel.

   e. A puller may be required if the wheel hasn't been removed for some time.

   f. Ensure the shaft "key" is installed on the shaft before installing the new wheel.

   g. When installing a new wheel, the wheel should be positioned in the housing with the correct spacing between the edge of the inlet cone and the wheel. The wheel to cone clearance on the Primary Blower is 0.3175 cm.

   h. Ensure that the wheel is installed securely before reassembling the blower assembly.

   i. Install the blower assembly

   j. Install the damper assembly

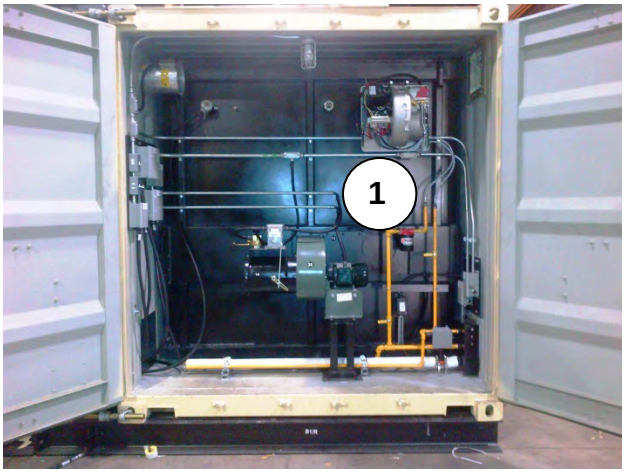
Primary & Secondary Chamber Burners: (01-002.M & 02-002.M)

Do not store flammable or hazardous materials in the vicinity of fuel burning appliances. Improper installation, adjustment, alteration, service or maintenance can cause property damage, personal injury or death. Refer to the Burner manual for instructional or additional information.

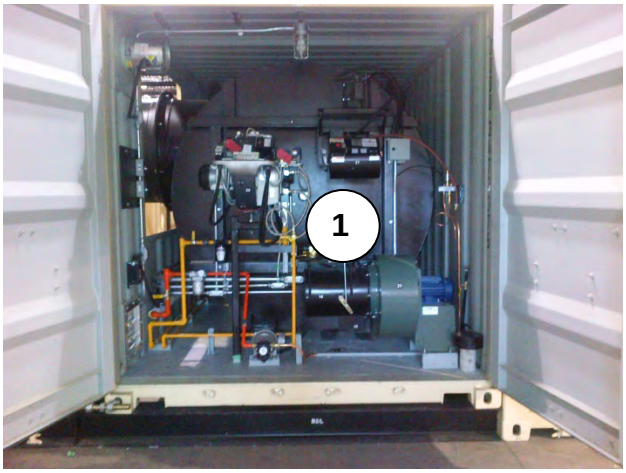
INSTRUCTION 01/02-002.M.01: CHECK FLEXIBLE OIL LINE

1. Check flexible oil lines to make sure that they are still in good condition. This includes frayed, leaking, or worn swivel joints.

2. If any type of damage is observed replace the flexible oil lines see *Part IV Section 4 CMI 4.4.3/01-002F & 4.4.3/02-0002F*



Primary Chamber Burner Flexible lines
(1 Above)



Secondary Chamber Burner Flexible Lines
(1 Above)

INSTRUCTION 01/02-002.M.02: INSPECT BURNER PUMP DELIVERY PRESSURE

1. Remove the cover from the Burners as described in Instruction 01/02-002.W.01.

2. The pump delivery pressure must be between 180-210 psi, and can be viewed on the gauge shown below.

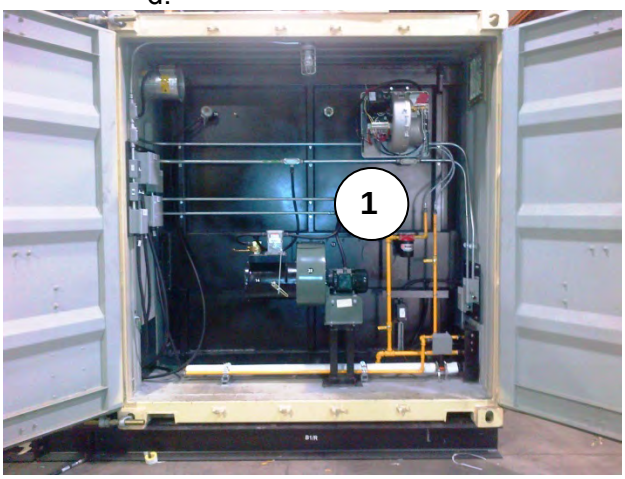
3. If the pressure is found to be unstable or if the pump is running noisily try the following:

a. Detach the flexible hose from the line filter (Shown below as #1).

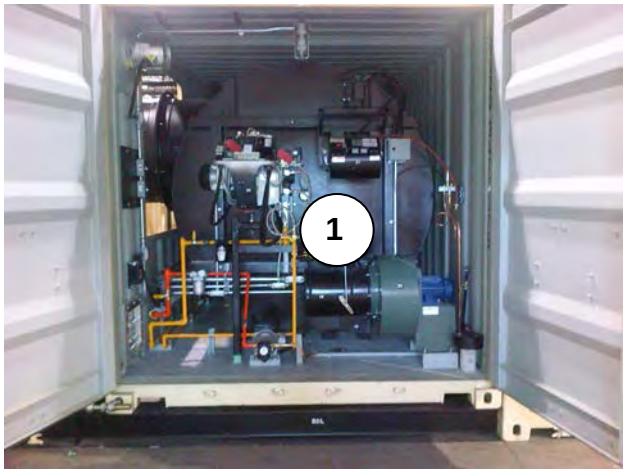
b. At the tank pour fuel into the supply line.

c. If there is fuel coming in through the filter it means the filter is not clogged. If no fuel is coming through the filter remove and replace.

d.



Primary Chamber Burner Flexible lines



Secondary Chamber Burner Flexible Lines

4. If the pump is found to be responsible:
   a. Loosen the bleed screw.
   b. Turn on the burner
   c. Once all the air has been bled out. Close the bleed screw.

   If the pump is still not working after these steps replace the pump: see *Part IV Section 4 CMI 4.4.7/01-002I or 4.4.7/02-002I.*

5. If the problem lies in the suction line, check to make sure that the filter is clean and that air is not entering the piping from a loose fitting or damaged line.

INSTRUCTION 01/02-002.M.03: CLEAN BURNERS OF DUST

1. Remove the cover from the Burners as described in Instruction 01/02-002.W.01.

2. Check that no dust has accumulated inside the burner fan or on fan blades.

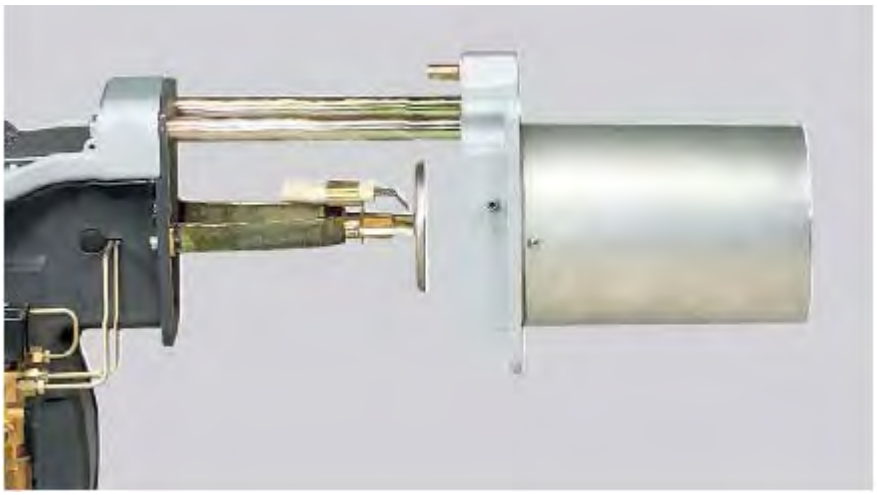
3. If any dust is visible take a clean soft cloth to the fan or the blades and wipe clean.

INSTRUCTION 01/02-002.M.04: CHECK BURNER COMBUSTION HEAD

1. Remove the cover from the Burners as described in Instruction 01/02-002.W.01.

2. Check that all parts of the combustion head are in good condition, free of all impurities, and that no deformation has been caused by operation at high temperatures.

(Below is an example of burner in good condition)



If damage is found, please refer to *Part IV Section 4 CMI 4.4.3/01-002D* & *4.4.3/02-002D*

Refractory: (05-001.M)

When working with the refractory make sure you use the proper tools; wear goggles, dust mask and gloves

Please follow all instructions outlined in *Section 4.2.2 Zero Mechanical State & Lock Out Instructions.*

INSTRUCTION 05-001.M.01: INSPECT REFRACTORY

1. Ensure power is locked out.
2. Open Secondary Chamber door.
3. Fasten door open, ensuring it will not close by its own weight.
4. Enter Secondary Chamber and check the refractory for shrinkage, any gaps between the modules greater than 2.5 cm should be patched.
5. Fix gaps with supplied blanket by stuffing material into opening. (See *Part IV Section 4 CMI 4.4.2/05-001A)*
6. Check for any exposed metal, if metal is exposed make sure to patch area with blanket material or new module. (See *Part IV Section 4 CMI 4.4.2/05-001A* & *4.4.2/05-001B)*
7. Pay special attention to areas where the junction boxes are located, as any excessive heat may melt the wires within the box.

Some cracking is normal, however if pieces are missing or have fallen out, (See *Part IV Section 4 CMI 4.4.2/05-001E)*

Air Compressor: (03-001.M)

 **INTAKE AIR. Can contain carbon monoxide or other contaminants. Will cause serious injury or death. This air compressor is not designed, intended or approved for breathing air. Compressed air should not be used for breathing air application unless treated in accordance with all applicable codes and regulations.**

 **HAZARDOUS VOLTAGE. Can cause serious injury or death. Disconnect power and bleed pressure from the tank before servicing. Compressor must be connected to properly grounded circuit. Do not operate compressor in wet conditions. Store indoors.**

 **MOVING PARTS. Can cause serious injury. Do not operate with guards removed. Machine may start automatically. Disconnect power before servicing. Lockout/Tagout machine.**

 **HOT SURFACES. Can cause serious injury. Do not touch. Allow to cool before servicing.**

 **HIGH PRESSURE AIR. Bypassing, modifying or removing safety/relief valves can cause serious injury or death. Do not bypass, modify or remove safety/relief valves. Do not direct air-stream at body. Rusted tanks can cause explosion and severe injury or death. Drain tank before each use. Drain valve located at bottom of tank.**

RISK OF BURSTING. Use only suitable air handling parts acceptable for pressure of not less than the maximum allowable working pressure of the machine.

INSTRUCTION 03-001.M.01: CHECK FASTENERS FOR TIGHTNESS

1. Check all fasteners for tightness (tighten as required).

2. Check the safety valve manually, by pulling ring or lever, to make sure that it is not stuck. Allow the ring to snap back to normal position

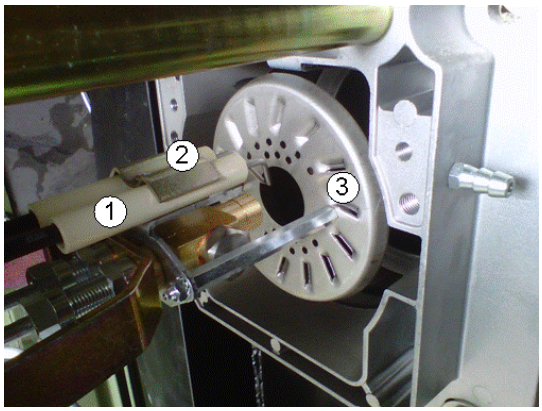
Quarterly Instructions

Primary & Secondary Chamber Burners: (01-002.Q & 02-002.Q)

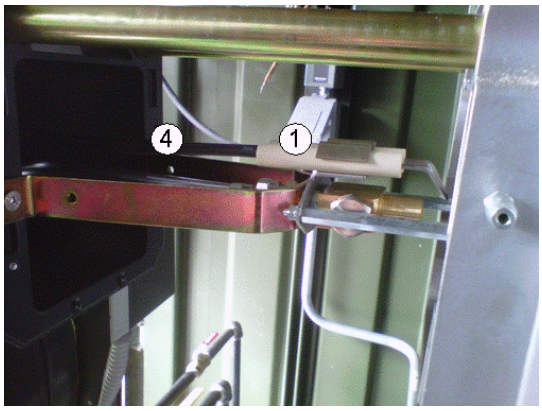
Do not store flammable or hazardous materials in the vicinity of fuel burning appliances. Improper installation, adjustment, alteration, service or maintenance can cause property damage, personal injury or death. Refer to the Burner manual for instructional or additional information.

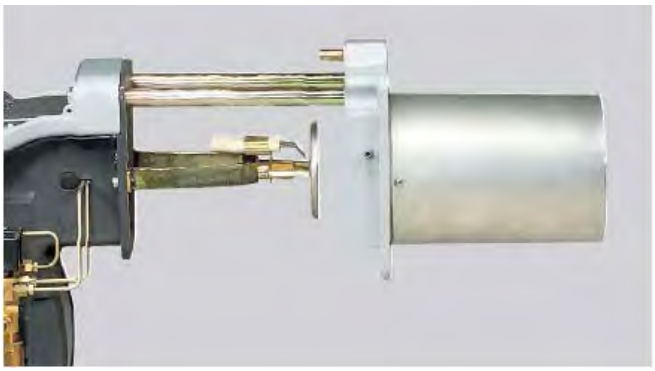
INSTRUCTION 01/02-002.Q.01: INSPECT COMPONENTS FOR HEAT DAMAGE

1. Check all components for heat damage.
2. Look for excessive rust, deformation of all the parts including but not limited to the end cone and the diffuser disc.
3. Check to see that the High Temperature Leads (HT leads) are still intact and have not melted from any excessive heat coming back into the burner. If they are damaged replace with new HT Lead.
    a. The HT leads are attached to the control box and the electrode via a squeeze fitting. Remove the leads from the electrode and control box by simply pulling them out.



1. Electrode
2. U-Bolt
3. Diffuser Disc
4. HT Leads





End cone

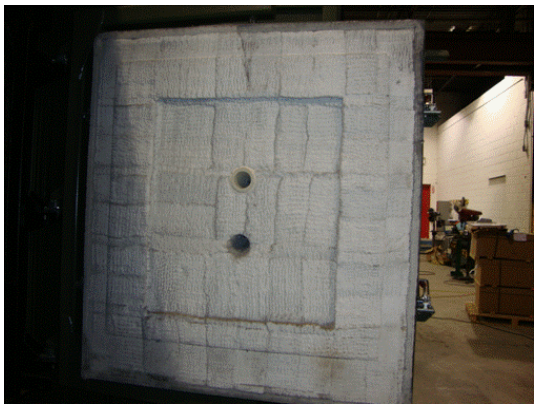
Refractory: (05-001.Q)

When working with the refractory make sure you use the proper tools; wear goggles, dust mask and gloves

Please follow all instructions outlined in *Section 4.2.2 Zero Mechanical State & Lock Out Instructions.*

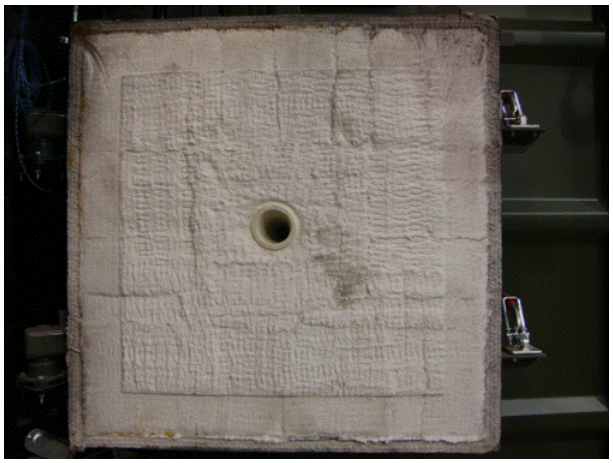
INSTRUCTION 05-001.Q.01: INSPECT DOOR GASKETS

1. Open Primary and Secondary Chamber doors.
2. Fasten doors open, ensuring the door will not close on its own.
3. Inspect door gasket for damage.
4. Replace any damaged segments of door gasket if necessary. Cut out the damaged section and replace with new door gasket. See *Part IV Section 4 CMI 4.4.2/05-001C*.
5. Doors must close tightly and securely, ensuring a good seal.



Primary Door (refractory lined)

1. Primary Door Gasket



Secondary Door (refractory lined)

1. Secondary Door Gasket

INSTRUCTION 05-001.Q.02: INSPECT REFRACTORY FOR SHRINKAGE

1. Ensure power is locked out.
2. Open Primary and Secondary Chamber doors.
3. Fasten doors open, ensuring they will not close on their own.
4. Enter Primary and Secondary Chamber and check the refractory for shrinkage, anything greater than 2.54 cm should be patched.
5. Check to make sure the anchoring of the modules is still strong and intact, if any modules seem loose replace complete module with new module.

A. REMOVAL: Remove existing Module (physically pull away existing refractory from underlying Module Anchor).

B. Remove welded stud from steel casing (cut with hack saw or other device between Module Anchor and Furnace Casing/Shell).

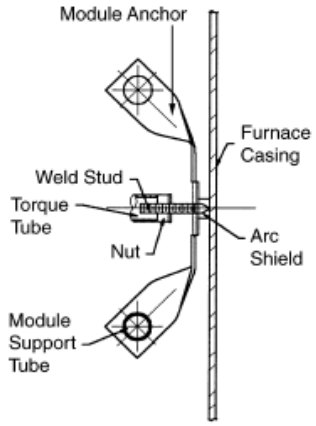


Figure 1: Side view of the Weld Loc Module

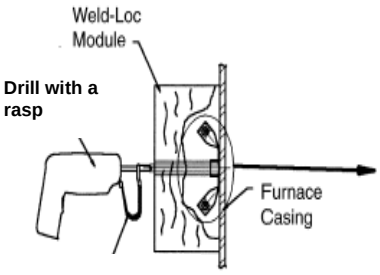


Figure 2: Stud Gun with rasp and Torque Tube.

A. INSTALLATION: Once the new module is in place take the stud gun with rasp to the Torque Tube and drill into place.

B. Once it has tightened the Torque Tube should come off with the drill.

Air Compressor (03-001.Q)

 **INTAKE AIR. Can contain carbon monoxide or other contaminants. Will cause serious injury or death. This air compressor is not designed, intended or approved for breathing air. Compressed air should not be used for breathing air application unless treated in accordance with all applicable codes and regulations.**

 **HAZARDOUS VOLTAGE. Can cause serious injury or death. Disconnect power and bleed pressure from the tank before servicing. Lockout/Tagout machine. Compressor must be connected to properly grounded circuit.**

 **MOVING PARTS. Can cause serious injury. Do not operate with guards removed. Machine may start automatically. Disconnect power before servicing. Lockout/Tagout machine.**

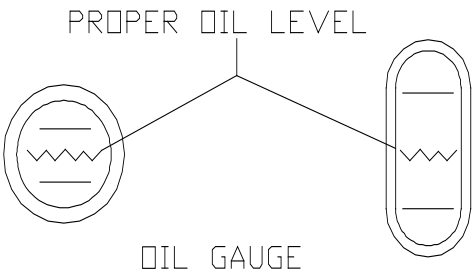
 **HOT SURFACES. Can cause serious injury. Do not touch. Allow to cool before servicing. Do not Touch hot compressor or tubing.**

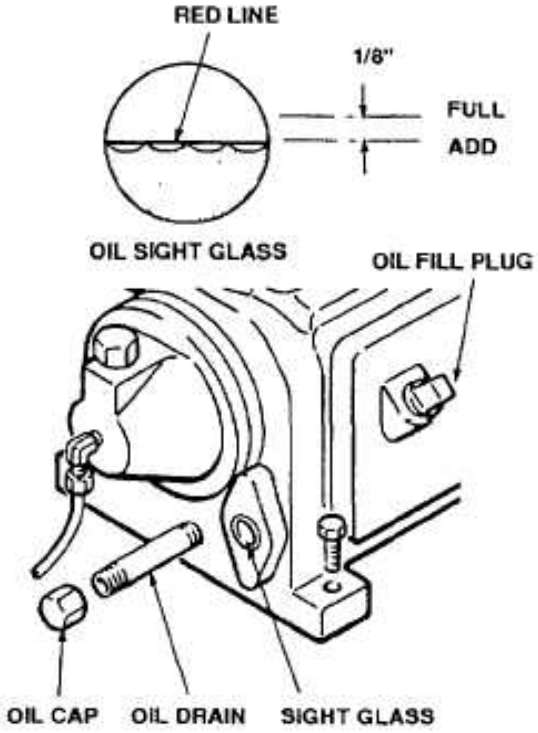
 **HIGH PRESSURE AIR. Bypassing, modifying or removing safety/relief valves can cause serious injury or death. Do not bypass, modify or remove safety/relief valves. Do not direct air-stream at body. Rusted tanks can cause explosion and severe injury or death. Drain tank before each use. Drain valve located at bottom of tank.**

 **RISK OF BURSTING. Use only suitable air handling parts acceptable for pressure of not less than the maximum allowable working pressure of the machine.**

INSTRUCTION 03-001.Q.01: CHANGE THE OIL

1. Change the oil





2. Remove the oil cap (above) to drain the oil.
3. Replace oil cap.
4. Refill the oil reservoir, using compressor oil, to the fill line as illustrated above.
5. Maintain oil level mid-way between the upper and lower lines of the crankcase sight gauge. See illustration above.

Paint: (05-003.Q)

Ensure proper ventilation and proper equipment is being used when using any paint product.

INSTRUCTION 05-003.Q.01: INSPECT AND MAINTAIN EXTERIOR PAINT

1. Maintain paint exterior to protect metal from heat and corrosion damage. This includes all components in the system including containers and incinerator components.

2. If discoloration is noted and painting needs to be performed, on areas where paint will be applied, you must do a light sanding before application.

3. Follow paint manufacturer's application instructions which will include surface preparation, priming and painting.

4. If components within the container need to be painted, for example the Primary Chamber or the Secondary Chamber, proceed as above. Use a type of paint that meets the following specifications:

Paint Specifications:

Incinerator Paint: This is the paint coated directly on the incinerator shell. This includes the following components:

1. Primary Chamber
2. Secondary Chamber
3. Breech Section
4. Hot Stack Section (Black)

Finish needs to be able to withstand temperatures in the 650-750°F (340-400°C) range.

Container Paint: Paint to conform to Customer outlined specifications.

Parts: There are no paint specifications for each individual component. This is left up to the discretion of the customer.