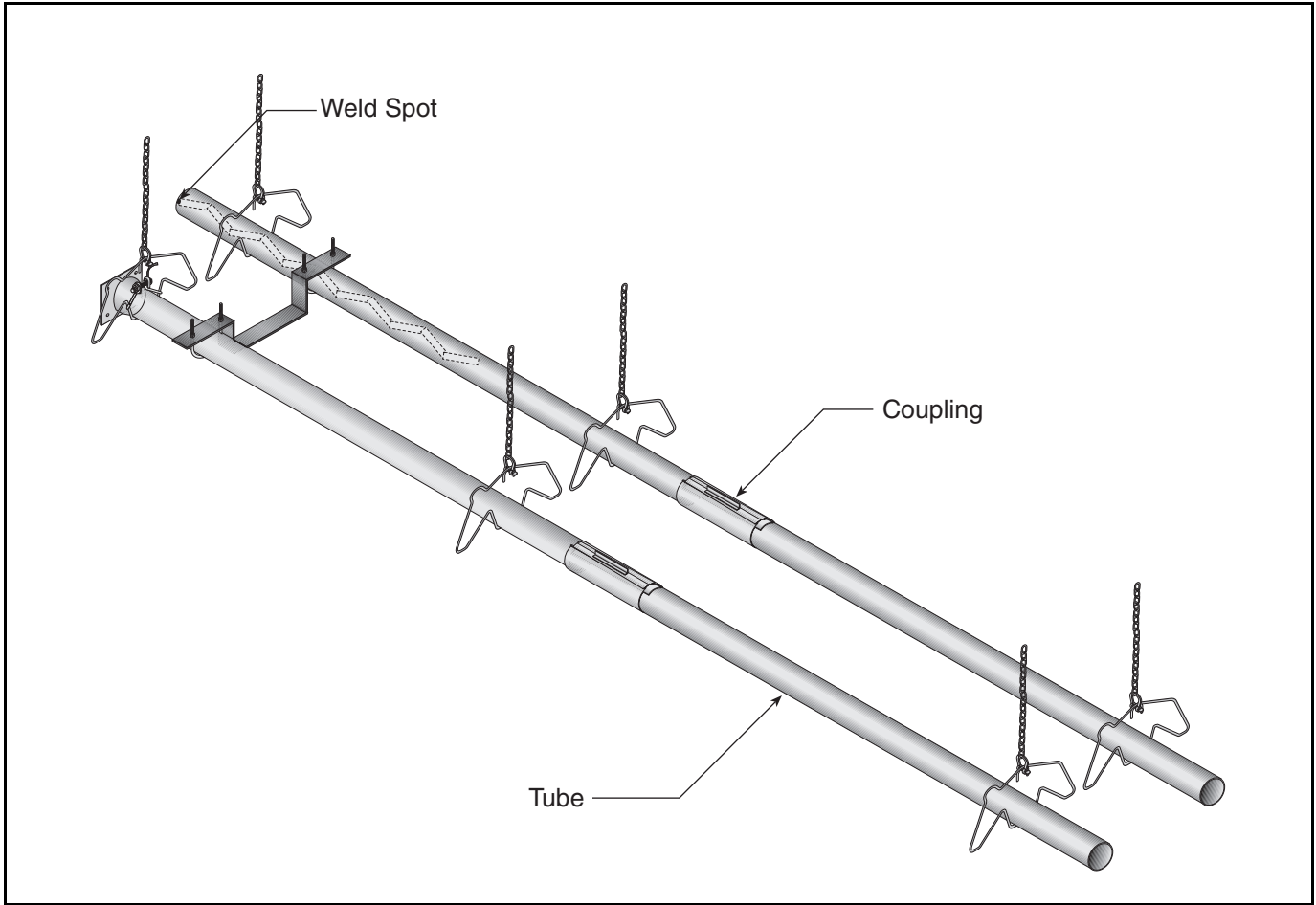
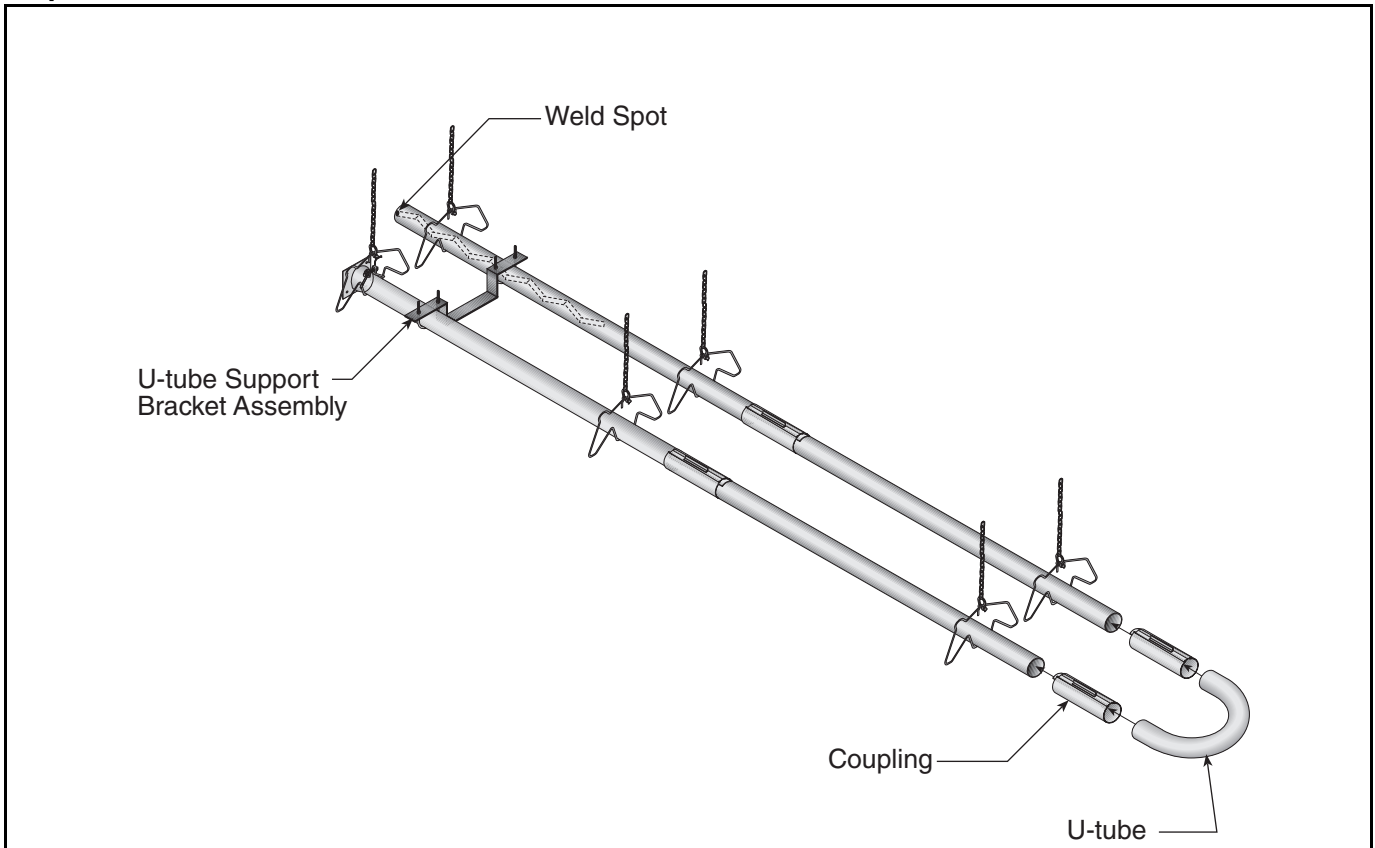


Step 7.6 Tube Installation



Step 7.7 U-Tube Installation



Description	Part Number
Coupling	01329600
Slide Bar/Coupling Lock	01329700
U-Tube	01335901

Step 7.8 Reflector Installation

⚠ WARNING

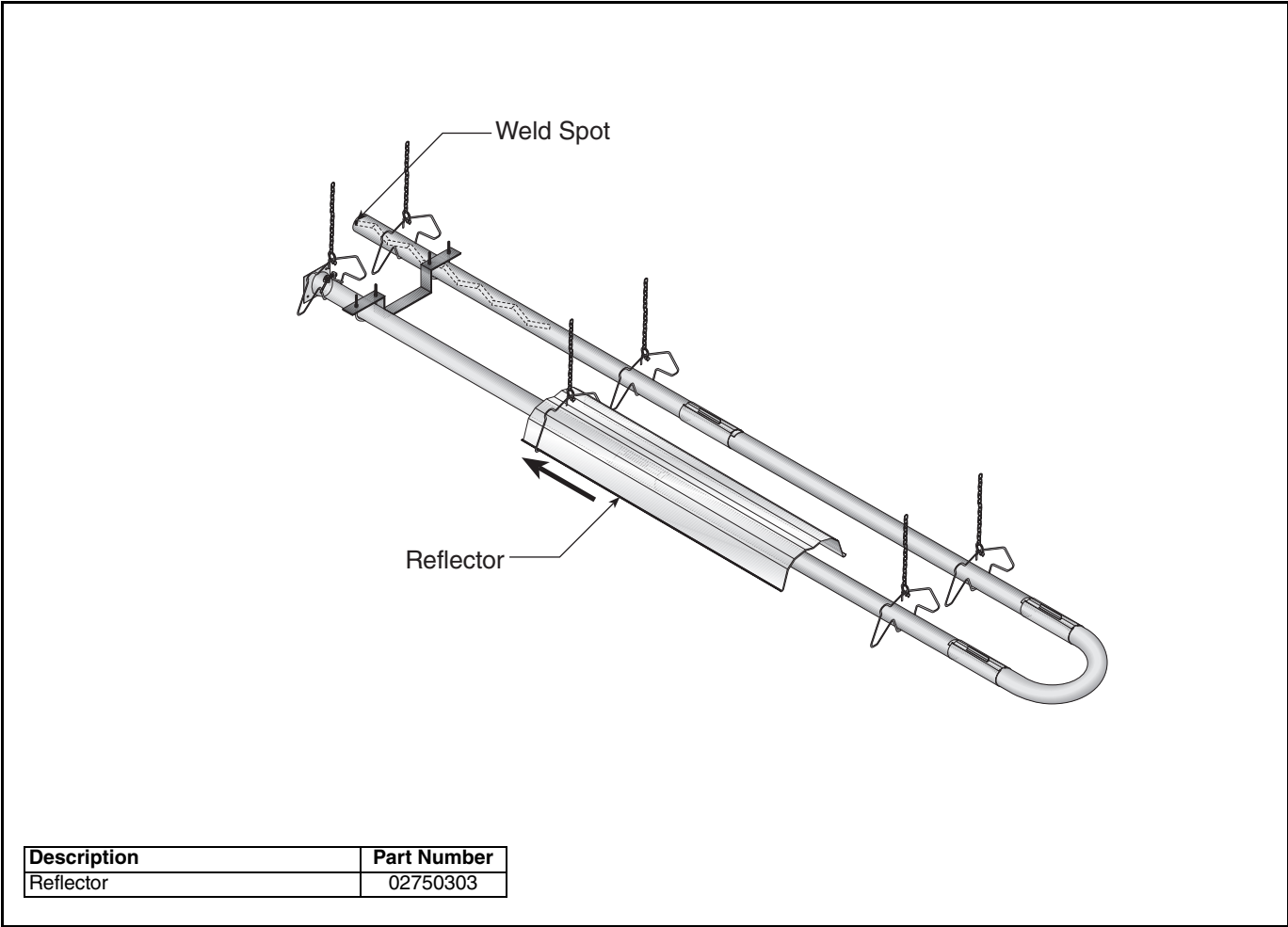


Fire Hazard

Support reflector with reflector hanger and support strap.

Reflector must not touch tube.

Failure to follow these instructions can result in death, injury or property damage.



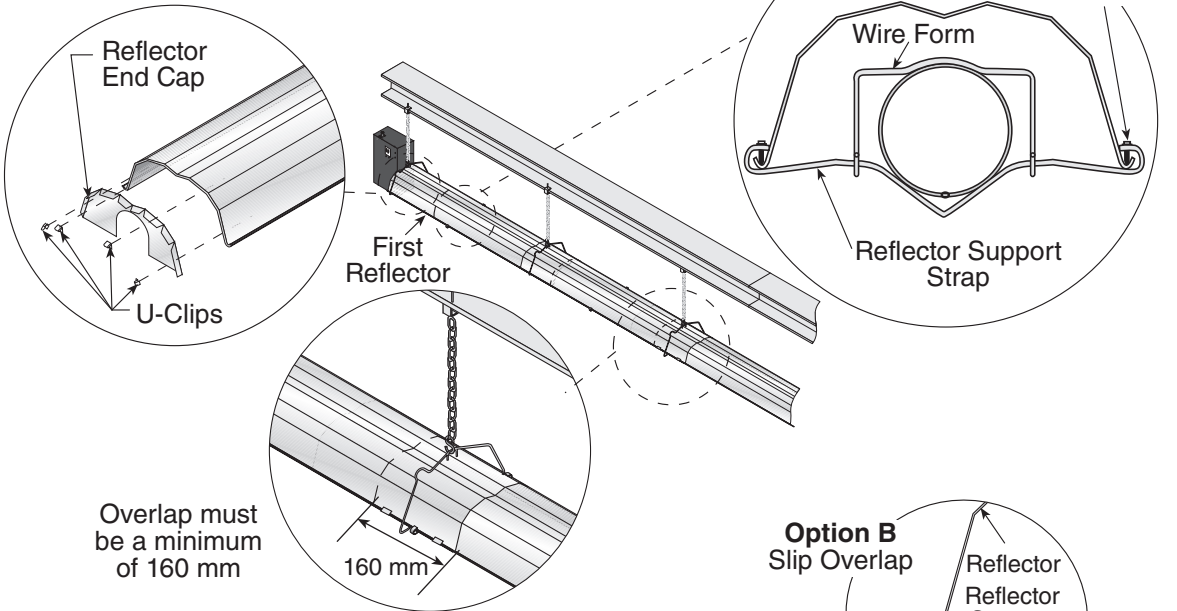
Step 7.8.1 Reflector, U-Clip and Reflector Support Installation

The pictorial drawings of the heater construction in Section 6 are schematic only and provide a general guideline of where hangers, reflector supports and U-clips are to be installed.

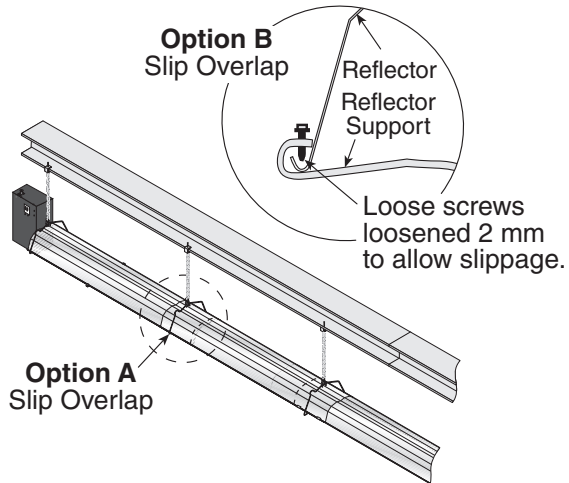
To ensure proper expansion and contraction movement of the reflectors, a combination of U-clips and reflector

supports are used. The positioning of reflector supports and U-clips depend on the individual installation. Use either pop rivets or sheet metal screws instead of U-clips when installing end caps and joint pieces in areas where impact and high wind may be a factor. The following rules must be observed:

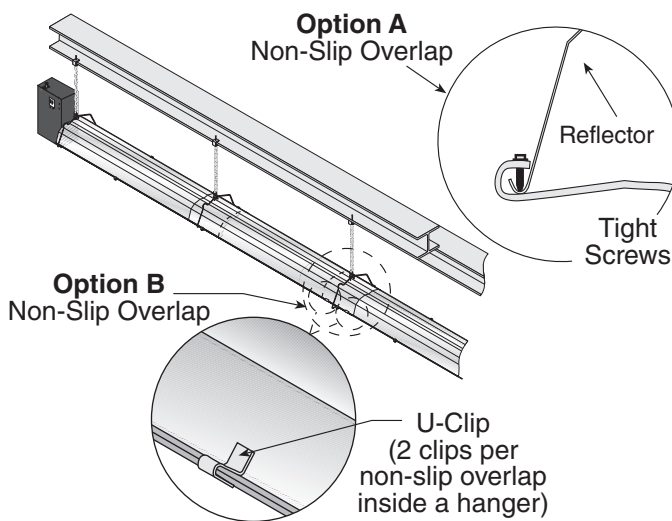
1. The first reflector after the burner must be affixed in the middle of the reflector with a reflector support and tight screws.



2. The overlap at the first and second reflector is a slip overlap. Thereafter, every third reflector joint is a slip overlap. A slip overlap is achieved by either:
 a.) both reflectors lay inside a hanger. (no reflector support needed).
 b.) using a reflector support with loose screws at the reflector overlap.



3. The remaining reflector overlaps require a non-slip overlap connection. To affix the reflectors together in a non-slip overlap either:
 a.) use reflector support and tight screws.
 b.) if both reflectors lay inside a hanger, u-clips or sheet metal screws may be used.



This section of three reflectors joined together must be affixed to the tube with at least one reflector support with tight screws.

Description	Part Number
Reflector Support Package	03050010
Wire Form	91908004
Reflector Support Strap	03050000
Screw #8 x 3/4 (3.9 x 19mm)	94320812
U-Clip Package	91107720
Reflector End Cap	027508XX

SECTION 8: MULTIBURNER CONFIGURATION & INSTALLATION

! WARNING**Severe Injury Hazard**

Secure burner to burner tube with bolts and lockwashers.

Hang heater with materials with a minimum working load of 75 lbs (33 kg).

Failure to follow these instructions can result in death, injury or property damage.

! WARNING**Cut/Pinch Hazard**

Wear protective gear during installation, operation and service.

Edges are sharp.

Failure to follow these instructions can result in injury.

8.1 Initial Assembly

See Page 13, Section 6 for linear heater assembly instructions.

See Page 25, Section 7 for U-tube heater assembly instructions.

Check layout drawings for location of manifold pipe installation.

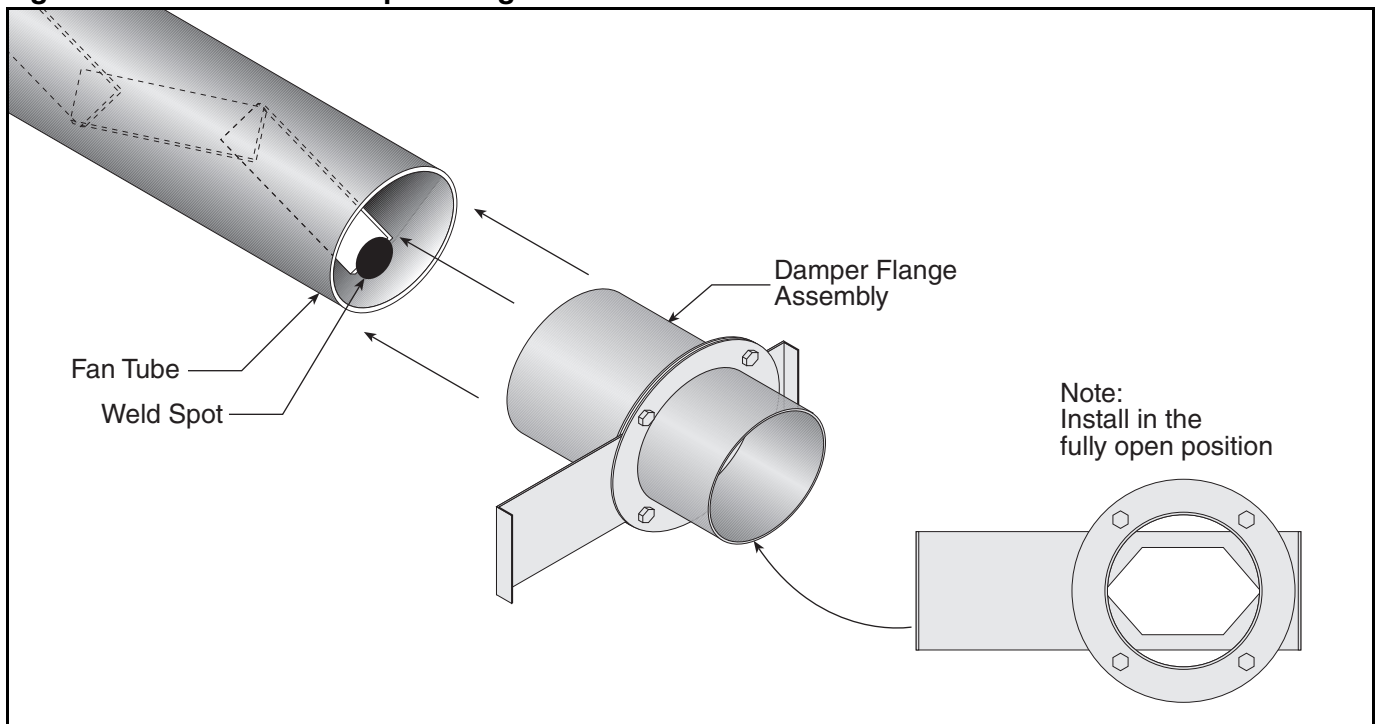
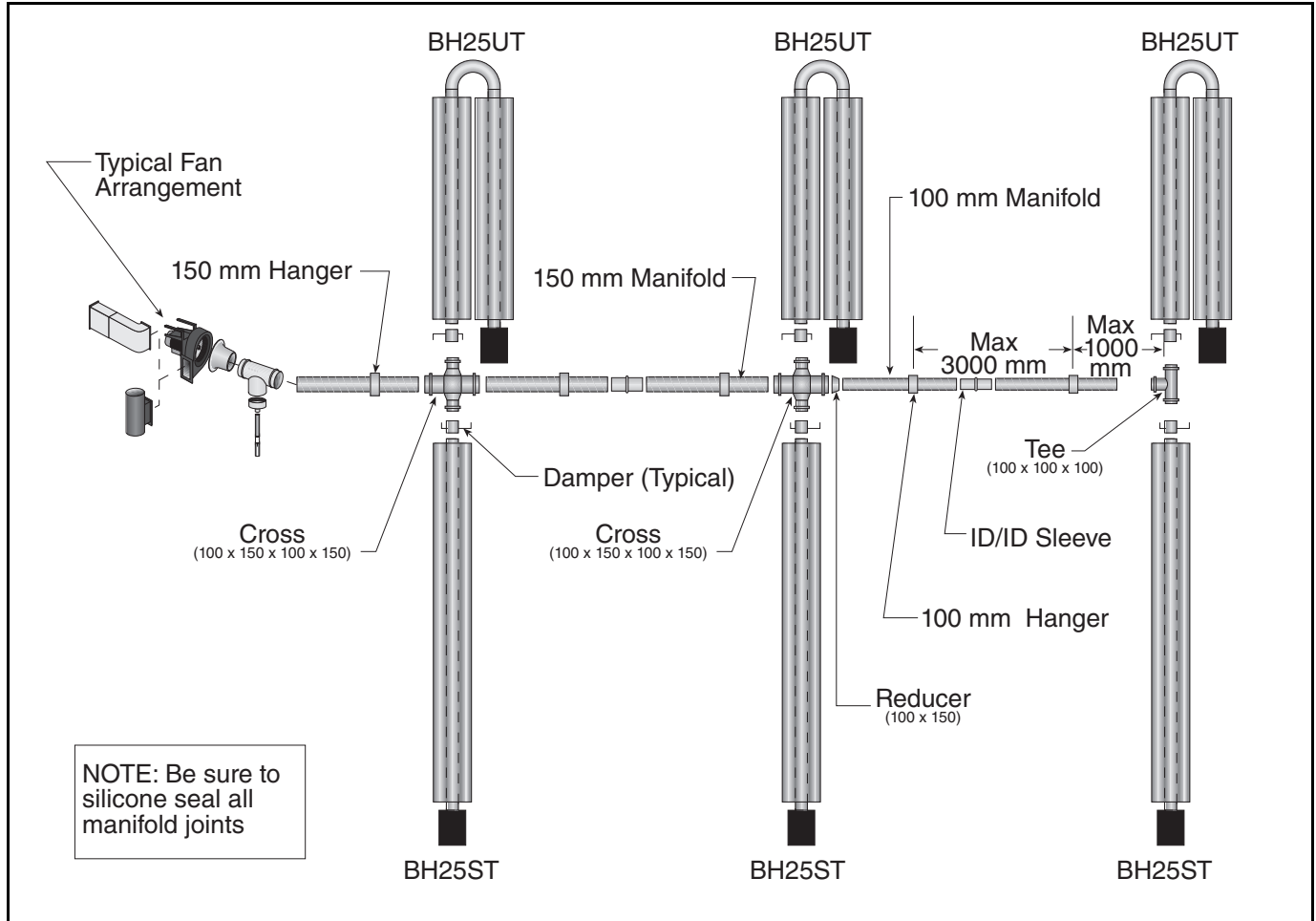
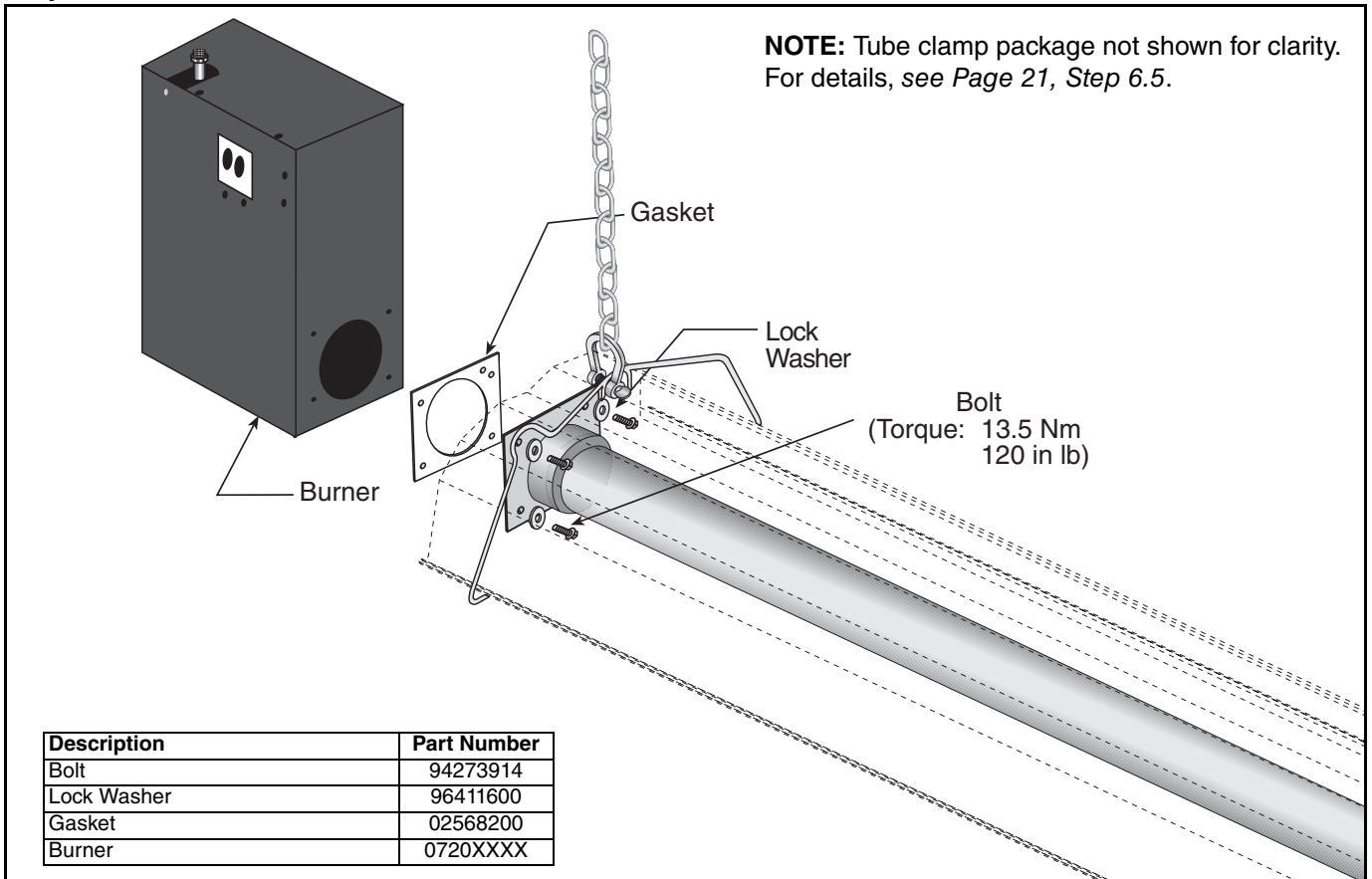
Figure 25: Multiburner Damper Flange Installation

Figure 26: Typical Manifold Layout (Linear and U-Tube Configuration)

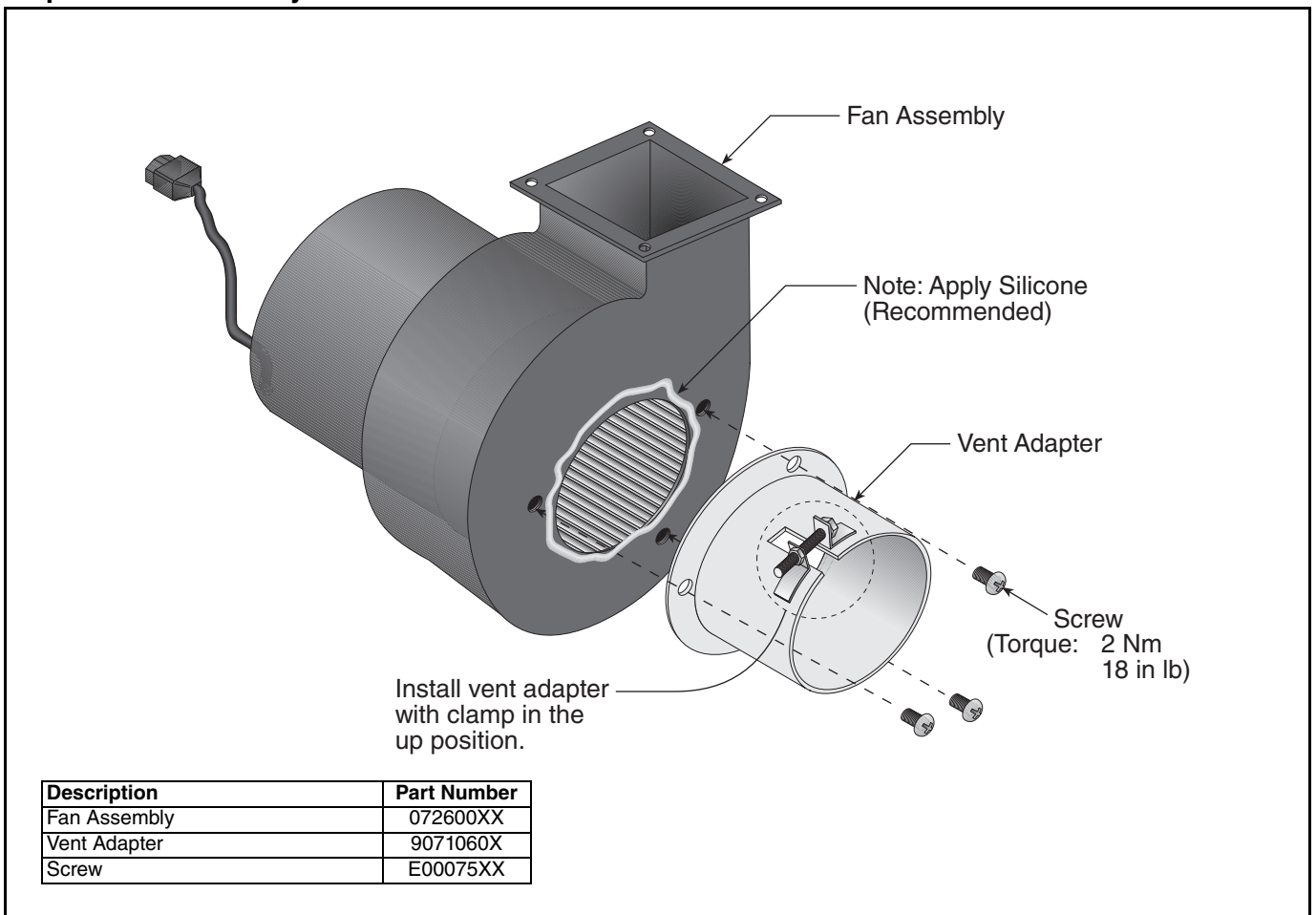


SECTION 9: BURNER & FAN INSTALLATION

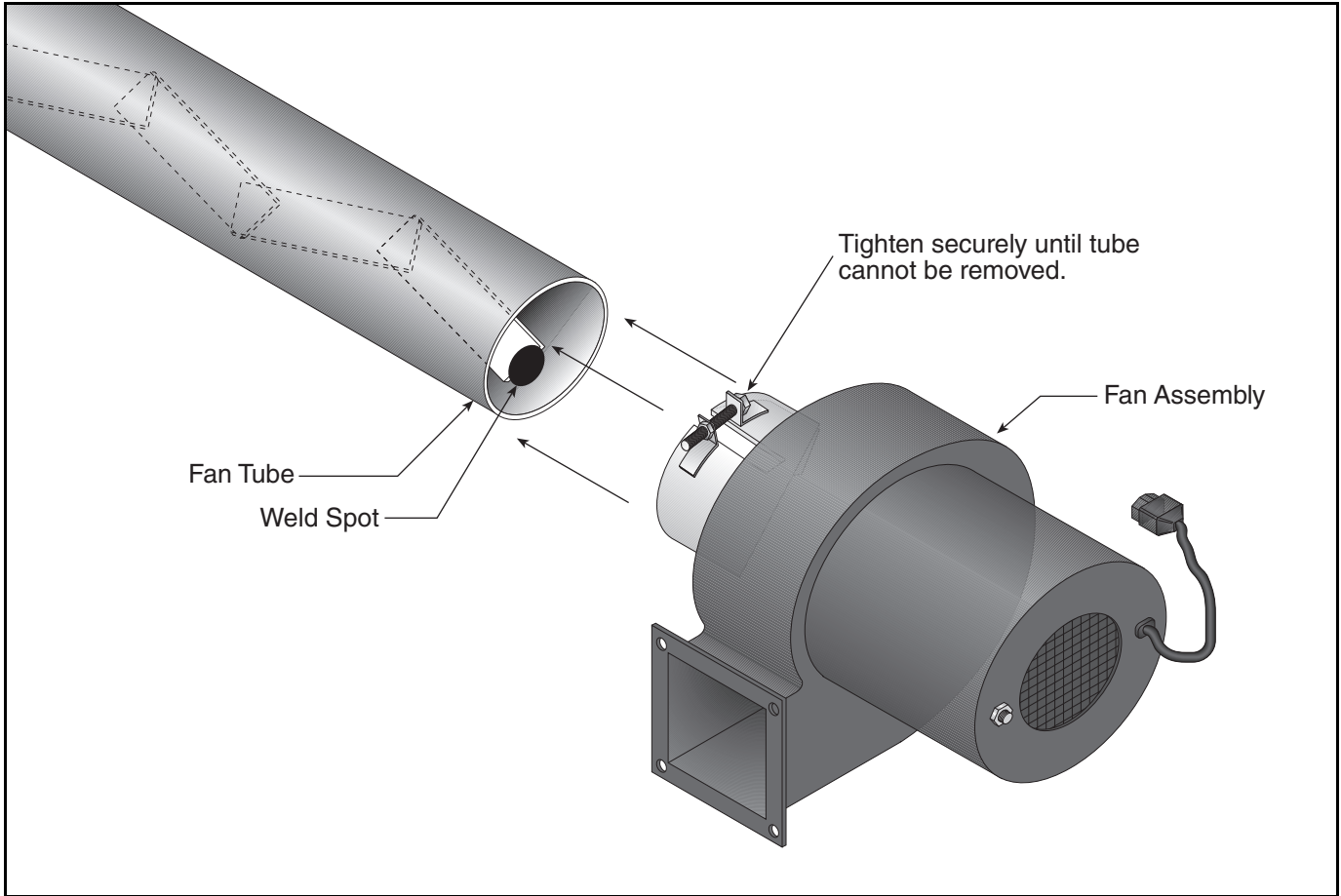
Step 9.1 Burner Installation



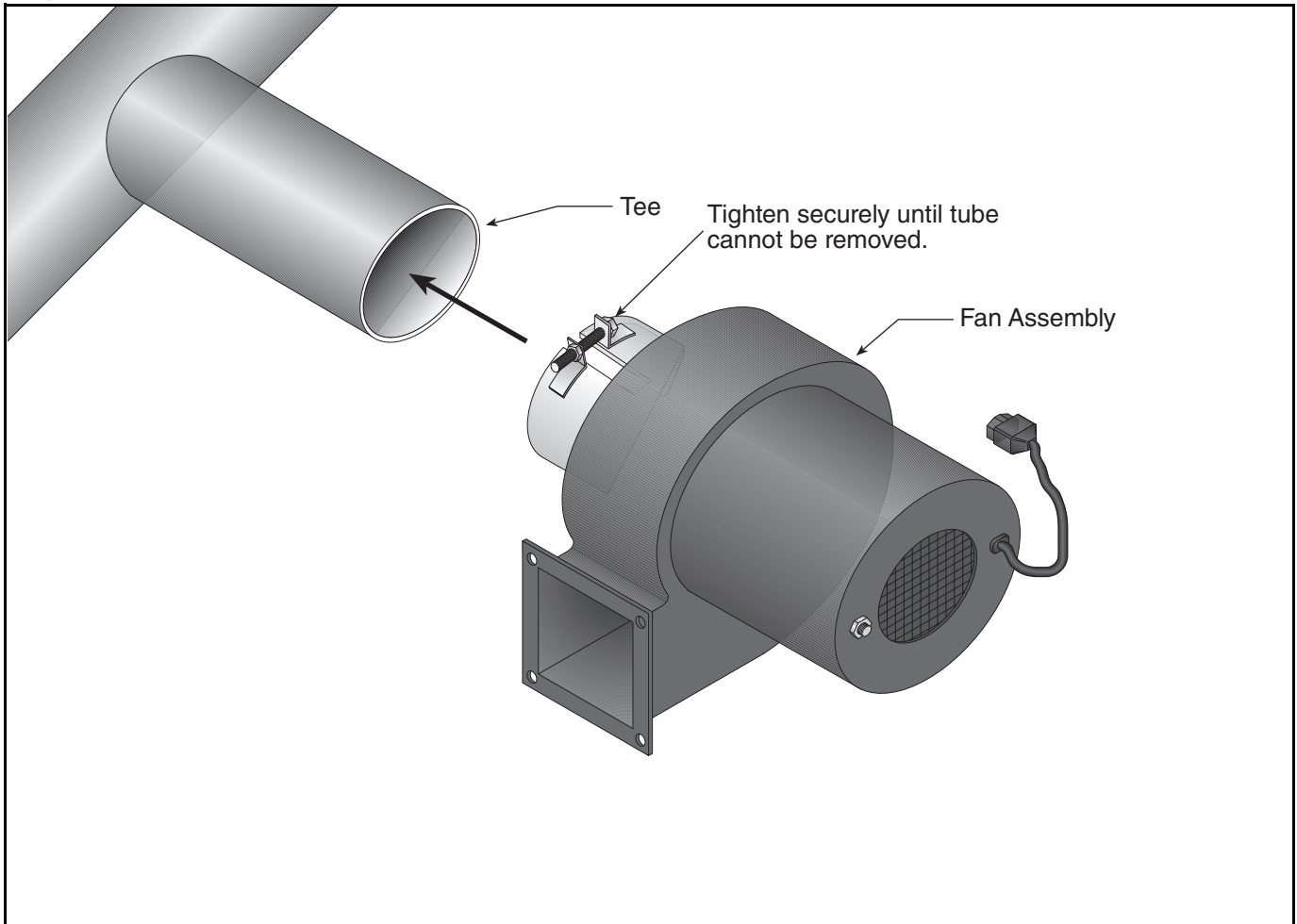
Step 9.2 Fan Assembly



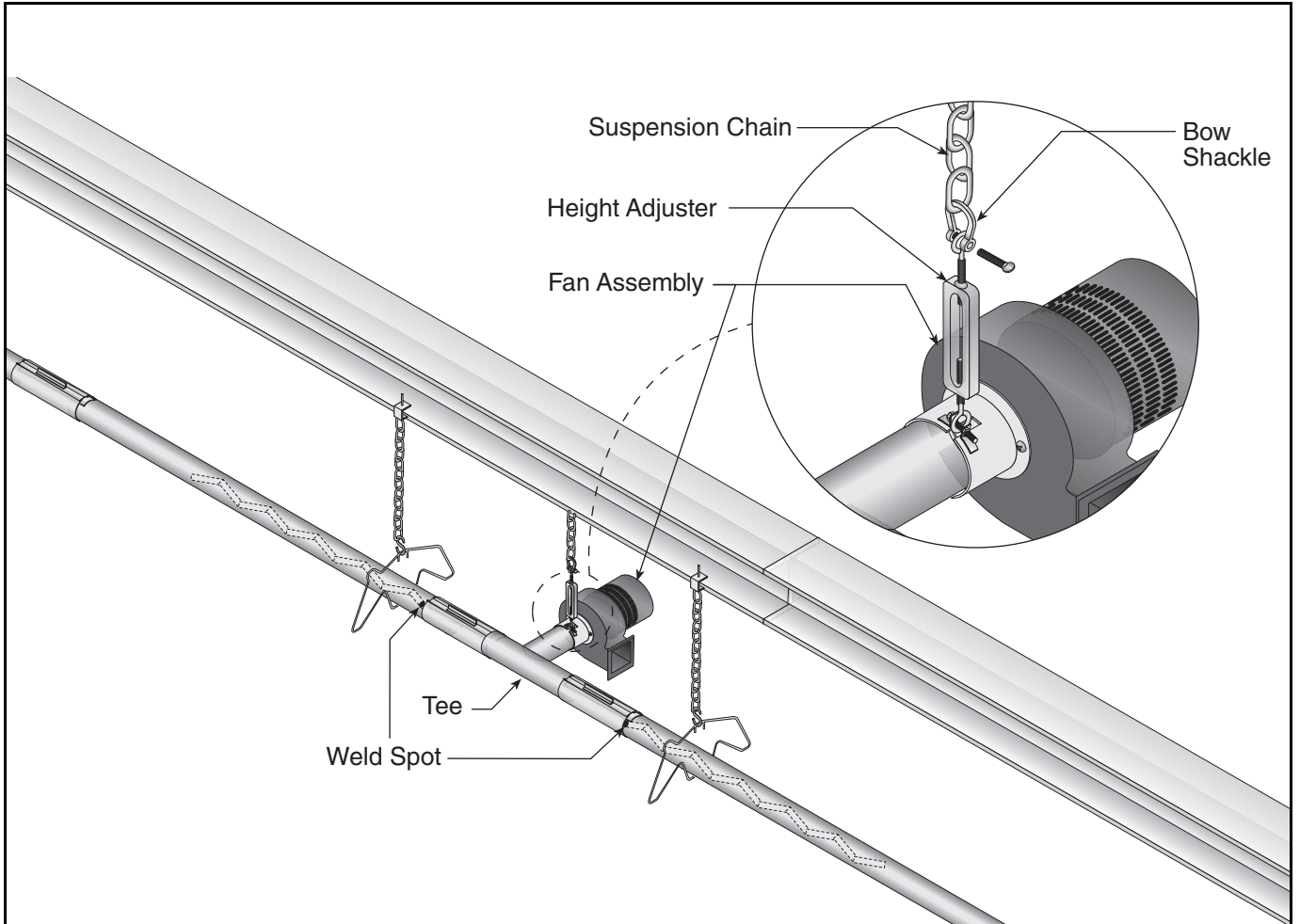
9.3 Linear & U-Tube Fan Installation



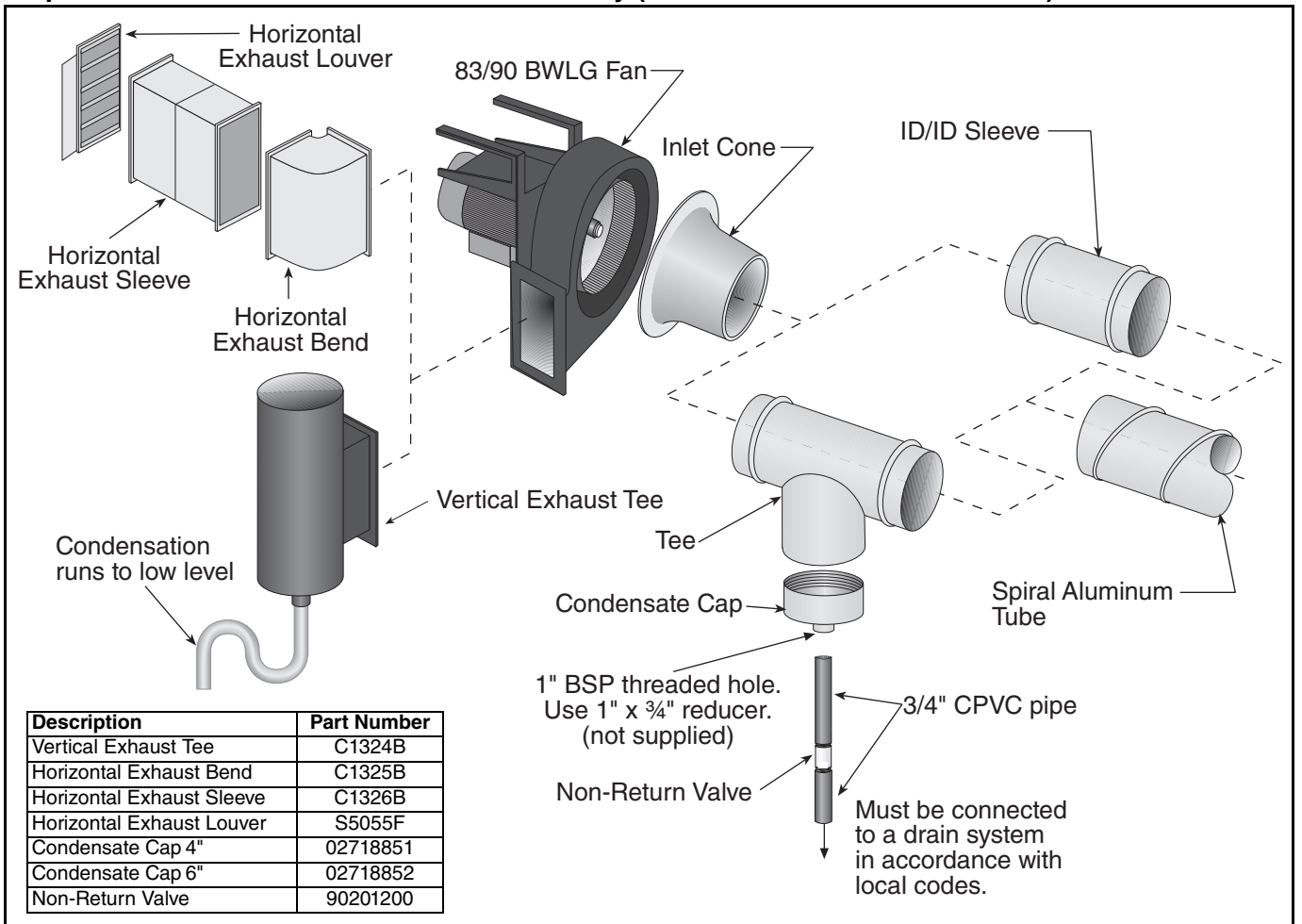
Step 9.4 Double Linear Fan Installation



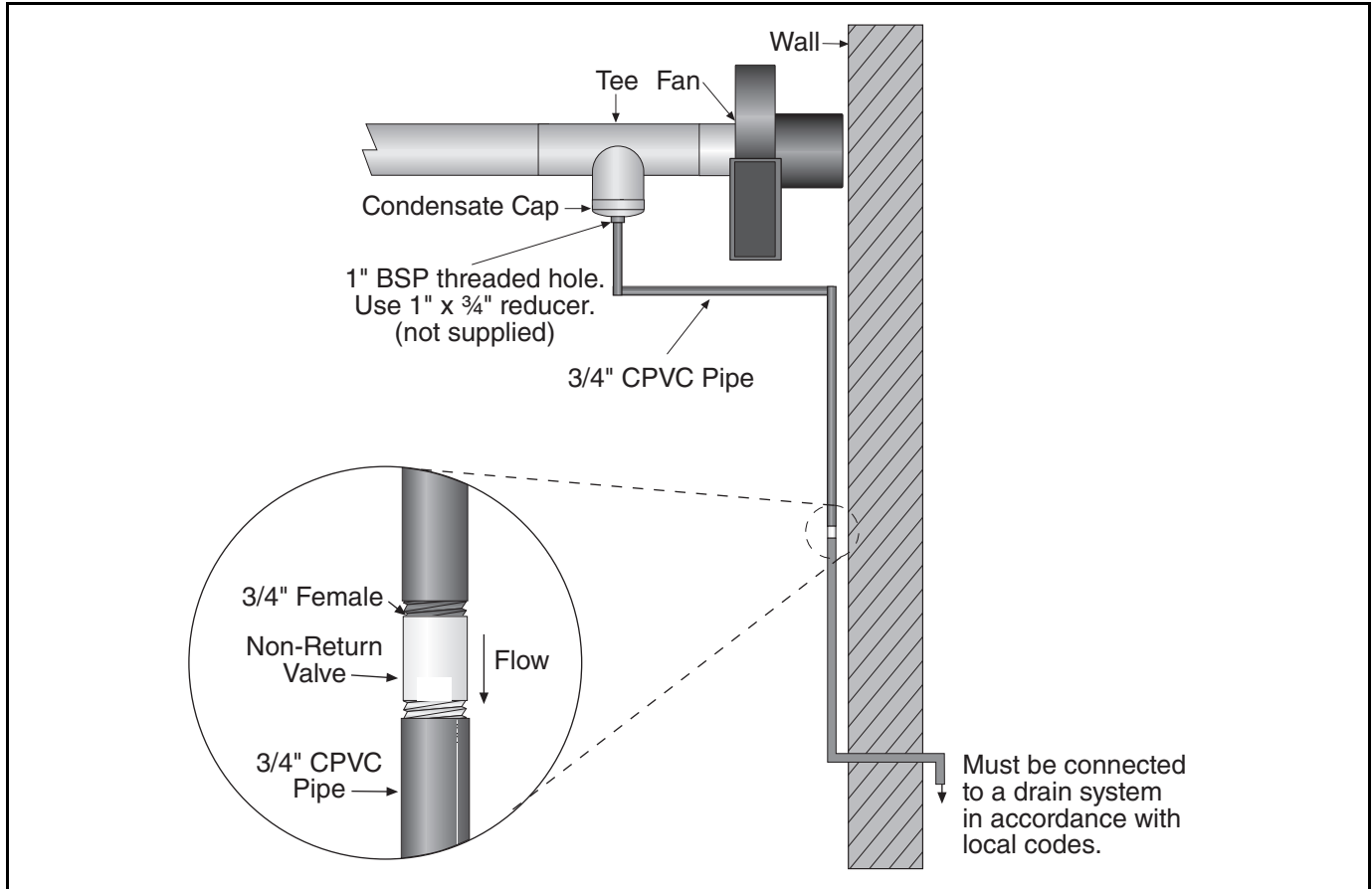
Step 9.4.1 Double Linear Fan Installation (Continued)



Step 9.5 Multiburner 83/90 BWLG Fan Assembly (Horizontal and Vertical Outlets)



Step 9.6 Condensate Drain Assembly



SECTION 10: OPTIONAL HEATER ACCESSORIES

⚠ WARNING**Cut/Pinch Hazard**

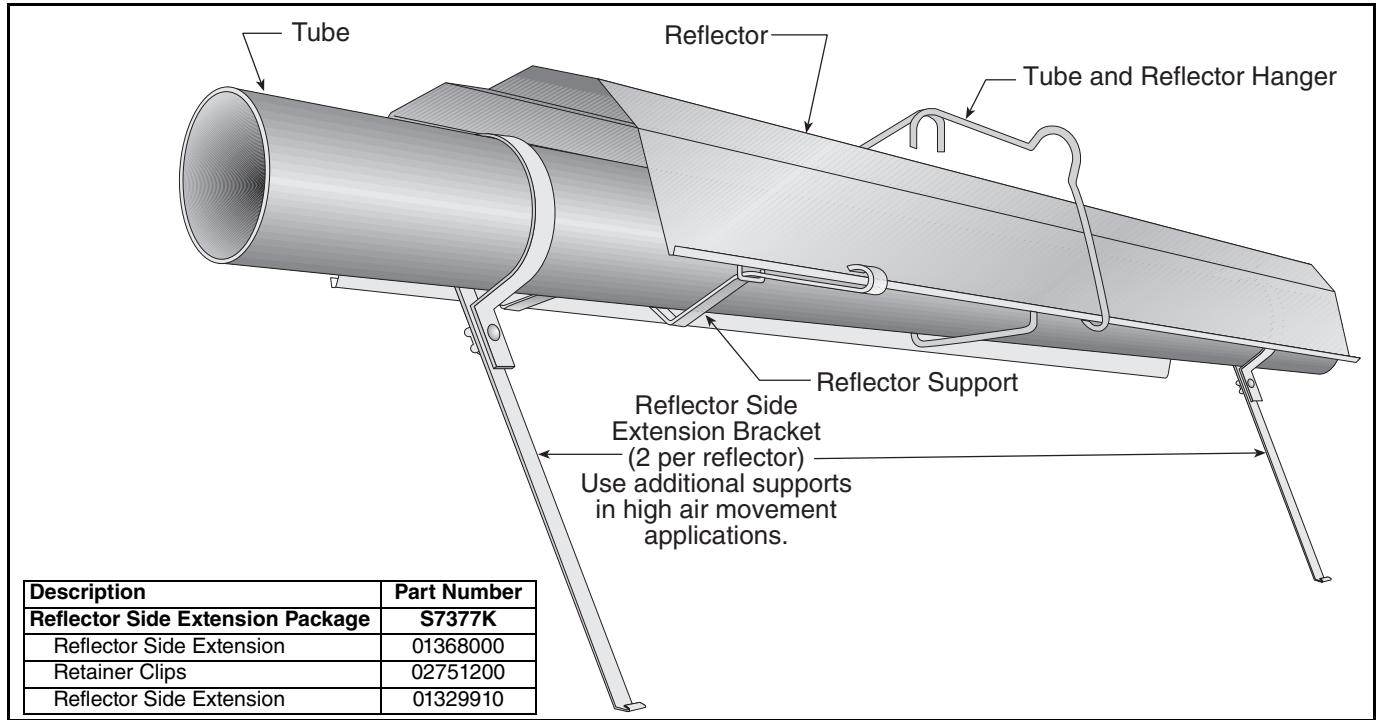
Wear protective gear during installation, operation and service.

Edges are sharp.

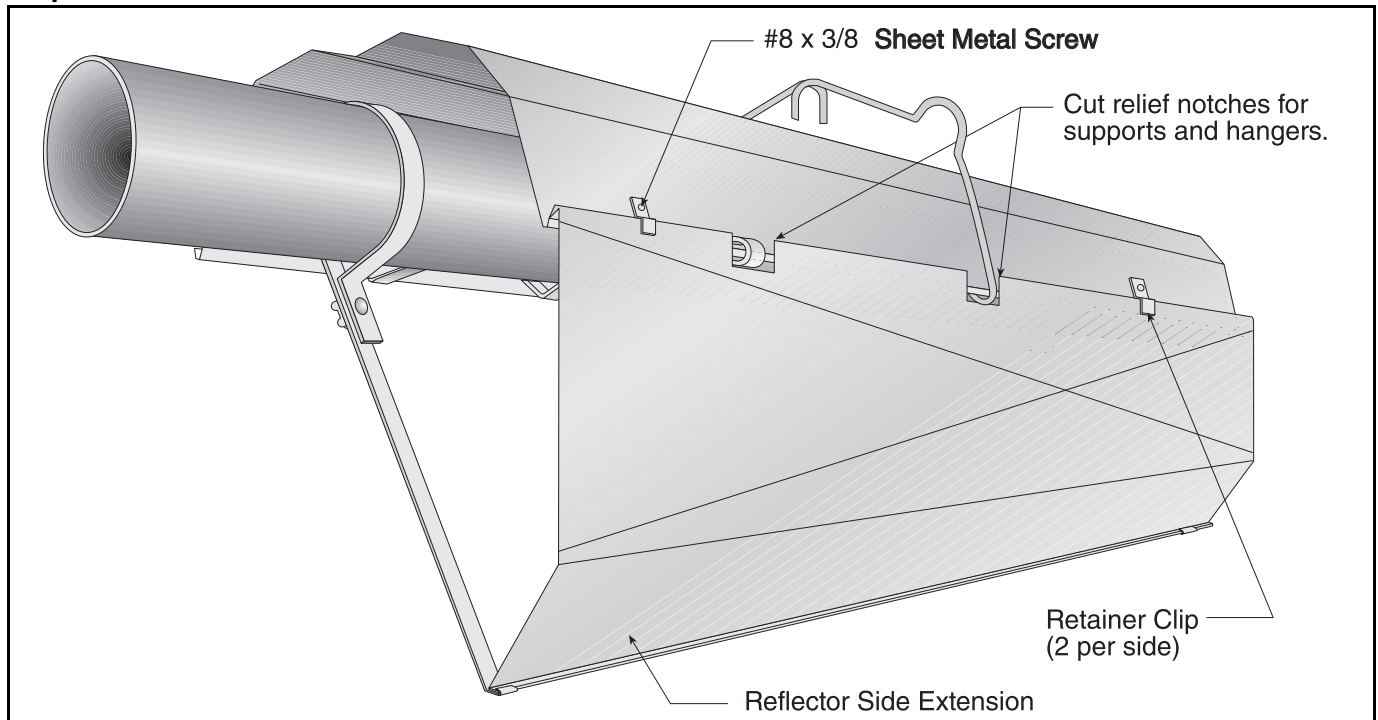
Failure to follow these instructions can result in injury.

10.1 Reflector Side Extension Installation

Step 10.1.1 Bracket Installation



Step 10.1.2 Side Reflector Installation



10.2 U-Tube Cover Installation

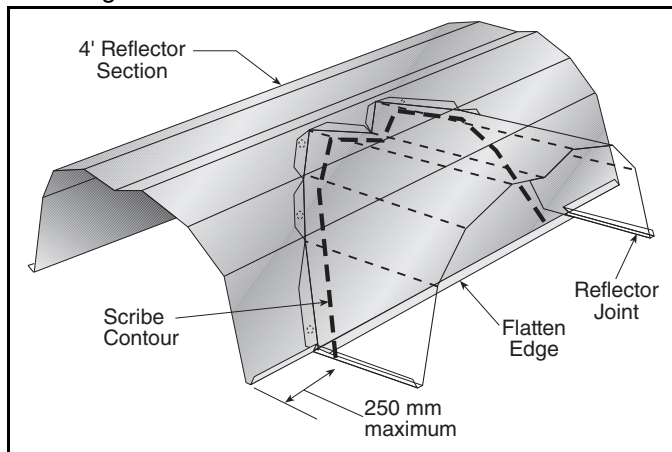
The package contains two reflector joint pieces (P/N 02750901), one 8' reflector and 18 x #8 sheet metal screws. Install the U-tube cover using the following procedure.

Step 10.2.1

Cut the 8' reflector in half to be used on both sides to cover the U-tube.

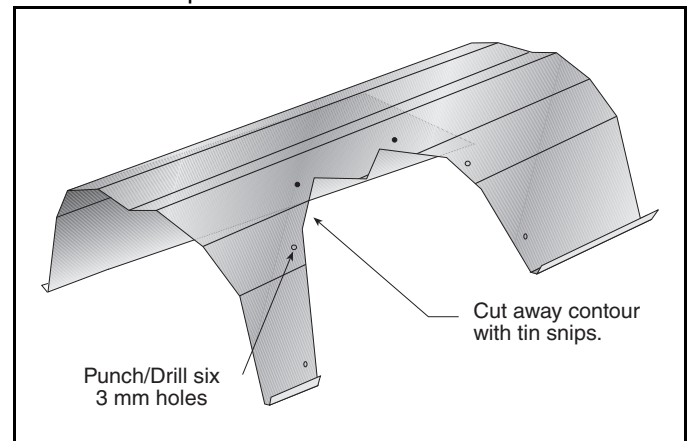
Step 10.2.2

Flatten 4' reflector edge where joint piece matches. Put a mark on the 4' reflector, directly over the tube center. Center the accessory joint piece on the mark and scribe its contour on the reflector. Scribe the location of the mounting holes.



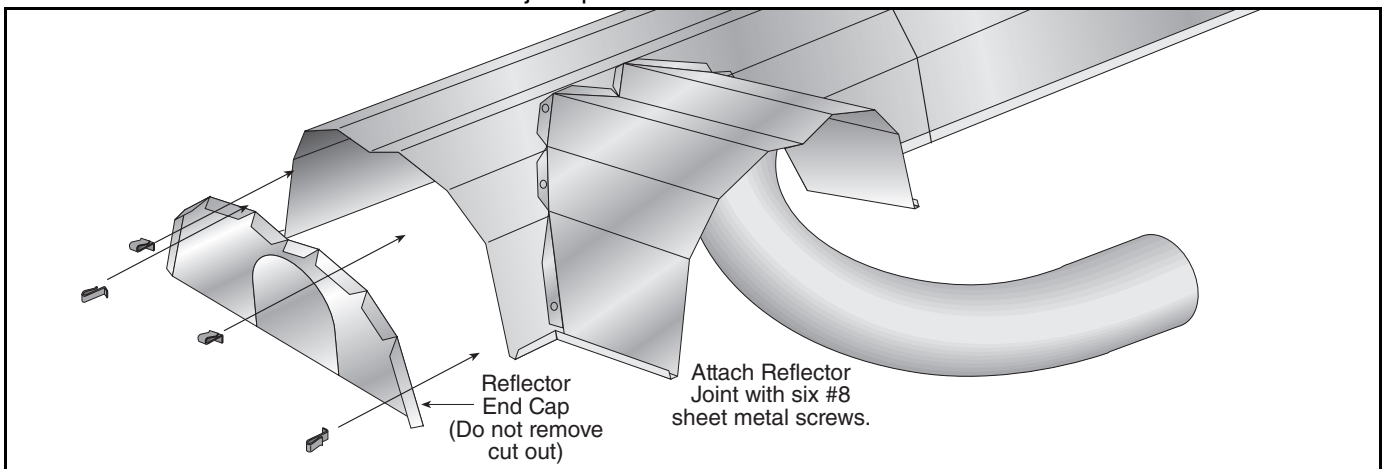
Step 10.2.3

Cut away the reflector to clear the tube, leaving about 1" of material inside the scribed contour to attach the accessory joint. Drill or punch six 3 mm diameter holes in reflector in the positions shown below.



Step 10.2.4

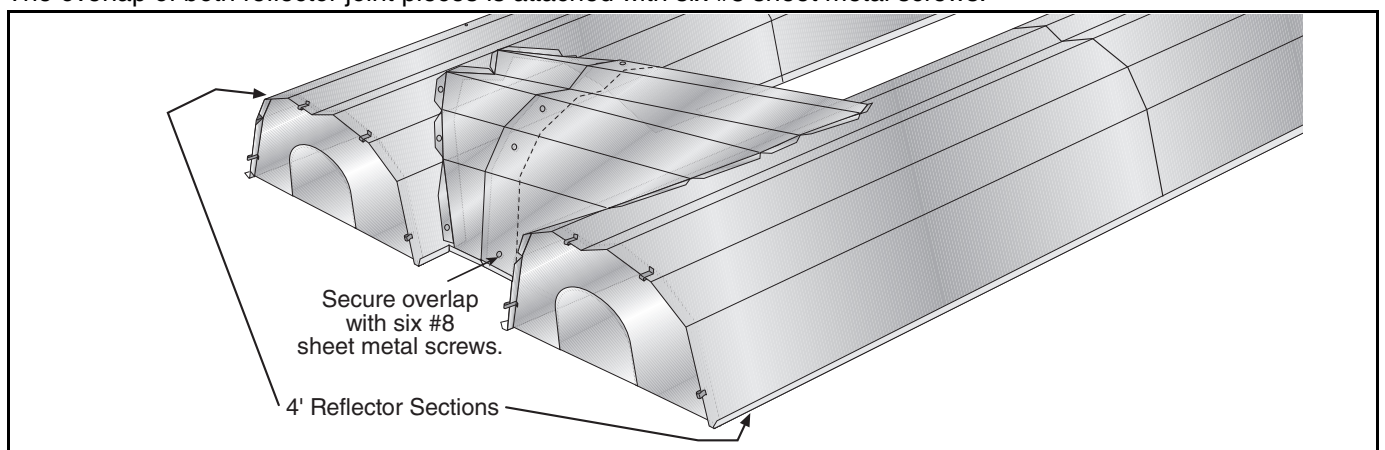
Use six #8 sheet metal screws to attach the joint piece.



Repeat Step 10.2.1 through Step 10.2.4 to attach the reflector joint piece on the other reflector.

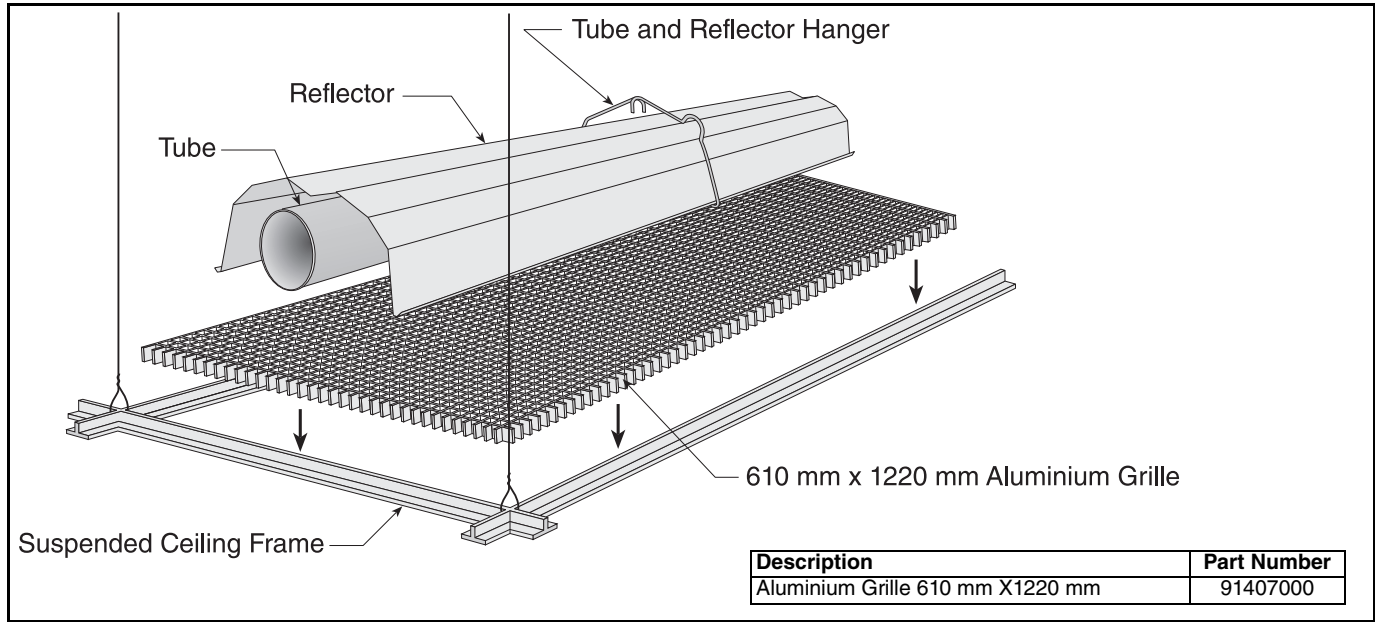
Step 10.2.5

The overlap of both reflector joint pieces is attached with six #8 sheet metal screws.

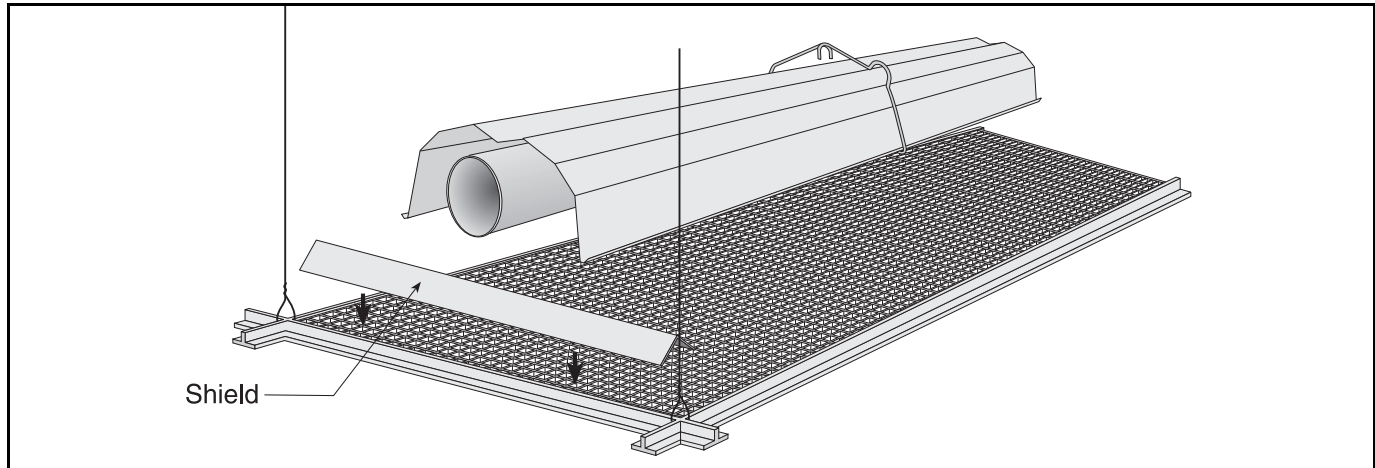


10.3 Decorative Grille Installation

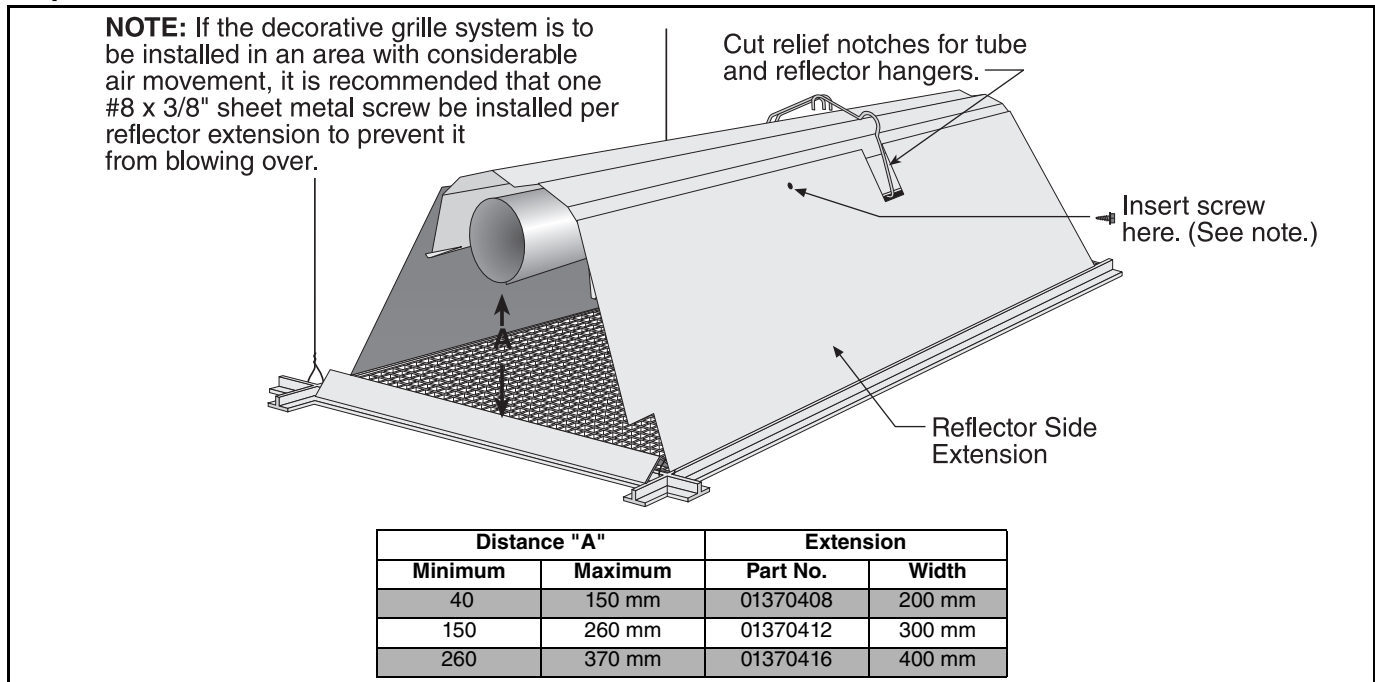
Step 10.3.1 Grille Installation



Step 10.3.2 Frame Shield Installation

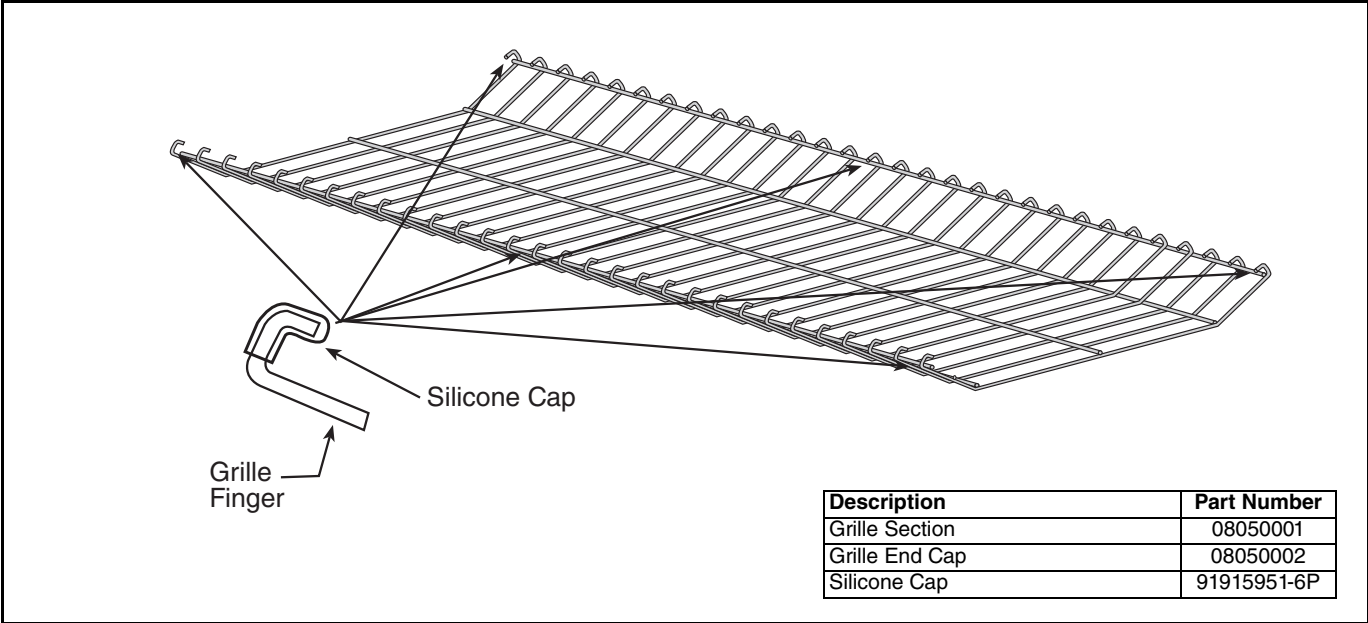


Step 10.3.3 Reflector Side Extension Installation for Decorative Grilles

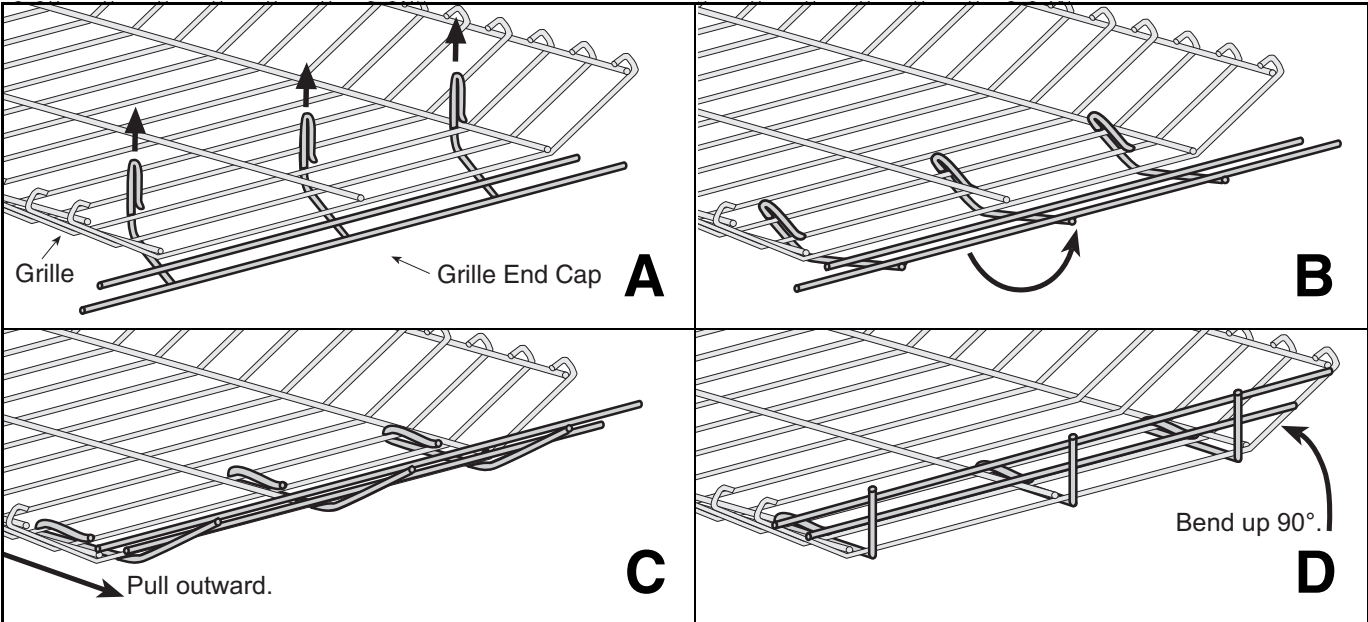


10.4 Protective Grille Installation

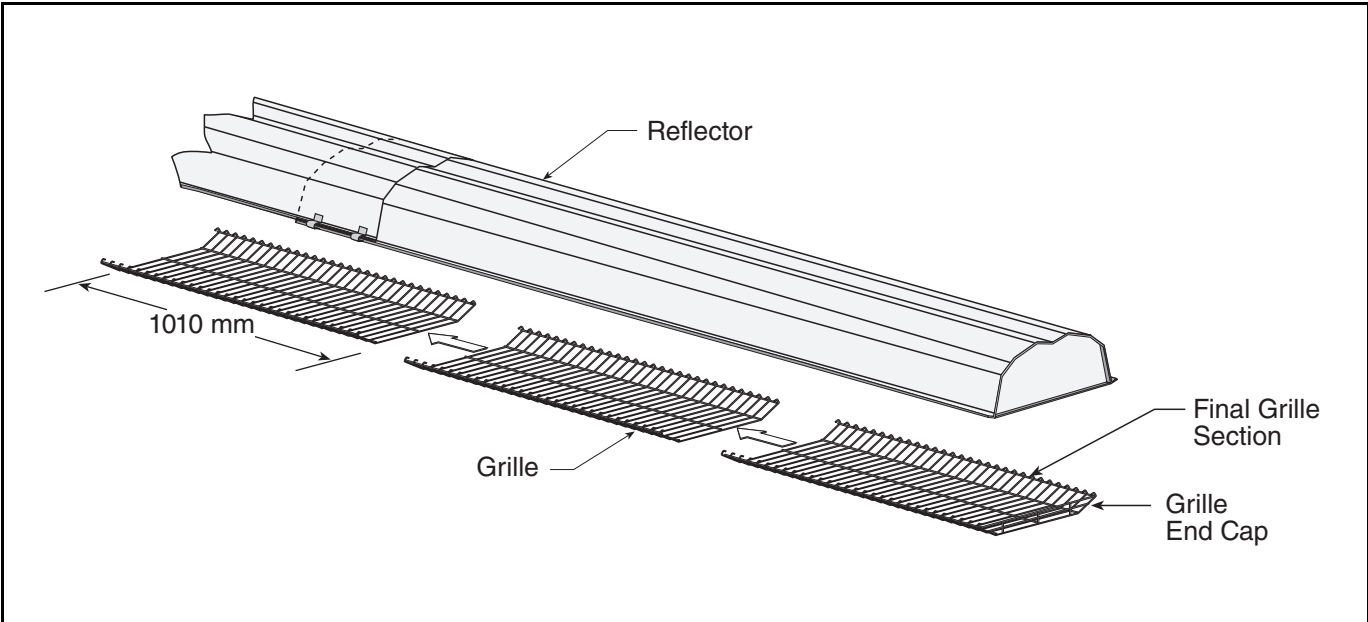
Step 10.4.1 Silicone Cap Installation



Step 10.4.2 Grille End Cap Installation

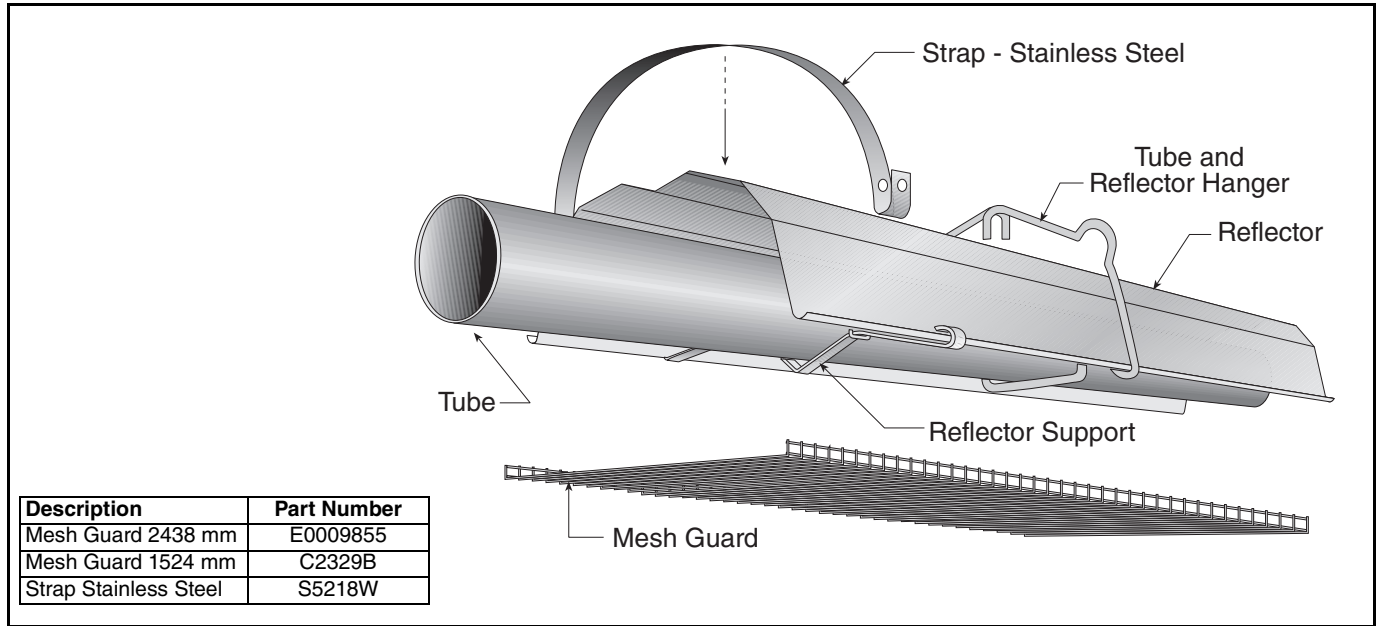


Step 10.4.3 Grille Installation

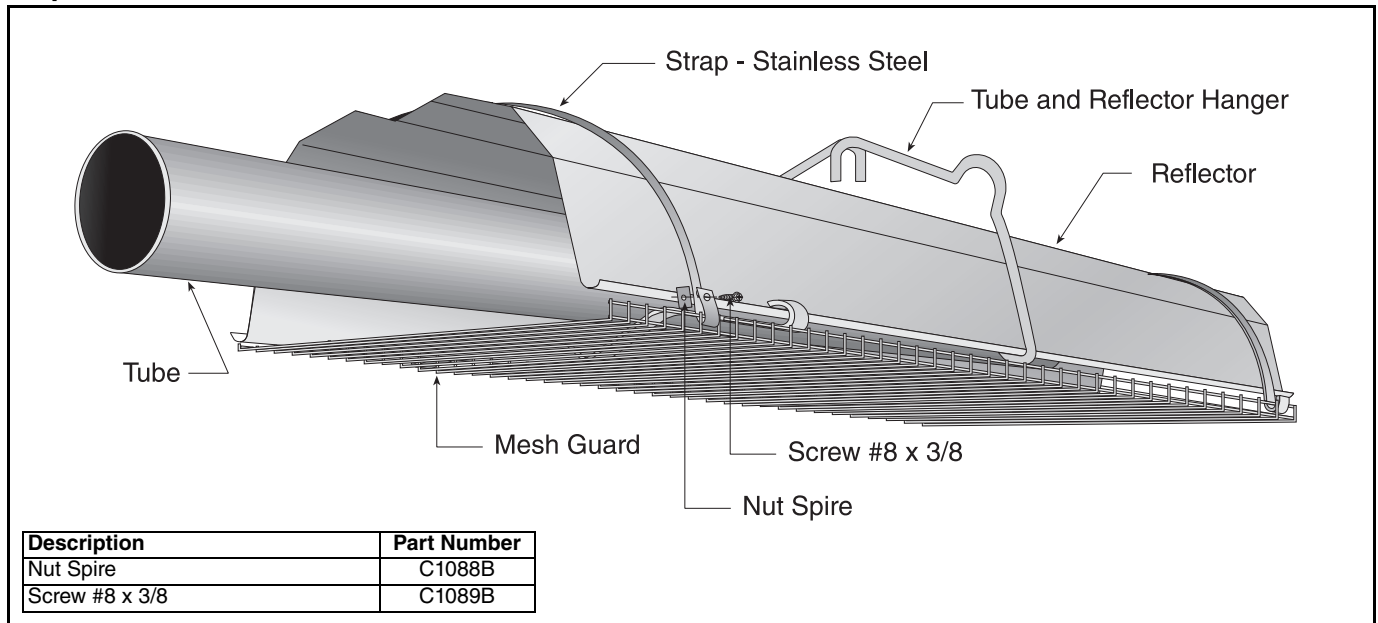


10.5 Sports Hall Guard Installation

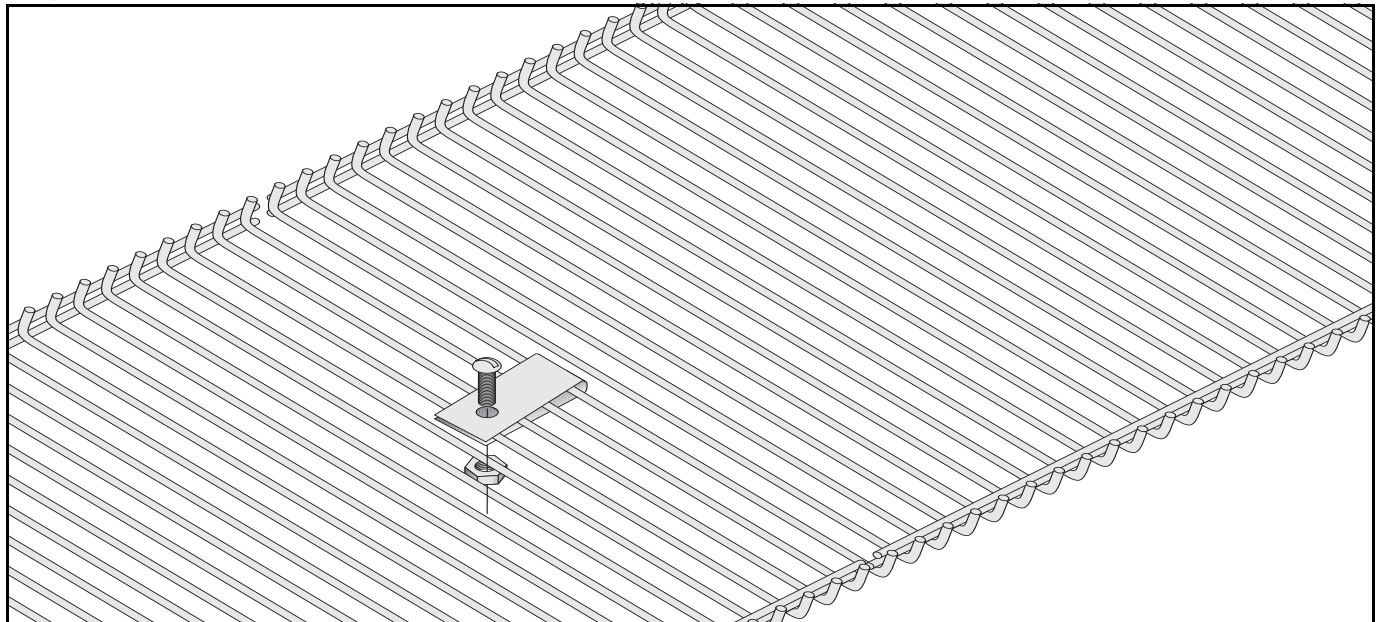
Step 10.5.1 Grille Installation



Step 10.5.2 Fastener Installation



Step 10.5.3 Mesh Guard Connection



10.6 Undershield Installation

10.6.1 Hanger Installation

Description	Part Number
Undershield Reflector Package 101 cm	S7399K
Assembly Hanging Bracket	C0318B
Stud M6 x 90	C0693B
Nut M6	C0090B

10.6.2 Undershield Installation

Description	Part Number
Undershield Reflector Package 1010 mm	S7399K
Undershield Reflector 1010 mm	C0521B
Nut M6	C0090B
Shield Support Bracket	02751700

10.6.3 Adjust Undershield Height

10.7 Wall Mounting

Install wall mounting brackets at the height shown in the layout drawing provided by the estimator. Space wall mounting brackets and hangers as indicated by dimensions d, e and f (u-tube) in the relevant layout overview drawing for your heater. For linear heaters see Page 15, Figure 20, for double linear heaters see Page 18, Figure 22 and for U-tube heaters see Page 28, Figure 24.

10.7.1 Hardware Installation

The wall mounting brackets must be attached to a suitable wall through all mounting holes. Screw sizes less than M8 (5/16") may not be used. In order for the wall

mounting brackets to adequately carry the weight of the heater, it must be installed with best building practice.

Model	Quantity of Wall Mounting Brackets	Model	Quantity of Wall Mounting Brackets
BH15UT	2	BH15ST	3
BH20UT	3	BH20ST	4
BH25UT/EF	3	BH25ST/EF	4
BH30UT/EF	3	BH30ST/EF	5
BH35UT/EF	3	BH35ST/EF	5
BH40UT/EF	3	BH40ST/EF	5
BH45UT/EF	4	BH45ST/EF	6
BH50UT/EF	4	BH50ST/EF	6

Figure 27: U-Tube (Horizontal)

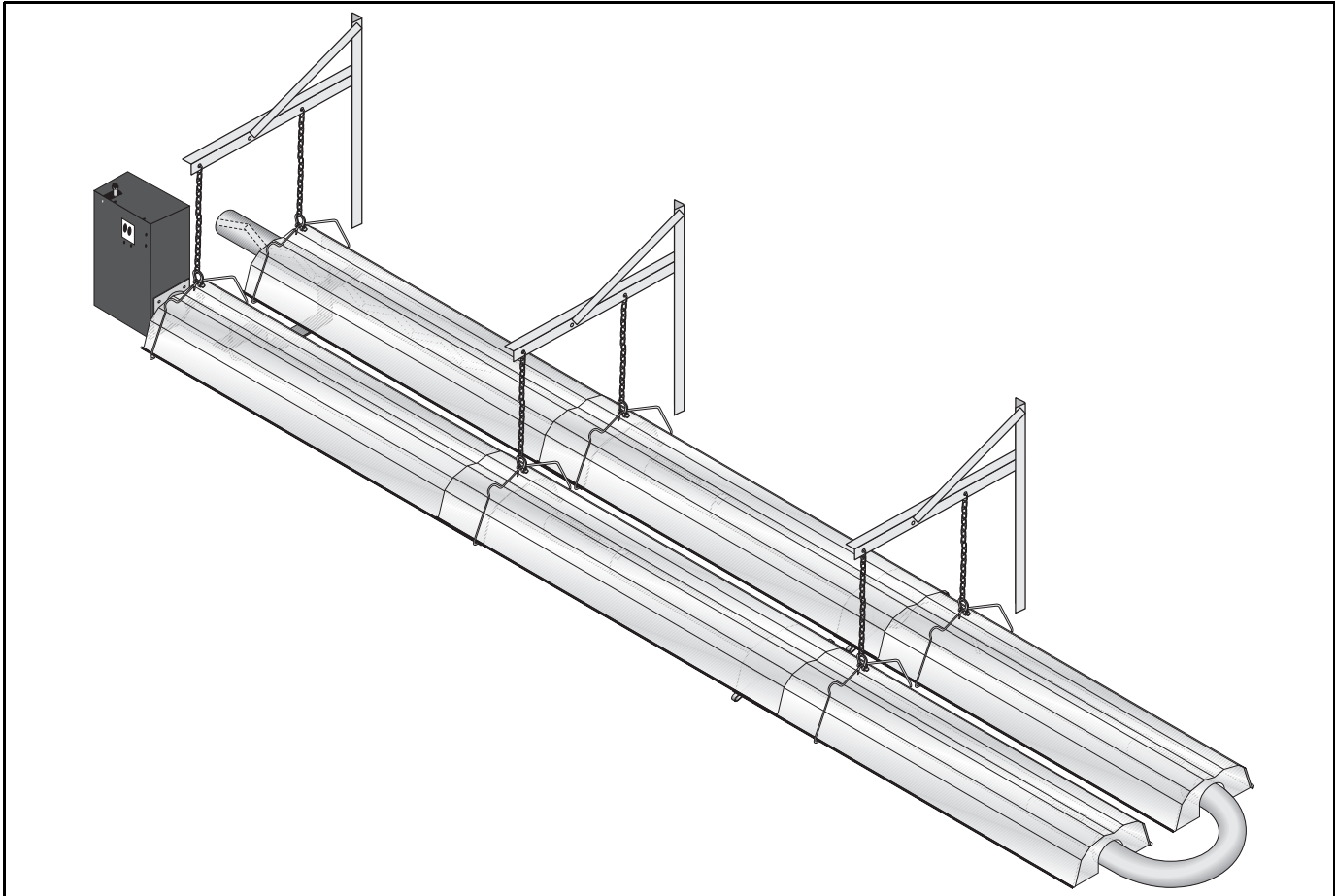


Figure 28: U-Tube (Angle Mounted)

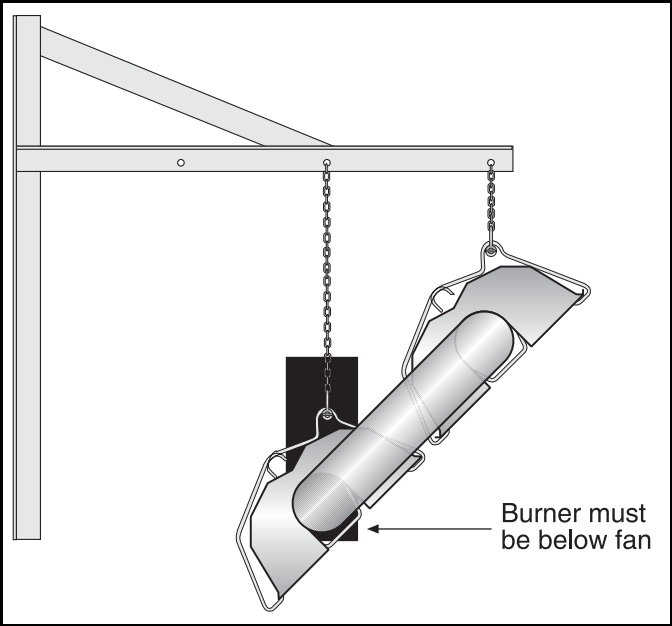
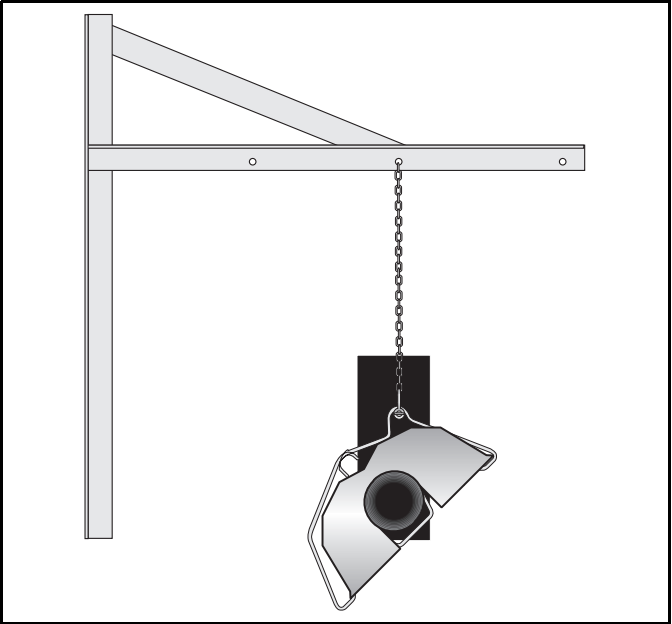


Figure 29: Linear



SECTION 11: VENTING**! WARNING****Carbon Monoxide Hazard**

Multiburner systems are not approved for unvented use and must be vented outdoors.

Unitary heaters installed unvented must be interlocked with sufficient building exhaust.

Heaters must be installed according to the installation manual.

Failure to follow these instructions can result in death or injury.

! WARNING**Cut/Pinch Hazard**

Wear protective gear during installation, operation and service.

Edges are sharp.

Failure to follow these instructions can result in injury.

insulated if longer than 8,000 mm. Contact the manufacturer if more than 2 x 45° offset bends are necessary. The flue must be self supporting.

Fans

83 BWLG

90 BWLG

Horizontal

190 x 75 (hole)

190 x 75 (hole)

Vertical

150 mm dia.

150 mm dia.

11.1.4 Flueless Installation

If the heater is being installed in an area where combustion products can be dissipated within the building, ensure that the fan outlet is horizontal and away from the burner. Where installation is close to a wall (perimeter system) or other obstruction close to the fan outlet or wall angle mounted, install the heater so that the fan tube is the furthest away from the wall or obstruction, i.e. the fan will always blow into the building or away from the obstruction.

11.2 Ventilation Requirements

Detailed recommendations for air supply are given in the relevant National Standards. There must be an adequate supply of air for both combustion and general ventilation. Air vents should have negligible resistance. Do not locate air vents where they can be easily blocked or flooded, or adjacent to any flues or extraction systems carrying flammable vapour.

11.2.1 Flue Installation

Where the heater(s) is flued, the space containing it must have a permanent outside air vent with a minimum effective area of 4.5 cm² per kW of heat input. If mechanical ventilation is employed, the minimum proven airflow rate shall be 2.35 m³/h per kW of heat input.

If the flue is to be horizontally vented through a wall, a wind-proof terminal must be fitted to outdoor vent pipe to prevent a back draught.

11.2.2 Flueless Installation (EN 13410)

The installation room must have a volume of at least 10m³/kW of installed nominal heat input. A minimum of 10m³/h of exhaust air per kW of operating heat input must be ventilated out of the installation room by either thermal or mechanical evacuation. Appropriate exhaust and fresh air openings must be provided and exhaust fans interlocked with the operation of the heating equipment. Further no exhaust system is necessary if the building air change rate is greater than 1.5 per hour or the density of operating heat input is not greater than 5 W/m³.

11.1 General Venting Requirements**11.1.1 Type C₁₂, C₃₂ & C₆₂ Appliance**

Room Sealed

The heaters are designed to be installed as room sealed appliances. The flue and air intake are run as separate pipes to the special concentric wall or roof terminal. The wire mesh inside the fresh air adapter on the heater must be removed prior to installation. See Page 52, Figure 33.

11.1.2 Type B₂₂ Appliance

The flue must be fitted with a low resistance terminal. See Page 52, Figure 33.

11.1.3 Flue Installation

The fan outlet may discharge vertically or horizontally. Connection should be made using 100 mm minimum diameter aluminium or stainless steel flue material to National Standard and must be adapted to insert into the 100 mm flue adapter. Both fresh air supply and flue duct shall not exceed 10,000 mm. BH15 and BH20 flue must be insulated if longer than 5,000 mm. BH25 flue must be

Figure 30: Individual Flue Connection Detail

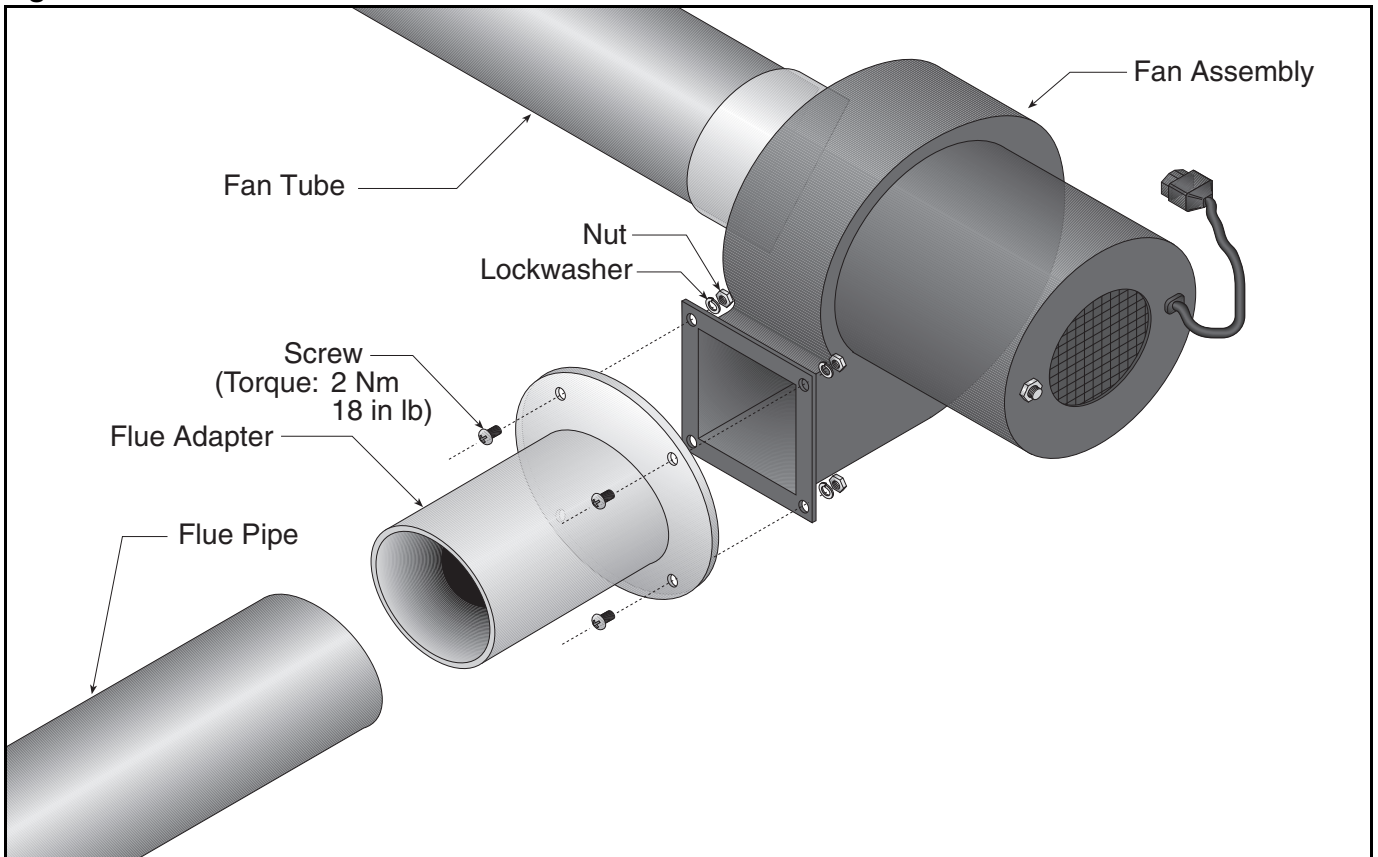
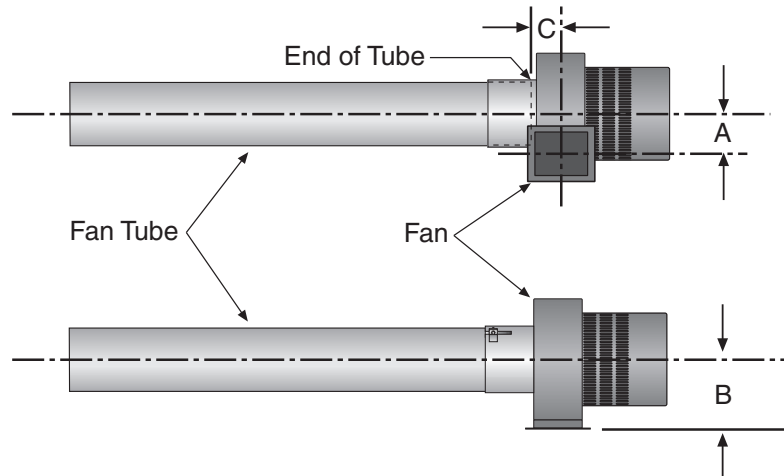


Figure 31: Flue Connection Dimensions



Heater Model	Fan Model	A	B	C	Part Number
BH 15-30	Torin DSF-133-42	79 mm	95 mm	45 mm	C2374B
BH 35-50	AO Smith JF1G	89 mm	102 mm	51 mm	90710000

11.3 Outside Combustion Air Supply

Where necessary, clean air may be ducted into the burner box through an added spigot on the back of the burner box replacing the existing dust arrest baffle plate.

See Page 50, Section 11.1.3 for recommendations on duct length. Air duct should be as straight as possible. Do not use bends in excess of 45°. Consult the manufacturer if more than 2 x 45° offset bends are necessary. The fresh air duct must be self supporting.

11.3.1 Air Supply Requirements

When fresh air duct is used, follow one of these rules:

- The flue must penetrate the roof while fresh air can penetrate any wall. (See Page 52, Figure 33)
- The flue and fresh air supply must penetrate the same roof, at a minimum of 1 m apart. (See Page 52, Figure 33)
- The flue must penetrate 1 m higher than the fresh air inlet on the same wall. (See Page 52, Figure 33)

Figure 32: Fresh Air Intake Spigot

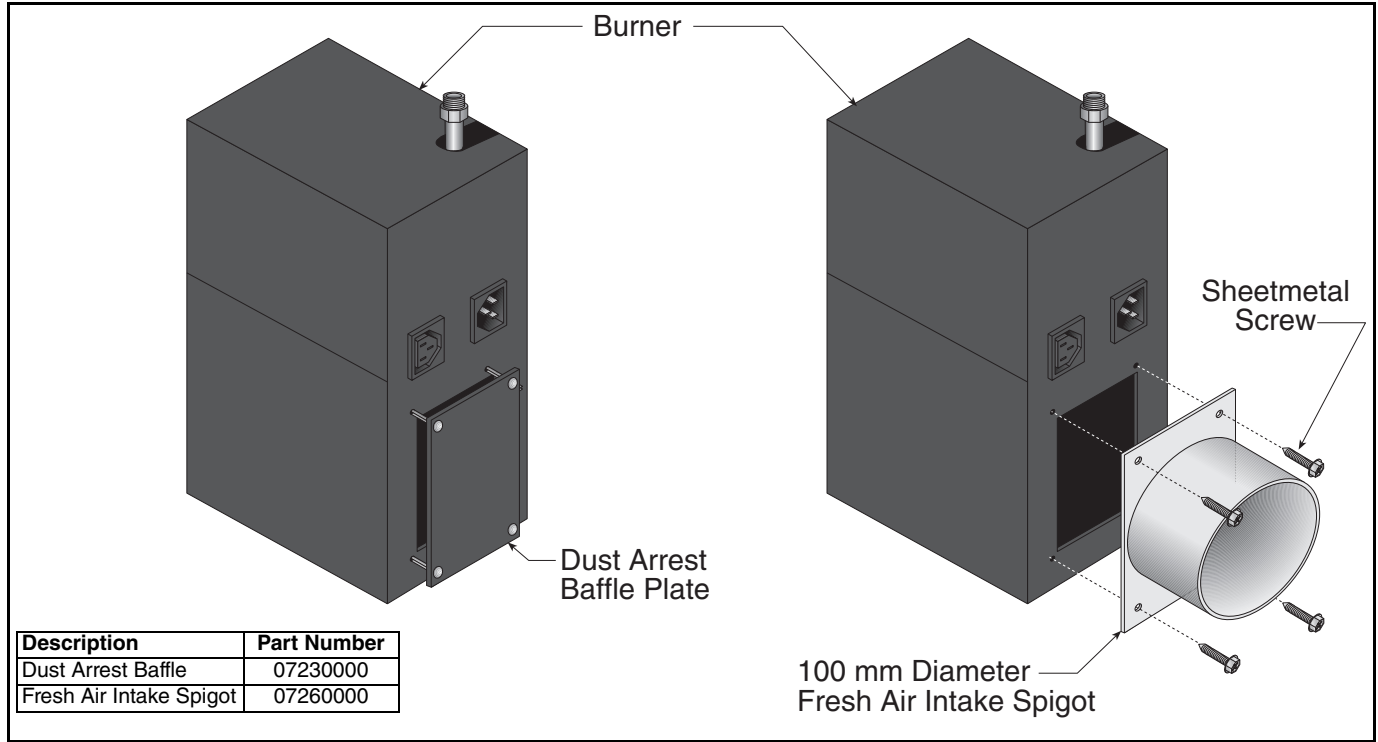
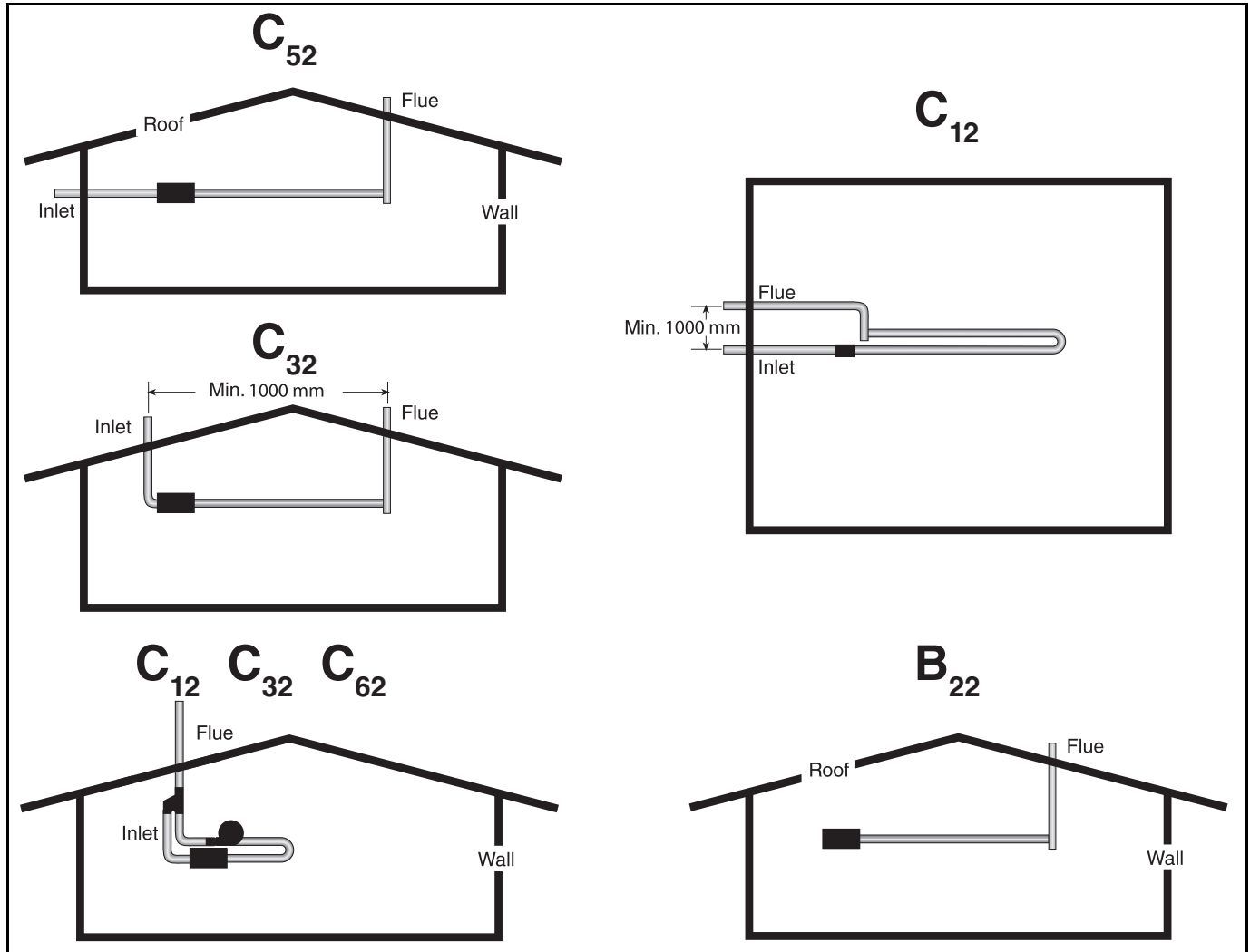


Figure 33: Air Supply with Flue Configurations



11.4 Common Duct

When using a common air inlet duct, always ensure that the area of the common air inlet duct represents the area of all air ducts.

SECTION 12: GAS PIPING

⚠ WARNING**Fire Hazard**

Tighten gas line fittings to connect gas supply according to Figure 34.

Flex gas line can crack when twisted.

Gas line moves during normal operation.

Use only 1000 mm long connector of 1/2" or 3/4" nominal ID.

Failure to follow these instructions can result in death, injury or property damage.

hose. This can cause a gas leak resulting in an unsafe condition if the gas connection is not made in strict accordance with *Figure 34*.

Meter and service must be large enough to handle all the burners being installed plus any other connected load. The gas hose which feeds the system must be large enough to supply the required gas with a maximum pressure drop of 13 mm wc. When gas piping is not included in the layout drawing, the local gas supplier will usually help in planning the gas piping.

IMPORTANT - the complete installation must be tested for gas soundness and be purged in accordance with local and national codes.

- **Check the pipe and tubing ends for leaks before placing heating equipment into service. When checking for gas leaks, use a soap and water solution; never use an open flame.**

⚠ WARNING**Explosion Hazard**

Leak test all components of gas piping before operation.

Gas can leak if piping is not installed properly.

Do not high pressure test gas piping with heater connected.

Failure to follow these instructions can result in death, injury or property damage.

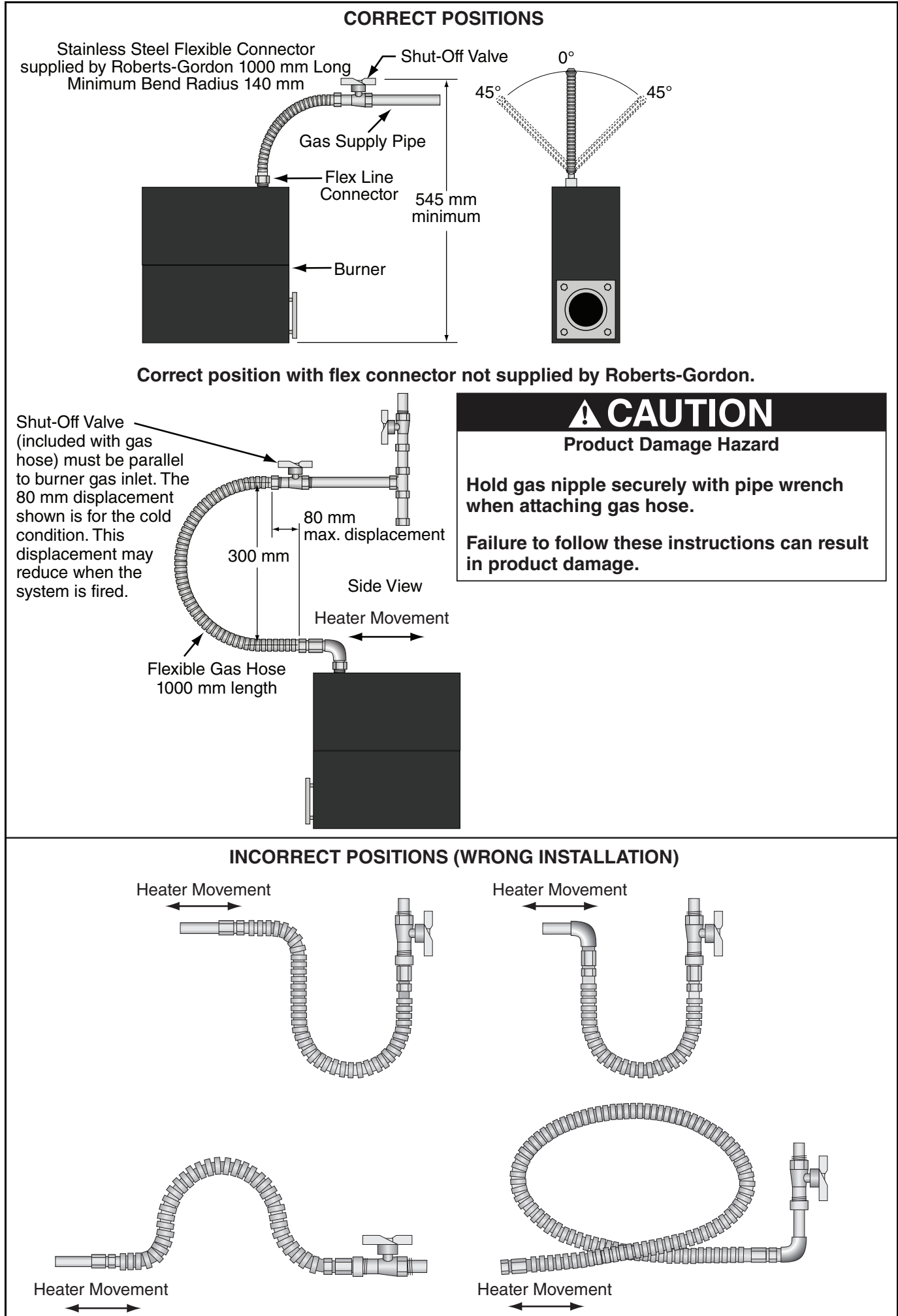
It is important that the gas supply pipe and electrical connections do not support any of the heater's weight.

Installation pipes should be fitted in accordance with National Standards. Pipe work from the meter to the heater(s) must be of adequate size. Pipes of smaller size than the heater inlet gas connection should not be used.

Install the gas hose as shown on *Page 54, Figure 34*. The gas hose accommodates expansion of the heating system and allows for easy installation and service of the burner. Before connecting the burners to the supply system, verify that all high pressure testing of the gas piping has been completed.

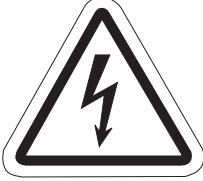
There is an expansion of the tube with each firing cycle. This will cause the burner to move with respect to the gas

Figure 34: Gas Connection with Stainless Steel Flex Connector



SECTION 13: WIRING

⚠ DANGER



Electrical Shock Hazard

Disconnect electric before service.

Heater must be properly grounded.

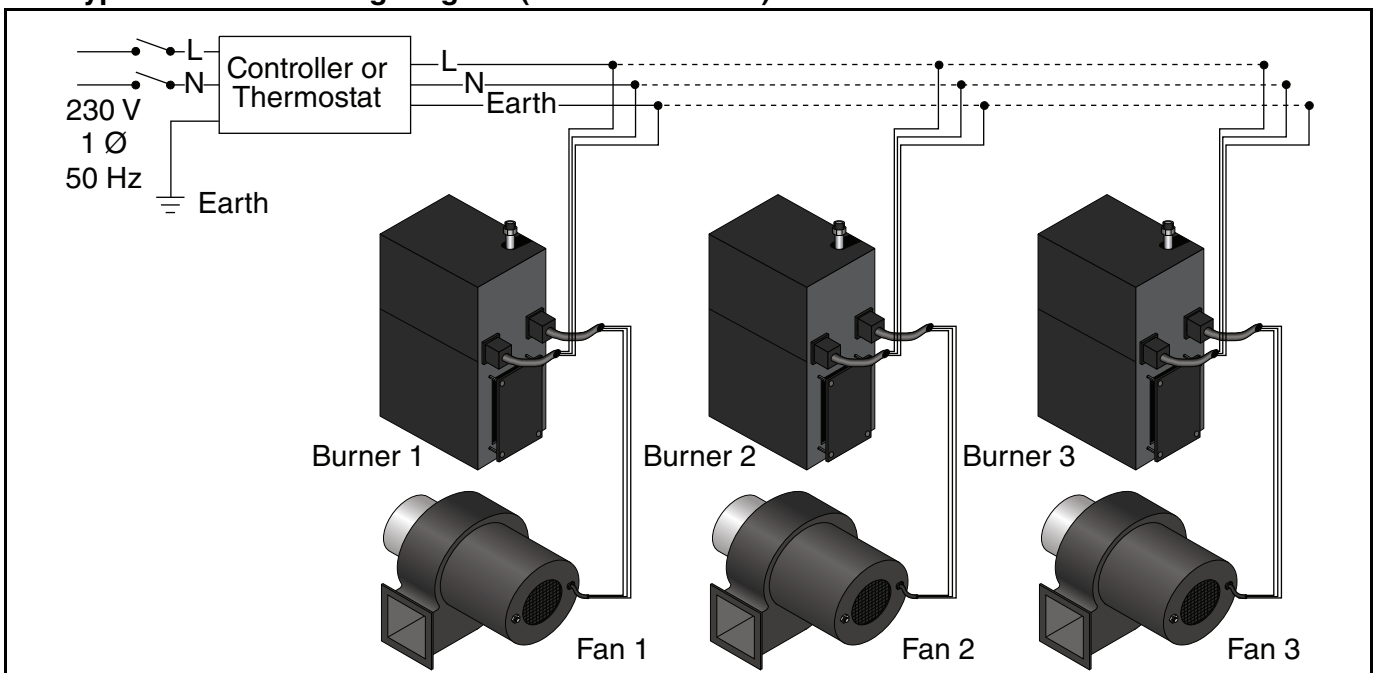
Failure to follow these instructions can result in death or electrical shock.

Connect to the electrical supply using a 3 pin plug via a locally mounted double pole fused switch having a minimum disconnection of 3 mm on each pole. This switch should be fused to 3 amps. The burner is fused at 2 amps. There are no control connections in the standard burner. Control is affected by interruption of the main power inlet. See Page 55, Section 13.1 through Page 56,

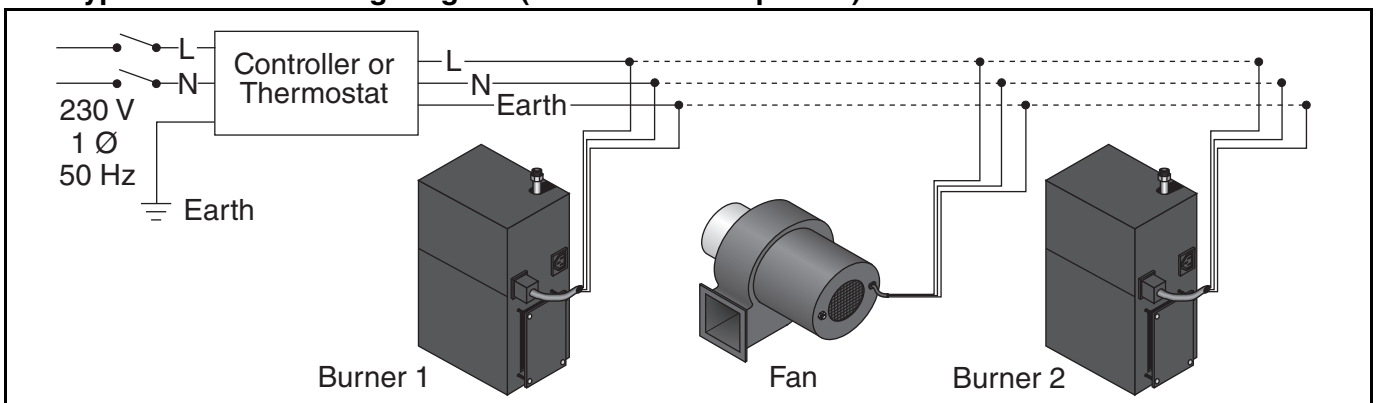
Section 13.4 for the external wiring details for the single-burner, double linear and multiburner heater systems.

All wiring must comply with current wiring regulations and any local regulations which may apply. Always switch off the supply to the burner and disconnect by removing the plug before removing the burner side panel.

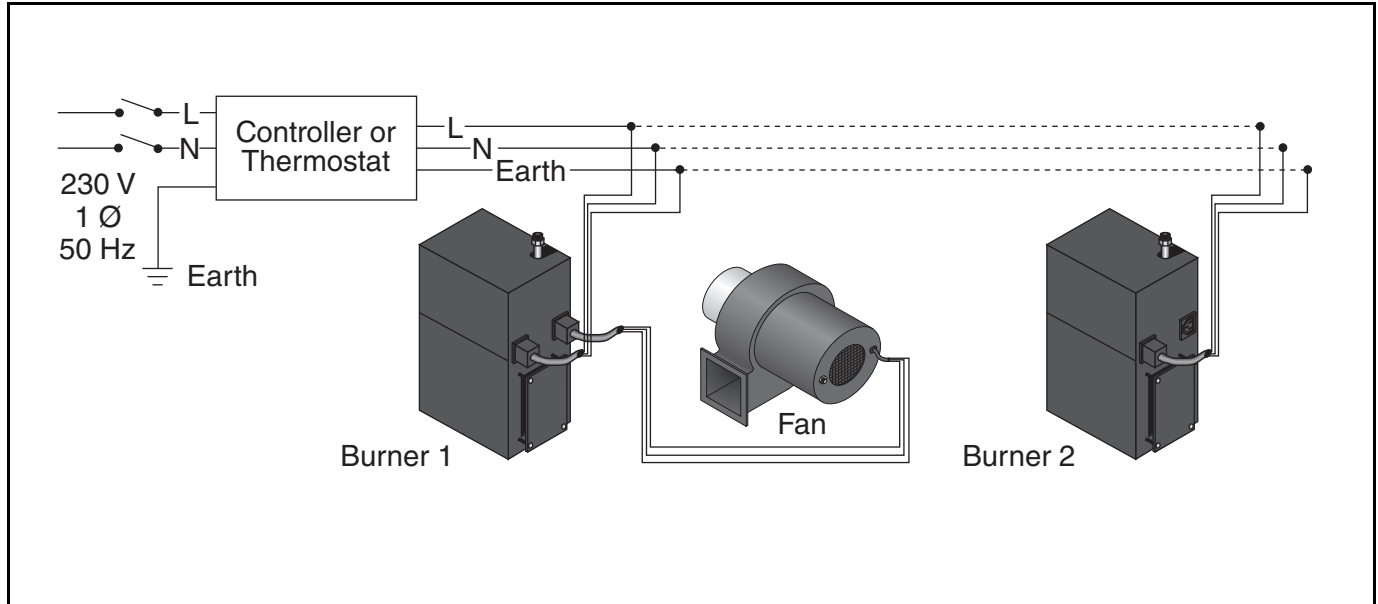
13.1 Typical External Wiring Diagram (Linear or U-Tube)



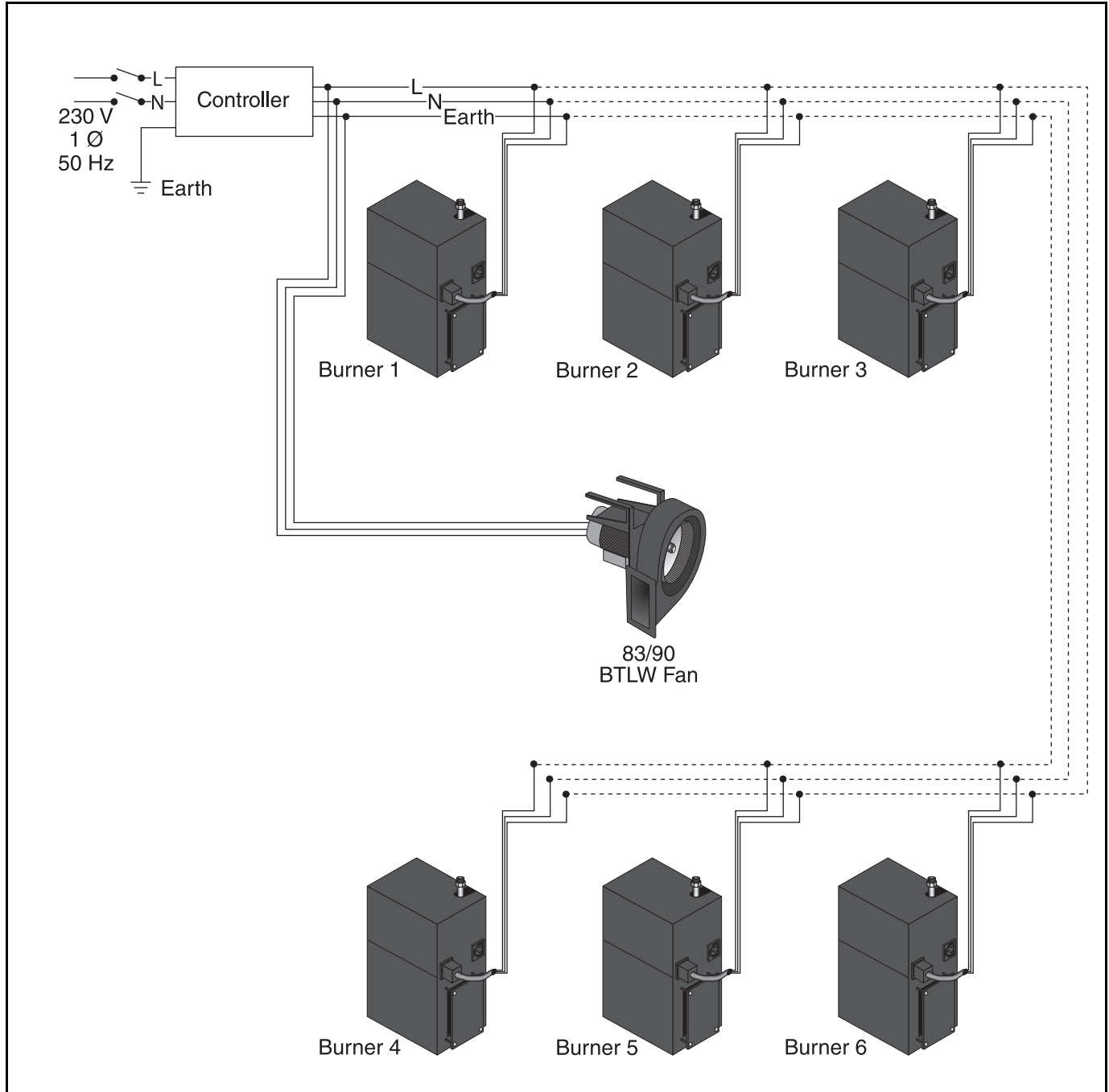
13.2 Typical External Wiring Diagram (Double Linear Option 1)



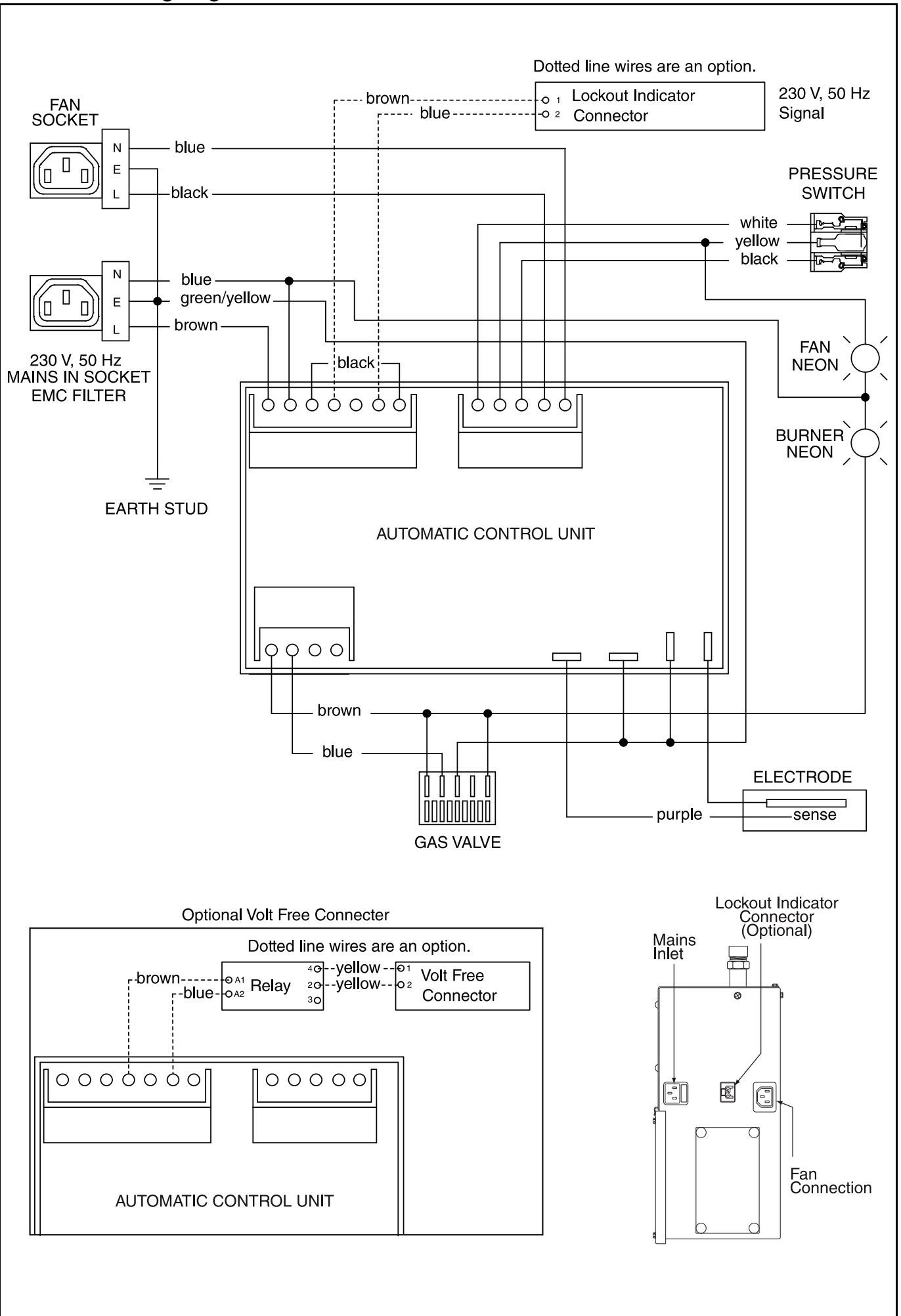
13.3 Typical External Wiring Diagram (Double Linear Option 2)



13.4 Typical External Wiring Diagram (Multiburner)



13.5 Internal Wiring Diagram



SECTION 14: OPERATION





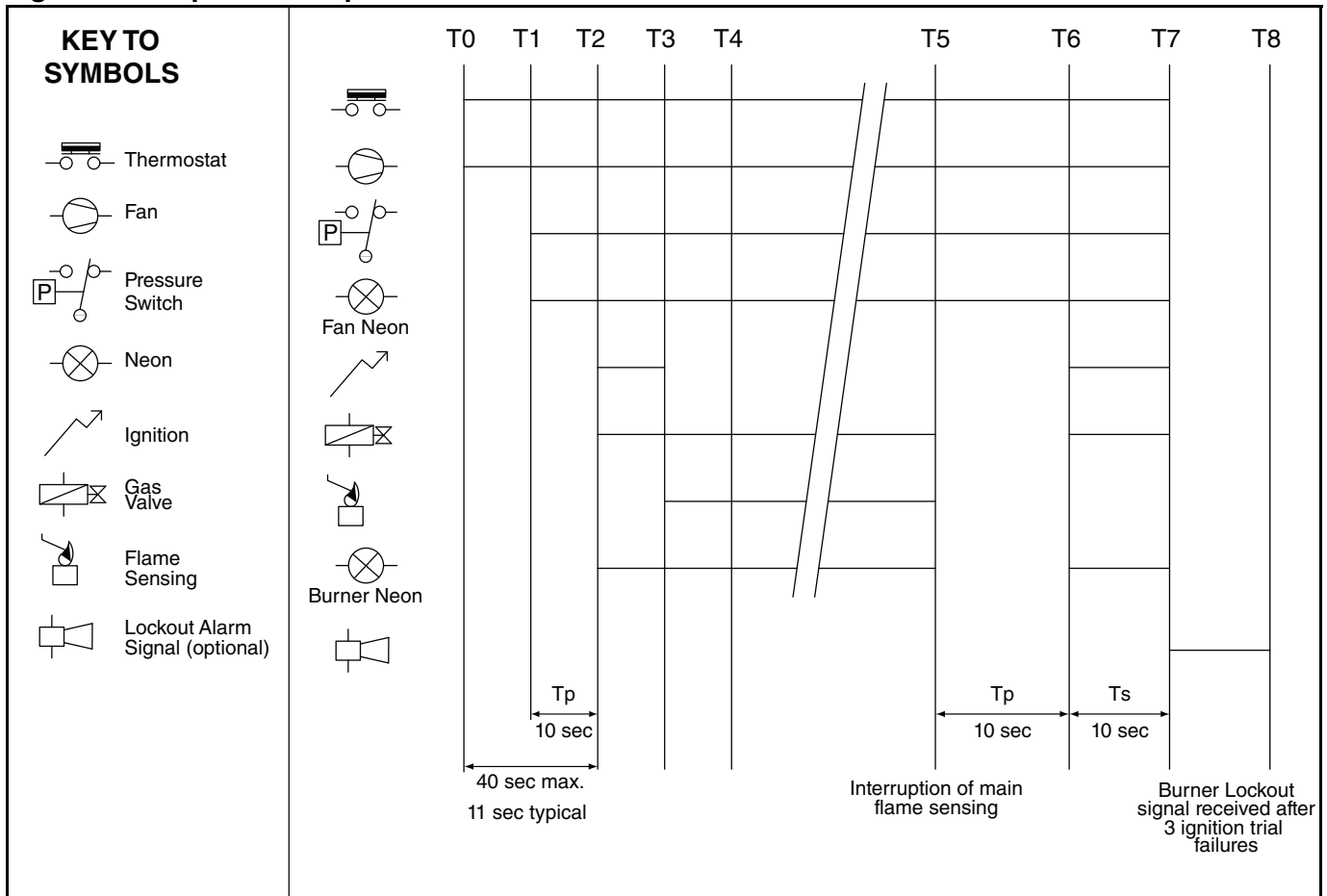
⚠ DANGER		⚠ WARNING	
			
<p>Electrical Shock Hazard</p> <p>Disconnect electric before service.</p> <p>More than one disconnect switch may be required to disconnect electric from heater.</p> <p>Heater must be connected to a properly grounded electrical source.</p>	<p>Explosion Hazard</p> <p>Turn off gas supply to heater before service.</p>	<p>Burn Hazard</p> <p>Allow heater to cool before service.</p> <p>Tubing may still be hot after operation.</p>	<p>Cut/Pinch Hazard</p> <p>Wear protective gear during installation, operation and service.</p> <p>Edges are sharp.</p>
<p>Failure to follow these instructions can result in death, electric shock, injury or property damage.</p>			

Figure 35: Sequence of Operation Chart



NOTE: If the heater operates for more than 24 hours continuously, the ignition module will automatically recycle the burner to ensure that all safety functions are still in working condition.

14.1 Heater Lockout Indication (Optional)

In case of flame loss during operation of the heater, the burner control unit goes to lockout mode after three ignition trials. At this stage a signal or closed relay will enable the ROBERTS GORDON® controller, BMS

system, etc. to indicate precisely which heater has failed. This can be done by two options.

14.1.1 Heater Lockout Indicator by Connector

A 230 V signal is provided which enables the ROBERTS GORDON® controller, BMS system, etc. to indicate the heater that has failed. An additional wire has to be installed from the heater lockout indicator connector to the monitoring computer. See *Page 57, Section 13.5*.

Description	Part Number
Connector male - Lockout Indicator	91324000
Connector female - Lockout Indicator	91324001
Wire Blue 12"	91300011
Wire Brown 12"	91300012

14.1.2 Heater Lockout Indicator by Volt Free Connector

A volt free contact relay is closed which enables the ROBERTS GORDON® controller, BMS system, etc. to indicate the heater that has failed. An additional wire has to be installed from the heater volt free connector to the monitoring computer. See *Page 57, Section 13.5*.

Description	Part Number
Connector male - Volt Free	91324000
Connector female - Volt Free	91324001
Wire Blue 7"	91300004
Wire Brown 7"	91300005
Wire Yellow 12"	91300003
Screw #8 x 3/8 Hex Wshr PHH Type 23	94961406
Base relay P2RF05E	C1050B
Relay G2R1-SN IMO 220 V 10 A	C1049B

14.2 Testing

Establish that a satisfactory purged gas supply and an electrical supply is available to the heater. Ensure that all time clocks and thermostats are set to call for heat.

With the gas supply cut off at the appliance isolating cock and the electrical supply isolated by switching off at the local switch and removing the appliance inlet plug, open the control chamber secured by the two screws. Loosen the sealing screw from the pressure test point and remove the cover cap from the governor.

Turn on the gas supply and connect appliance electrical plug. Ensure that the timer or thermostat, if fitted, are set to call for full gas rate. Switch on at the local switch. The sequence as described should take place. If not, refer to detailed fault finding sequence. When flame is established, check the gas pressure reading and adjust if necessary. Refer to burner data label.

Check the gas pressure at the outlet of the gas valve. See *Page 74, Section 18.9.1* or *See Page 75, Section 18.9.2* for pressure settings or refer to the data plate.

Switch off the electrical supply (shutting down the heater), remove pressure gauge - tighten pressure test point screw, ensuring a tight gas seal. Replace governor cover cap. Close burner side cover.

14.3 Commissioning (Multiburner)

1. Establish that a satisfactory purged gas supply and an electrical supply is available to the heater.
2. ENSURE that all the dampers are in the fully open position.

3. With the gas supply off at each of the burners and the electrical supply isolated, open the control chamber secured by two self tapping screws.
4. Ensure that all time clocks and thermostats are set to call for heat.

5. Switch on the electrical supply at the main isolator. This will start the exhaust fan.

6. Balancing Cold Vacuum

Check each burner vacuum by connecting an inclined pressure gauge to the tee on the pressure switch inlet side in the burner. Adjust the damper so that the vacuum is 1.9 mbar. Repeat for each burner.

7. Starting at the end burner (furthest from the exhaust fan), with the inclined pressure gauge connected as described above. Turn on the gas supply and connect appliance electrical plug, reset the pressure switch by removing vacuum from the inlet side of the pressure switch waiting several seconds and reconnecting. The start up sequence described on *Page 58, Section 14* should take place. If not, refer to detailed fault finding sequence. When flame is established, check the gas pressure reading and adjust if necessary. See data label.

Check the gas pressure at the outlet of the gas valve. See *Page 74, Section 18.9.1* or *See Page 75, Section 18.9.2* for pressure settings or refer to the data plate.

Switch off the electrical supply (shutting down the heater), remove pressure gauge - refit pressure test point screw, ensuring a tight gas seal. Replace governor cover cap.

Repeat this procedure for each burner in the system.

Close the control chamber and secure with two sheet metal screws.

8. Balancing Hot Vacuum

Reconnect all the burners on the system and allow them to reach full operating temperature (approximately 20 minutes). Return to each burner and recheck the hot vacuum at the tee on the inlet to the pressure switch. Readjust the damper so that the hot vacuum of 1.5 mbar (2.0 mbar for BH40EF) is achieved and lock the damper in position.

14.4 System Checks

Switch on again at the local switch to ensure smooth ignition. Carry out the following system checks:

When running, turn off the gas supply at the appliance. The heater will immediately shut down followed by three ignition attempts followed by lockout.

Linear and Double Linear only:

When running, disconnect the fan plug from the burner. The unit should shut down within three seconds, proving operation of the pressure switch.

14.5 User Instructions

After satisfactory testing, ensure that the client is fully aware of the operation of the system. Bring this manual to

the attention of the user or purchaser; instruct them in the safe operation of the heater(s). Advise the user that if the system is unflued, any reduction in the natural ventilation of the building may require a flue to be fitted, or additional ventilation grilles will be required.

14.6 ECA Approved Systems (Multiburner only)

On ECA approved systems, it must be verified that the requirement of 91% net combustion efficiency is met. Measurements of temperature and CO₂ concentration in the exhaust gasses have to be done. The net combustion efficiency calculates as follows;

$$100 - [(t_E - t_R) (A/CO_{2m} - B)] = \text{net combustion efficiency}$$

t_E - Exhaust Temperature °C





t_R - Room Temperature °C

A - G20 = 0.37, G31 = 0.42

B - G20 = 0.009, G31 = 0.008

CO_{2m} - Measured CO₂ Concentration %

SECTION 15: SERVICING INSTRUCTIONS

⚠ DANGER		⚠ WARNING	
			
<p>Electrical Shock Hazard</p> <p>Disconnect electric before service.</p> <p>More than one disconnect switch may be required to disconnect electric from heater.</p> <p>Heater must be connected to a properly grounded electrical source.</p>	<p>Explosion Hazard</p> <p>Turn off gas supply to heater before service.</p>	<p>Burn Hazard</p> <p>Allow heater to cool before service.</p> <p>Tubing may still be hot after operation.</p>	<p>Cut/Pinch Hazard</p> <p>Wear protective gear during installation, operation and service.</p> <p>Edges are sharp.</p>
<p>Failure to follow these instructions can result in death, electric shock, injury or property damage.</p>			

IMPORTANT: Never use the heater as a support for ladders or other access equipment. Always test for gas soundness with a suitable detection fluid after completing any servicing or exchange of gas carrying component. On completion of any service/fault finding tasks which require the breaking and remaking of electrical connections, the checks:- A:Earth Continuity, B:Polarity and C:Resistance to Earth must then be repeated.

15.1 Annual Procedure

Carry out the following procedure annually. The preferred time would be immediately before the winter heating period. If very dirty conditions arise, it may be necessary to carry out this procedure more often. If the unit takes in air through an air duct or filter assembly, more frequent service may be necessary.

15.1.1 Burner and Fan Removal

Isolate the heater from the gas and electrical supplies. Remove the fan plug from the burner. Unscrew the securing screws on the burner flange. The burner can now be removed. Take care not to disturb the gasket on the flanged burner tube. Unscrew the securing screw on the fan flange spigot. The fan can now be removed.

15.1.2 Burner and Fan Removal Maintenance

Remove the fan and burner independently to floor level and clean both items internally using a soft brush and compressed air, if available. Take care not to damage the internal parts of the burner. Check fan impeller for cleanliness and free rotation.

The electrodes are an integral part of the burner. To check spark gap, remove the securing screws on the electrode and withdraw it ensuring the gasket is not damaged. Spark gap on electrode should be approximately 3 mm.

15.1.3 Tube and Reflector Maintenance

With burner and fan removed, clean the outer surfaces of the tubes using a brush and wipe the inner surface of the reflector with a soft damp cloth - use a household detergent if necessary. Never use abrasive cleaners on the reflectors. Reassemble the burner and fan in reverse

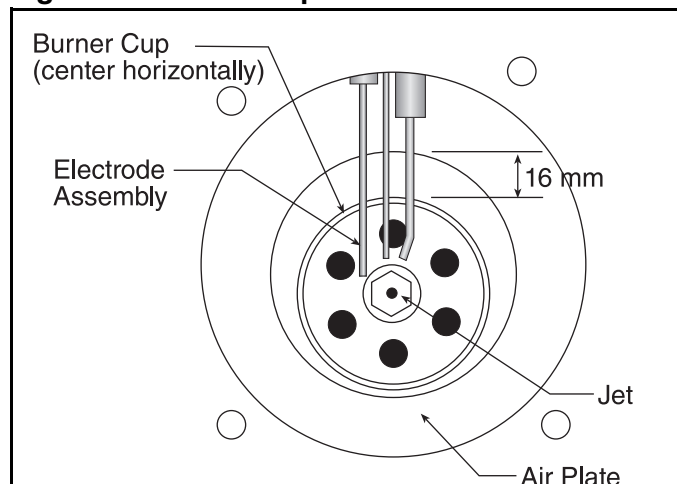
order. Carry out the Testing Procedure. See Page 59, Section 14.2.

15.2 Component Removal

First, isolate the heater from the gas and electrical supplies. Entry to the burner assembly is gained by removing the door screws and opening the hinged side cover. Entry to the combustion chamber is gained by removing the combustion chamber cover.

15.2.1 Electrode

Figure 36: Burner Cup Position



15.2.2 Burner Head/Injector Jet

When the cover is removed completely, the burner assembly is exposed. Unscrew the burner cup. Remove brass injector jet (orifice). Replace in reverse sequence.

15.2.3 Solenoid Valve/Governor

Remove burner head. Remove screws securing the solenoid/governor body bracket. Withdraw the four wires between the solenoids. The solenoid/governor and fittings can now be withdrawn from the compartment. The solenoid(s) can be removed from the body by unscrewing central screw. Replace in reverse sequence. Note: Earth is green/yellow.

15.2.4 Automatic Flame Control Unit

Remove black ignition lead. Withdraw the connectors. Remove two screws from the cover. Replace if faulty. Refit in reverse sequence.

15.2.5 Pressure Switch

Disconnect the two silicone tubes. Remove wires from the three blades. Remove two screws which secure the pressure switch to the burner. Remove pressure switch. Replace pressure switch, if faulty, and refit in reverse sequence ensuring that the rubber tubes are reconnected to the switch correctly.

Note: Wires fitted as follows:

- NO - Yellow
- NC - White
- Common - Black

15.2.6 Neons

Remove the two push on connectors and remove the neons by pushing downwards. Replace in reverse sequence.

15.3 Maintenance Checklist

Installation Code and Annual Inspections:

All installation and service of ROBERTS GORDON® equipment must be performed by a contractor qualified in the installation and service of equipment sold and supplied by Roberts-Gordon and conform to all requirements set forth in the ROBERTS GORDON® manuals and all applicable governmental authorities pertaining to the installation, service and operation of the equipment. To help facilitate optimum performance and safety, Roberts-Gordon recommends that a qualified contractor conduct, at a minimum, annual inspections of your ROBERTS GORDON® equipment and perform service where necessary, using only replacement parts sold and supplied by Roberts-Gordon.

The Vicinity of the Heater Do not store or use flammable objects, liquids or vapours near the heater. Immediately remove these items if they are present.
See Page 5, Section 3.

Vehicles and Other Objects Maintain the clearances to combustibles.
Do not hang anything from, or place anything on, the heater.
Make sure nothing is lodged underneath the reflector, in between the tubes or in the decorative or protective grilles (included with select models).
Immediately remove objects in violation of the clearances to combustibles.
See Page 5, Section 3.

Reflector Support reflector with hanger and support strap.
Reflector must not touch tube.
Make sure there is no dirt, sagging, cracking or distortion.
Do not operate if there is sagging, cracking or distortion.
Make sure reflectors are correctly overlapped. *See Page 23, Section 6.6.1. or Page 34, Section 7.8.1.*
Clean outside surface with a damp cloth.

Vent Pipe Venting must be intact. Using a flashlight, look for obstructions, cracks on the pipe, gaps in the sealed areas or corrosion.
The area must be free of dirt and dust.
Remove any carbon deposits or scale using a wire brush.
See Page 50, Section 11.





Outside Air Inlet Inlet must be intact. Look for obstructions, cracks on the pipe, gaps in the sealed areas or corrosion.
The area must be free of dirt and dust. Clean and reinstall as required.

Tubes	<p>Make sure there are no cracks.</p> <p>Make sure tubes are connected and suspended securely.</p> <p><i>See Page 11, Section 5.</i></p> <p>Make sure there is no sagging, bending or distortion.</p>
Gas Line	<p>Check for gas leaks. <i>See Page 53, Section 12.</i></p>
Burner Observation Window	<p>Make sure it is clean and free of cracks or holes.</p> <p>Clean and replace as required.</p>
Blower Scroll, Wheel and Motor	<p>Compressed air or a vacuum cleaner may be used to clean dust and dirt.</p>
Burner Cup and Orifice	<p>Clear of obstructions (even spider webs will cause problems). Carefully remove any dust and debris from the burner.</p>
Electrode	<p>Replace if there are cracked ceramics, excessive carbon residue, or erosion of the electrode.</p> <p>The electrode gap should be 3 mm.</p>
Thermostat	<p>There should be no exposed wire or damage to the thermostat.</p> <p><i>See Page 55, Section 13.</i></p>
Suspension Points	<p>Make sure the heater is hanging securely.</p> <p>Look for signs of wear on the chain or ceiling.</p> <p><i>See Page 11, Section 5.</i></p>
Sports Hall Guard, Decorative and Protective Grilles (optional)	<p>The grille must be securely attached. If the grille is loose or off, contact a contractor qualified in the installation and service of gas-fired heating equipment for repair.</p> <p>Check that side reflector extensions are installed correctly and secured in place if necessary (decorative grille only).</p> <p><i>See Page 42, Section 10.1 and Page 45, Section 10.4.</i></p> <p>Make sure shield is installed correctly and secured in place if necessary. (Decorative grille only.) <i>See Page 44, Section 10.3.2.</i></p>
Wall Tag	<p>If a wall tag is present, make sure it is legible and accurate. Please contact Roberts-Gordon LLC or your ROBERTS GORDON® independent distributor if you need a wall tag. <i>See Page 4, Section 2.1.</i></p>

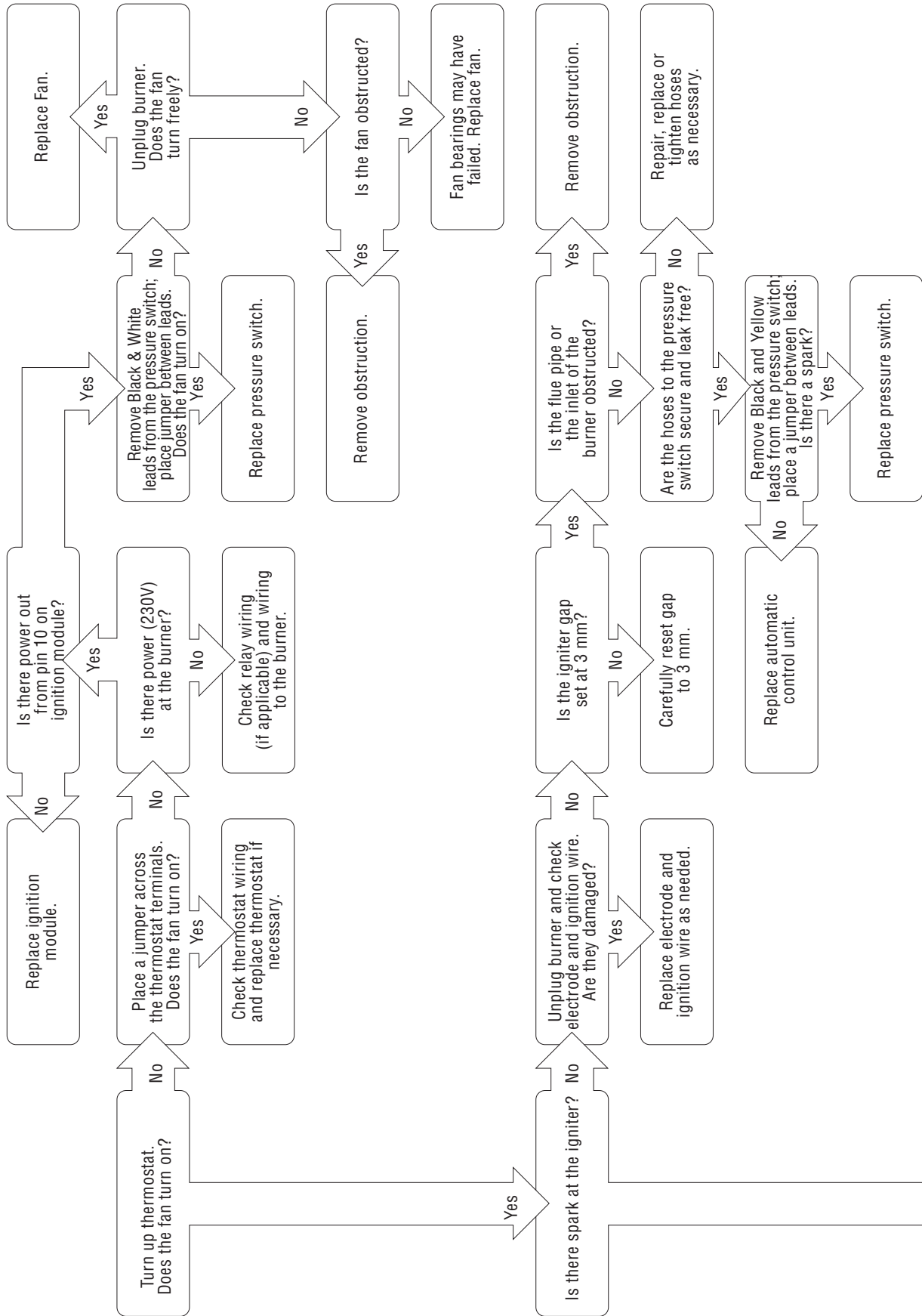
SECTION 16: TROUBLESHOOTING

⚠ DANGER

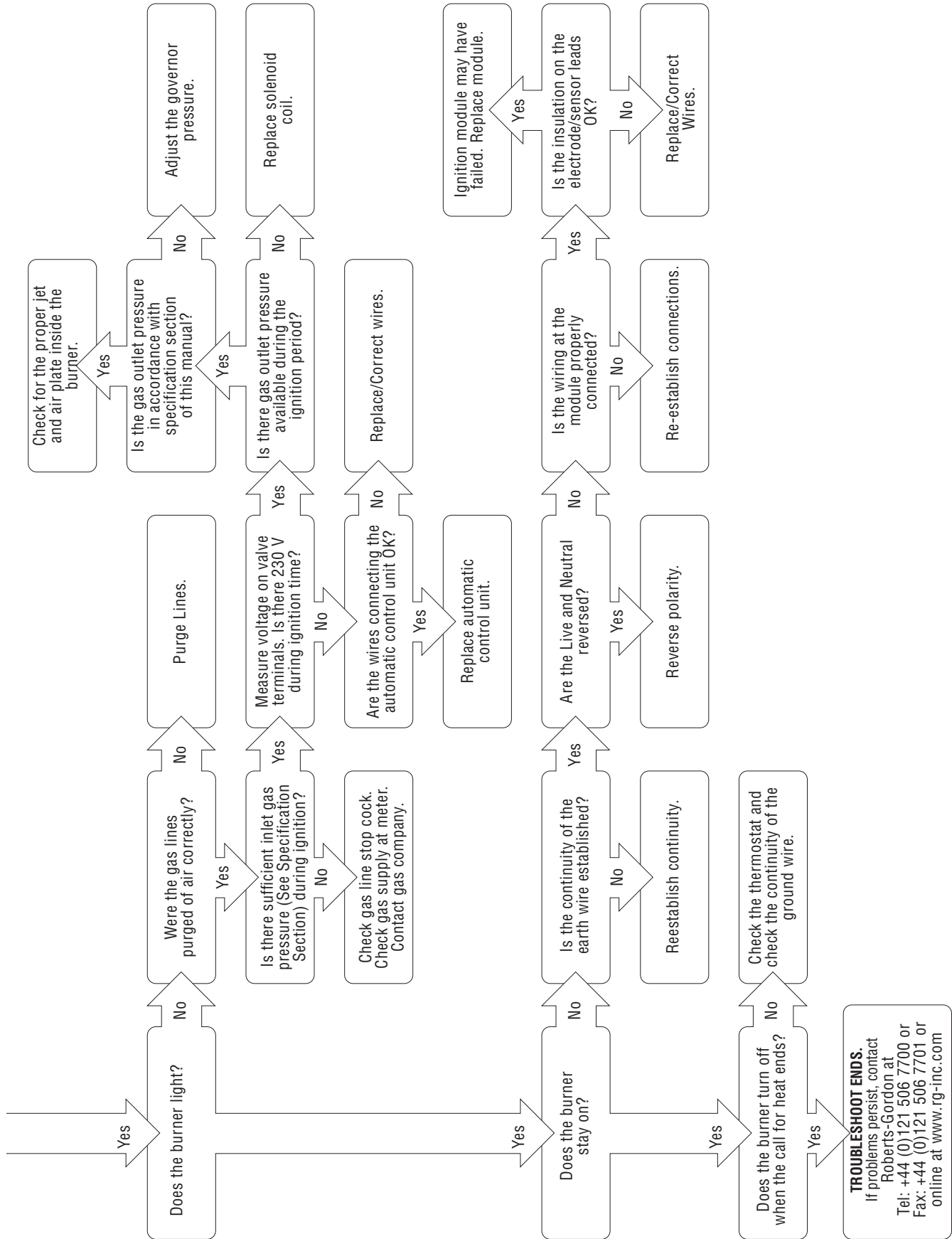
Electrical Shock Hazard
<p>Disconnect electric before service.</p> <p>Heater must be properly grounded.</p> <p>Failure to follow these instructions can result in death or electrical shock.</p>

⚠ WARNING			
			
Fire Hazard	Explosion Hazard	Burn Hazard	Cut/Pinch Hazard
<p>Keep all flammable objects, liquids and vapors the minimum required clearances to combustibles away from heater.</p> <p>Some objects will catch fire or explode when placed close to heater.</p>	<p>Turn off gas supply to heater before service.</p>	<p>Allow heater to cool before service.</p> <p>Tubing may still be hot after operation.</p>	<p>Wear protective gear during installation, operation and service.</p> <p>Edges are sharp.</p>
Failure to follow these instructions can result in death, injury or property damage.			

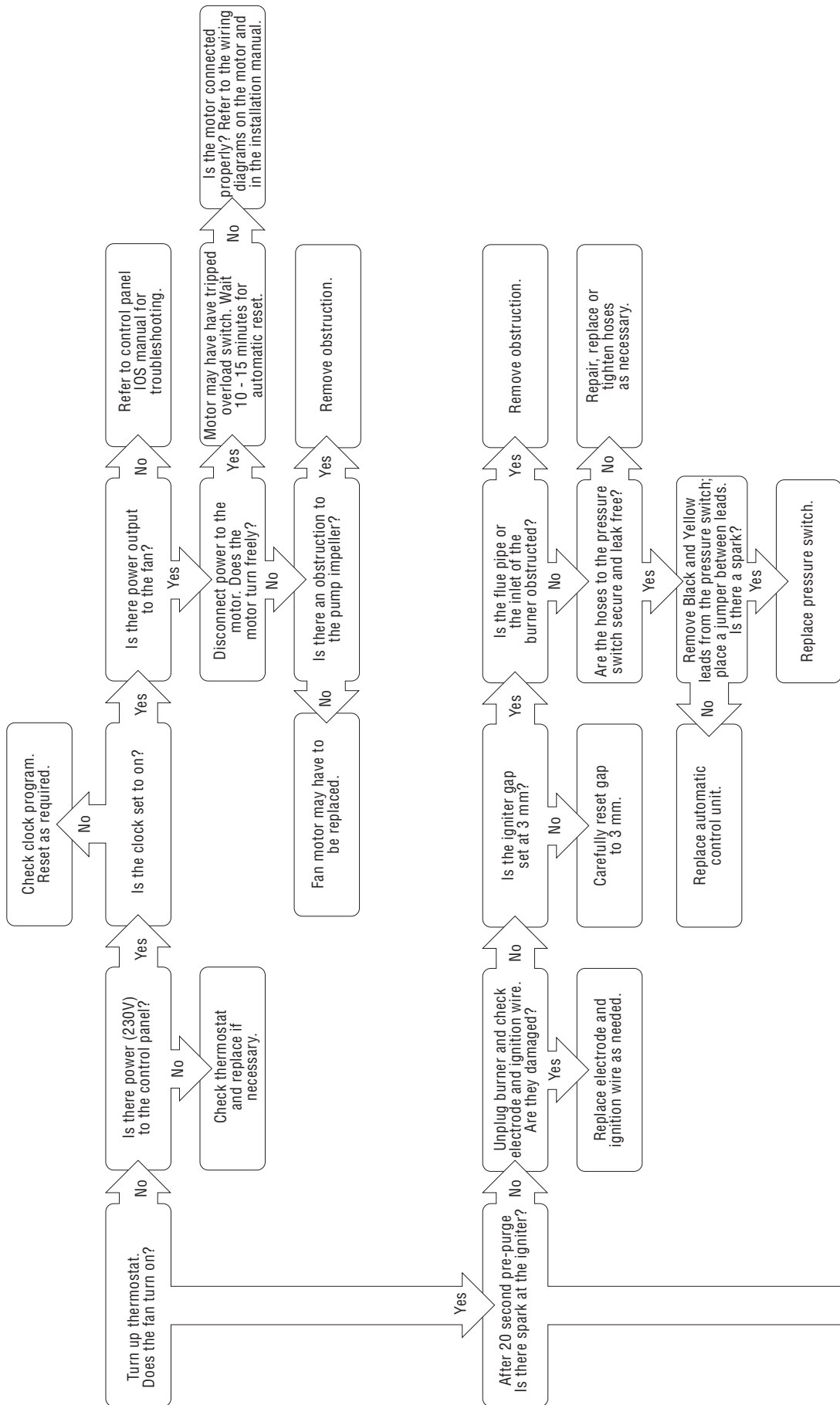
16.1 Troubleshooting Flow Chart (Linear, Double Linear and U-Tube)



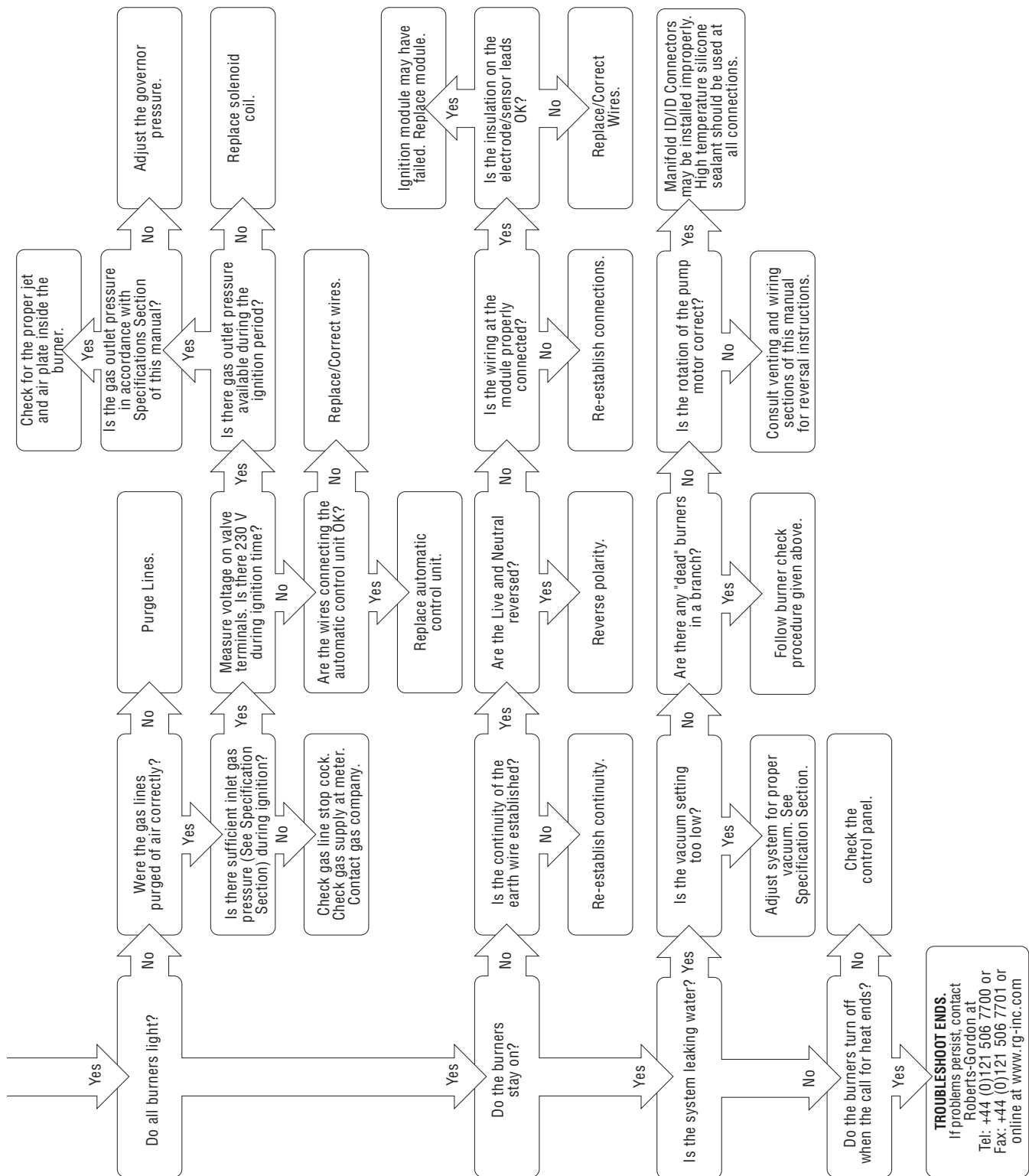
Troubleshooting Flow Chart (Linear, Double Linear and U-Tube)



16.2 Troubleshooting Flow Chart (Multiburner)

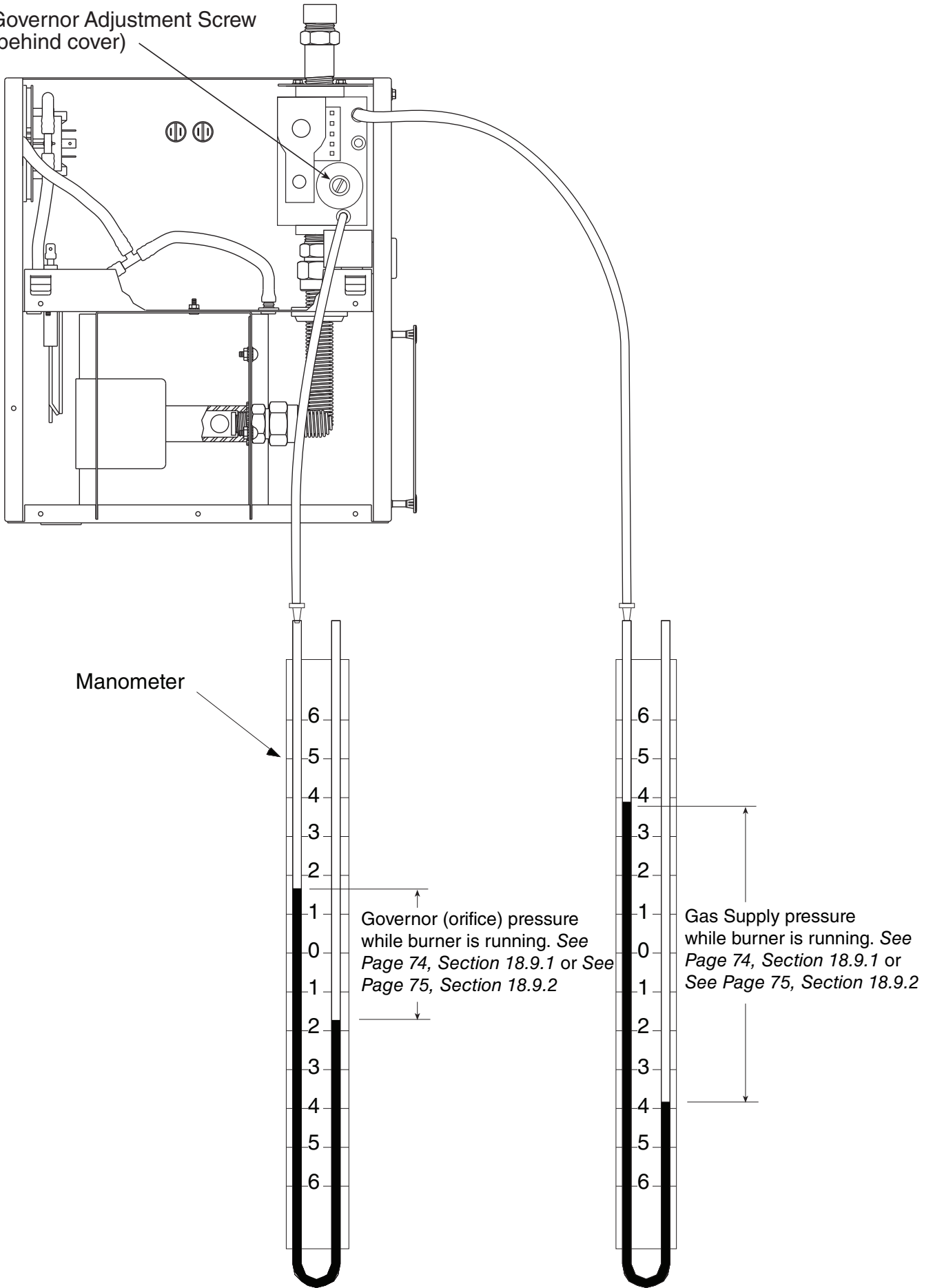


Troubleshooting Flow Chart (Multiburner)

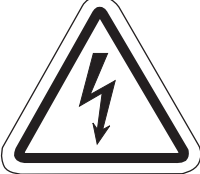





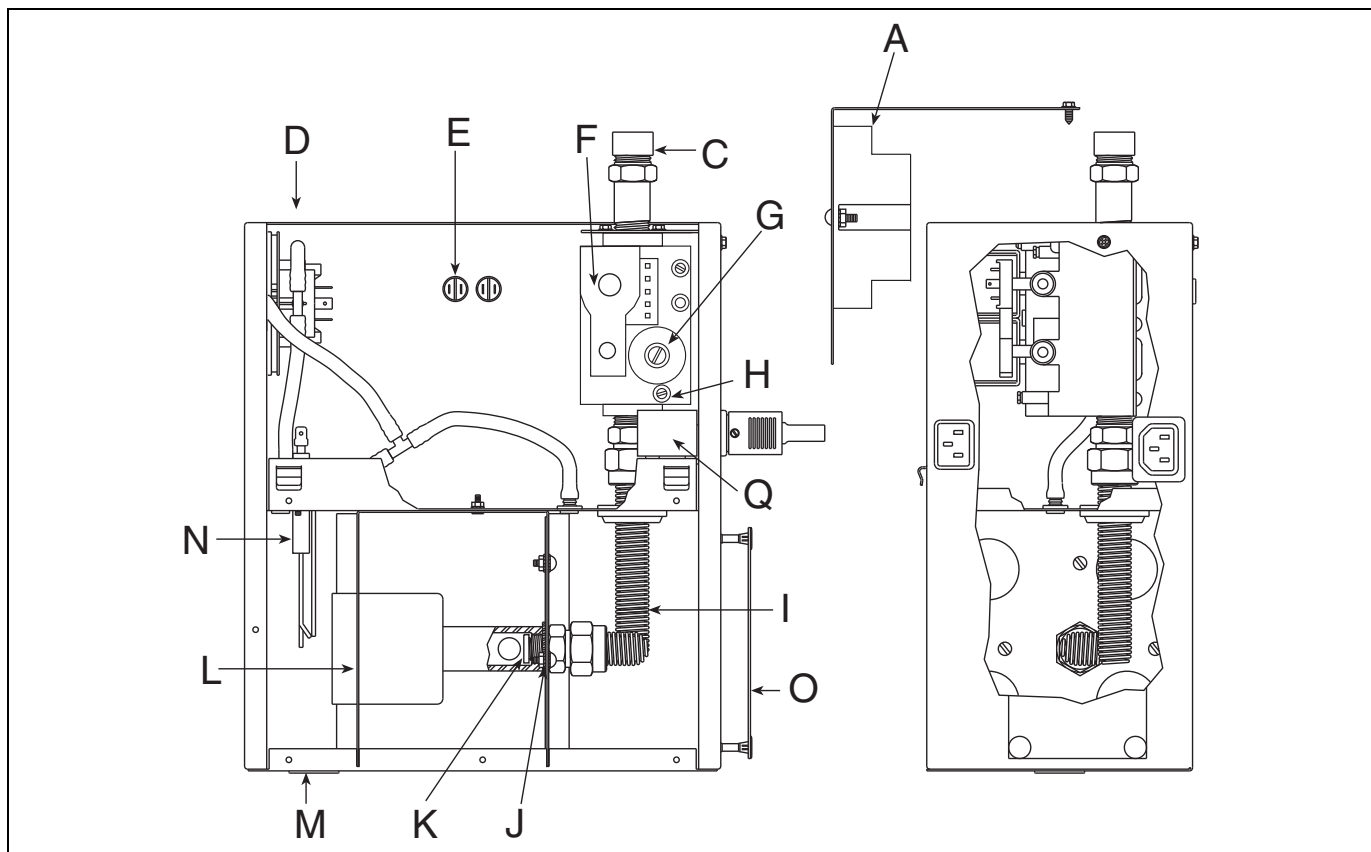
16.3 Manifold Gas Pressure Setting

Governor Adjustment Screw
(behind cover)



SECTION 17: REPLACEMENT PARTS

⚠ DANGER		⚠ WARNING	
			
Electrical Shock Hazard	Explosion Hazard	Fire Hazard	Carbon Monoxide Hazard
Use only genuine ROBERTS GORDON® replacement parts per this installation, operation and service manual.			
Failure to follow these instructions can result in death, electric shock, injury or property damage.			



Item	Description	Part Number	Item	Description	Part Number
A	Automatic Control Unit	90438702	O	Dust Arrest Baffle Plate	07230000
C	Flex Line Adapter	91220700	Q	Mains in socket with EMC Filter	90438902
D	Pressure Switch for BH25 - BH55, BH50EF, (0.23" w.c.) BH15 and BH20 (0.32" w.c.) BH30EF and BH35EF (0.41" w.c.) BH45EF (0.47" w.c.) BH40EF (0.79" w.c.) BH25EF (0.59" w.c.)	90439801 90439802 90439803 90439804 90439808 90439809	N/S	Ignition Wire	90427704
E	Amber Neon Lamp	91320602	N/S	Outside Air Kit	07260000
F	Gas Valve	90033101	N/S	Flue Collar 100 mm	91911700
G	Governor Screw	N/A	N/S	Outside Air Mounting Plate	07261000
H	Outlet Pressure Tap	N/A	N/S	#8 x 3/8 Washer Head Screw	94118106
I	Flex Manifold	03090702T	N/S	Burner Tube Gasket	02568200
J	Star Washer	96212100	N/S	Wire Purple 12.5"	07250007
K	Jet Orifice (See Page 74, Section 18.9.1)	N/A	N/S	Wire Harness BH Gas Valve	07250006
L	Burner Cup Assembly	03020100	N/S	Wire Harness BH Pressure Switch	07250005
M	Mica Window Assembly	02552303	N/S	Wire Harness BH Main Power	07250004
N	Electrode Assembly	90427403	N/S	Lockout Indicator Connector (male)	91324000
N/S	Electrode Gasket	02558501	N/S	Lockout Indicator Connector (female)	91324001

Notes:

SECTION 18: SPECIFICATIONS

18.1 Material Specifications

18.1.1 Combustion and Tubes

100 mm dia. 16 gauge heat treated aluminised mild steel.

18.1.2 Reflectors

NS3 H14 aluminium or 1.4016 2R stainless steel (option).

18.2 Heater Specifications

18.2.1 Sequence Controller

Fully automatic, three try, direct spark, 100% shut off ignition flame rectification module.

18.2.2 Electrical

Rating: 230V, 50 Hz, 1 Ø, 1 A

Connection: 3 pin moulded plug

18.2.3 Gas Supply

Connection: Rc1/2 (1/2" BSP int)

Natural G20:

Minimum - Inlet 15 mbar (6 in wg)

Maximum - Inlet 50 mbar (20 in wg)

Natural G25:

Minimum - Inlet 17.5 mbar (7 in wg)

Maximum - Inlet 50 mbar (20 in wg)

LP Gas (Propane or Butane):

Minimum - Inlet 32.5 mbar (13 in wg)

Maximum - Inlet 50 mbar (20 in wg)

18.3 Venting Specifications

18.3.1 Fans

BH-15, 20, 25, 30..... Model: Torin DSF 133-42

BH-25 EF, 30 EF, 35 EF,
BH-35, 40, 45 Model: Torin DSA 524-202

BH-40 EF, 45 EF,
50 EF, BH-50 Model: Magnetek JF1G

BH30DL, 40DL, BH50DL/EF,
60DL/EF, 70DL/EF..... Model: Magnetek JF1G

Multiburner Model: Airflow 83 BTLW

..... Model: Airflow 90 BTLW

Consult the manufacturer for availability of alternate fans.

18.3.2 Flue

When fitted, the flue must be 100 mm, or greater in diameter, and must conform to National Codes. The flue must be self supporting. Inlet must be 100 mm diameter.

Multiburner - Flue must be 150 mm diameter and will be sized to suit arrangement and will connect to the fan. Flue material must conform to National Codes. The flue must be self supporting.

18.4 Suspension Specifications

Hang heater with materials with a minimum working load of 33 kg.

18.5 Controls Specifications

Time switches, thermostats, etc. can be wired into the electrical supply. External controls supplied as an optional extra.

18.6 Linear Heater	BH15ST	BH20ST	BH25ST BH25ST/EF	BH30ST BH30ST/EF	BH35ST BH35ST/EF	BH40ST BH40ST/EF	BH45ST BH45ST/EF	BH50ST BH50ST/EF	BH55ST*
Input - Gross (kW)	15	20	25	30	35	40	45	50/51	55
Input - Net (kW)	13.5	18	22.5	27	31.5	36	40.5	45/46	49.5
Tube Length (mm)	6096	9144	9144	12192	12192	12192	15240	15240	18288
Overall Heater Length (mm)	6661	9709	9709	12757	12767	12767	15815	15850	18579
Weight (kg)	39	55	55	68	68	68	81	81	95
Heated Area (m ²)	20-160	30-210	40-265	50-315	55-370	65-420	70-475	80-525	90-620
Minimum Installation Height(mm)	3500	3500	3500	3500	4600	5000	5000	5000	6000
Recommended Installation Height (mm)	3500	3600	3900	4200	4800	5500	6700	7600	8000

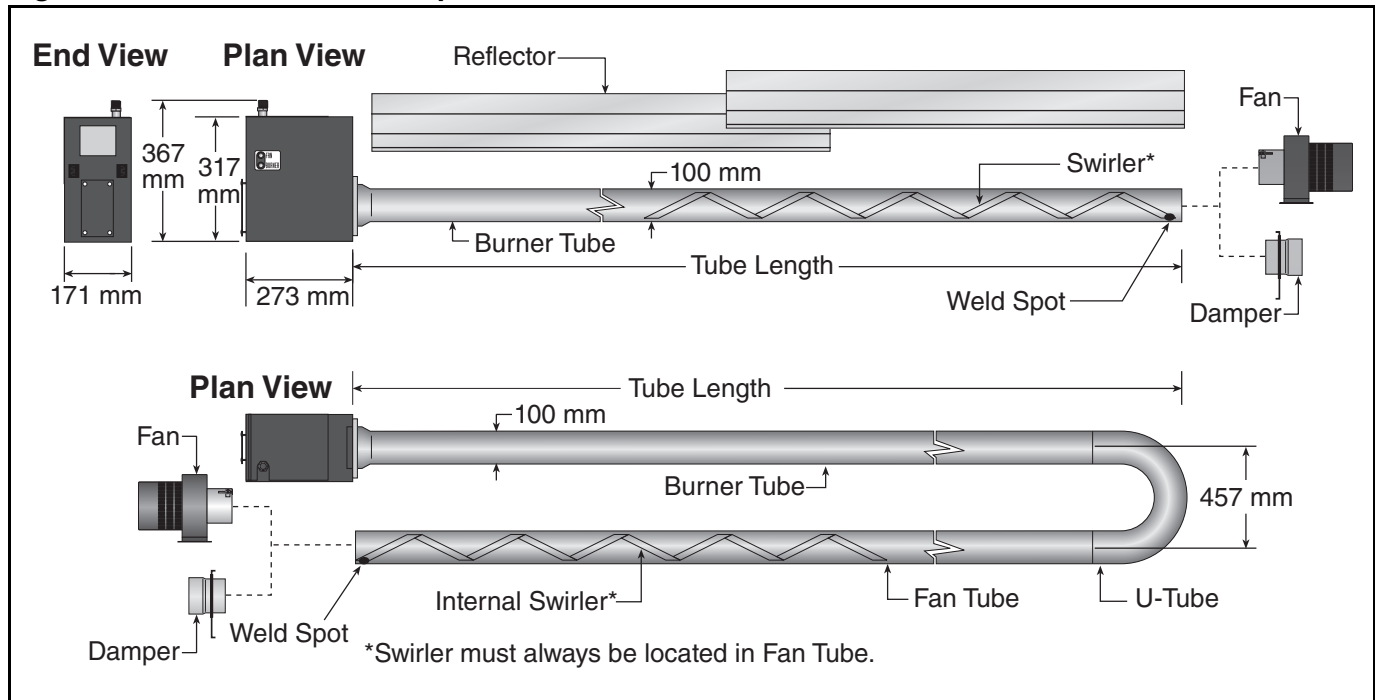
* Only available in Multiburner.

18.7 Double Linear Heater	BH30DL	BH40DL	BH50DL BH50DL/EF	BH60DL BH60DL/EF	BH70DL BH70DL/EF
Input - Gross (kW)	30	40	50	60	70
Input - Net (kW)	27.5	36	45	54	63
Tube Length (mm)	12802	18898	18898	24994	24994
Overall Heater Length (mm)	13462	19558	19558	25654	25654
Weight (kg)	82	110	110	136	136
Heated Area (m ²)	50-315	65-420	80-525	100-630	110-740
Minimum Installation Height (mm)	3500	3500	3500	3500	4600
Recommended Installation Height (mm)	3500	3600	3900	4200	4800

18.8 U-Tube Heater	BH15UT	BH20UT	BH25UT BH25UT/EF	BH30UT BH30UT/EF	BH35UT BH35UT/EF	BH40UT BH40UT/EF	BH45UT BH45UT/EF	BH50UT BH50UT/EF
Input - Gross (kW)	15	20	25	30	35	40	45	50
Input - Net (kW)	13.5	18	22.5	27	31.5	36	40.5	45
Tube Length (mm)	3531	5055	5055	6579	6579	6579	8103	8103
Overall Heater Length (mm)	3822	5346	5346	6870	6870	6870	8394	8394
Weight (kg)	41	54	54	65	65	66	96	96
Heated Area (m ²)	20-160	30-210	40-265	50-315	55-370	65-420	70-475	80-525
Minimum Installation Height (mm)	3500	3500	4000	4700	5000	5000	5000	5000
Recommended Installation Height (mm)	3500	3600	4000	4700	5000	5500	6700	7600

18.9 Burner Specifications

Figure 37: Linear and U-Tube Specifications



18.9.1 Standard Burner Specifications

	BH15	BH20	BH25	BH30	BH35	BH40	BH45	BH50	BH55*
Burner Airplate ID Number	20	15	12	6	7	9	10	11	19
Jet Numbers - Natural G20 & 25	#30	3.8 mm	#19	4.7 mm	#9	#3	#2	B	E 6.8 mm (G25)
Jet Numbers - Propane/Butane	#46	2.3 mm	#37	#33	3.1 mm	3.3 mm	#29	#26	#24
Jet Numbers - Pressure Couple	1.95 mm	2.25 mm	2.5 mm	2.7 mm	2.9 mm	3.2 mm	3.25 mm	3.4 mm	-
Gas Consumption** Natural G20 (m³/h)	1.43	1.91	2.38	2.86	3.36	3.81	4.29	4.77	5.25
Gas Consumption** Natural G25 (m³/h)	1.66	2.22	2.77	3.32	3.88	4.43	4.99	5.54	6.09
Gas Consumption** Propane (m³/h) [kg/h]	0.56 [1.07]	0.75 [1.43]	0.94 [1.79]	1.13 [2.15]	1.32 [2.50]	1.51 [2.86]	1.69 [3.22]	1.88 [3.58]	2.07 [3.94]
Gas Consumption** Butane (m³/h)	0.43	0.57	0.72	0.86	1.00	1.15	1.29	1.43	1.57
Governor Pressure Butane (mbar)	21.4	19.7	19.2	17.4	18.2	17.9	16.9	18.4	18.3
Governor Pressure Butane (in wg)	8.6	7.9	7.7	7.0	7.3	7.2	6.8	7.4	7.3
Governor Pressure Propane (mbar)	26.1	26.1	26.1	27.4	26.1	28.6	28.6	26.1	26.1
Governor Pressure Propane (in wg)	10.5	10.5	10.5	11.0	10.5	11.5	11.5	10.5	10.5

*Only available in Multiburner. **Based on Gross Caloric Value.

Natural G20: 8.7 mbar 3.5 in wg
 Natural G25: 11.1 mbar 4.5 in wg

Natural G25 BH 55*: 9.5 mbar 3.8 in wg

18.9.2 EF Burner Specifications	BH25/EF	BH30/EF	BH35/EF	BH40/EF	BH45/EF	BH50/EF
Burner Airplate ID Number	14	5	6	5	6	10
Jet Numbers - Natural G20	#20	#16	#9	#5	#2	B
Gas Consumption** - Natural G20 (m ³ /h)	2.38	2.86	3.36	3.81	4.29	4.86

**Based on Gross Caloric Value.

Attach this information to a wall near the ROBERTS GORDON® heater.



Read the Installation, Operation, and Service Manual thoroughly before installation, operation, or service.

Know your model number and installed configuration.

Model number and installed configuration are found on the burner and in the Installation, Operation and Service Manual.

Write the largest clearance dimensions with permanent ink according to your model number and configuration in the open spaces below.

OPERATING INSTRUCTIONS

1. STOP! Read all safety instructions on this information sheet.
2. Open the manual gas valve in the heater supply line.
3. Turn on electric power to the heater.
4. Set the thermostat to desired setting.

TO TURN OFF THE HEATER

1. Set the thermostat to off or the lowest setting.

IF THE HEATER WILL NOT OPERATE, TO ENSURE YOUR SAFETY, FOLLOW THESE INSTRUCTIONS TO SHUT DOWN YOUR HEATER

1. Set the thermostat to off or the lowest setting.
2. Turn off electric power to the heater.
3. Turn off the manual gas valve in the heater supply line.
4. Call your registered installer/contractor qualified in the installation and service of gas-fired heating equipment.

⚠ WARNING



Fire Hazard

Keep all flammable objects, liquids and vapors the minimum required clearances to combustibles away from heater.

Some objects will catch fire or explode when placed close to heater.

Failure to follow these instructions can result in death, injury or property damage.

**Maintain _____ clearance
to the side and
_____ clearance below
the heater from vehicles
and combustible materials.**

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E-mail: export@rg-inc.com

Installation Code and Annual Inspections:

All installation and service of ROBERTS GORDON® equipment must be performed by a contractor qualified in the installation and service of equipment sold and supplied by Roberts-Gordon and conform to all requirements set forth in the ROBERTS GORDON® manuals and all applicable governmental authorities pertaining to the installation, service and operation of the equipment. To help facilitate optimum performance and safety, Roberts-Gordon recommends that a qualified contractor conduct, at a minimum, annual inspections of your ROBERTS GORDON® equipment and perform service where necessary, using only replacement parts sold and supplied by Roberts-Gordon.

Further Information: Applications, engineering and detailed guidance on systems design, installation and equipment performance is available through ROBERTS GORDON® representatives. Please contact us for any further information you may require, including the Installation, Operation and Service Manual.

This product is not for residential use.

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Printed in U.S.A.

P/N 91037912 Rev. H