

DTHS SERIES

TUBE HEATER

INSTALLATION, OPERATION,
MAINTENANCE
AND PARTS MANUAL



Detroit Radiant Products Company

FOR YOUR SAFETY!

IF YOU SMELL GAS:

1. Open Windows.
2. Do not touch electrical switches.
3. Extinguish any open flame.
4. Immediately call your gas supplier.

Do not store or use gasoline or other flammable vapors and liquids in the vicinity of this or any other appliance.

FOREWORD

WARNING!

THIS HEATER **MUST** BE INSTALLED AND SERVICED BY TRAINED GAS INSTALLATION AND SERVICE PERSONNEL ONLY. READ AND UNDERSTAND THESE INSTRUCTIONS THOROUGHLY BEFORE ATTEMPTING TO INSTALL, OPERATE OR SERVICE THE DETROIT RADIANT PRODUCTS COMPANY HEATER. FAILURE TO COMPLY WITH THESE WARNINGS AND INSTRUCTIONS, AND THOSE ON THE HEATER, COULD RESULT IN PERSONAL INJURY, DEATH, FIRE, ASPHYXIATION, AND/OR PROPERTY DAMAGE. RETAIN THESE INSTRUCTIONS FOR FUTURE REFERENCE.

Approval Standards and Certifications

Detroit Radiant Products units comply with or are certified by the following Organizations or Standards:

- ❖ American National Standards (ANSI Z83.6)
- ❖ Occupational Safety and Health Act (OSHA)
- ❖ American Gas Association (AGA)
- ❖ International Approval Services (IAS)

IMPORTANT!

Any alteration of the system or of the factory authorized components specified either in this manual or by Detroit Radiant Products Company voids all certification and warranties.

Detroit Radiant Products Company

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SAFETY INFORMATION

- This infra-red heater is designed for use in industrial and commercial buildings such as warehouses, manufacturing plants, aircraft hangars, service garages, etc.

NOT FOR RESIDENTIAL USE!

Do not use the home, sleeping quarters, attached garages, etc.

- Detroit Radiant Products Company cannot anticipate every use, which may be made of their heaters. Check with your local fire safety authority if you have questions about local regulations.

The following information **must** be reviewed before installing this heater:

WARNING!

This is not an explosion-proof heater. Where there is the possibility of exposure to flammable vapors, consult the local fire marshal, the fire insurance carrier or other authorities for approval of the proposed installation.

CAUTION!

- Check the AGA rating label on the heater to verify the minimum clearances to combustibles and the proper gas to be used. Check the other labels on the heater to verify proper mounting.
- The installation of this heater must conform with local building codes or, in the absence of local codes, with the latest edition of the National Fuel Gas Code, ANSI-Z223. 1 (NFPA 54).
- The installation of this heater in public garages must conform with the Standard for Parking Structures, ANSI/NFPA 88A-latest edition or the Standard for Repair Garages, ANSI/NFPA 88B-latest edition and must be at least 8 ft. above the floor.
- The installation of this heater in aircraft hangars must conform with the Standard for Aircraft Hangars, ANSI/NFPA 409 latest edition. The heater must be installed at least 10 ft. above the upper wing surfaces and engine enclosures of the highest aircraft which might be stored in the hangar. In areas adjoining the aircraft storage area, the heaters must be installed at least 8 ft. above the floor. The heaters must be located in areas where they will not be subject to damage by aircraft, cranes, movable scaffolding or other objects.
- The heater, when installed, must be electrically grounded in accordance with the latest edition of the National Electrical Code, ANSI/NFPA 70.
- Under no circumstance is either the gas supply line or the electrical supply line to the heater to provide any assistance in the suspension of the heater.
- The weight of the heater must be entirely suspended from a permanent part of the building structure having adequate load characteristics.
- Neither the gas supply line, electrical supply line nor sprinkler heads shall be located within the minimum clearances to combustibles as shown in the Clearances to Combustibles Chart on page 3.
- Signs should be posted in storage areas to specify maximum stacking height allowed in order to maintain clearance to combustibles.

FOR YOUR SAFETY!

IF YOU SMELL GAS:

1. Open windows.
2. Do not touch electrical switches.
3. Extinguish any open flame.
4. Immediately call your gas supplier.

FOR YOUR SAFETY!

Do not store or use gasoline or other flammable vapors and liquids in the vicinity of this or any other appliances.

SAFETY CLEARANCE INFORMATION

WARNING!

Failure to comply with the stated clearances to combustibles could result in personal injury, death and/or property damage.

WARNING!

This heater should be installed so that the minimum clearances to vehicles, as marked on the heater, will be maintained. If vehicle lifts are present, ensure that these clearances will be maintained from the highest raised vehicle.

For the safe installation of this unit, the following table contains clearances that must be maintained:

CLEARANCES TO COMBUSTIBLES [IN.]					
MODEL NO.	MOUNTING ANGLE	SIDE		TOP	BELOW
		BEHIND	IN FRONT		
DTHS20-40 (N, P) -2	0°	15		9	40
	0° - 45°	12	15	9	40
DTHS(20,30)-50 (N,P)-2	0°	15		9	52
	0° - 45°	12	15	9	52
DTHS(20,30)-60 (N,P)-2	0°	24		9	62
	0° - 45°	12	24	9	62
DTHS(20,30)-60 (N,P)-2	0°	24		9	70
	0° - 45°	12	24	9	70
DTHS40-50 (N, P) -2	0°	10		9	36
	0° - 45°	10	25	9	36
DTHS40-60 (N, P) -2	0°	10		9	40
	0° - 45°	10	38	9	40
DTHS40-75 (N, P) -2	0°	24		9	54
	0° - 45°	10	38	9	54
DTHS(30,40,50)-100(N,P)-2	0°	24		9	72
	0° - 45°	24	50	9	72

Chart 1

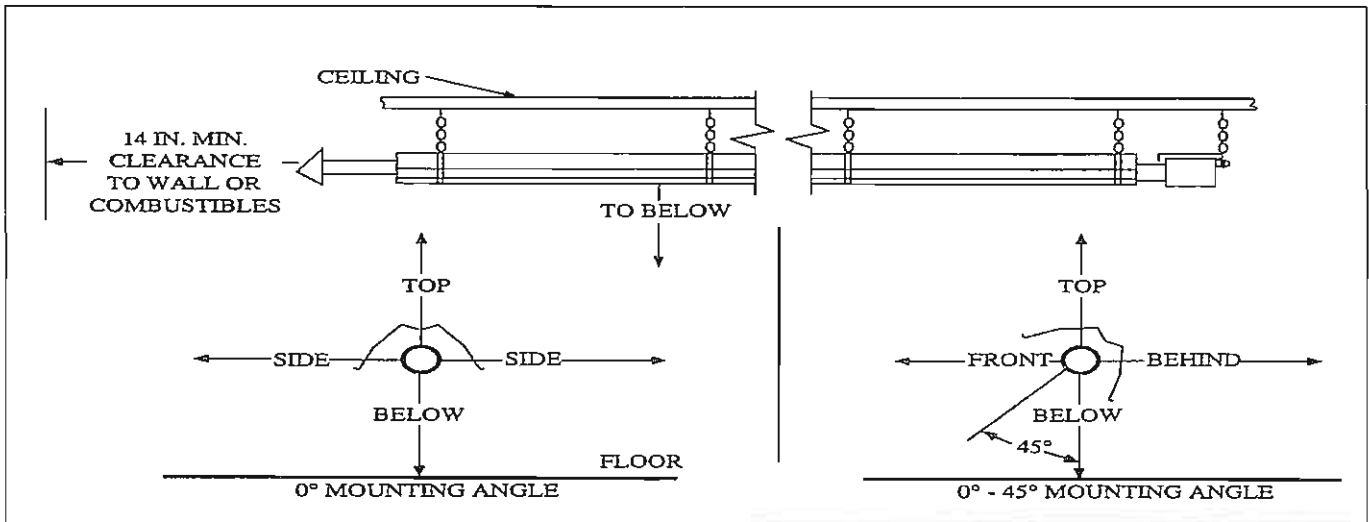


Figure 1: CLEARANCE TO COMBUSTIBLES DIAGRAM

1 INSTALLATION

1.1 Design Criteria

Perimeter mounting of these infrared heaters provides for the most efficient installation. In Figure 1-1, the heaters are mounted at the perimeter of the space to be heated. Refer to the DTHS

Heater Installation Chart for the recommended distances on the models being installed. Buildings that require the rows of heaters to be farther apart than the recommended distance in the chart may need additional heaters placed in the center of the space.

DTHS HEATERS INSTALLATION CHART						
MODEL	GAS INPUT [MBTU/H]	TYPICAL MOUNTING HEIGHT [ft]	DISTANCE BETWEEN HEATERS [ft] (Dimension A)	DISTANCE BETWEEN HEATER ROWS [ft] (Dimension B)	MAXIMUM DISTANCE BETWEEN HEATER AND WALL [ft] (Dimension C)	
					Heater Angle 0°	Heater Angle 45°
DTHS 20	40	9 - 15	8 - 26	10 - 50	15	5
DTHS (20,30)	50	10-16	10-32	12 - 60	16	6
DTHS (20,30)	60	11 - 18	12 - 38	14 - 70	17	7
DTHS (20,30)	75	13 - 20	15 - 43	16 - 85	20	8
DTHS 40	50	9 - 16	6 - 26	9 - 50	14	6
DTHS 40	60	10 - 18	8 - 32	11 - 60	16	7
DTHS 40	75	11 - 20	10 - 36	13 - 70	18	8
DTHS (30,40,50)	100	13 - 25	13 - 40	15 - 85	20	10

Chart 2

NOTE: This chart is provided as a guideline. Actual conditions may dictate variation from this data

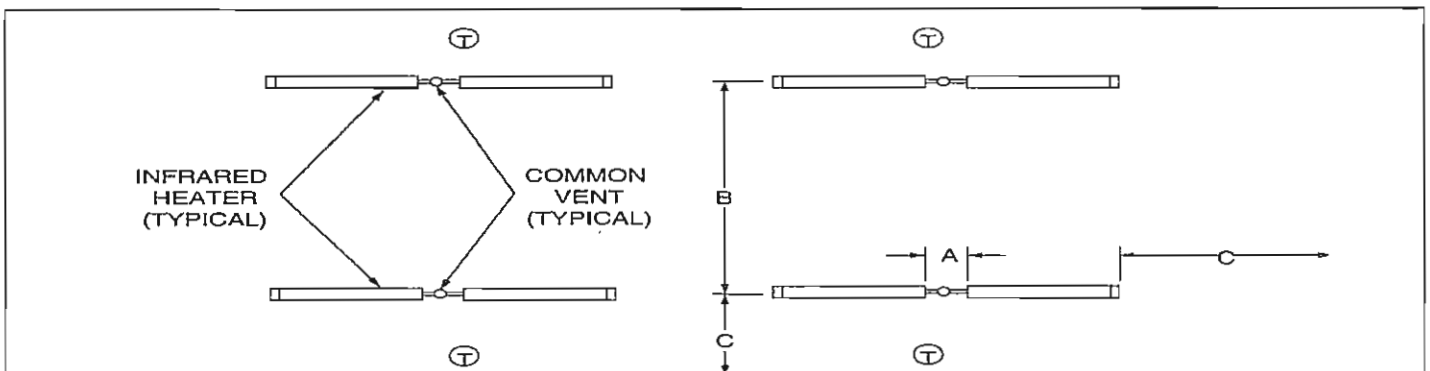


Figure 1-1

TYPICAL BUILDING LAYOUT

When positioning heaters, keep in mind the clearances to combustible materials, lights, sprinkler heads, overhead doors, storage areas with stacked materials, gas and electrical lines, parked vehicles, cranes and any other possible obstructions or hazards. Refer to the warnings, cautions and the Clearance to Combustibles Chart (1) on page 3 and on the heater to verify that a safe installation condition exists.

The following guidelines must also be met to ensure a good installation and proper heater performance:

- A maximum of two 90° elbows (factory supplied Part No. E6 **only**) can be installed on DTHS model heaters. The gas input of the heaters, as stated on the rating label, will determine the minimum length of the 4 in. diameter emitter pipe from the control box to the first elbow. (See Section 2.5, Optional “L” or “U” Configuration).

NOTE: Flue vent requirements do not change when elbows are installed.

WARNING!

The ceiling top clearance **must** be a minimum of 15 in. for heaters with a gas input rating of 60,000 and 75,000 BTU/H and only 10 ft. of 4 in. diameter emitter pipe to the first elbow. All other clearances are as stated in the Clearance to Combustibles Chart (1) on page 3.

- **Do not** exceed the maximum vent length (usually 20 ft.) for exhausting the heater. Consult the Flue Venting Chart on page 14.
- **Do not** combine the exhaust vents of two heaters into a straight through tee. A Part No. Y or staggered tee arrangement **must be** used. Heaters sharing the same vent must share the same thermostat. Common vents must have a 6 in. diameter. Common vents must have a 6 in. diameter flue (see Figure 1-1).
- Non-contaminated air for combustion **must** be ducted to the heater if chlorinated or fluorinated contaminants are present in the area where the heater is installed. Consult Combustion Air Requirements section on page 17.
- **Do not** exceed the maximum duct length for fresh air intake (usually 20 ft). Consult Air Intake Duct Chart on page 17.
- **Do not** draw fresh air to the heater from an attic space. There is no guarantee that adequate air will be supplied.
- All unvented heaters **must** use part no. WVE-GALV vent with flapper.

Once all of the safety precautions and design criteria are met, the actual installation of the heater may begin.

1.2 Prechecks

1. Verify that all parts have been received by checking them against the packing list. If anything is missing, notify the Re-Verber-Ray representative or Detroit Radiant Products.
2. Check the AGA rating label on the heater to verify the model number, the gas to be used and that the clearances to combustibles will be met.
3. Make sure the finished installation will conform to the design requirements listed in the Clearance To Combustibles Chart (1) and the figure shown on page 3, and Figures 1-2 and 1-3.
4. While heater is still on the ground, connect a 120 V. line to heater, and check glo-bar operation. If the glo-bar does not light, see Section 4.1, Glo-bar Replacement, for replacement instructions.

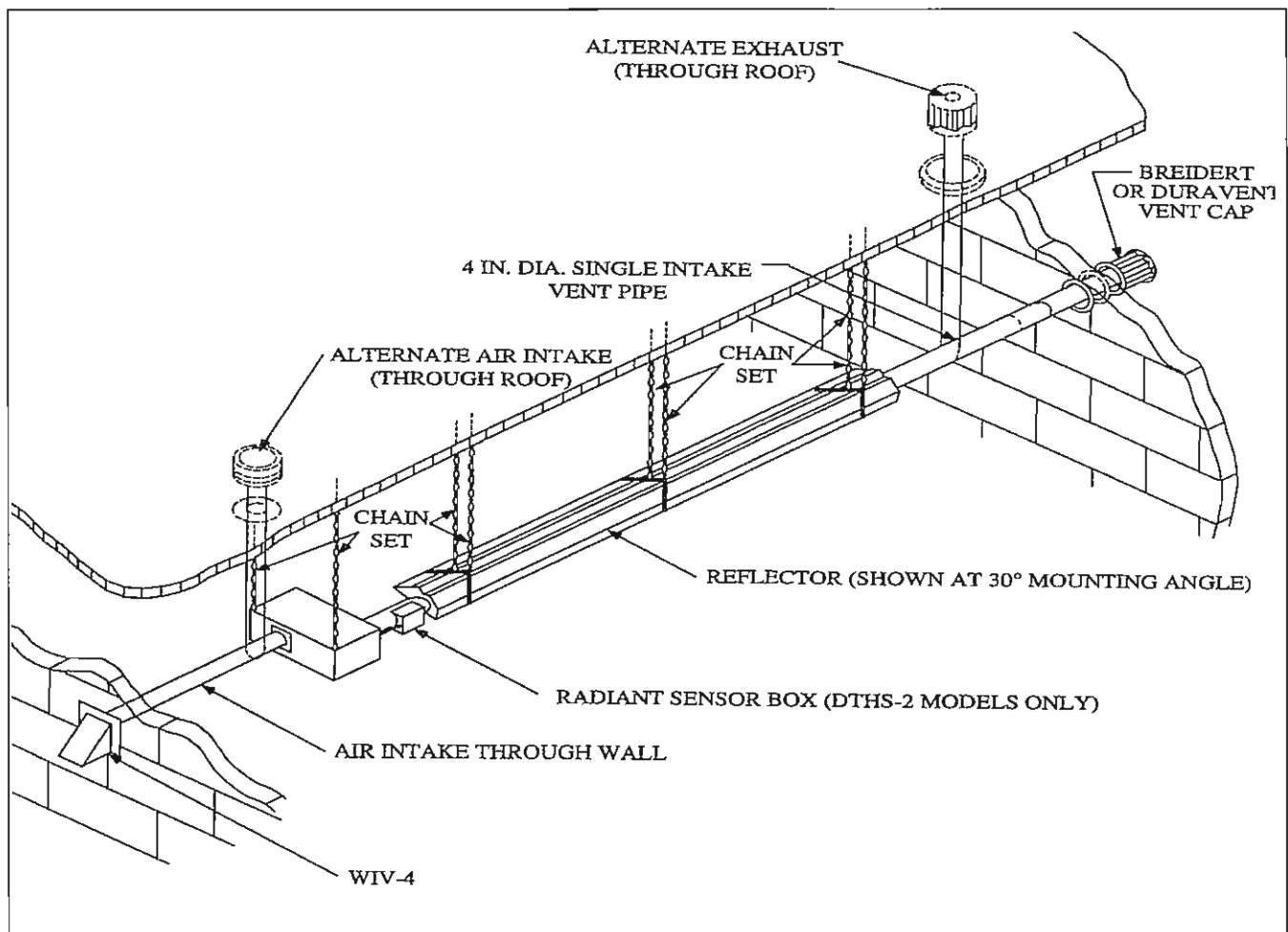


Figure 1-2

TYPICAL INSTALLTION DRAWING

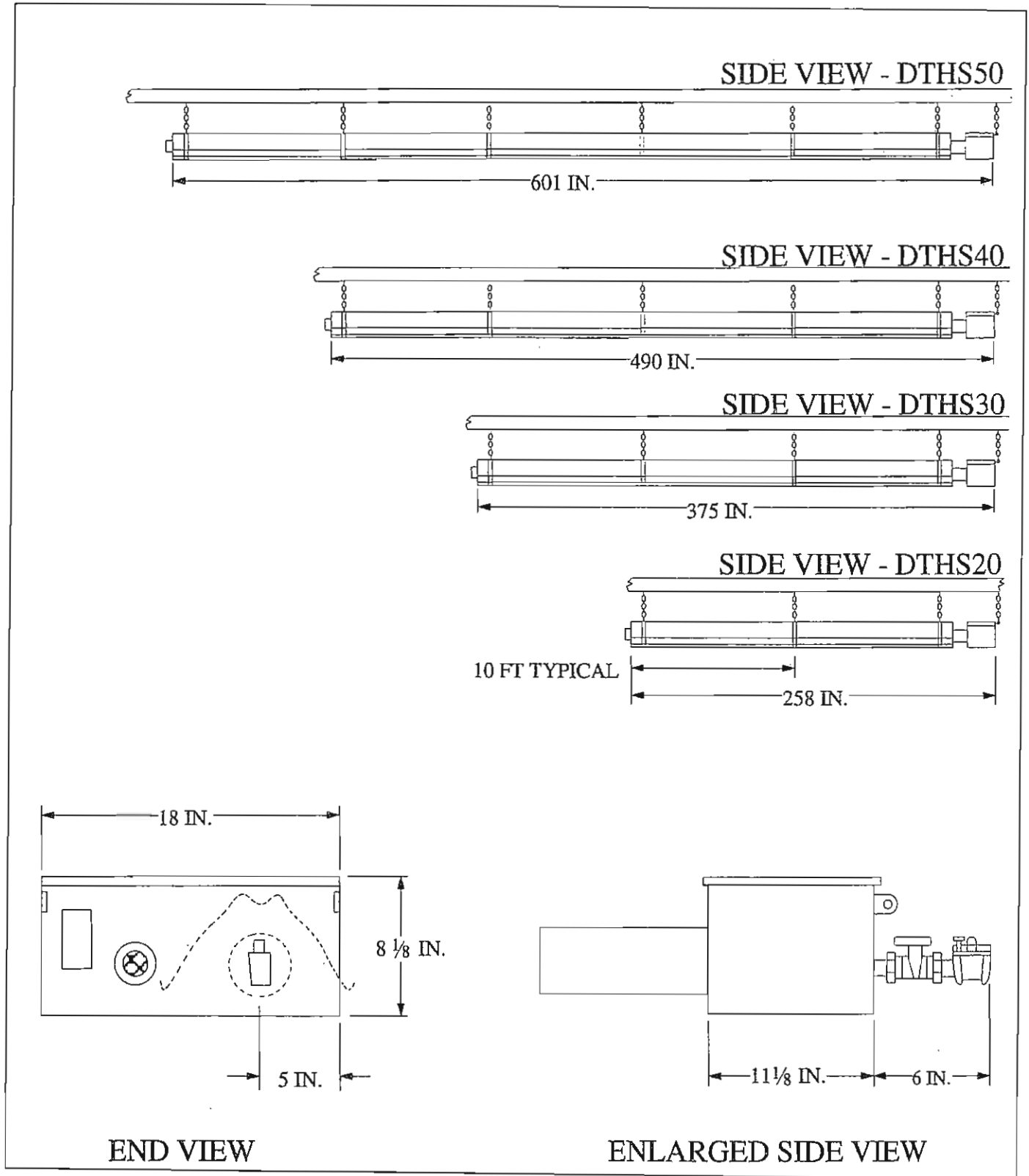


Figure 1-3

DIMENSIONS FOR MODELS: DTHS 20, 30, 40 AND 50 INFRA-RED TUBE HEATER

1.3 Heater Mounting

- Each heater comes equipped with the necessary hangers (Figure 1-4) for hanging. The DTHS 20 requires three hangers, the DTHS 30 four hangers, the DTHS 40 five hangers, and the DTHS 50 six hangers. Each heater also comes with one reflector center support (Figure 1-5) for the first 10 ft. section of reflector and one DTHS installation kit.

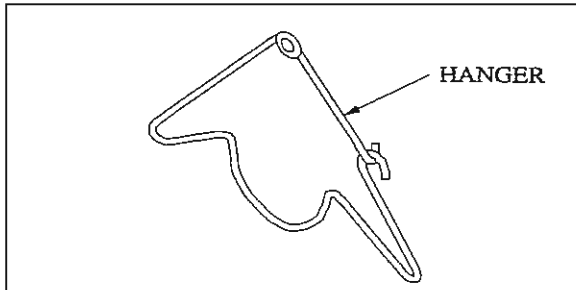


Figure 1-4

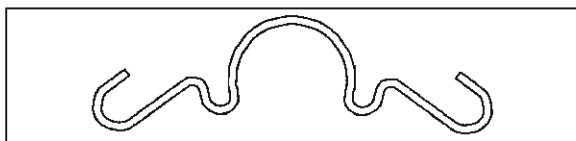


Figure 1-5

- Use of #1 double-loop chain is recommended for heater hanging (Accessory No. THCS) (see Figure 1-6). Close all "S" hooks to ensure maximum load carrying capacity. Accessory No. "BK" allows for preset mounting angle of 15°, 30°, or 45°.

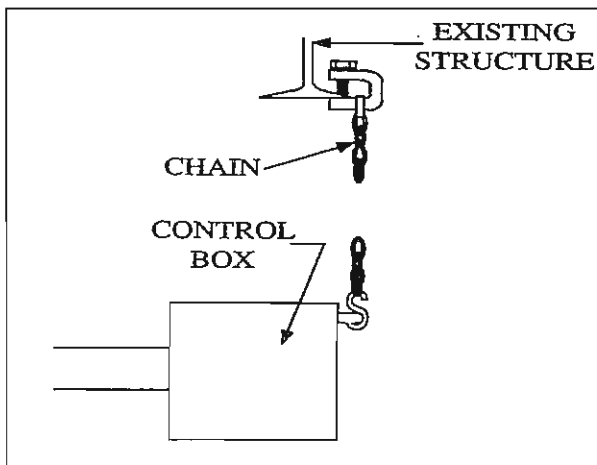


Figure 1-6

NOTE: If windy conditions exist in the space around the heater, it may be necessary to rigidly mount the heater to prevent swaying. It is recommended that threaded rod be used for the two hanging points at the burner control box (see Figure 1-7). The remaining hanging points should use chains to allow for heater expansion.

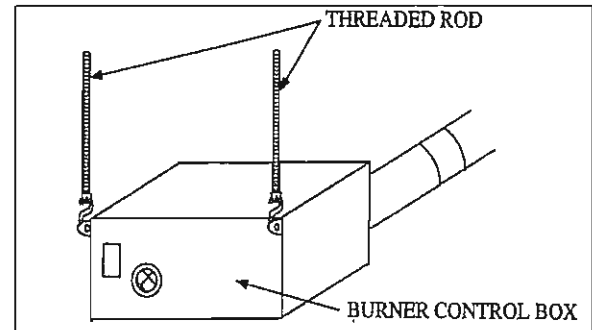


Figure 1-7

IMPORTANT: The first 10 ft. tube on DTHS (40,50)-100P (propane) and DTHS 30-100, **must** be a titanium alloy, aluminized steel tube (Alumi-Ti).

- Mount hangers on approximately 10 ft. centers. Slide tubes through hangers with weld seam downward (see Figure 1-8) and fasten with tube clamps (see Figure 1-9). Center clamps on seams.

NOTE: The tube clamps provided with the heater are pre-assembled at the factory. If a clamp is dismantled, it is important that upon reassembly the spacer is properly inserted (see Figure 1-9). The spacer's concave surface **must** face the radiant tube. Incorrect spacer placement will result in shearing of the bolt when torqued to the recommended specification (50-70 lb.-ft).

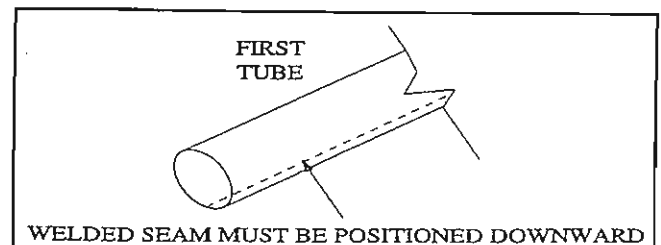


Figure 1-8

IMPORTANT: The DTHS models utilize one or two baffle(s) which must be installed in the last radiant tubes. Install these baffles before assembling tubes for ease of installation. See Figure 1-10. All baffles must be in the vertical position.

4. Mount heaters in conformance with Approval Standards referenced in the Foreword.

5. Install chains perpendicular to the heater.

6. Install heater so that it is independently supported and does not rely on the gas or electrical line for any of its support.

7. Mount heater so that burner sight glass is visible from the floor.

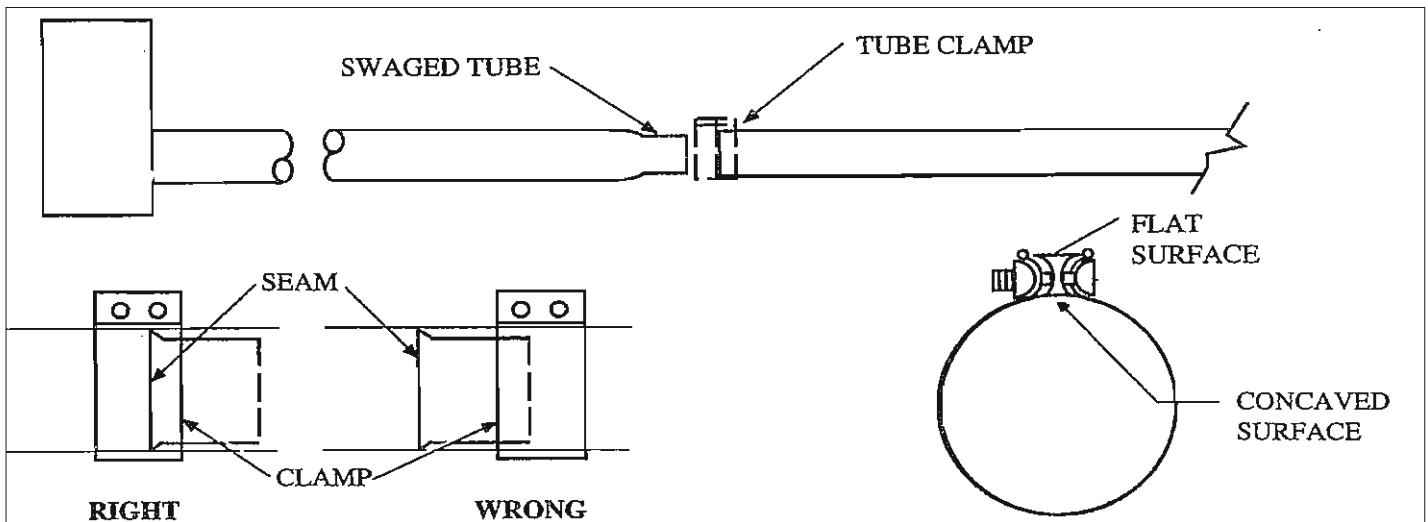


Figure 1-9

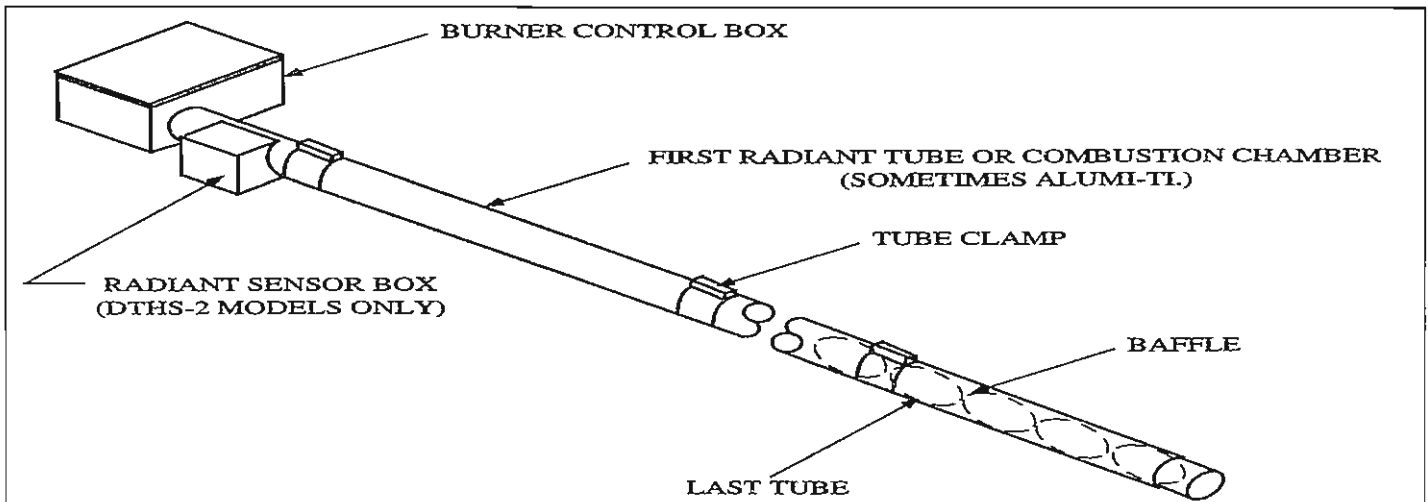


Figure 1-10

1.3 Reflector Assembly

1. Install reflector center supports (RCS) as shown in Figure 1-11.
2. Slide reflector through wire hangers and adjust the reflector positioning spring in the V-groove on top of the reflector as shown in Figure 1-12. Overlap reflectors 4 in. for support (See Figure 1-11).

NOTE: Assemble the reflector after every 10 ft. section of emitter pipe is installed.

3. Secure reflectors together with supplied reflector clips at points indicated by arrows (see Figure 1-13). Make sure to leave an expansion joint.

NOTE: The clips prevent the reflectors from shifting position due to heater operation.

4. Install reflector end caps at exposed ends of the reflector runs with clips (Figure 1-12).

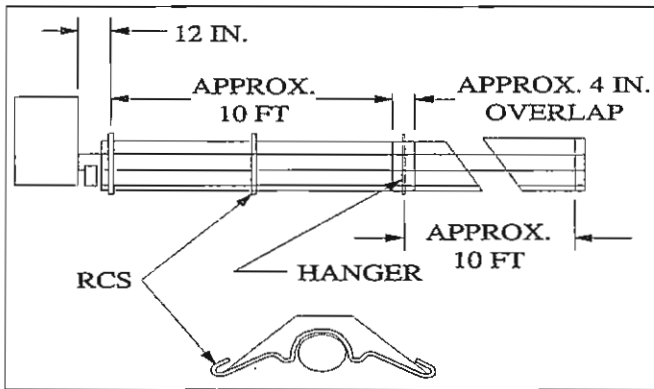


Figure 1-11

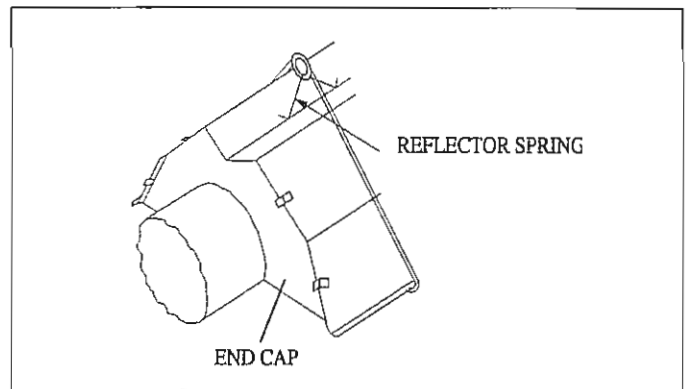


Figure 1-12

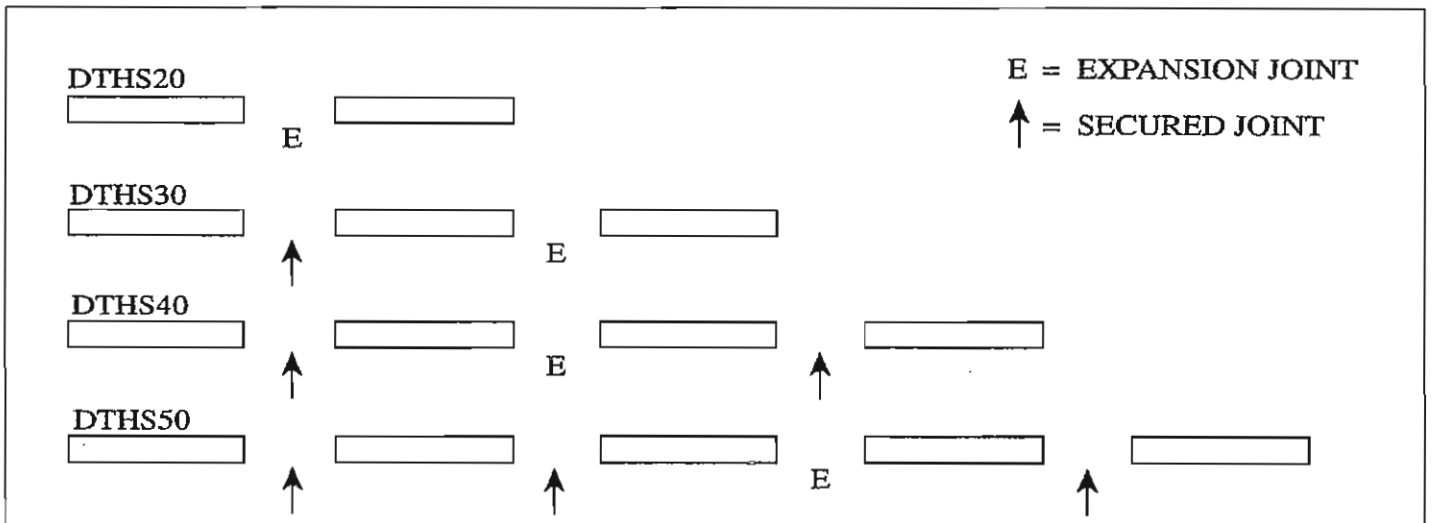


Figure 1-13

Optional Side Shield Installation

1. Install an additional 2 reflector center supports (RCS) 4 ft. on each side of the standard RCS.
2. Install the side shield by hooking the edge holes onto the RCS's (Figure 1-14).

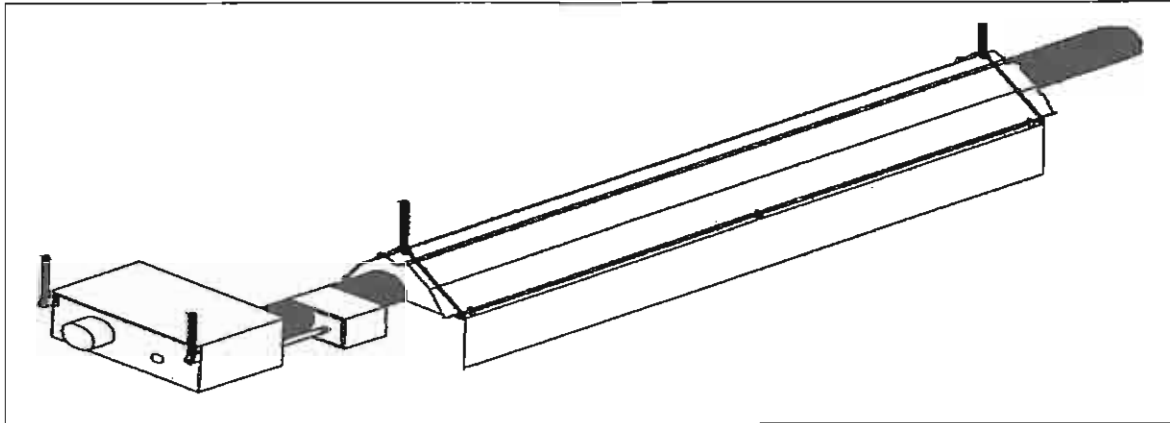


Figure 1-14

Optional “L” or “U” Configuration

A maximum of two 90° elbows (DRP Accessory #E6) or one 180 degree U (DRP Accessory #TF1B) (Figures 1-15 and 1-16) may be installed in the exchanger to alter the standard configuration of the heater.

See the Chart and Figures below for dimensions and distance requirements between the burner control box and an elbow or “U”.

CONFIGURATION	PART NO
90 °	E6
180 °	TF1B

Chart 3

WARNING!

The ceiling top clearance **must** be a minimum of 15 in. for heaters with a gas input rating of 60,000 and 75,000 BTU/H and only 10 ft. of 4 in. diameter emitter pipe to the first elbow. All other clearances are as stated in the Clearance to Combustibles Chart (1) on page 3.

MODEL NO.	MINIMUM DISTANCE FROM THE BURNER TO AN ELBOW OR U FITTING (FT)
DTHS (20-40)-60 (N, P) DTHS (20,30)-50 (N, P) DTHS (20,30)-60 (N, P) DTHS (20,30,40)-75 (N, P)	10
DTHS (30,40,50)-100 (N, P)	15

Chart 4

NOTE: Do not remove any baffle length when using DTHS series heaters and E6 or TF1B fittings.

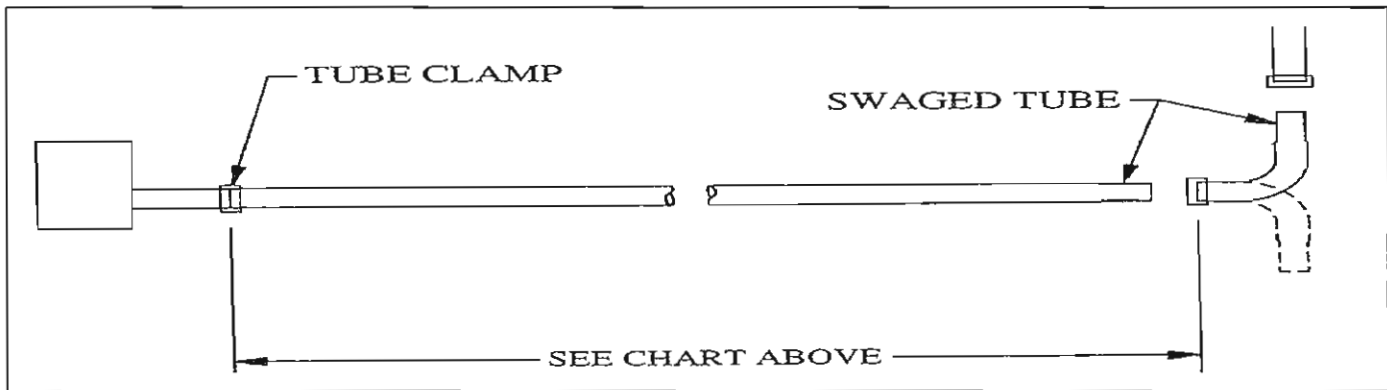


Figure 1-15

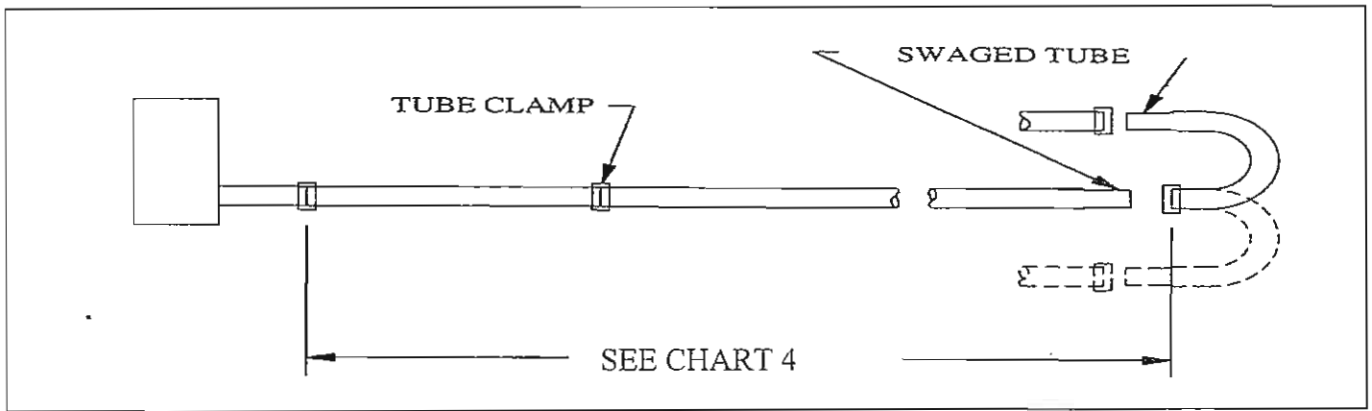


Figure 1-16

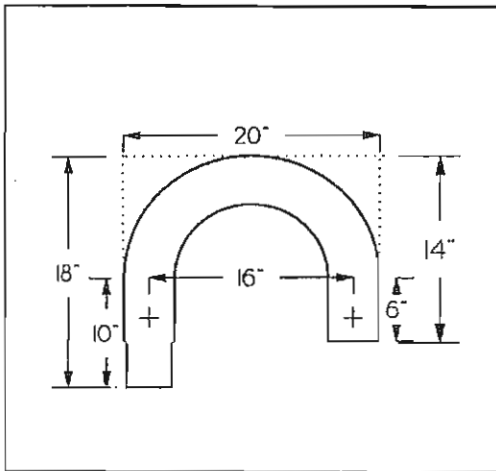


Figure 1-17

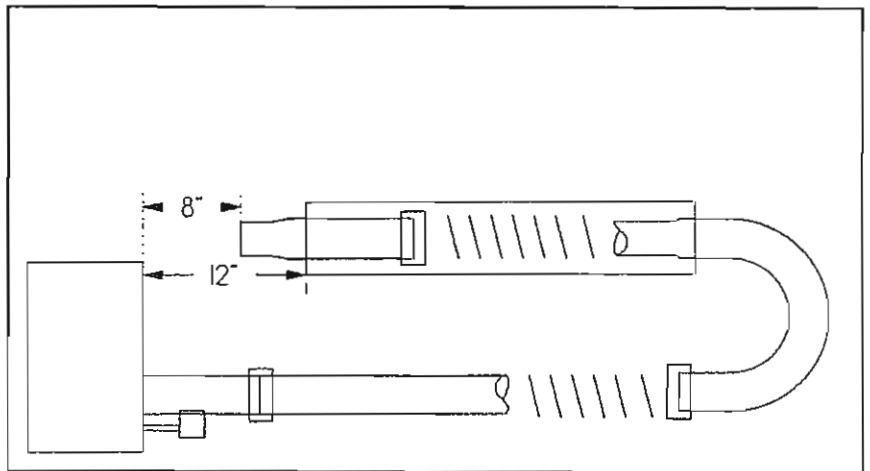


Figure 1-18

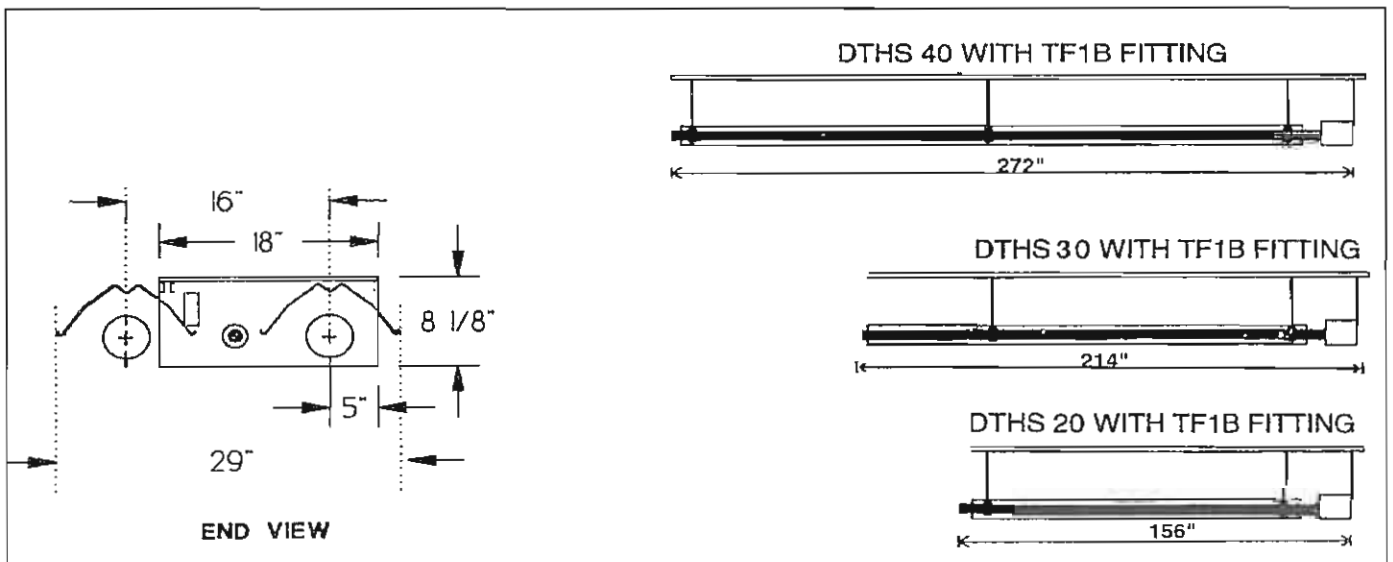


Figure 1-19

1.6 Flue Venting

The following guidelines must be observed to ensure proper system performance and safety:

- Check all applicable codes prior to installing flue stacks. Local codes may vary. In the absence of local codes see the National Fuel Code ANSI/Z223.1 (NFPA 54) latest edition.
- The heater is designed to operate with a 4 in. diameter exhaust stack.
- Stacks may consist of a 10 ft. section of radiant tubing, if desired. Single wall galvanized flue pipe must be used. The portion of the flue pipe which goes through combustible material in the building wall or roof must pass through a type "B" vent sleeve to maintain clearances (see Figures 1-20 and 1-21). See the Flue Venting Chart for maximum stack lengths.

FLUE VENTING CHART		
MODEL	GAS INPUT [MBTU/H]	MAXIMUM STACK LENGTH INCLUDING OPTIONAL EXTENSION [ft]
DTHS 20-2	40	25
DTHS (20,30)-2	50	35
	60	35
	75 / 100	35
DTHS 40-2	50	20
	60	20
	75	20
DTHS (40,50)-2	100	20
	MAXIMUM OF (2) 90 DEGREE ELBOWS	

Chart 5

- Stacks may exit the building either horizontally or vertically. Vertical venting exiting the roof should be 2 ft. above the roof. For horizontal venting, the flue should be 2 in. from the sidewall. Care should be exercised to ensure that the vent opening is beyond any combustible overhang (see Figure 1-20).

- A common flue of 6 in. diameter must be used for double-venting of units. One thermostat must control both units. **When common venting is used, flues should be connected so that the by-products of one heater cannot flow into the adjoining flue of the other heater.** A dual exhaust assembly is available from Detroit Radiant Products, Part No. Y or RT (see Figures 1-23 through 1-24).
- Do not use more than two 90° elbows in the exhaust vent (all models).
- A Breidert or Duravent vent cap **must** be used for sidewall venting.

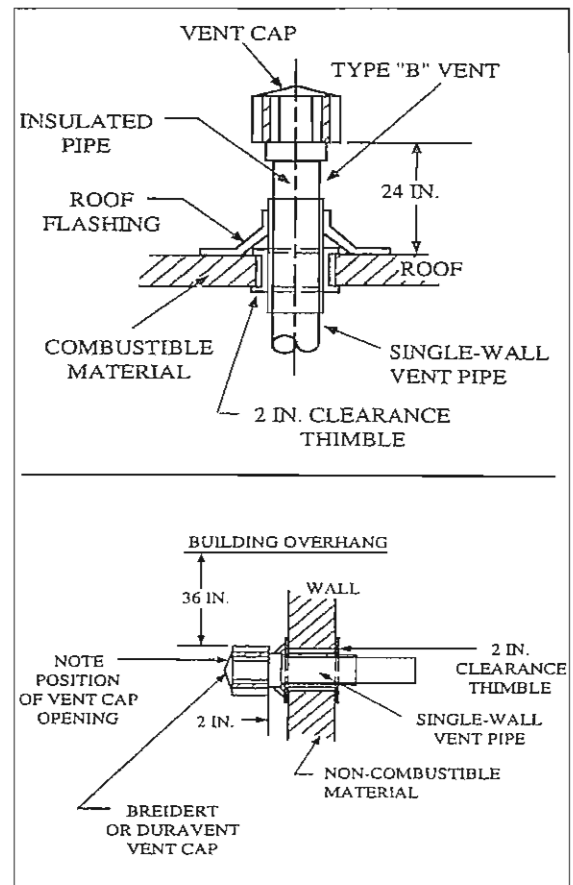


Figure 1-20

- All vent pipes must be sealed with high temperature sealant and (3) #8 sheet metal screws.
- Horizontal flues should be pitched down toward outlet, ¼ in. per foot of the vent length, to prevent rain from entering the heater (see Figure 1-21). **Do not pitch heater.**

- Single wall vent that is exposed to cold air must be insulated to prevent condensation.

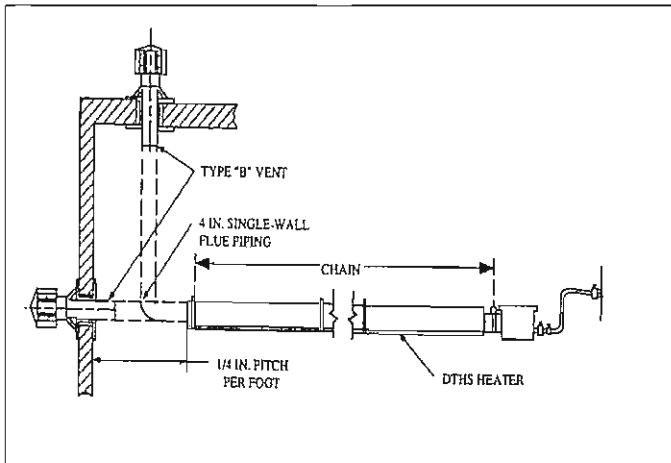


Figure 1-21

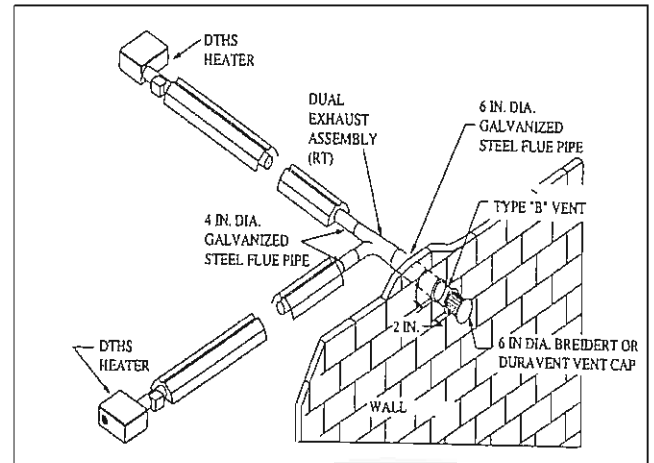


Figure 1-23

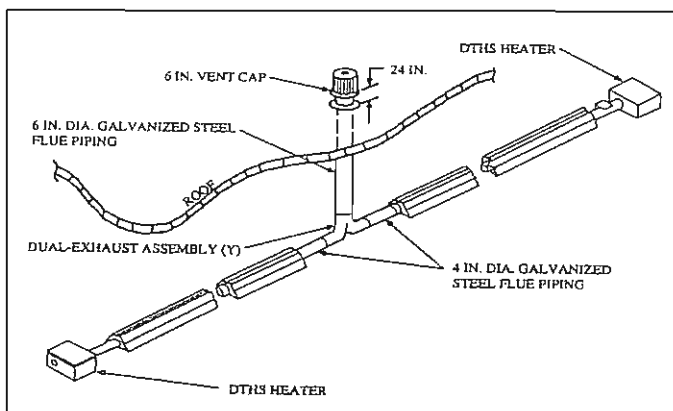


Figure 1-22

DUAL-EXHAUST ASSEMBLY
(TROUGH ROOF)

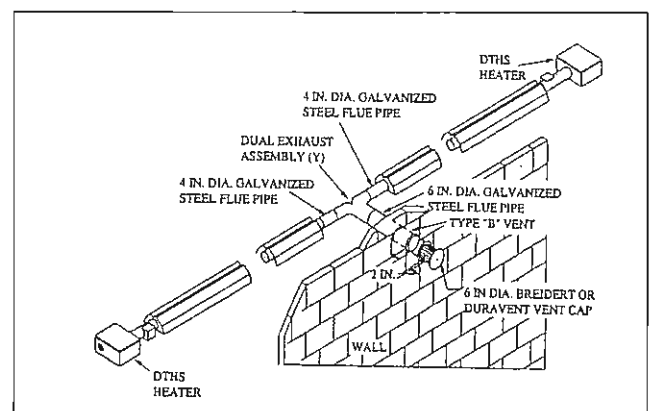


Figure 1-24

DUAL-EXHAUST ASSEMBLY
(THROUGH WALL)

1.7 Installation for Unvented Operation

(Optional)

The model DTHS units are approved for unvented operation when equipped with a factory supplied end cap/diffuser, Part No. WVE-GALV (see Figure 1 in the Foreword). This allows the products of combustion to be discharged from the units into the space being heated.

Ventilation of the space is required to dilute those products of combustion sufficiently. For proper ventilation, it is recommended that a positive air displacement of at least 3.8 CFM per 1000 BTU/H of natural gas input be provided.

If propane is used, a positive air displacement of at least 4.5 CFM per 1000 BTU/H of gas input is recommended. This air displacement may be accomplished by either gravity or mechanical means. Provisions must be made for a sufficiently large fresh air intake area and exhaust air outlet area, to accomplish the displacement. Local codes may require that the mechanical exhaust system be interlocked with the electrical supply line to the heaters, enabling both to function simultaneously.

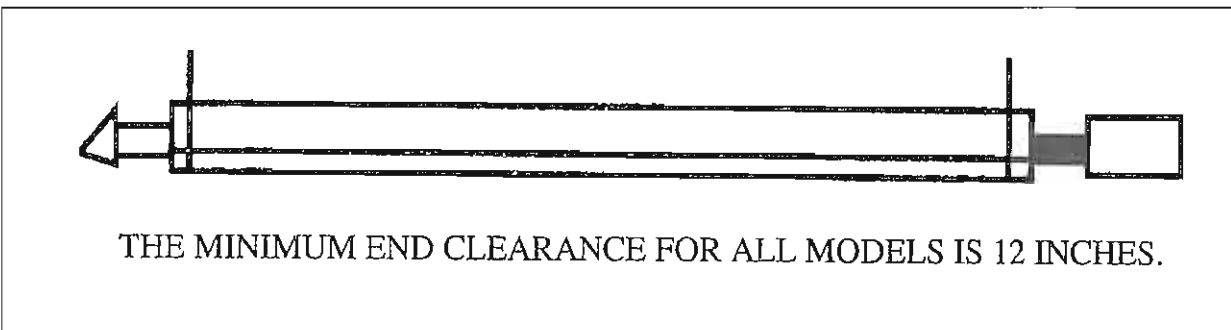


Figure 2-25

1.8 Combustion Air Requirements

Combustion air intake has a factory preset air orifice. If indoor combustion air is to be supplied for a tightly closed room, one square inch of free air opening should be provided for each 5000 BTU/H of heater input.

Noncontaminated air for combustion **must** be ducted to the heater if chlorinated or fluorinated contaminants are present in the area where the heater is installed, or if the building has a negative pressure. Typical sources of these contaminants are refrigerants, solvents, adhesives, degreasers, paint removers, paints, lubricants, pesticides, etc.

Outside combustion air may be provided by a 4 in. air duct directly attached over the air orifice collar (see Figure 1-26). A WIV-4 wall inlet vent must be used with horizontal outside air intake ducts.

NOTE: Use insulated duct or PVC pipe to prevent condensation on outer surface. Keep intake opening at least 3 ft. from any exhaust vent openings. For limitations of length and size, see the Air Intake Duct Chart.

AIR INTAKE DUCT CHART		
MODEL	AIR INTAKE DUCT SIZE [in.]	MAXIMUM INTAKE LENGTH [ft]
ALL	4	20
MODELS	5	30

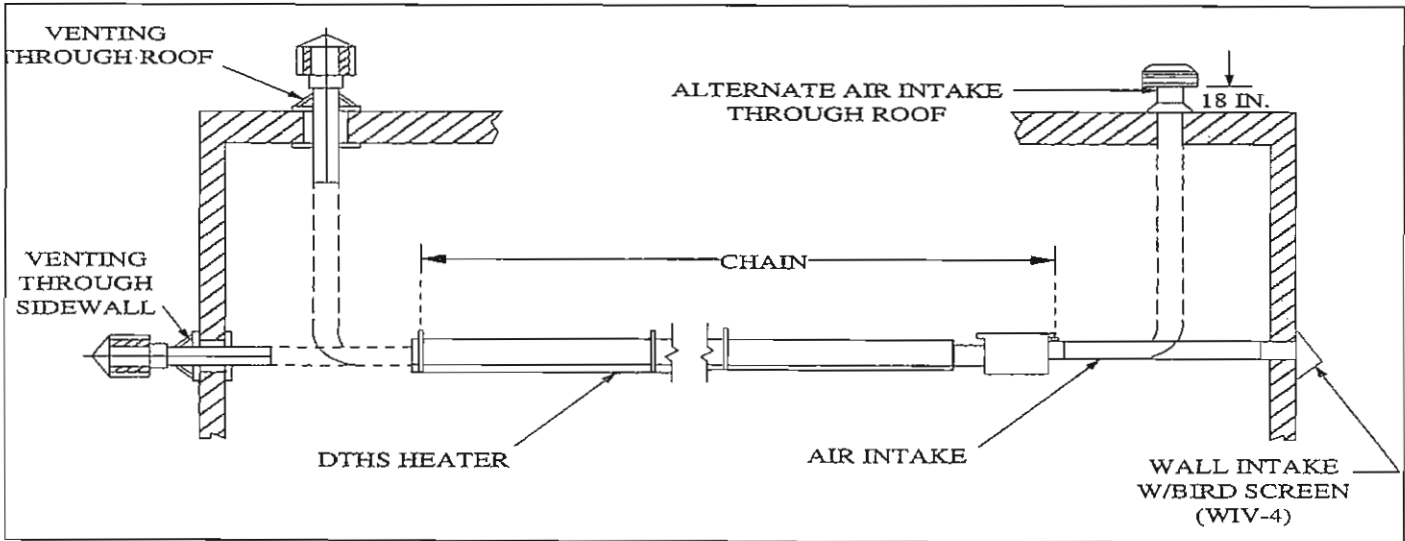


Figure 1-26

1.9 Gas Supply

CAUTION!

CORRECT INLET PRESSURES ARE VITAL FOR EFFICIENT OPERATION OF HEATERS. REFER TO AGA RATING LABEL AND CONSULT GAS COMPANY IF NECESSARY.

If all or a portion of the gas supply line consists of used pipe, it must be cleaned and then inspected to determine its equivalency to new pipe. Test all main supply lines according to local codes. **(Isolate heater gas valve and supplied gas cock during test.)**

Excessive torque on manifold may misalign orifice. Always use two wrenches when tightening mating pipe connections.

WARNING!

Never use a match or any other flame to test for gas leaks. Use soap and water to check for leaks.

If any portion of the gas supply line is located in an area that could cause an abnormal amount of condensate to occur in the pipe, a sediment trap should be installed (see Figure 1-27).

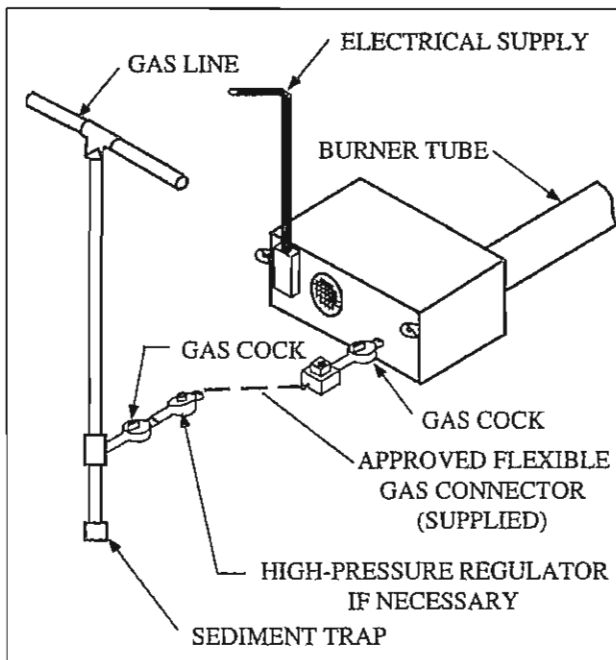


Figure 1-27

NOTE: For high pressure gas above 14 in. W.C.P. (Water Column Pressure), a high pressure regulator and gas cock must be used. If compressed air is used to detect leaks in the gas supply line, disconnect and cap at shutoff cock to avoid damage to regulator and gas valve.

A typical gas supply line connection is illustrated in Figure 1-28. The method shown will decrease the possibility of any loose scale or dirt in the supply line entering the heater's control system and causing a malfunction. Provide a 1/8 in. NPT, plugged tapping accessible for test gauge connection immediately upstream of gas connection to heater. The gas supply line must be of sufficient size to provide the required capacity and inlet pressure to the heater (consult gas company) as follows:

NOTE: Manifold pressure should be checked at the tap on the gas valve. Readings will be above atmospheric pressure.

- **Natural Gas**

To obtain the required manifold pressure of 3.8 in. W.C.P., a minimum inlet pressure of 4.8 in. W.C.P. is necessary for purposes of input adjustment. A maximum inlet pressure of 14.0 in. W.C.P. is allowed for all units.

- **Propane Gas**

To obtain the required manifold pressure of 10.0 in. W.C.P., a minimum of 11.0 in. W.C.P. for 14.0 in. W.C.P. must be provided ahead of the control system on each heater. **Do not** exceed a manifold operating pressure of 10.0 in. W.C.P.

Use only a pipe-joint compound that is resistant to liquefied petroleum gases.

- **Pressure Equivalents**

1 in. W.C.P. equals 0.58oz/sq. in.
4.8 in. W.C.P. equals 2.78oz/sq. in.
6 in. W.C.P. equals 3.48oz/sq. in.
11 in. W.C.P. equals 6.38oz/sq. in.
14 in. W.C.P. equals 8.12oz/sq. in.

- Allowance for Expansion

Allowances must be made for the system to expand. The supplied stainless-steel, flexible gas connector is recommended. If, however, local codes require rigid piping to the heater, a swing joint can be used.

- Gas Line Connection

- a. The gas outlet shall be in the same room as the appliance and the connector must not be concealed within or run through any wall, floor or partition.
- b. The connector shall be of adequate length.
- c. The final assembly shall be tested for leaks. CAUTION: Matches, candles, open flame or other sources of ignition shall not be used for this purpose. Leak test solutions may cause corrosion-water rinse after test.

- d. Contact with foreign objects or substances shall be avoided.

- e. The connector shall not be kinked, twisted or torqued.

- f. Connectors are not designed for movement after installation. Bending, flexing or vibration must be avoided.

- g. Connectors are for use only on piping systems having fuel gas pressures not in excess of ½ pound per square inch.

CAUTION!

CONNECTOR NUTS MUST NOT BE CONNECTED DIRECTLY TO PIPE THREADS. THIS CONNECTOR MUST BE INSTALLED WITH ADAPTORS PROVIDED. DO NOT RE-USE.

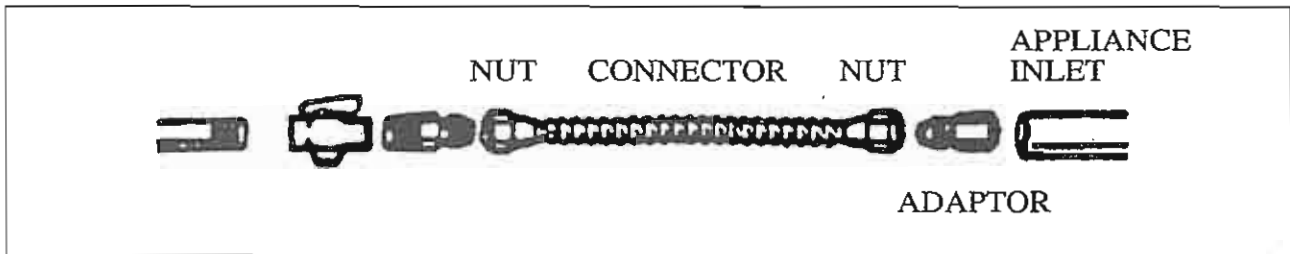


Figure 1-28

1.10 Electrical Requirements

1. Heaters operate on 120V, 60 Hz, single phase. The maximum amperage requirement (starting current) is 4.8 amps per heater. The running current is 1.1 amps.
2. Heater must be grounded in accordance with the National Electrical Code ANSI/NFPA 70 (latest edition).
3. It is recommended that the thermostat be installed on the hot side of a fused supply line and have a sufficient ampere rating for the heater(s) it controls.
4. Wiring must not be run above or below the heater, nor exposed to the radiant output.
5. Observe proper electrical polarity.

1.11 Lighting Instructions

1. Purge main gas supply line at start-up.
2. Rotate heater's manual gas valve knob to the "ON" position.
3. Close electrical circuit.
4. If heater fails to light, turn off gas and wait five minutes before repeating the above procedure.

1.12 Shutdown Instructions

1. Open electrical circuit.
2. Rotate heater's manual gas valve knob to the "OFF" position.

2 THEORY OF OPERATION

2.1 DTHS-2 Models: 40,000 BTU/H through 100,000 BTU/H

- **Starting Circuit (Figures 2-1 and 2-2)**

When voltage is applied to L1 and L2, a circuit is completed from L1 via the blower motor to L2. The blower fan is mounted in the control box and rated to supply sufficient air for combustion.

Air pressure generated by the blower will cause the normally open burner pressure switch No. 1 to close. The burner pressure switch is factory preset to ensure that a minimum of $\frac{2}{3}$ the normal rate of combustion air is passed into the combustion chamber. Any air flow restriction resulting in less than $\frac{2}{3}$ normal rate will cause the pressure switch to open and shut down the entire system.

Current will pass through the burner pressure switch to the normally closed exhaust pressure switch No. 2. The exhaust pressure switch is factory preset to ensure that a minimum of $\frac{1}{2}$ the normal rate of exhaust air is expelled from the heater. Any air flow restriction resulting in less than $\frac{1}{2}$ normal rate will cause the pressure switch to open and shut down the entire system.

NOTE: Pressure switches are nonadjustable.

Another circuit is completed from L1 to the radiant sensor and glo-bar back to L2. Simultaneously, the safety and booster coils of the first of two redundant valves are energized through the contact of the radiant sensor. This causes the first valve to open and the glo-bar to heat up. No gas flows however, until the second redundant valve is energized and opened.

- **Running Circuit**

When the glo-bar reaches ignition temperature, the radiant sensor is heated and opens (maximum 60 seconds). The radiant sensor is a heat sensitive bimetal switch with a single throw contact that is normally in the closed position and calibrated to open when the glo-bar has attained ignition temperature.

The second redundant valve, now in series with the glo-bar, is energized and opened. Gas flows through the burner and is ignited by the glo-bar. The second coil remaining in series with the glo-bar causes the glo-bar to cool down. The radiant sensor is held open by radiant heat emitted from the gas flame. The booster coil of the first valve is now placed in series with the secondary coil, and very low current flows through the coil. The safety coil power is sufficient to hold only the first valve open. If a momentary power failure occurs, the first valve will shut down the gas supply to the burner. When power is restored, the safety coil alone does not have the power to pull the valve open, therefore, the radiant sensor cools down, the contacts close and the unit cycles (maximum 60 seconds).

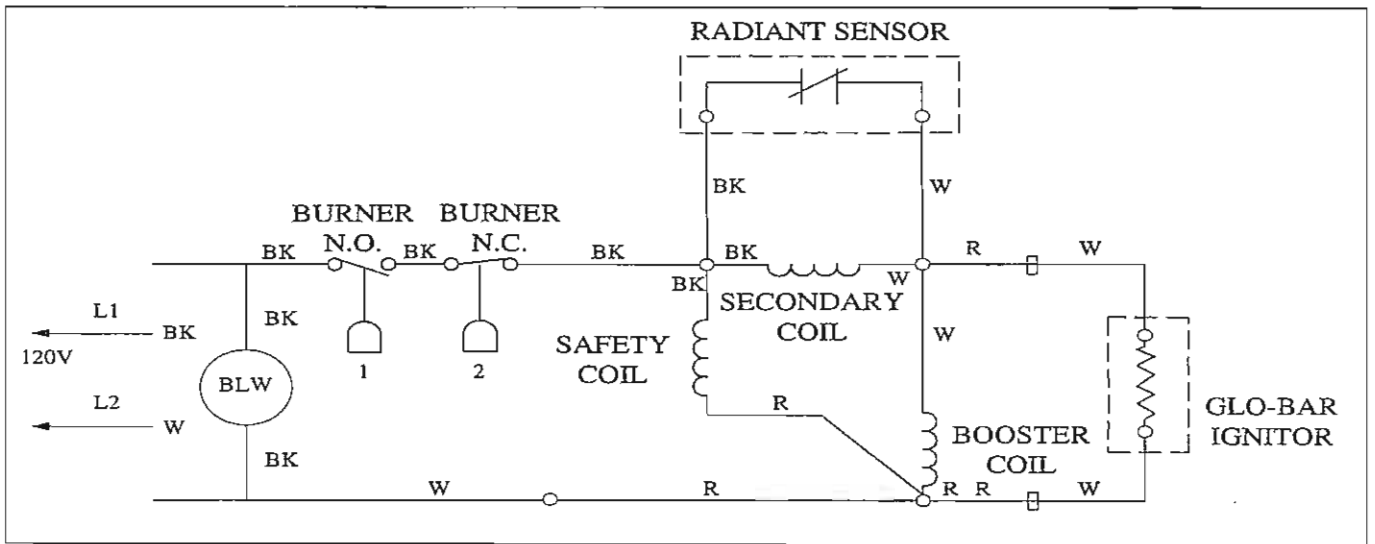


Figure 2-1

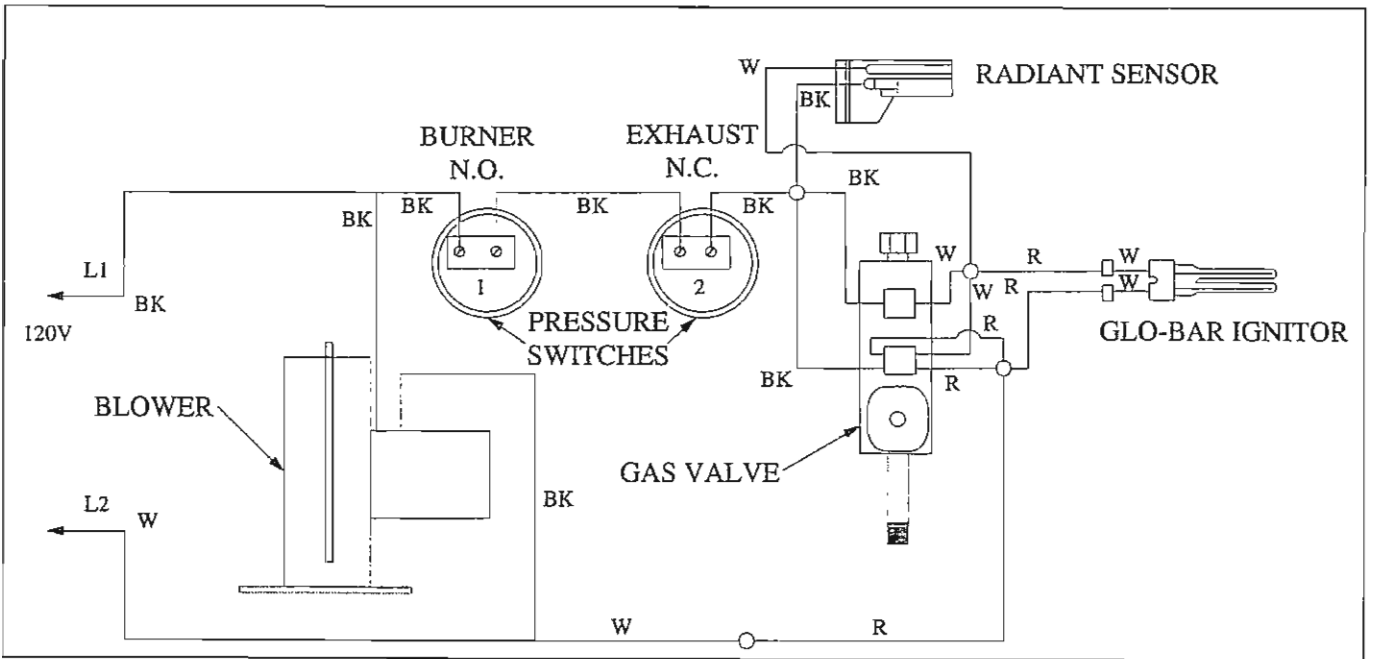


Figure 2-2

4 TROUBLESHOOTING

4.1 Glo-bar Replacement

1. Shut off gas and electricity to unit if installed.
2. Remove cover from control box (see Figure 4-1).

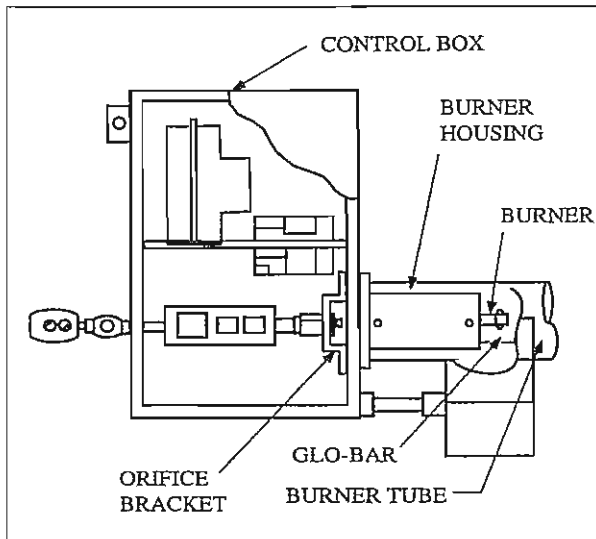


Figure 4-1

3. Unplug wire (A) at the glo-bar. Remove nut (B) and slide control assembly back. Unscrew bolts (C) fastening the orifice bracket to the control box, and pull out burner housing from tube (see Figure 4-2). Pull burner housing off fixed bolts, rotate counterclockwise ¼ turn and remove.

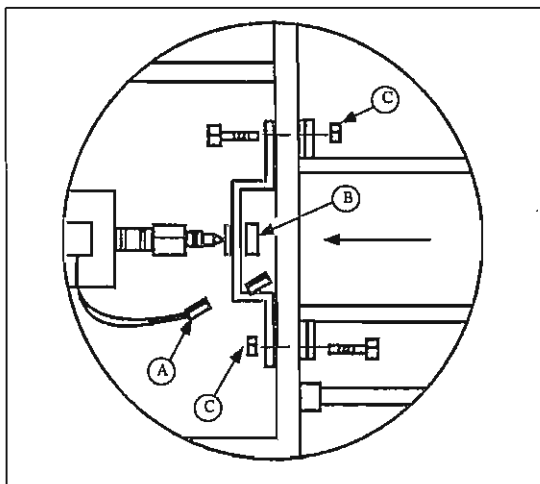


Figure 4-2

4. Remove screws (D) from top of burner housing and pull out burner (see Figure 4-3).

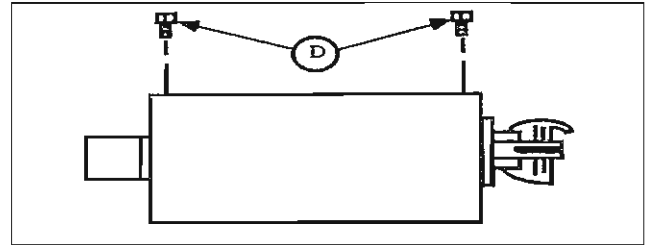


Figure 4-3

5. Remove screw (E) holding broken glo-bar to burner and replace glo-bar (see Figure 4-4).

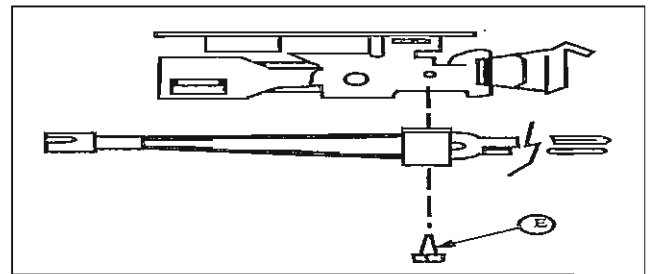


Figure 4-4

6. Install new glo-bar by reversing the above steps.

4.2 Gas Valve Testing (Part No. TP 36)

This section can be used to troubleshoot 25K39A Gas Valves for open coils.

CAUTION! DO NOT REMOVE THE VALVE WIRE NUTS OR DISASSEMBLE VALVE, AS THIS WILL VOID THE VALVE'S WARRANTY.

Using an ohmmeter, follow the steps listed below to determine if a coil is defective.

1. Remove valve and ensure that supply leads, sensor lead and igniter's leads are not touching one another.

Connect ohmmeter to supply leads. If reading ranges from 610-734 ohms, all coils are operational. If reading ranges from 1100-1610 ohms, there is a bad coil and the valve must be replaced.

4.3 TROUBLESHOOTING

DTHS Series General Troubleshooting Chart		
SYMPTOM	POSSIBLE CAUSE	CORRECTIVE ACTION
Thermostat closed but nothing happens.	<ol style="list-style-type: none"> 1. Blown fuse. 2. Defective thermostat. 3. Loose or disconnected wire 4. Defective fan. 	<ol style="list-style-type: none"> 1. Replace. 2. Replace. 3. Repair as required. 4. Lubricate, repair or replace.
Thermostat closed. Fan operates, but glo-bar does not energize.	<ol style="list-style-type: none"> 1. Loose or disconnected wire. 2. Plugged or restricted exhaust vent. 3. Plugged pressure switch lines. 4. Defective pressure switches. 5. Defective glo-bar. 6. Defective radiant sensor. 7. Box lid or gasket not in place. 	<ol style="list-style-type: none"> 1. Adjust to 1.0 in. W.C.P. 2. Repair as required. 3. Clean. 4. Clean or replace. 5. Replace. 6. Replace radiant sensor. 7. Put in place.
Thermostat closed. Fan and glo-bar operate. After 45 seconds glo-bar shuts off. No reignition.	<ol style="list-style-type: none"> 1. Closed gas supply. 2. Dirty or restricted orifice. 3. Defective valve. Disconnected valve wire. 	<ol style="list-style-type: none"> 1. Open all gas connections. 2. Remove and clean with a soft object. 3. Replace or repair.
Loss of heater efficiency.	<ol style="list-style-type: none"> 1. Low gas pressure. 2. Dirty or restricted orifice. 3. Foreign matter inside burner assembly. 4. Unit cycles on and off. 5. Reflector is sooted and has lost its reflective ability. 6. Reflector not in place. 7. Clogged fan blower. 	<ol style="list-style-type: none"> 1. Provide required gas pressure 2. Remove and clean with a soft object. 3. Clean as necessary. 4. Check previous symptom. 5. Clean with aluminum cleaner and soft wiping cloth. 6. Put in place 7. Clean.
Radiant tube leaking burnt gases.	<ol style="list-style-type: none"> 1. Loose tube connections. 2. Holes or cracks in radiant tubes. 	<ol style="list-style-type: none"> 1. Assure that tube is fully inserted into flared end and properly clamped. 2. Replace.
Condensation.	<ol style="list-style-type: none"> 1. Stack length too long. 2. Light gauge flue stack used. 	<ol style="list-style-type: none"> 1. Shorten stack. 2. Minimum of 26 gauge vent pipe is required.
Tube bowing.	<ol style="list-style-type: none"> 1. Insufficient combustion air. 2. Overfired. 	<ol style="list-style-type: none"> 1. Provide 2 sq. in. of free air per 5000 BTU/H of input. 2. Check gas pressure and orifice size.
Tubing corroding.	<ol style="list-style-type: none"> 1. Contaminated combustion air. 	<ol style="list-style-type: none"> 1. Provide fresh air inlet duct.
Visual inspection of burner operation not possible.	<ol style="list-style-type: none"> 1. Dirty or sooted sight glass. 2. Unit mounted upside down. 	<ol style="list-style-type: none"> 1. Remove, clean or replace. 2. Mount correctly.
Stack sooting.	<ol style="list-style-type: none"> 1. Insufficient combustion air. 2. Improper gas. 	<ol style="list-style-type: none"> 1. Provide 1 sq. in. of free air for every 5000 BTU/H of input. 2. Correct with proper gas input.
Thermostat closed. Fan and glo-bar operate. After 1 minute glo-bar stays on. No ignition.	<ol style="list-style-type: none"> 1. Dirty or sooted radiant sensor window or mica. 2. Misaligned radiant sensor window 3. Defective radiant sensor. 	<ol style="list-style-type: none"> 1. Clean as necessary. 2. Adjust radiant sensor to radiant tube using prepunched mounting holes. 3. Replace radiant sensor.
Thermostat closed. Fan and glo-bar operate. Ignition occurs Burner cycles off after a minimum of 1 minute.	<ol style="list-style-type: none"> 1. Dirty or sooted radiant sensor window or mica. 2. Misaligned radiant sensor. 3. Low gas pressure. 4. Dirty or restricted orifice. 5. Defective radiant sensor. 6. Baffle improperly positioned. 	<ol style="list-style-type: none"> 1. Clean as necessary. 2. Adjust radiant sensor to radiant tube using prepunched mounting holes. 3. Provide required gas pressure. 4. Remove and clean with a soft object. 5. Replace 6. Reposition baffle (see page 6).

MAINTENANCE

Model DTHS gas-fired, infrared heaters require a minimum of routine maintenance to keep them operating at peak performance.

WARNING!

Use protective glasses when cleaning the heater.

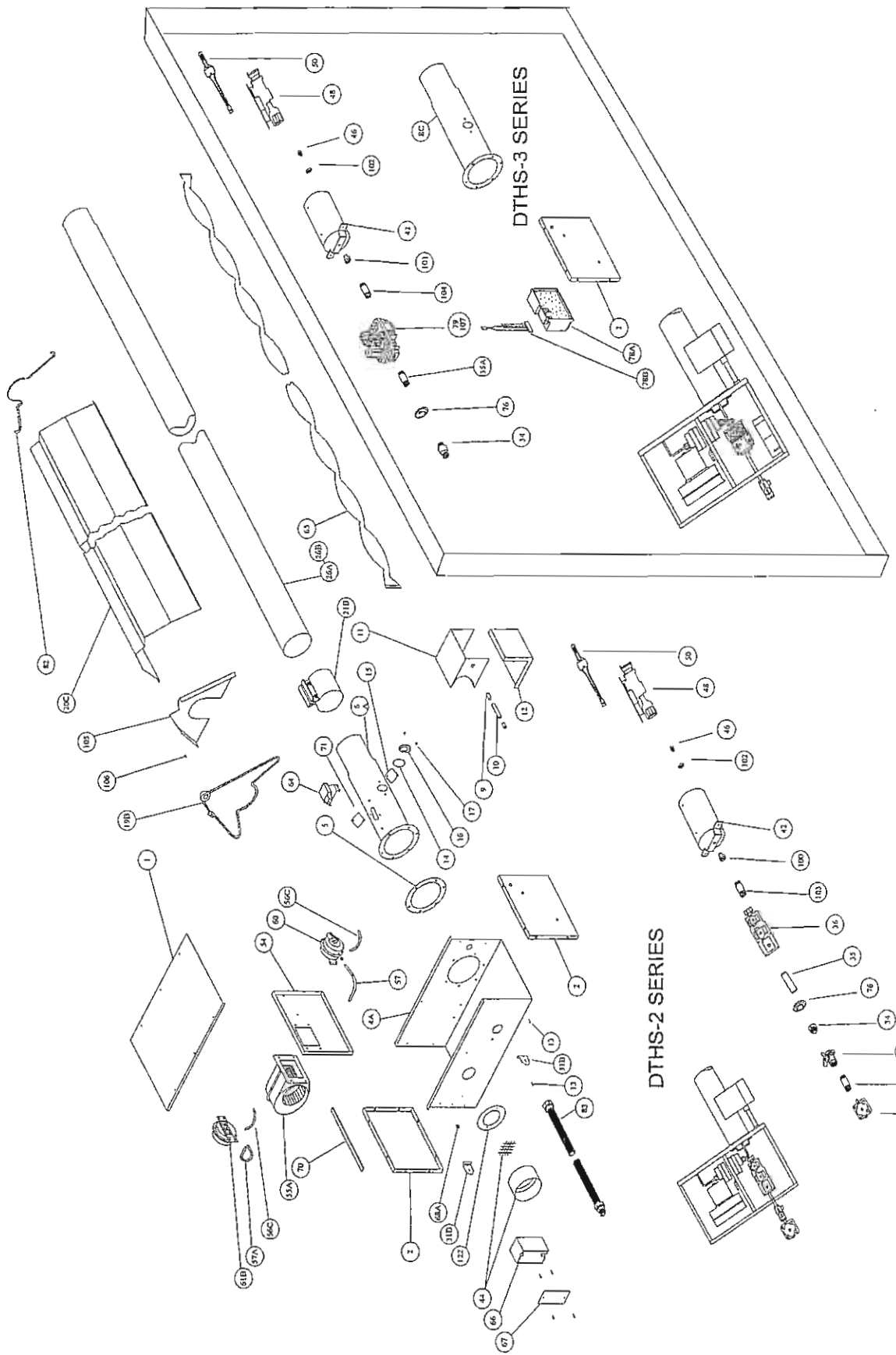
1. Ensure that the squirrel cage in the blower is kept clean. If dirt becomes a problem, installation of outside air intake ducts for combustion is recommended. Oiling the blower motor will extend bearing life beyond the 30,000 hour minimum.
2. Keep the aluminum reflectors clean.

5 PARTS LIST

5.1 Basic Parts List

KEY	TP#	ITEM	KEY	TP#	ITEM
	TP-1	CONTROL BOX COVER		TP-56B	1/4" PRESSURE TUBE (LOCATED IN FAN OPENING) FOR SINGLE SWITCH MODELS
	TP-2	CONTROL BOX END		TP-56C	1/4" ATMOSPHERIC TUBE (VINYL)
	TP-4A	CONTROL BOX FOR DTHS	-2,-3	TP-57A	1/4" PRESSURE TUBE
	TP-5	FLANGE GASKET		TP-57B	1/4" PRESSURE TUBE (LOCATED IN BRNR CHAMBER) FOR SINGL SWIT MODEL
*	TP-6A	16" BURNER TUBE W/ FLANGE (NEW STYLE)		TP-58	MALE COMPRESSION FITTING
	TP-8A	16" BURNER TUBE W/ FLANGE - SUB TP6A		TP-60	EXHAUST PRESSURE SWITCH
*,-3	TP-8C	16" BRNR TUBE W/ FLANGE NO SLOT (125/150)	-2		DWYER # 1911-0 (USED ON SOME -2)
	TP-9	CONDUIT COUPLING		TP-60A	EXHT PRESS. SWITCH - SUB TP-60C
	TP-10	CONDUIT 4" X 1/2"		TP-60B	EXHT PRESS. SWITCH - SUB TP-60D
	TP-11	RADIANT SENSOR BOX	-2	TP-60C	EXHAUST PRESSURE SWITCH
	TP-12	RADIANT SENSOR LID	-2	TP-60D	EXHAUST PRESSURE SWITCH
	TP-14	SIGHT GLASS GASKET	-3	TP-61	BRNR PRESS. SWITCH - DWYER #1911-00
	TP-15	SIGHT GLASS		TP-61A	BRNR PRESS. SWITCH - SUB TP-61B
	TP-16	SIGHT GLASS WASHER	-2,-3	TP-61B	BURNER PRESSURE SWITCH
	TP-19A	HANGING CLAMP (USED ON OPT. B)	-2,-3	TP-63	1/4" EXHAUST PRESSURE TUBE
	TP-19B	4" TUBE & REFLECTOR HANGER		TP-64	RADIANT SENSOR
	TP-20B	11" DTH REFLECTOR (USED ON DTHS OPT.B)		TP-65A	66" HEAT DIFFUSER (BAFFLE) CONSULT FACTORY
	TP-20C	120" DTHS REFLECTOR		TP-65B	99" HEAT DIFFUSER (BAFFLE) CONSULT FACTORY
	TP-21A	TUBE CLAMP - TORCA (OLD STYLE)		TP-65C	132" HEAT DIFFUSER (BAFFLE) CONSUL. FACTORY
	TP-21B	TUBE CLAMP		TP-66	2" X 4" OUTLET BOX
	TP-22	REFLECTOR CLAMP (USED ON OPT. B)		TP-67	2" X 4" OUTLET BOX COVER
	TP-26	10' RADIANT TUBE STRT - SUB TP-26A		TP-68	CONDUIT NIPPLE
	TP-28A	10 FT. RADIANT TUBE STRAIGHT		TP-68A	STRAIN RELIEF BUSHING
*	TP-26B	10' RAD. TUBE STRT. (AL-TI) (100,125,150)		TP-70	CONTROL BOX COVER GASKET (**PER FOOT)
*,-2,-3	TP-31B	CONTROL BOX BRACKET		TP-71	RADIANT SENSOR MICA
	TP-33	RV47L-3.8 NAT GAS REGULATOR		TP-72A	DOOR SWITCH
	TP-33P	REPLACES RV35AL		TP-75	WASHER W/ SHOULDER
	TP-33A	RV47L-11 PROPANE GAS REGULATOR		TP-76	RUBBER GROMMET
	TP-33B	REPLACES R400		TP-77	DIODE BOARD 500TA-1 - NLA CONS. FAC.
	TP-33C	1/2" X CLOSE NIPPLE	-2	TP-78A	MARK 17X-117 CIRCUIT BOARD
	TP-34	1/2" GAS COCK	-3	TP-78B	MOLEX CONNECTOR W/WIRES (125/150)
	TP-35	RV43L NAT GAS REGULATOR SET 4.5 (125N)	-3	TP-79	VALVE V444A-1028 - SUB 36E36A-238
	TP-36	3/8" X 1/2" BUSHING		TP-82	VALVE-V445A-1199 - SUB TP-107P
	TP-35A	PIPE NIPPLE 3/8" X 2'-1/2"	-3	TP-83	REFLECTOR CENTER SUPPORT
	TP-36	PIPE NIPPLE 1/2" X 4" (125/150)		TP-87	ATMOSPHERIC BARBED FITTING
	TP-36A	3/8" GAS VALVE - WR 25K39A-9		TP-101	1/2" ADAPTOR FITTING
	TP-36B	VALVE 36C68A-241 - NLA- CONSULT FAC.		TP-102	9/16" NUT
	TP-36C	VALVE 36C68A-241 - NLA- CONSULT FAC.		TP-103	3/8" X 1-1/2" PIPE NIPPLE
	TP-37	VALVE 36C68A-241 - NLA- CONSULT FAC.		TP-104	1/2" X 2" PIPE NIPPLE
	TP-37A	3/8" UNION FITTING - SUB TP-100 & TP-102	-2	TP-105	REFLECTOR END CAP
	TP-38	1/2" UNION FITTING (125,150) SUB TP-101	-3	TP-106	REFLECTOR CLIP
	TP-39	UNION NUT - SUB TP-100, TP-101, & TP-102		TP-107	36E36A-231 GAS VALVE (125N)
	TP-40	1" X 1/2" UNION BUSHING - SUB TP-101	-3	TP-107P	SUB 36E36A-246
	TP-42	1/2" X 1/4" BUSHING - SUB TP-100, TP-102		TP-108	36E36A-240 GAS VALVE LP GAS (125,150P)
	TP-44	BURNER CASING W/ ORIFICE BRACKET		TP-109	5" AL-TI TUBE, PAINTED, DBL. SWEDGE, 2 CLAMPS
	TP-45	AIR ORIFICE W/ SCREEN - CONSULT FAC.		TP-111	5" AL-TI TUBE, PAINTED, DBL. SWEDGE, 2 CLAMPS
	TP-46	1/4" X 1/8" BUSHING - SUB TP-100, TP-102		TP-112	5" REFLECTOR
	TP-48	BURNER ORIFICE - CONSULT FACTORY		TP-122	GASKET FOR AIR ORIFICE & AIR COLLAR
	TP-50	MAIN BURNER		TP-CPA-2	CENTER PANEL ASSEMBLY -2 MODELS
	TP-51	GLO-BAR IGNITOR		TP-CPA-3	CENTER PANEL ASSEMBLY -3 MODELS
	TP-54	1/4" EXHAUST PRESSURE TUBE			
	TP-55	BURNER BOX DIVIDER			
	TP-55A	FAN BLOWER	-2		
	TP-56A	1/4" BURNER PRESSURE TUBE	-3		

KEY: "NLA" = PART FOR NEW STYLE SWEDGED TUBES
 PARTS WITHOUT SYMBOLS ARE COMMON TO ALL DTHS HEATERS
 NOTE: IN ORDER TO PLACE ORDERS CORRECTLY, YOU MUST REFER TO THE KEY AREA OF THIS LIST.
 ORDERS MUST BE PLACED USING THE APPROPRIATE 'TP' STOCK NUMBER.
 TP-CPA = CENTER PANEL, EXHT & BRNR PRESS. SWIT., BLOWER AND FITTINGS
 *,-3 = PART FOR -2 MODEL UNITS
 ** = PART FOR -3 MODEL UNITS
 ORDER 6" PER BURNER BOX TO COVER OUTER EDGES.



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