



RECYCLED HOT MIX ANYWHERE, ANYTIME, ANY TEMPERATURE



# ***Heat Design Equipment Inc. Annual Maintenance Manual***



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**ALWAYS READ AND UNDERSTAND THIS  
OPERATORS MANUAL BEFORE OPERATING  
THE HEATER OR SERVICING YOUR HEATER**

## ***SAFETY***

### ***WARNING: DO NOT***



**DO NOT** run heater in an enclosed area. Exhaust gases contain carbon monoxide, an odourless and deadly poison.

**DO NOT** ignite entire machine at once.

**DO NOT** operate the heater while performing any maintenance.

**DO NOT** leave machine unattended while operating.

**DO NOT** park machine on a steep grade or slope.

**DO NOT** smoke while operating the heater.

**DO NOT** place hand over heater while operating for any length of time.

**DO NOT** operate the heater near an accumulation of grass, leaves or other combustible material.

# **OPERATION INFRARED ASPHALT HEATER**

## **INTENDED USE :**

This machine is designed for heating the asphalt without burning the oils. The asphalt can be repaired or altered depending on the particular application.



**DO NOT OPERATE THE MACHINE IF A HOSE IS DAMAGED OR IF THERE IS A HOLE IN THE HEATER CARTRIDGE. WHEN CONNECTING YOUR PROPANE TANKS OBSERVE THE FOLLOWING PRECAUTIONS.**

## **TANK CONNECTION**

1. All connections must be made by a trained worker (*check your regulations*).
2. Inspect the infrared heater, regulator and hoses for defects. Repair or replace any damaged parts.
  - Make sure all hoses and valve connections are clean.
3. Use proper fitting wrenches to make connections.
4. Check for any propane leaks using a soapy water solution.
5. Secure the propane cylinder with the supplied strap.

## **LIGHTING PROCEDURE**

1. Close all ball valves to the individual heaters.
2. Slowly open the cylinder valve and check for gas leaks when the hose line is full. When the infrared heater is in use the cylinder valve must be fully opened. Check for leaks with soapy water or leak detector.
3. Adjust regulator to 36 PSI (high fire).
4. Ignite the propane gas torch.
5. Slowly open the ball valve and place the torch tip underneath heater. Do not point the flame of the torch directly at the ceramic surface, this could damage the ceramic and reduce the life of the cartridge.
6. Repeat step 5 for each heater.

## **HEATING PROCEDURE**

1. Identify and mark areas to be repaired
2. Sweep area clean of stones and loose debris.
3. Place heat over area that needs repair, use only the correct number of heaters to cover the repair area.
  - Turn all other heaters off.

# **OPERATION INFRARED ASPHALT HEATER**

4. Heat area that needs repair with the heaters on high fire
  - MAKE SURE THAT SURFACE TEMPERATURE OF THE ASPHALT NEVER EXCEEDS 150<sup>oC</sup> (300<sup>oF</sup>).
  - NOTE: TIME REQUIRED TO SOFTEN ASPHALT TO DEPTH OF ABOUT 0.51mm (2") WILL VARY DEPENDING ON THE FOLLOWING:
    - A. WEATHER CONDITIONS
    - B. TYPE OF ASPHALT MIX (COURSE OR FINE, AC CONTENT)
    - C. STARTING TEMPERATURE OF ASPHALT
    - D. DARK SURFACES ABSORB RADIATION BETTER
    - E. EXTRANEIOUS MATERIALS, (IE. RUBBERIZED CRACK & SEALANT) ARE PRESENT IN REPAIR AREA
    - F. SURFACES LIGHTNESS
5. When asphalt is workable to entire thickness of asphalt or to about 0.57 mm (2") move machine away from repair area.
6. Using a ice scraper, standard construction rake, rework scarify asphalt to eliminate all cracks, etc. from repaired area. Start by reworking at the edges of the patched areas. All edges should be straight and square to create uniform looking patches. Allow 2-3 inches of hot asphalt untouched in order to make the patch seamless with old asphalt.
7. Once the entire repair area has been reworked, an asphalt rejuvenation agent should be sprayed on the entire patched area at a rate of 1/10th of a litre per square metre and be thoroughly mixed into the repair areas using an asphalt rake or lute.
8. Fresh hot mix asphalt should be added as required to repair area, to compensate for voids to fill and level all depressions.
9. While the materials is still hot, first compact the edges of the patch to ensure a seamless, smooth edge between the old and the new asphalt. Continue compacting inside area until satisfied density is delivered.
10. The newly patched area should be protected from traffic for a minimum two hour period or until the asphalt has cooled sufficiently, so that use will not leave any marks.

## **SHUT OFF PROCEDURE**

1. Close propane tank valve while heater is running (to clear the lines of propane). When pressure gauge reaches zero, turn the power switch to OFF on the electrical panel and close the panel.

## INFRARED HEATER ASSEMBLY

**TURN PROPANE VALVE OFF BEFORE  
SERVICING HEATER.**



**WARNING:** To avoid personal injury,  
turn the heater off and allow to cool.

**STEP 1**

Remove all damaged heaters from the machine.

**STEP 2**

Turn the heater upside down and run water over top of the ceramic. This will eliminate the fibres from travelling through the air.



**STEP 3**

Remove the eight bolts that hold the heater together.

**STEP 4**

Remove the top portion of the heater (plenum).

**STEP 5**

Remove the heater cartridge and place in a garbage bag.

# INFRARED HEATER ASSEMBLY

STEP 6

Place the heater skirt on a flat surface.



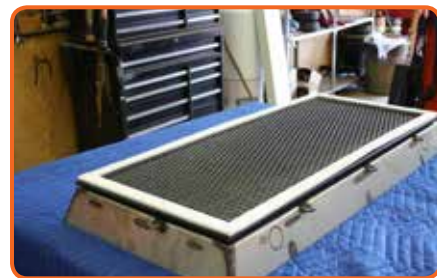
STEP 7

Place the heater cartridge with the ceramic facing down on top of the heater skirt.



STEP 8

Place the ceramic gasket in place



STEP 9

Carefully place the heater plenum on top of the gaskets. Make sure the gaskets do not shift.



STEP 10

Install bolts and hand tighten in a figure eight type pattern. The bolts should be tightened with a torque wrench to 60 inch pounds.



STEP 11

While tightening the bolts make sure that the gaskets do not shift out of place.



# VAPORIZER SHUT DOWN & PURGE PROCEDURE

## Application Models:

Alagas-SDI's Direct Fired Vaporizer Line

**Models: 40/40H,60/60H,80/40H and 120/60H**

There are many different methods used in the field to shut down and purge a direct fired vaporizer. However, not all of them are safe for the end user or the gas technician working on the vaporizer. At Heat Design Equipment Inc we are committed to ensure the users of our products know and understand the procedures that could potentially harm person or property if not performed correctly.

In order to safely shut down a direct fired vaporizer, the unit must first be purged of all liquid inside the heat exchanger. The information contained below is a step by step procedure on how to purge and shut down your direct fired vaporizer. This Procedure should be followed anytime a vaporizer needs to be maintained, serviced, relocated or shut down for any other reason.



**WARNING: PRIOR TO PURGING THE VAPORIZER, ENSURE THAT THERE ARE NO CLOSED BALL VALVES OR BACK CHECK VALVES RESTRICTING THE FLOW OF LIQUID TO THE TANK.**

## LIGHTING PROCEDURE:

1. Check visually all components of your machine if everything is in place and if nothing is loose, including propane components, before turning on the gas. **If everything is OK proceed with #2.**
2. Turn on gas slowly on the tank one, then open the valve slowly, the liquid propane will flow through the system, filling up the vaporizer. **If opened to fast , the excess flow valve will close.** If this occurs the tank valve should be closed and the procedure should be re started, opening the valve even slower.
3. Light the vaporizer as per unit instructions, by turning the control knob to pilot position, with the lighting device such as a small torch, place the flame of the torch next to the pilot light burner. After ignition of the pilot, keep on holding the button down for 30 seconds, **(pilot should stay lit at this point) Adjust control knob to position 3.**
4. Ensure the main power supply is off .
5. Open all valves downstream of vaporizer .
6. Make sure the **JMH panel** is powered.
7. Adjust the heater deck to approximately 2 to 3" from the asphalt with the jacks

## DIRECT FIRED VAPORIZER SHUT DOWN AND PURGE PROCEDURES:

1. Close outlet valve at EXIT of the vaporizer.
2. Ensure all tank valves are open with no restrictions of flow back to the storage tank. A check valve restricting flow back to the storage tank must never be used in a vaporizer installation.
3. Start the burner per the instructions in the Operations manual and turn the thermostat temperate dial to the "HIGH" setting.
4. After the burner cycles off; turn the thermostat knob to the "OFF" position, shut off the igniter (If installed) and check that the pilot flame is extinguished.
5. After the pilot flame is extinguished close the tank outlet valve.
6. Now open vaporizer outlet valve and flare or allow attached equipment to consume remaining Gas in the line.
7. After verifying the pressure in the lines are zero and no sources for ignition are present in that area, the vaporizer can now be disconnected.

# VAPORIZER INSPECTION CHECKLIST

## CHECKLIST ITEM

Model: \_\_\_\_\_

Serial Number: \_\_\_\_\_

		ACCEPTABLE		
		YES	NO	N/A
1	Do the cabinet, door and protective frame appear to be in good condition?			
2	Is the relief valve clean and equipped with dust cap?			
3	Has the strainer been cleaned within the last year?			
4	Has the inlet valve been inspected or changed within the last year?			
5	Has the capacity control valve been inspected or changed within the last year?			
6	Has the pilot orifice been cleaned or changed within the last year?			
7	Has the heat exchanger bottom head been checked for pitting in the last year? Heat exchanger to be replaced if pitting is in excess of 1/16" (40/40H-120/60H) or 1/8" (160H-800H)			
8	Has the drip leg before the thermostat been cleaned within the last year?			
9	Has the heat exchanger been cleaned within the last year?			
FOR VAPORIZERS MOUNTED IN A CAGE TURN VAPORIZERS UPSIDE DOWN AND CONNECT AIR SUPPLY TO THE VAPORIZER INLET (MINIMUM 50 PSI). TURN THE AIR SUPPLY ON.				
10	Does the gauge at the outlet manifold remain at 0 PSI for a minimum of 5 minutes?			
11	Turn the vaporizer back upright. Can the air be heard entering the heat exchanger chamber?			
12	Soap check all connections on vaporizers. Are all connections on vaporizers leak free?			
FOR VAPORIZERS INPERMANENT APPLICATION REMOVE THE LIQUID INLET VALVE AND SUPPLY AIR TO THE VALVE INLET (MINIMUM 50 PSI). TURN THE AIR SUPPLY ON. INSERT THE LIQUID INLET VALVE IN A TUB FULLED WITH WATER.				
13	Is there leakage present in the form of air bubbles coming from the valve outlet or pivot screws?			
14	Remove the valve from water, press the stem downwards several times to allow air to escape and repeat the test from No. 13.			
15	Reinstall liquid inlet valve and soap check all connections on vaporizers. Are all connections on the vaporizer leak free?			
DE-PRESSURIZE VAPORIZER & DISCONNECT AIR SUPPLY, START THE VAPORIZER AND PURGE ALL THE AIR OUT.				
1	Light pilot and engage main burners. Is the pilot strong and the main burner igniting and burning properly with light blue flame?			
2	Does the thermostat cycle off after a short period of time?			

Date of inspection: \_\_\_\_\_

Inspected by: \_\_\_\_\_

# **RECOMMENDED ANNUAL MAINTENANCE**

## **HEAT EXCHANGER**

- It is important to check the heat exchanger for possible heavy ends accumulation inside. It will affect the capacity of your vaporizer if accumulation is allowed.
- Remove inlet valve and tilt the vaporizer on its side to drain any heavy ends present. Over time the heavy ends will solidify if they are not drained.
- After removing the heavy ends, maintain and re-install the liquid inlet valve.

**NOTE: DEPENDING ON THE QUALITY OF THE LPG AT SITE, THE HEAT EXCHANGERS SHOULD BE CHECKED FOR HEAVY ENDS EVERY OTHER MONTH INITIALLY. ONCE IT IS ESTABLISHED THAT NO SIGNIFICANT QUANTITY OF HEAVY ENDS IS ACCUMULATING DURING THE VAPORIZER OPERATION, THIS SERVICE CAN BE PERFORMED ON A YEARLY BASIS.**

## **LIQUID INLET VALVE**

- P/N: 3-0016 repair kit to service liquid inlet valve.
- Replacing spring, valve seat and all O-rings.
- An inlet valve orifice removal takes a special socket, 7/16".
- Inspect orifice, replace if necessary.
- While valve body is apart and off the vaporizer, clean any debris or particles from the valve.
  - Plug the 1/8" tap on the cap.
  - Apply 80-100 pounds of air to the inlet and submerge in water.



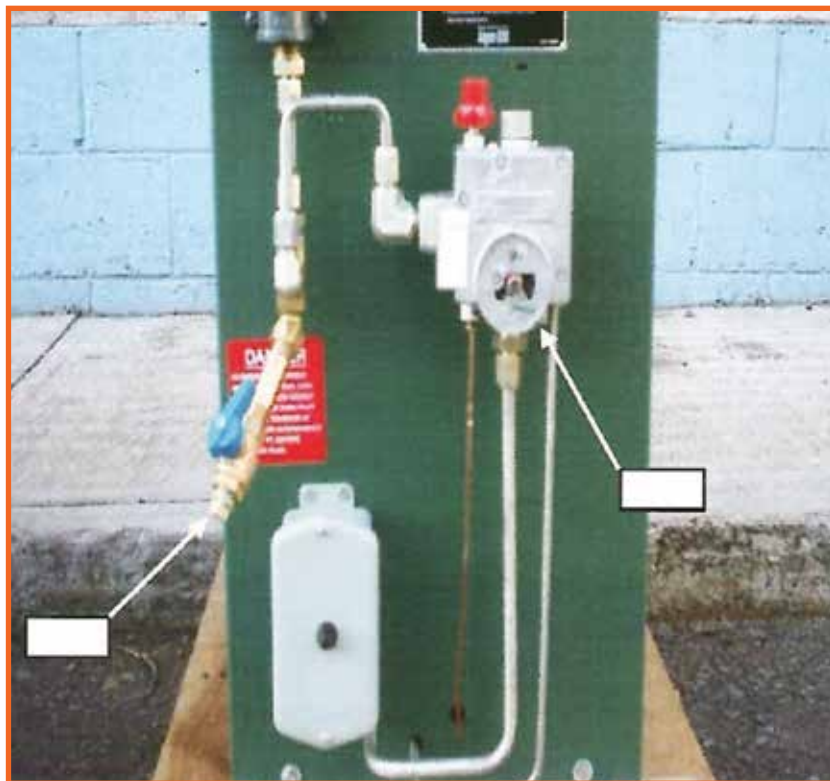
## **CAPACITY CONTROL VALVE**

- P/N: 3-0017 repair kit to service liquid inlet valve.
- Open the valve and remove inside components.
- Clean the inside of the valve body & position with a rag and solvent to remove any debris and or heavy ends accumulation.
- Heavy ends can inhibit the piston's ability to move inside the valve.
- Replace the spring and O-ring on the piston and valve plug.
- Dip the piston in powdered graphite before returning it to the valve.



## ***BURNER PRESSURE SETTINGS***

<b><i>MODEL</i></b>	<b><i>PRESSURE AT THERMOSTAT</i></b>	<b><i>PRESSURE AT DRIP LEG</i></b>
40/40H	6"W.C /BRN ON	16"W.C /BURNER OFF 15 W.C /BURNER ON
80/40H	6"W.C /BNR ON	16"W.C /BURNER OFF 15 W.C /BURNER ON
120/60H	12"W.C /BNR ON	16"W.C /BURNER OFF 15 W.C /BURNER ON



# MAINTENANCE

## Service and Maintenance

The vaporizers, like any other LP gas equipment, should be maintained periodically. The following maintenance schedule may be used as a guideline. This maintenance schedule includes items that must be serviced, the type of service to perform, and the frequency of service. However, this is only a suggested schedule. The conditions in your area and quality of the LP gas liquid may emit a more compelling maintenance, but whatever your schedule, remember that maintenance is of significant importance for trouble free operation of the vaporizer.



**CAUTION : THE EQUIPMENT DESCRIBED IN THIS MANUAL IS DESIGNED TO OPERATE WITH LP GAS, A FLAMMABLE FUEL UNDER PRESSURE. THE NATURE OF THE APPLICATION INVOLVES INHERENT HAZARDS THAT COULD RESULT IN INJURY. ONLY A TRAINED AND FULLY QUALIFIED PERSON SHOULD SERVICE THIS EQUIPMENT.**

## Items to be Serviced Monthly

<i><b>ITEMS TO BE SERVICED MONTHLY</b></i>	<i><b>SERVICE TO PERFORM</b></i>
STRAINER	REMOVE AND CLEAN SCREEN. REPLACE AS NECESSARY. IN SOME CASES IT MAY BE NECESSARY TO USE SOME TYPE OF CLEANER TO REMOVE ALL CONTAMINANTS.
PILOT BURNER ASSEMBLY	INSPECT PILOT ASSEMBLY. THE FLAME SHOULD ENVELOPE 3/8" TO 1/2" OF THE THERMOCOUPLE TIP.
MAIN BURNER ASSEMBLY	INSPECT FOR PROPER FLAME. CHECK THAT AIR SUPPLY OPENINGS ARE CLEAR OF DEBRIS, DIRT OR TRASH. IF NEEDED, CLEAN EACH BURNER ORIFICE.
RELIEF VALVES	CHECK ALL RELIEF VALVES ON VAPORIZER, LIQUID AND VAPOR LINES FOR SIGNS OF CORROSION IN OUTLET. CHECK ALL RAIN CAPS. REPLACE IF DAMAGED OR MISSING.
ENCLOSURE	CHECK ACCESS DOOR AND INSIDE ENCLOSURE FOR DEBRIS AND COMBUSTIBLE MATERIAL. CHECK AND, IF NEEDED, CLEAN THE INLET LOUVERS AND VENT CAP(S).

# MAINTENANCE

**NOTE: BEFORE REPLACING THERMOSTAT, BE SURE THE THERMOCOUPLE (READ WHILE HOT) IS DELIVERING THE PROPER VOLTAGE TO THE THERMOSTAT (13 TO 30 MILLIVOTS).**

## Items to be Serviced Annually

<i>ITEMS TO BE SERVICED ANNUALLY</i>	<i>SERVICE TO PERFORM</i>
THERMOSTAT	CHECK THE THERMOSTAT FOR PROPER OPERATION (SEE START-UP PROCEDURE). IF THE THERMOSTAT IS NOT OPERATING PROPERLY, IT SHOULD BE REPLACED (THE THERMOSTAT CANNOT BE SERVICED).
THERMOCOUPLE	THE ELECTRICAL OUTPUT OF THE THERMOCOUPLE SHOULD BE CHECKED WITH MILLIVOLT METER. THER THERMOCOUPLE (WHEN HOT) OUTPUT SHOULD BE BETWEEN 13 AND 30 MILLIVOLTS. A LOWER THAN 13 MILLIVOLT READING INDICATES THE THERMOCOUPLE SHOULD BE REPLACED.
LIQUID INLET VALVE	REMOVE PLUG FROM INLET VAVLE AND WIPE AWAY DEBRIS. USE KIT P/N: 3-0016 TO REPLACE VALVE SET, SPRING AND O-RING ON PLUG.
CAPACITY CONTROL VALVE	DISASSEMBLE AND CLEAN THE VALVE ASSEMBLY INSIDE OF THE BODY. USE KIT P/N: 3-0017 TO REPLACE THE SPRING AND THE O-RINGS ON THE POSTON AND PLUG. USE POWDERED GRAPHITE AS LUBRICANT AROUND THE TOP OF THE PISTON. USE GREASE AS LUBRICANT FOR THE O-RING ON THE VALVE PLUG.
HEAT EXCHANGE(S)	CHECK HEAT EXCHANGER FLUE FOR HOLES OR EXCESSIVE SCALE. REMOVE OBSTRUCTIONS AND DEBRIS IF NEEDED. CHECK HEAT EXCHANGER BOTTOM HEAD FOR PITTING. SHOULD PITTING BE IN EXCESS OF 0.125", REPLACE HEAT EXCHANGERS.
MAIN BURNER ASSEMBLY	INSPECT FOR PROPER FLAME. CHECK THAT AIR SUPPLY OPENINGS ARE CLEAR OF DEBIRS, DIRT OR TRASH. IF NEEDED, CLEAN EACH BURNER ORIFICE. ALL DIRECT FIRED VAPORIZERS BUILT AFTER OCTOBER 2002 USE #66 ORIFICE BURNER TIPS.

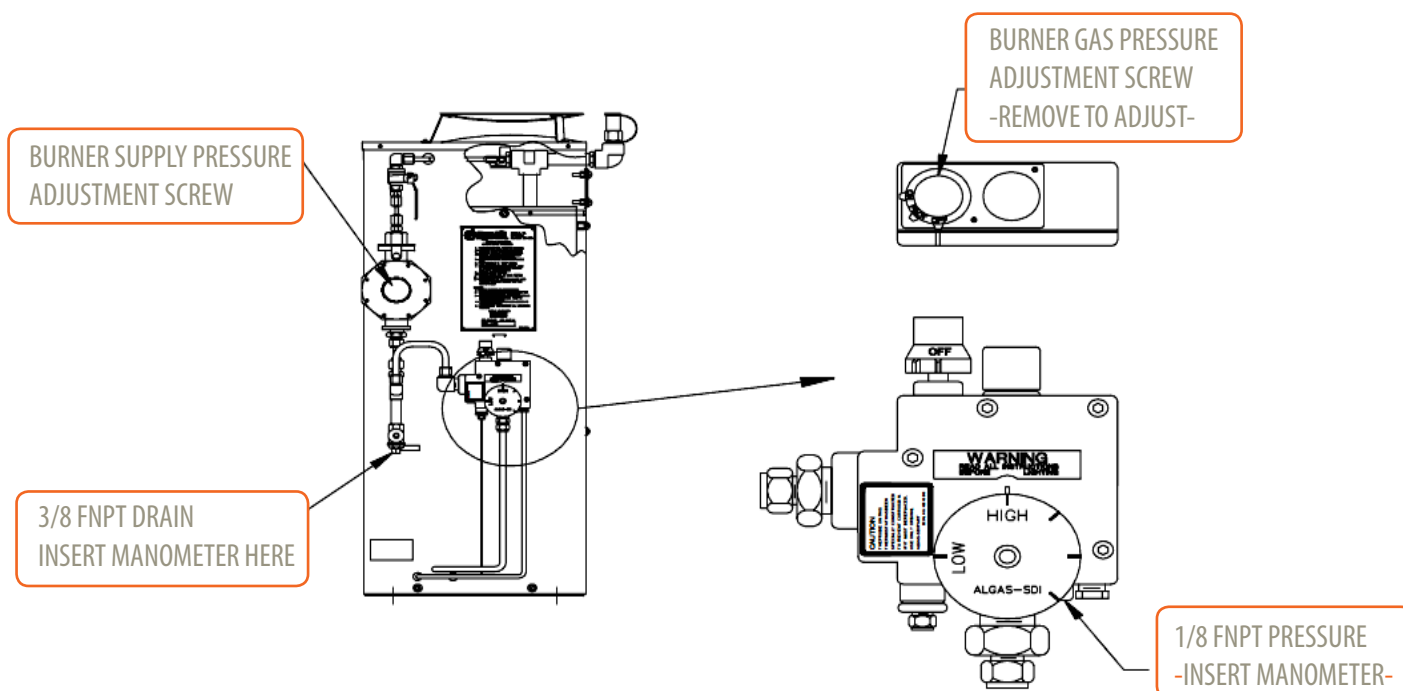
### CAUTION:

1. When performing maintenance on a component in the liquid or vapor line, ENSURE that the LP-gas supply is SHUT OFF to that component before it is removed or disassembled. The vaporizer must be completely blown down before performing service. Be sure that ALL sources of ignition are extinguished within 25 feet of the work area.
2. When flaring the contents of the vaporizer, be sure that the burners are on to prevent freezing during the flaring operation.



# ADJUSTING THE REGULATOR & THERMOSTAT

1. Close the supply valve to the Thermostat Supply Regulator and vent lines.
2. Using a 1/8" NPT barb fitting and hose, connect a 0-30" manometer (or similar pressure indicating device) to the pressure tap port at the bottom side of the thermostat between the main burner supply tube and the pilot supply tube. You will have to remove the existing 1/8" hex plug first.
3. Connect a 0-30" manometer (or similar pressure-indicating device) to the bottom of the drip leg. You will have to remove the 3/8" plug and drain the drip leg first.
4. Open the supply valve to the Thermostat Supply Regulator.
5. Set the thermostat temperature control knob to the last notch before the "HIGH" mark on the dial.
6. Establish pilot by turning "ON/PILOT/OFF" knob on top of the thermostat to "PILOT". Push down the "START" knob while igniting pilot (hold knob down for 30 - 60 seconds). After pilot is established, rotate the "ON/PILOT/OFF" knob to the "ON" position. The main burner(s) should now engage.
7. With the main burner operating, check the Thermostat Supply Regulator and burner gas pressure using the manometer. For the 40/40H and 80/40H, the desired pressure is 14" W.C. for the Thermostat Supply Regulator with the burner off. For the 60/60H and the 120/60H, the desired pressure is 18" W.C. with the burner off. To adjust the Thermostat Supply Regulator pressure, remove the cap and turn the adjustment screw clockwise with a standard screwdriver to increase the pressure. To adjust the pressure, remove the green cap on the top of the "ON/PILOT/OFF" knob and turn the adjustments crew clockwise with a standard screwdriver to increase the pressure. Replace all caps when complete.
8. Close the supply valve to the Thermostat Supply Regulator and WAIT UNTIL THE PILOT AND MAIN BURNER HAVE EXTINGUISHED Turn the "ON/PILOT/OFF" knob to the "OFF" position. Remove the manometer and fittings. REPLACE ALL PLUGS BEFORE PROCEEDING.



# VENTURI MAINTENANCE

## STEP 1

Remove the stainless steel protective cover from the air mixer.



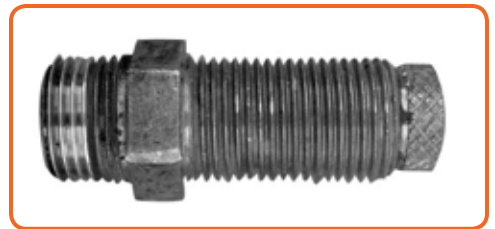
## STEP 2

Remove Brass Orifice holder by turning it counter clockwise using a 3/4" wrench.



## STEP 3

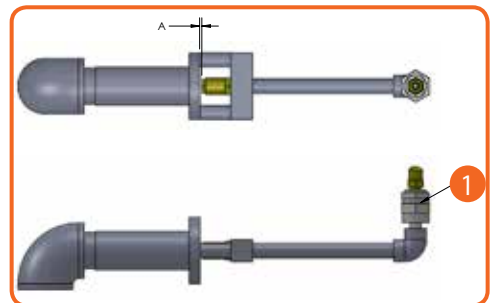
Inspect orifice for any debris. Remove the debris. If the orifice is severely plugged you may need to use compressed air. Check distance to inspirator.



**CAUTION: DO NOT USE TORCH TIP CLEANERS. THIS MAY INCREASE THE SIZE OR ANGLE OF THE ORIFICE. THIS WILL CAUSE THE HEATER TO PERFORM POORLY.**

## STEP 4

Re-tighten the orifice holder ensuring there is a small amount of pipe sealant on the threads.  
Dim A - Approx. Flush  
Suggested : Clean filter once a year (item 1)



## STEP 5

Re-install the protective hood.

## ***TROUBLESHOOTING***

### **Pilot - Troubleshooting trees #1 & #2**

- The pilot flame is adjusted at the factory to provide a non-blowing blue flame. If the flame is not sufficient or the pilot does not stay lit, check the pilot burner to see if it is clear of any obstructions.
- Flame should envelope 3/8" to 1/2" of the thermocouple tip. If the pilot flame is too low, the thermocouple will not generate sufficient voltage to hold the main burner's valve open. If the pilot flame is too small, clean the pilot burner orifice, or replace the pilot. The 40/40H and 60/60H vaporizers use #18 pilot orifices, while the 80/40H and 120/60H use #23 pilot orifices.

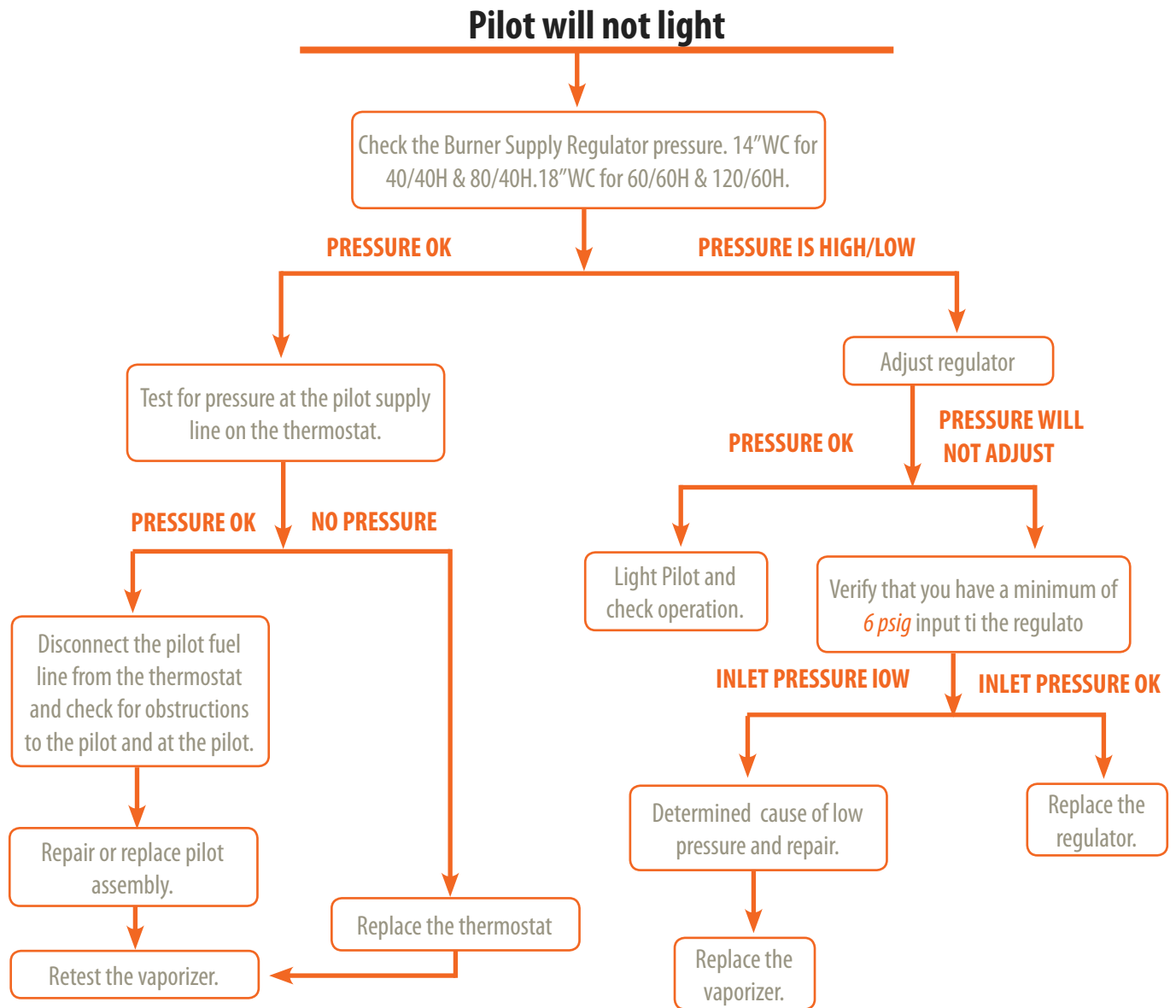
### **Main burner will not ignite - Troubleshooting trees #3**

- Check the pilot burner as instructed in #1 above.
- Check burner regulator. Disconnect tube from outlet side of regulator and check output pressure.
- If pilot burner and burner regulator check out OK, the problem is in the thermostat. Replace thermostat (the main burner will not come on unless the temperature in the heat exchanger drops).

### **If vapor pressure drops - Troubleshooting tree #4**

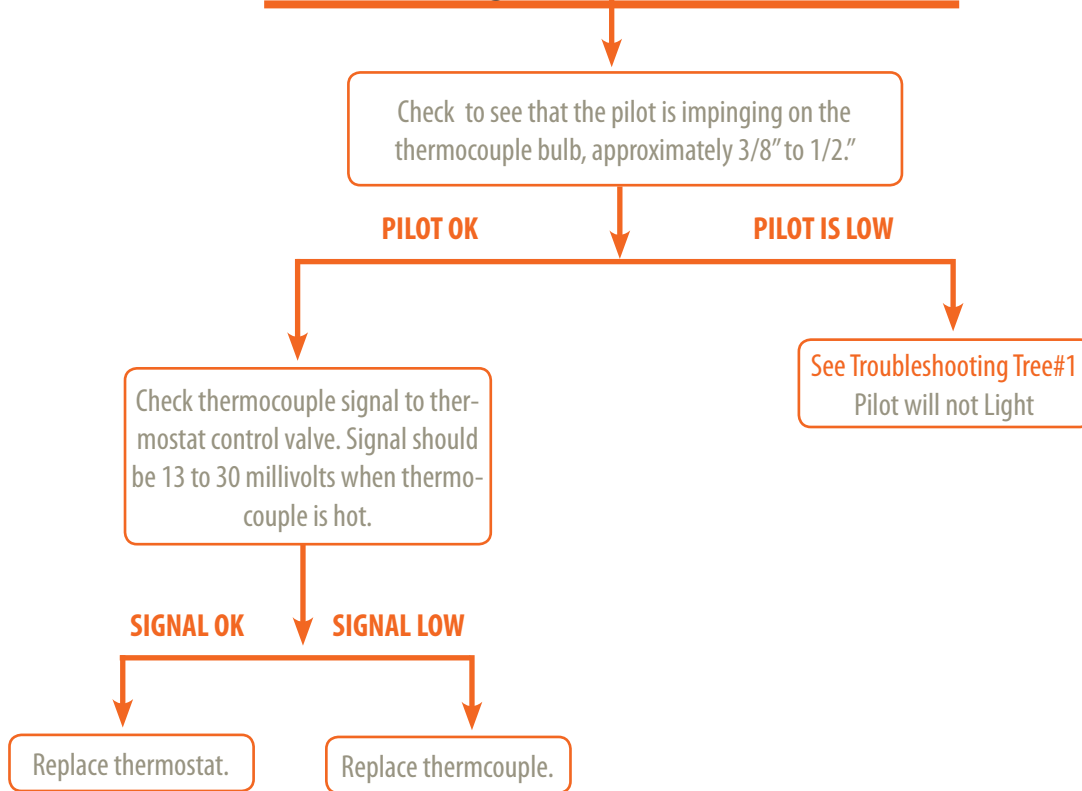
- Inspect burner & check pilot as in # 1 and # 2 above.
- If vapor pressure drops, but main burner(s) is working, vapor demand exceeds vaporizer capacity.
- Check liquid excess flow valve and shut off valve; make sure they are open.
- Close liquid inlet valve upstream of strainer. Bleed down system and clean strainer filter.

# TROUBLESHOOTING TREE #1



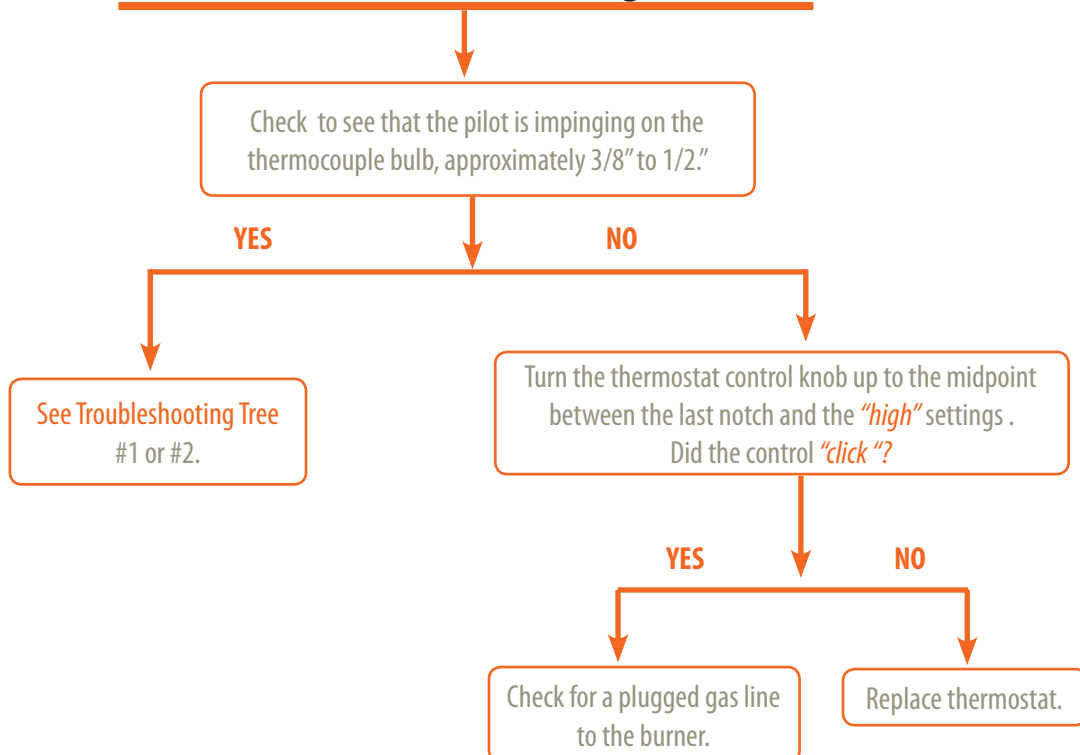
## TROUBLESHOOTING TREE #2

### Pilot lights but will not hold



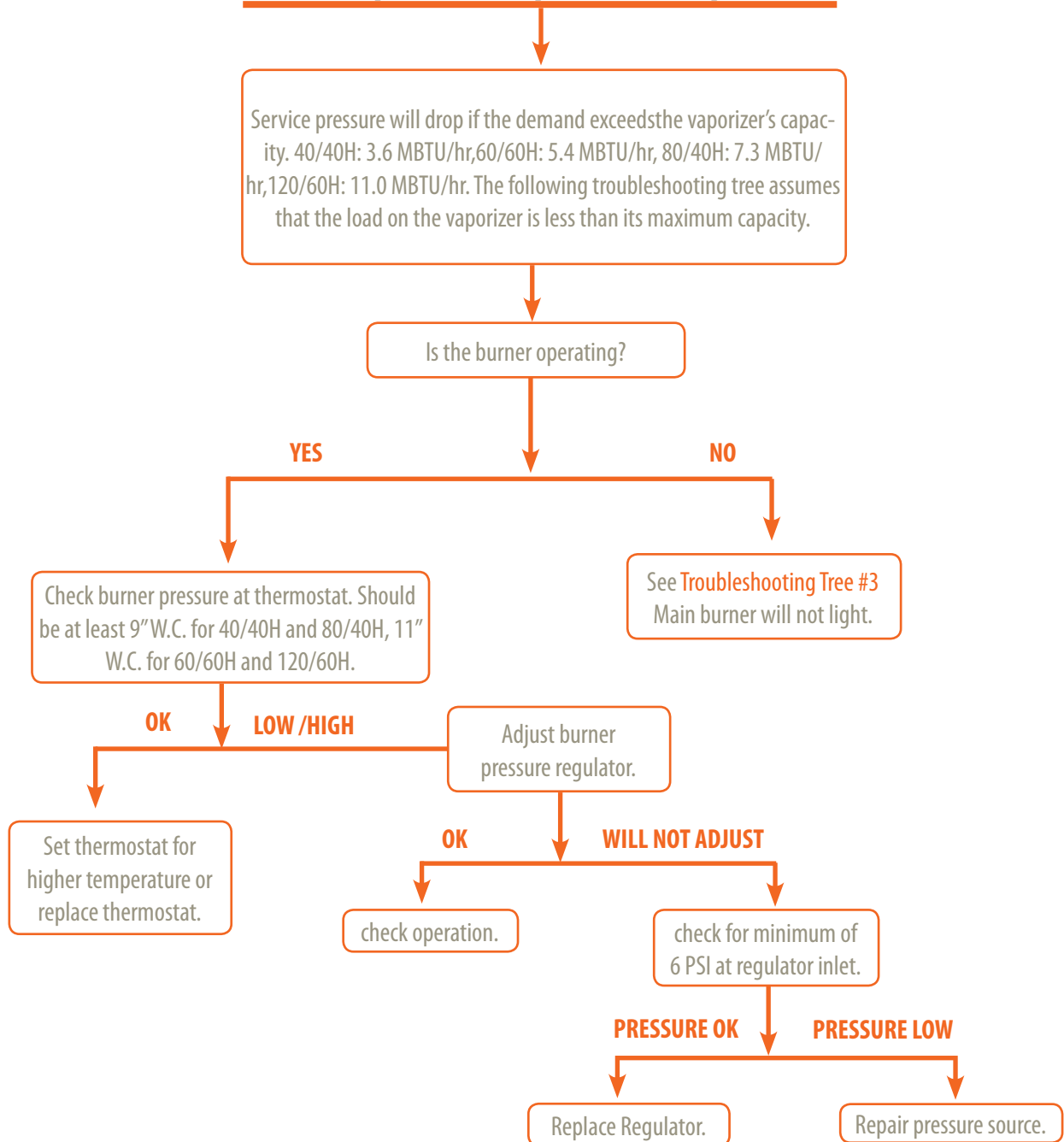
## TROUBLESHOOTING TREE #3

### Main burner will not light



## TROUBLESHOOTING TREE #4

### Vapor service pressure drops



## ***OPTIONS***

### **Contaminant Separator / Filtaire**

40/40H, 60/60H & 80/40H, Filtaire Model F4, Use P/N: 20536 or 20536-ASME, Quantity 1 per unit 120/60H, Filtaire Model F6 - ASME, Use P/N: 20540 or 20540-ASME, Quantity 1 per unit.

### **Economy Kit**

40/40H, 60/60H, 80/40H & 120/60H, Economy Option Kit P/N: 80793, Quantity 1 per unit.

### **Pipeaway Adapter**

40/40H, 60/60H, 80/40H & 120/60H, Pipeaway Adapter 3/4", Use P/N: 1501-5016, Quantity 1 per unit. We suggested pipeaway adapters kits to be installed on all direct fired units with at least 1 foot of pipe . All older style exhausted vent caps should be upgraded to the present design change. Use Convex tops Instead of concave tops . This prevents rain / water run-off from the dripping directly on the top of the heat exchanger and potentially into the burners.

