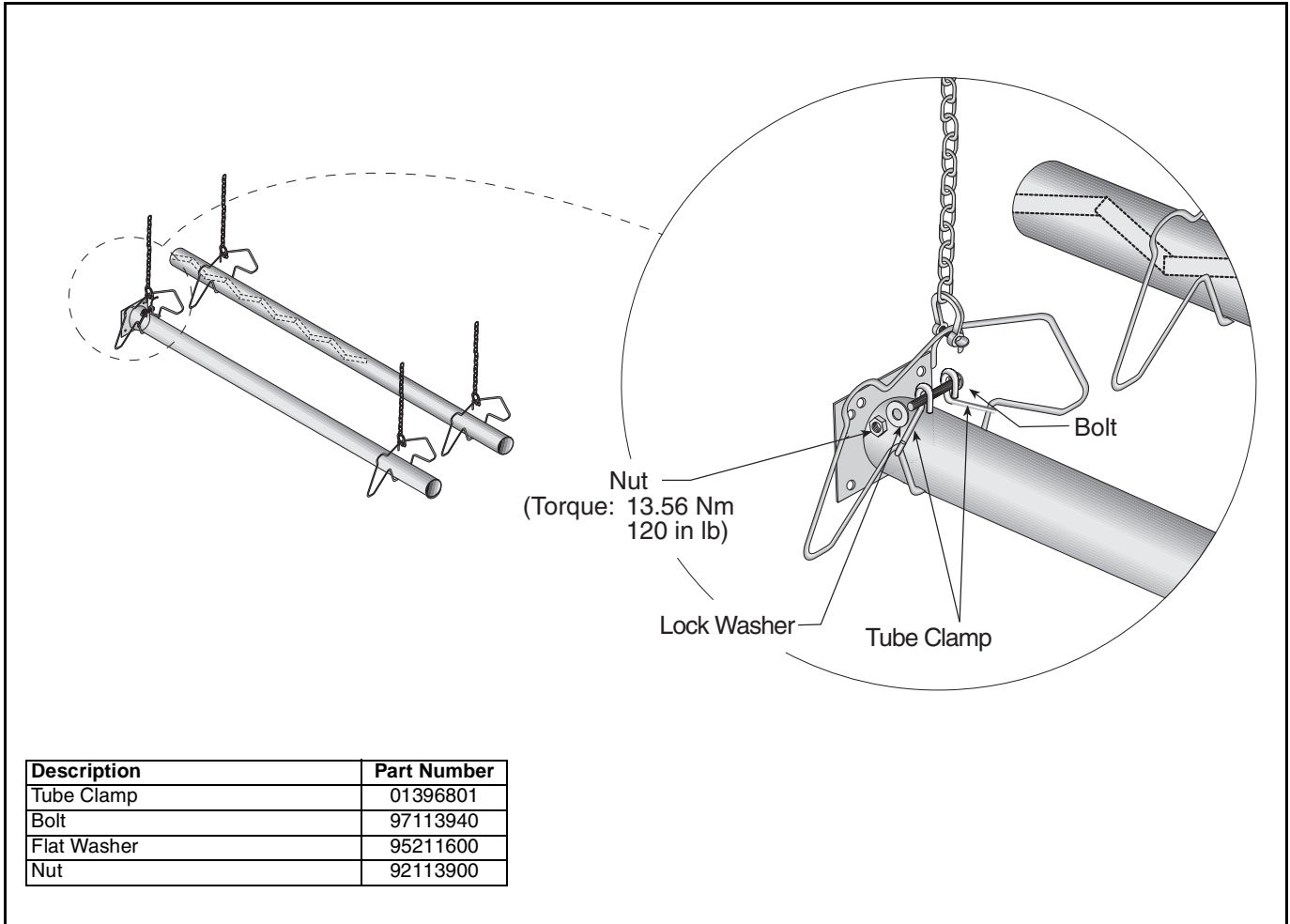
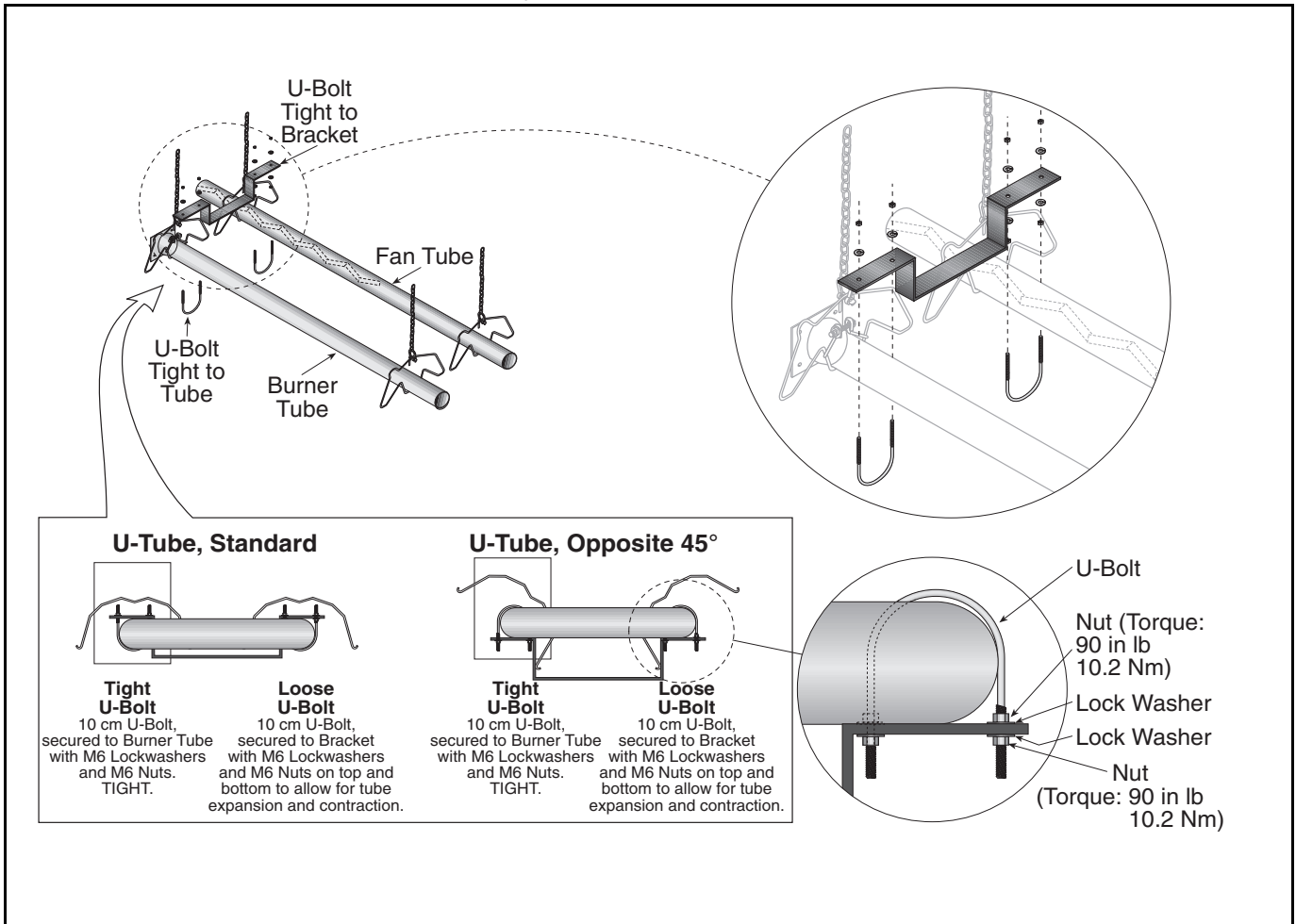


Step 8.3.1 Tube Clamp Package Installation



Step 8.4 U-Tube Support Bracket Assembly Installation



Step 8.5 Coupling and Tube Assembly

A Close coupling with tab

B Start Slidebar/Coupling Lock onto coupling

C Insert tubes into coupling

D Tighten coupling to join tubes

Description	Part Number
Coupling	01329600
Slidebar/Coupling Lock	01329700
Tube	91409408

Step 8.5.1 Coupling and Tube Assembly (Continued)

⚠ WARNING

Tighten slidebar as shown below.

Tubes will fall down if slidebar is incorrect.

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

Drive Slidebar until tight. End of slidebar should be within tolerance listed below.

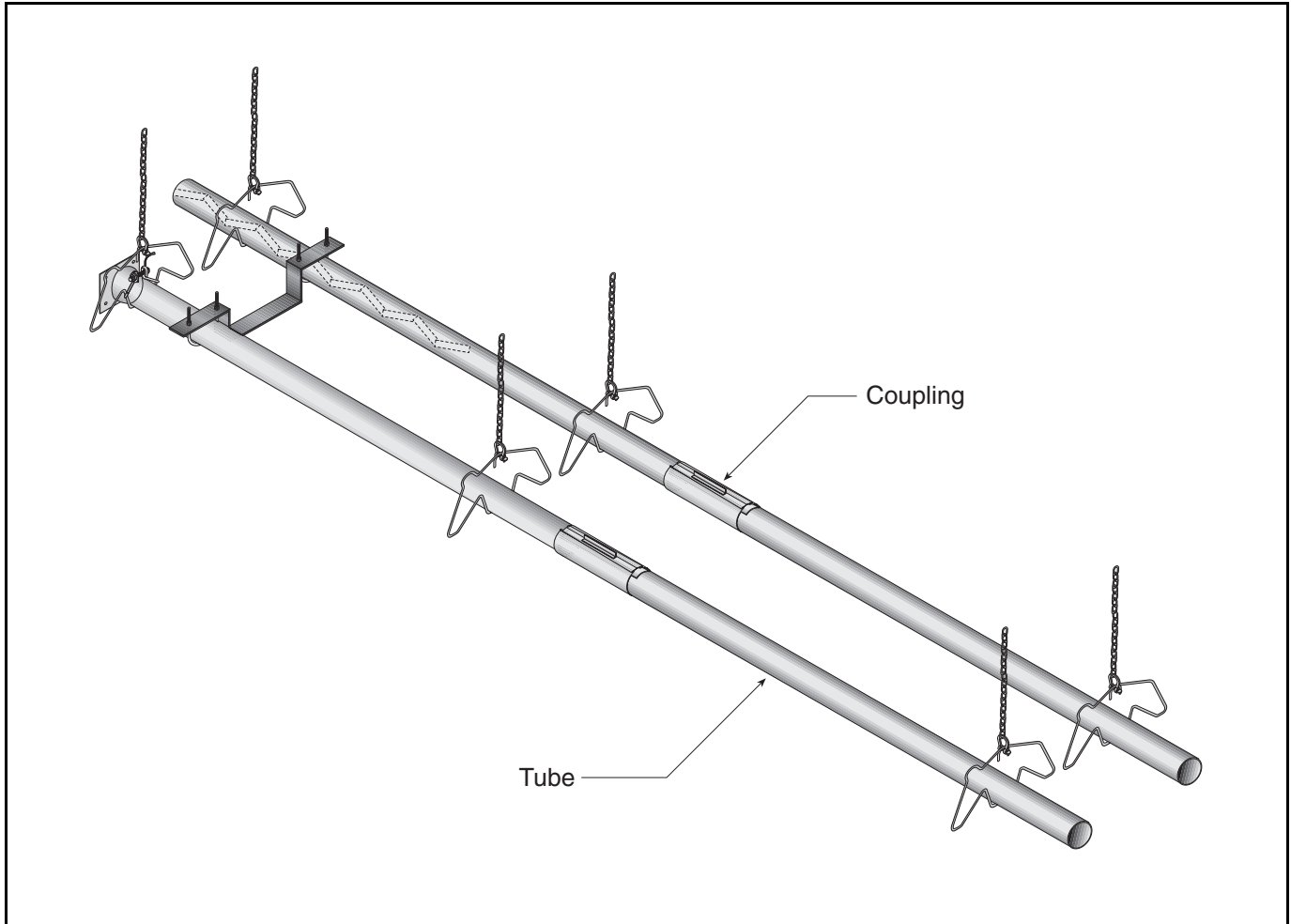
Correct slidebar dimensions

$\pm 5 \text{ cm}$

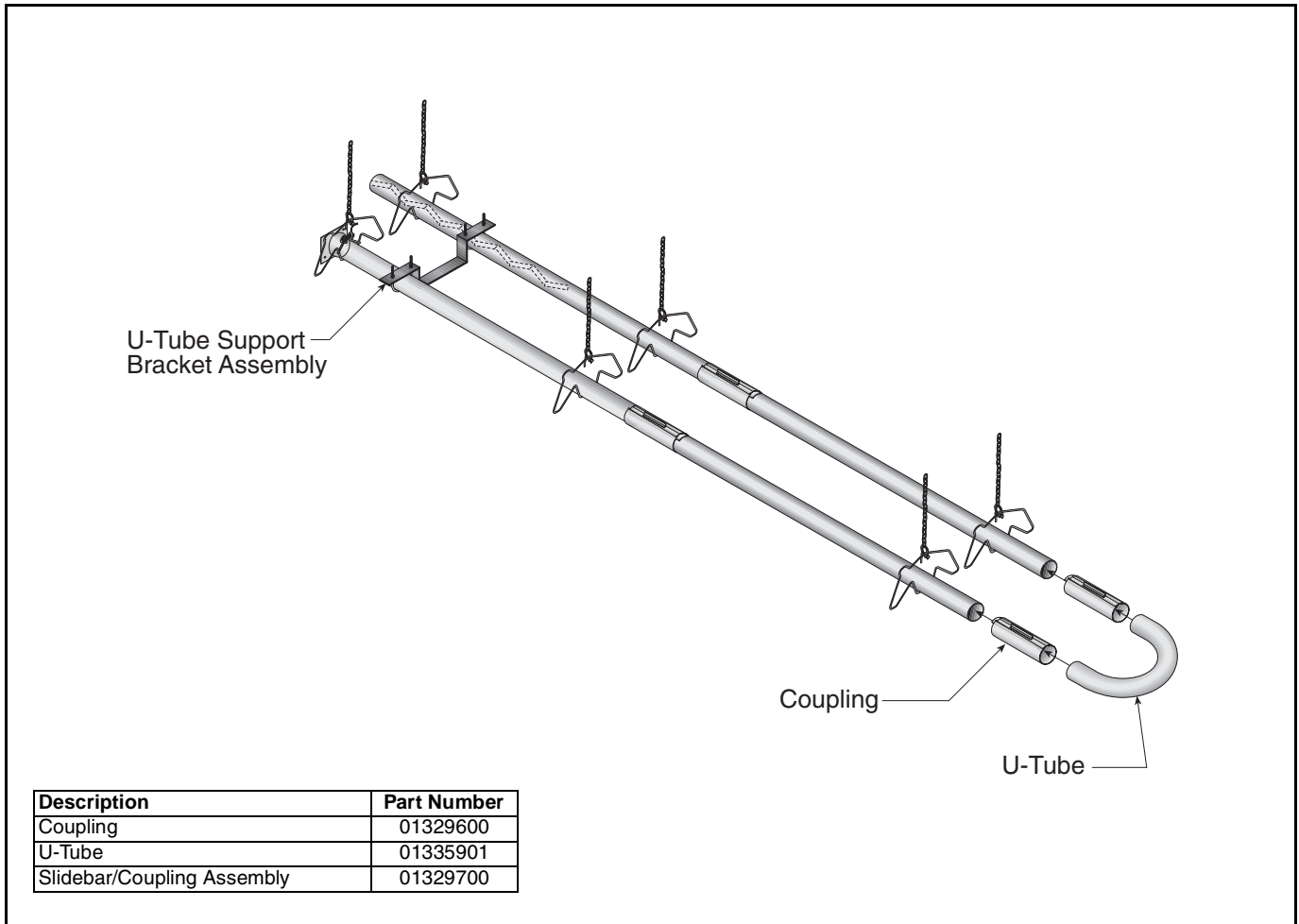
Incorrect slidebar position

• Repeat Step 8.5 A - D until all tubes are assembled.

Step 8.6 Tube Installation

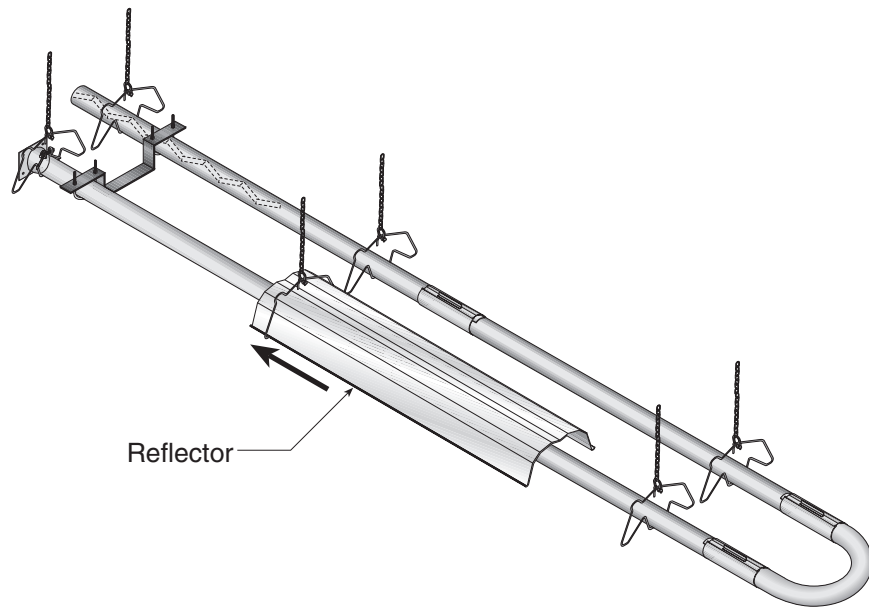


Step 8.7 U-Tube Installation



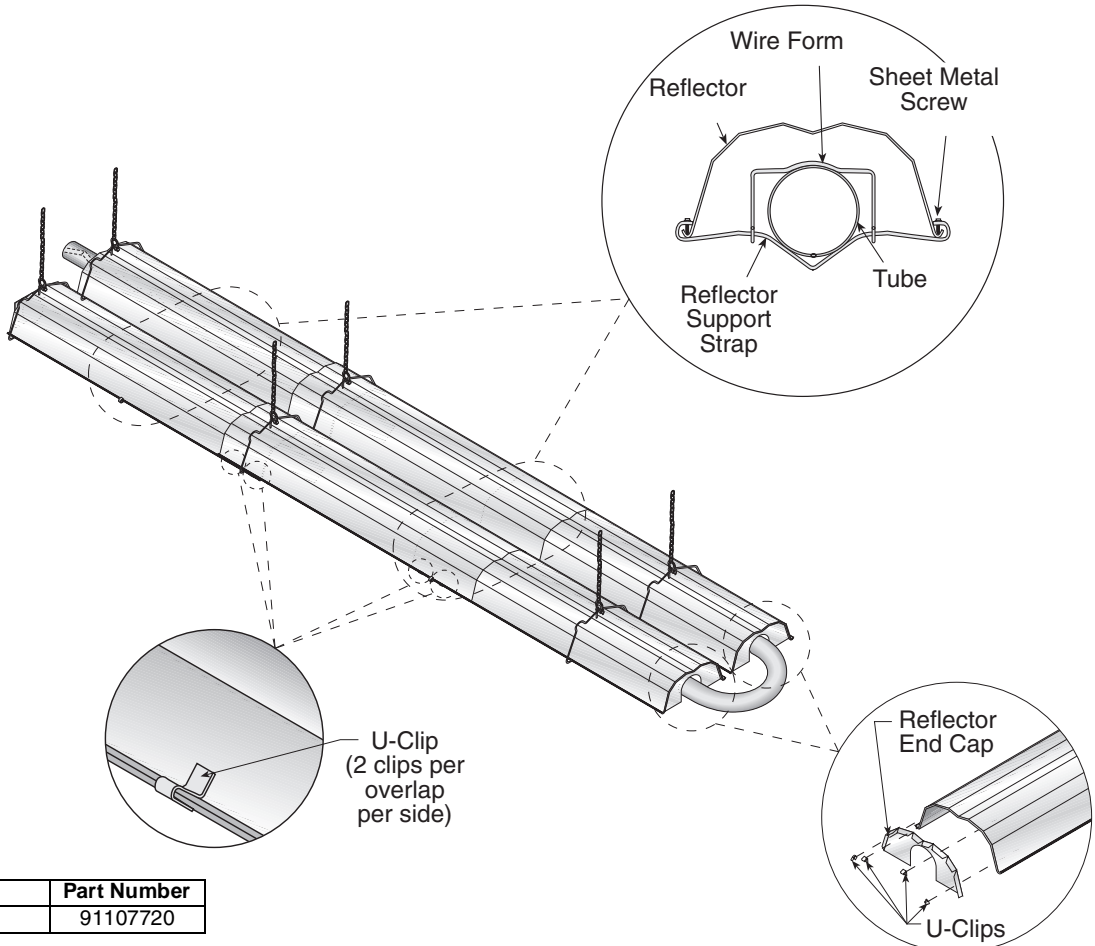
Description	Part Number
Coupling	01329600
U-Tube	01335901
Slidebar/Coupling Assembly	01329700

Step 8.8 Reflector Installation



Description	Part Number
Reflector	02750303

Step 8.8.1 Reflector Installation continued



Description	Part Number
U-Clip Package	91107720

SECTION 10: BURNER & FAN INSTALLATION

Step 10.1 Burner Installation

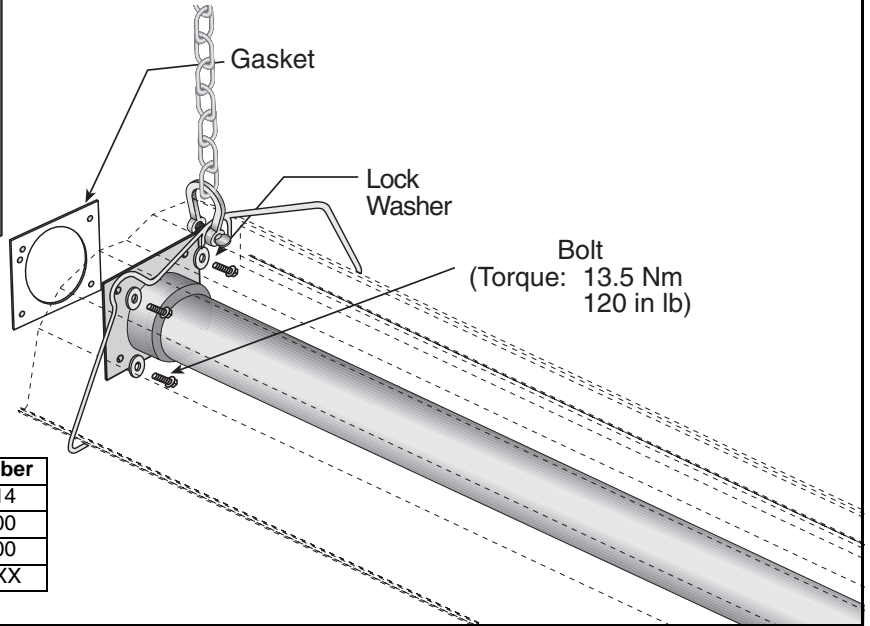
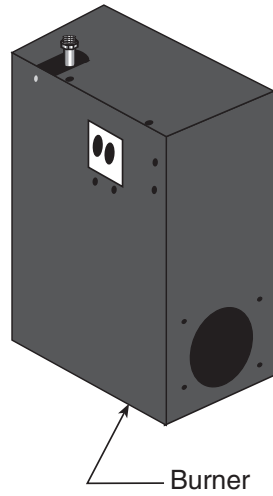
⚠ WARNING

Bolts must be torqued to 120 in/lbs as shown below to secure burner tube to burner.

Burner tube will separate from burner if not torqued properly.

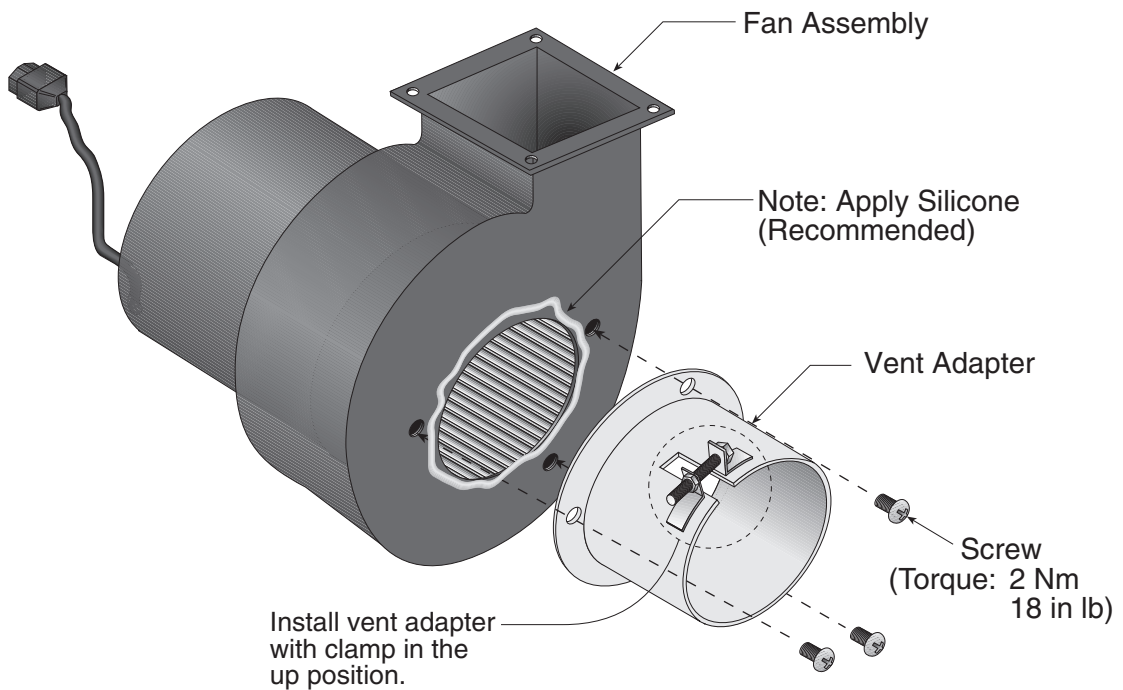
Locate first hangers no more than 10cm (4") from the burner.

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



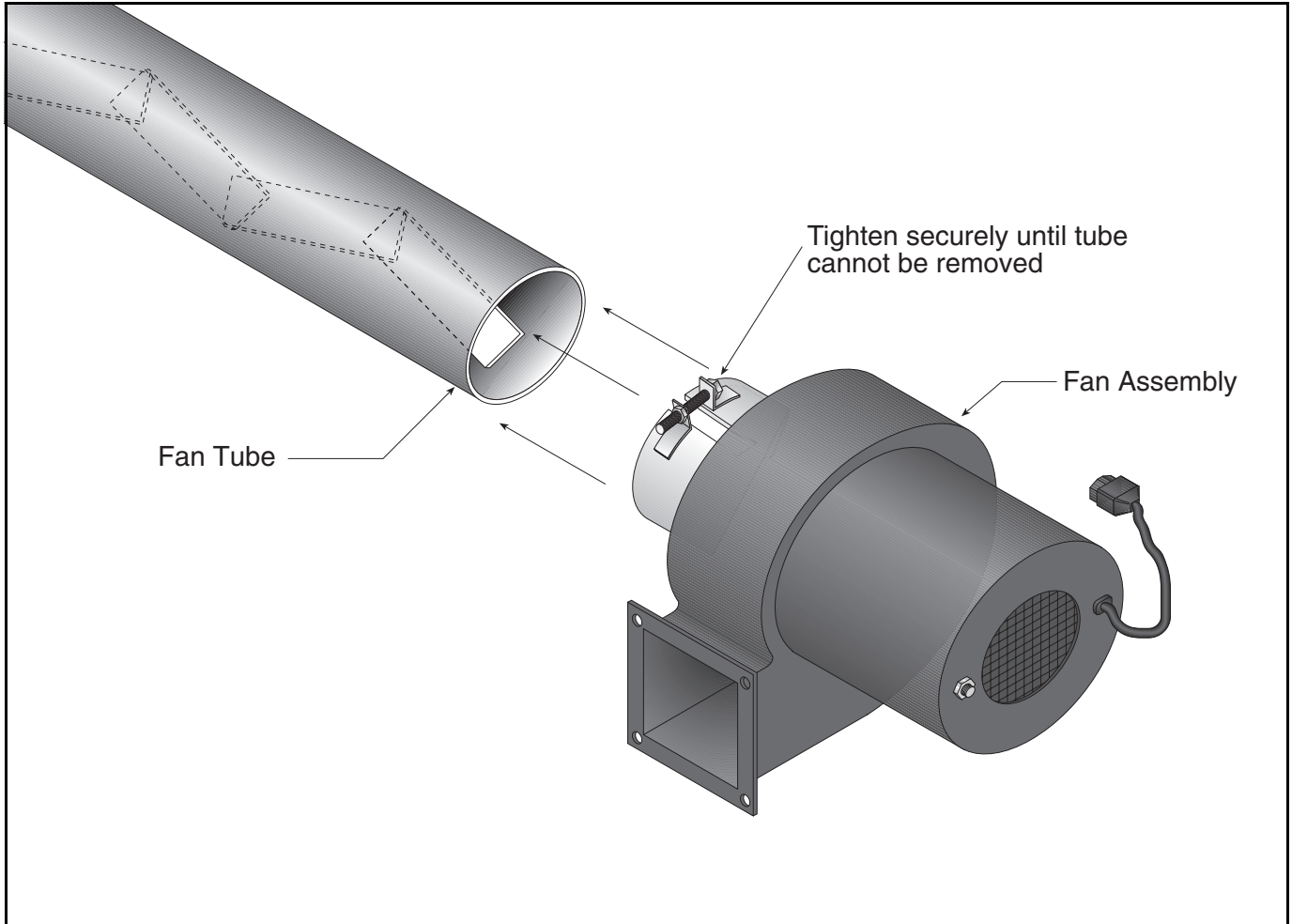
Description	Part Number
Bolt	94273914
Lock Washer	96411600
Gasket	02568200
Burner	0720XXXX

Step 10.2 Fan Assembly

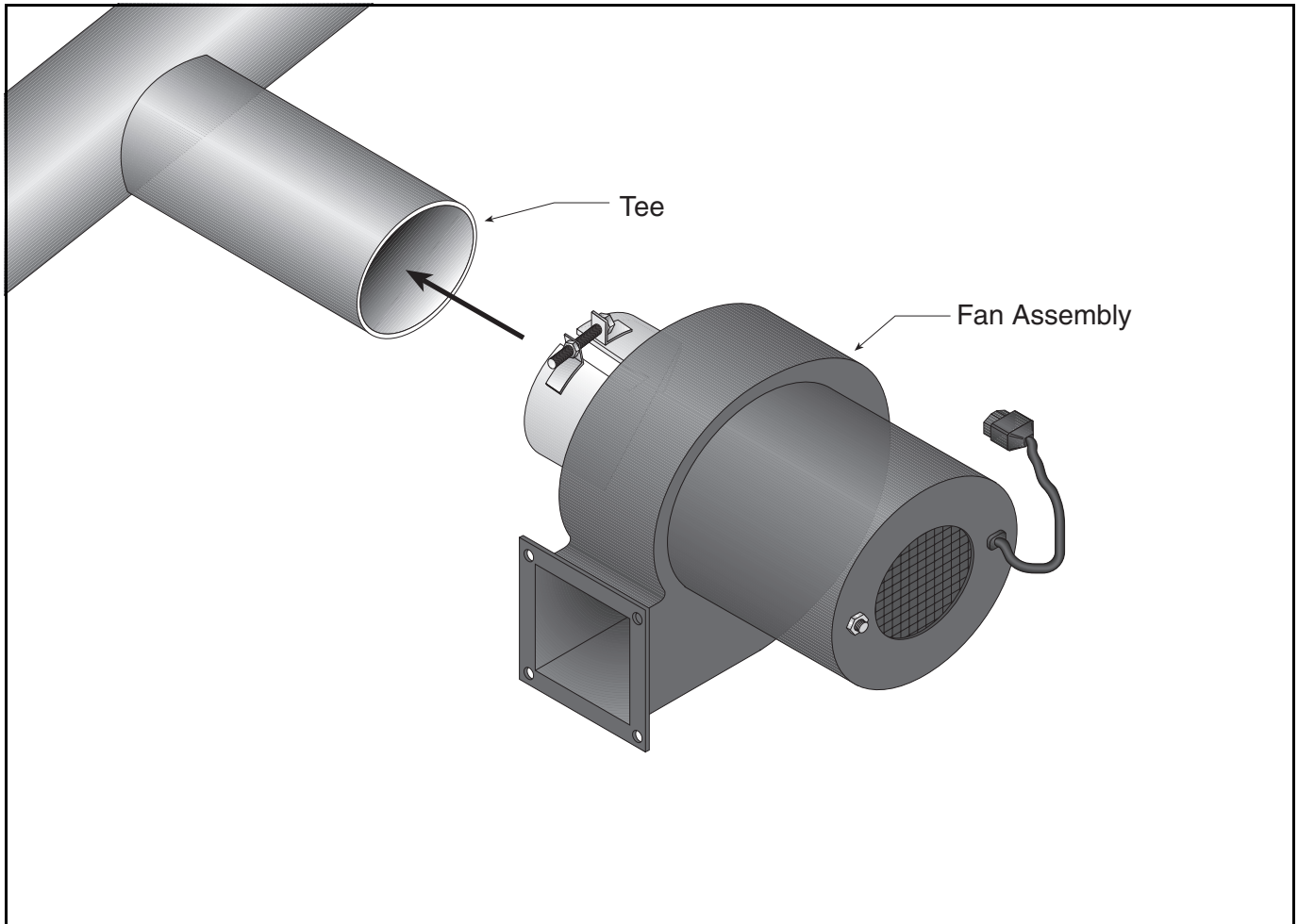


Description	Part Number
Fan Assembly	See Parts List
Vent Adapter	C1323B
Screw	C0061B

10.3 Linear & U-Tube Fan Installation



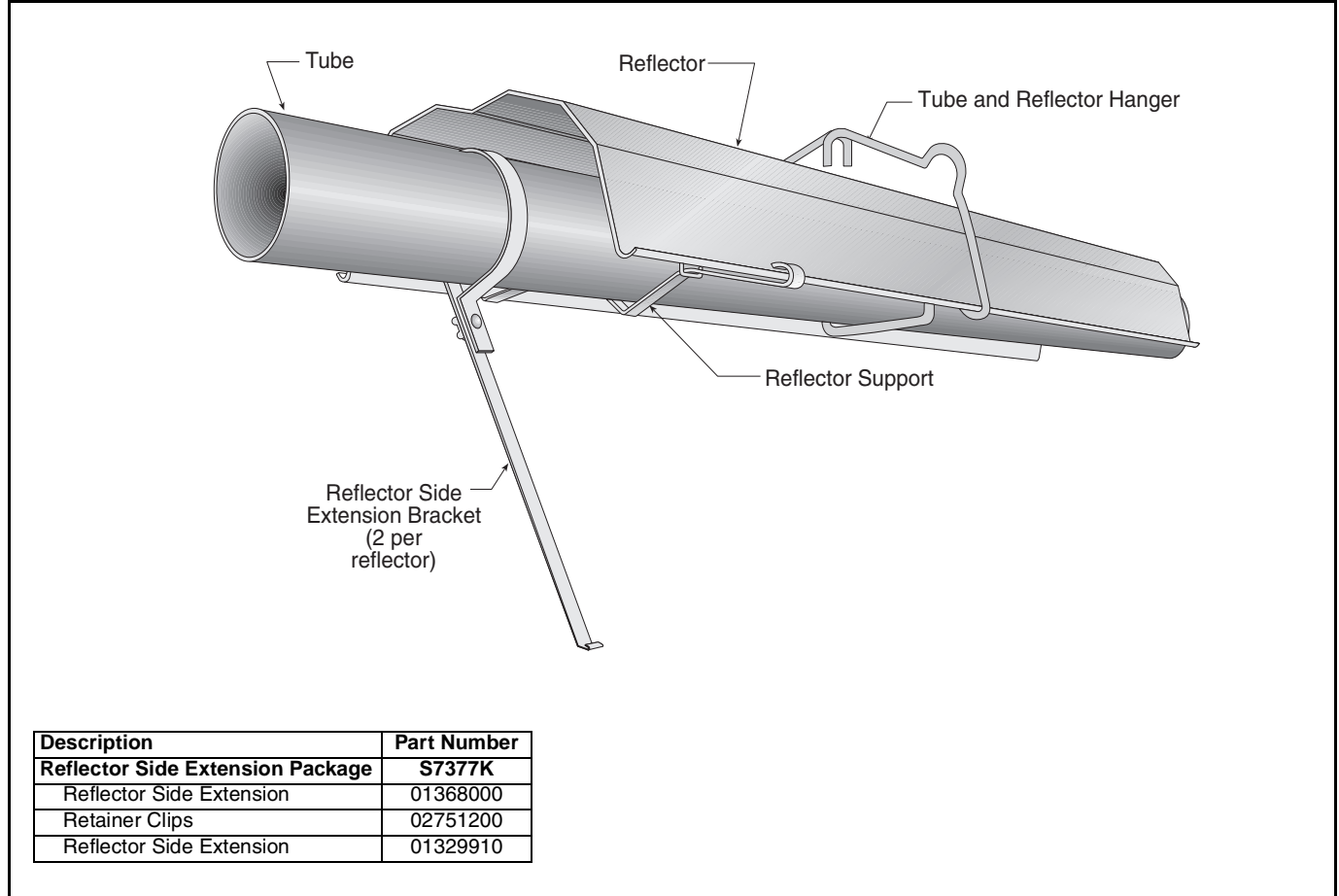
Step 10.4 NNOT APPLICABNon AGA Approved Appliances



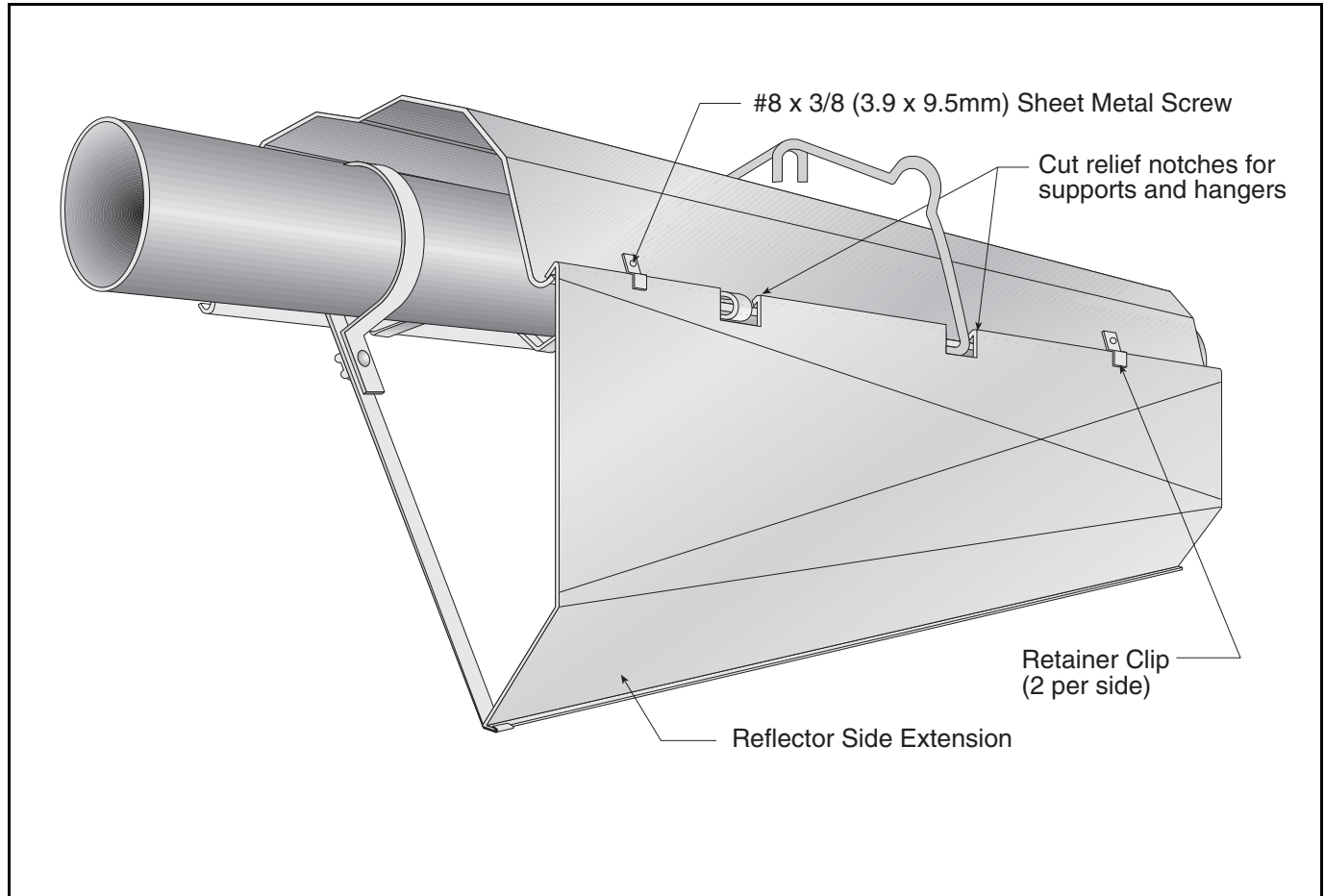
SECTION 11: OPTIONAL HEATER ACCESSORIES

11.1 Reflector Side Extension Installation

Step 11.1.1 Bracket Installation

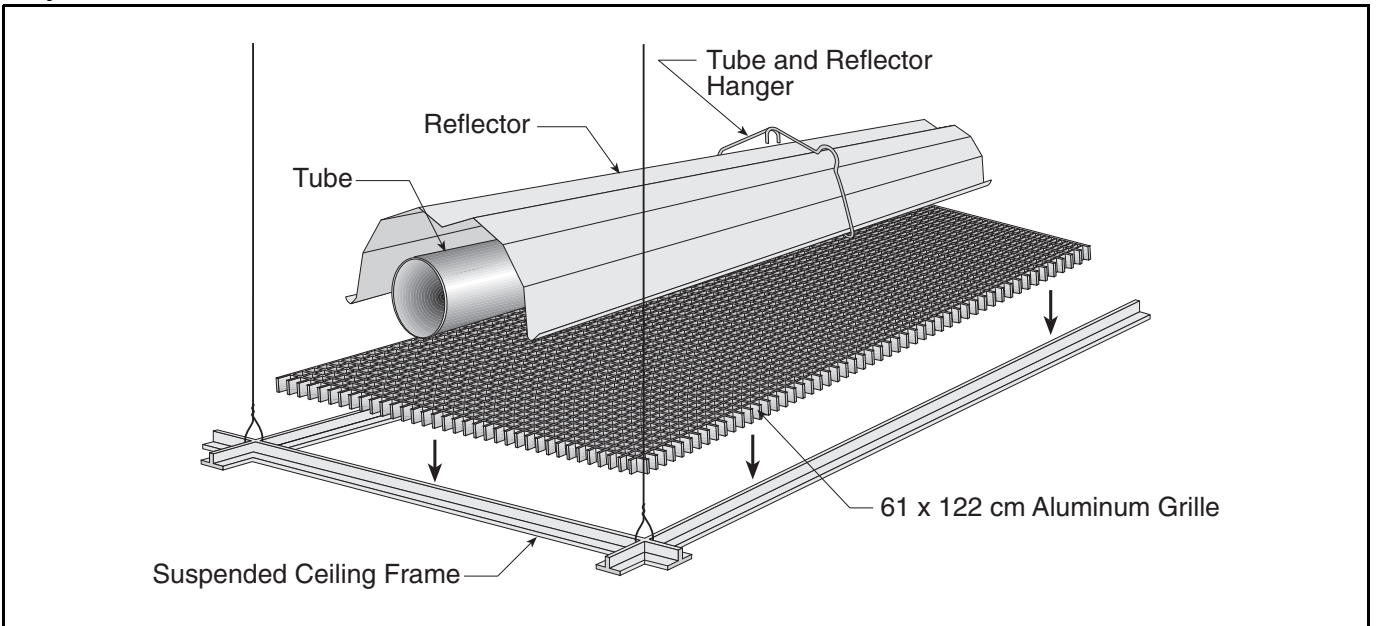


Step 11.1.2 Side Reflector Installation

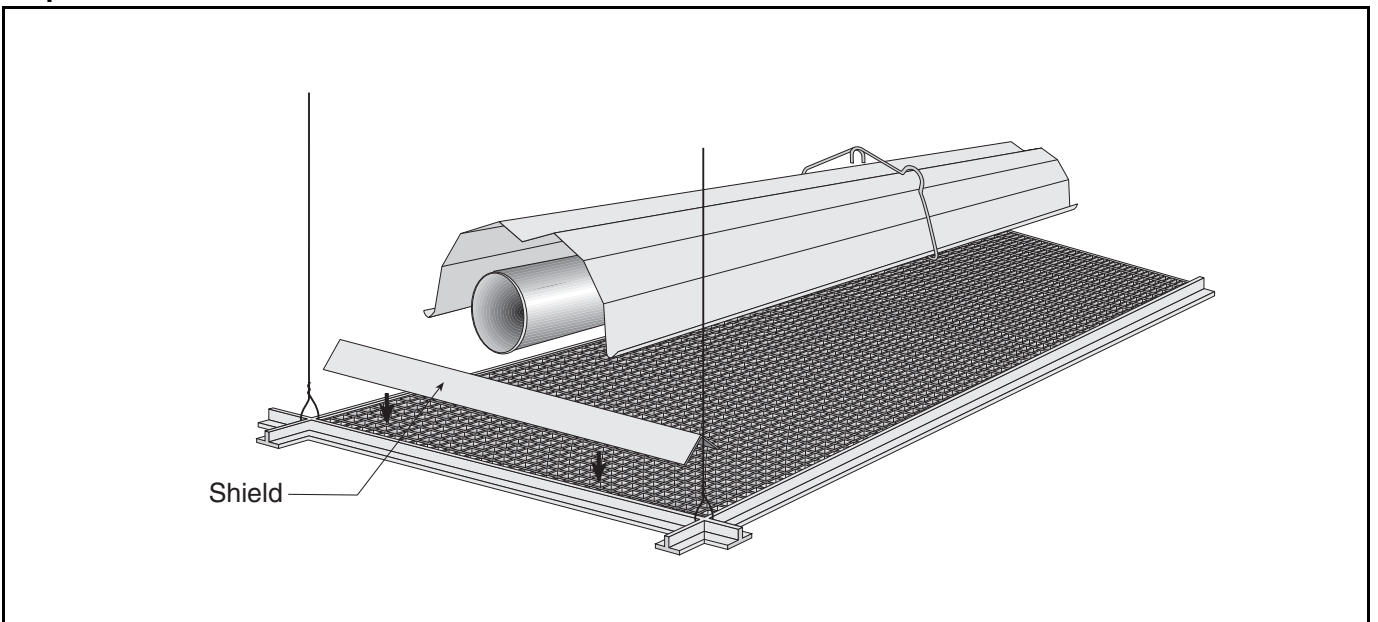


11.2 Decorative Grille Installation

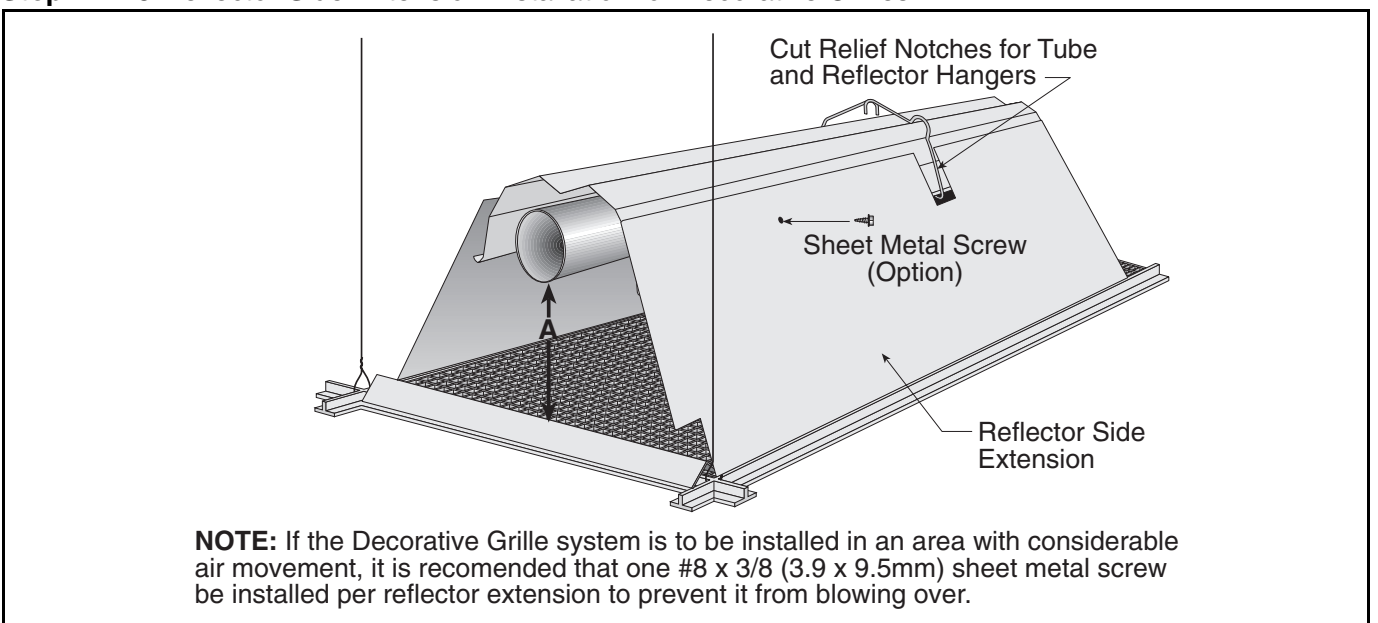
Step 11.2.1 Grille Installation



Step 11.2.2 Frame Shield Installation

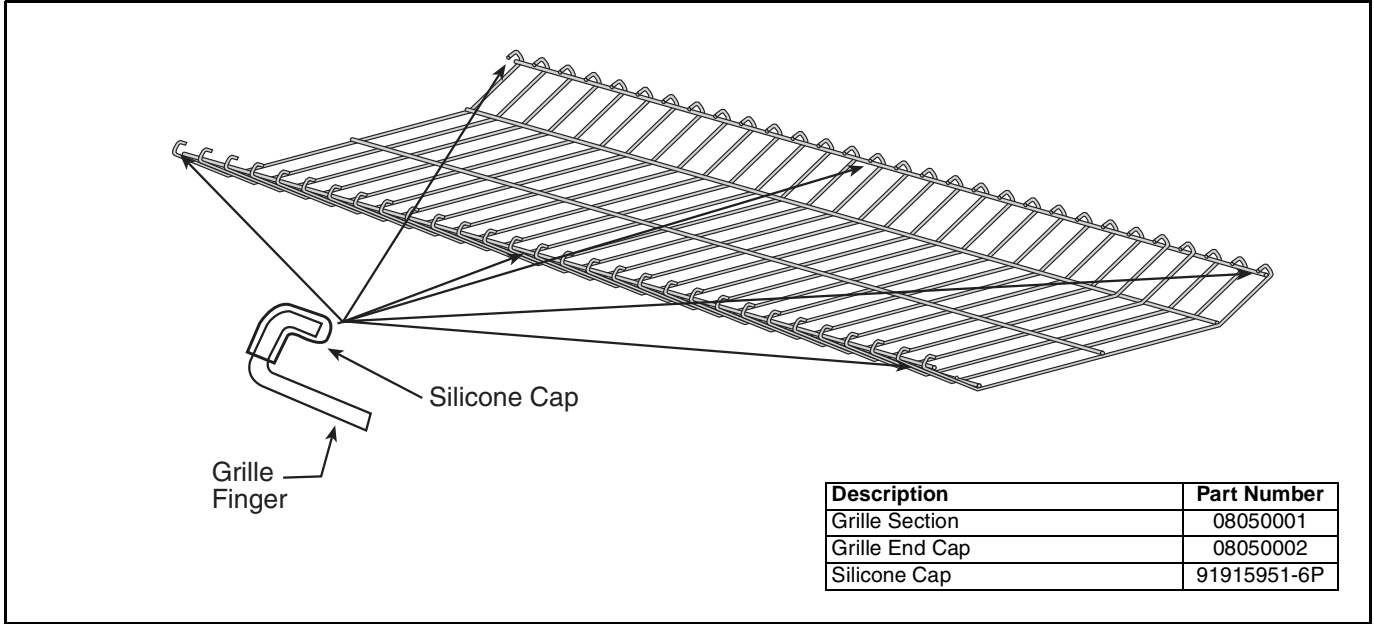


Step 11.2.3 Reflector Side Extension Installation for Decorative Grilles

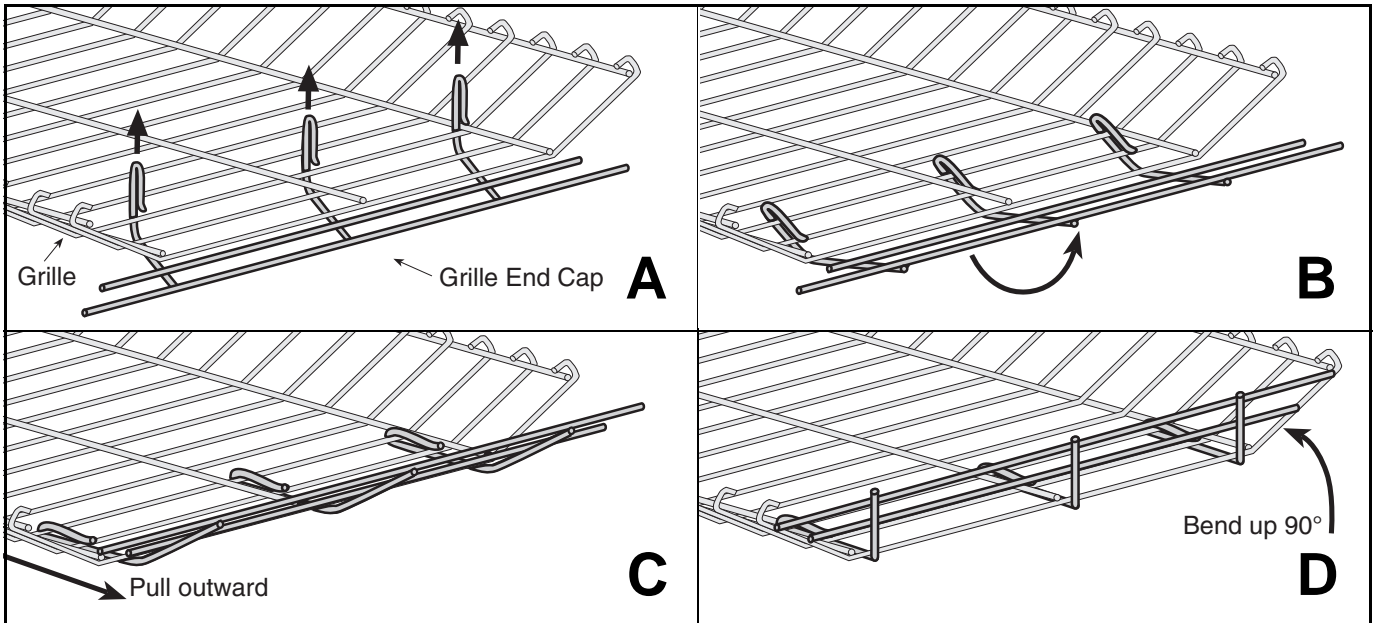


11.3 Protective Grille Installation

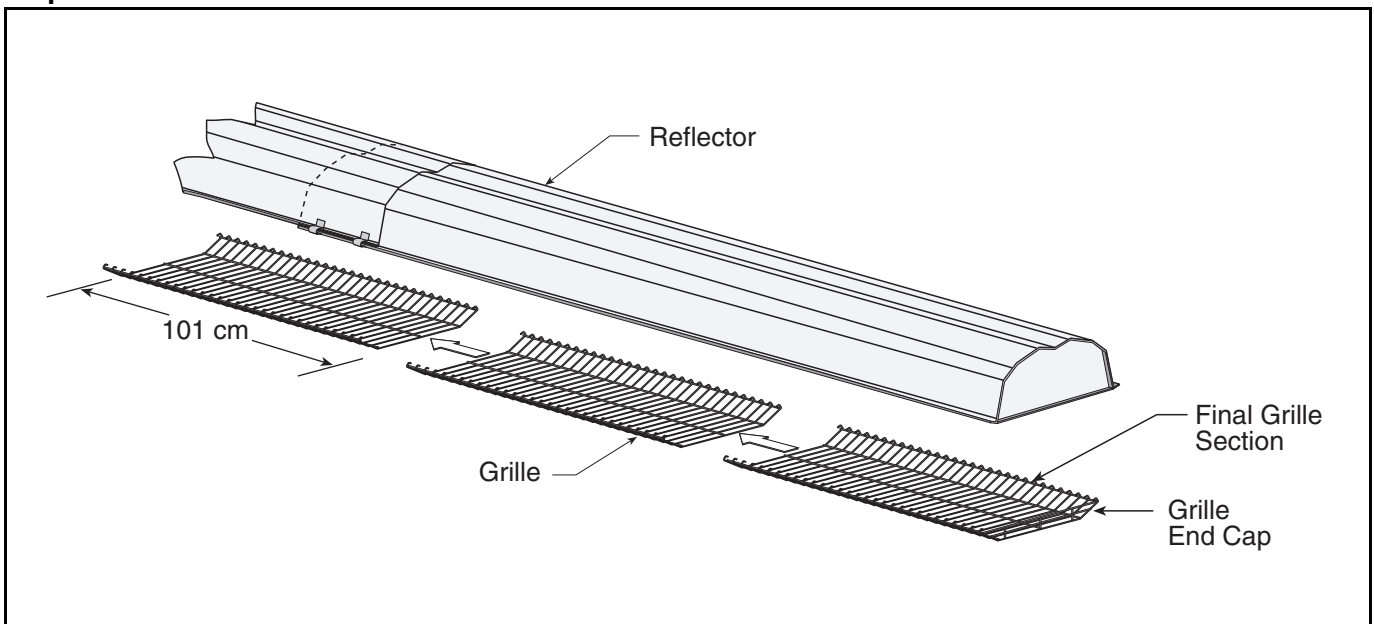
Step 11.3.1 Silicone Cap Installation



Step 11.3.2 Grille End Cap Installation

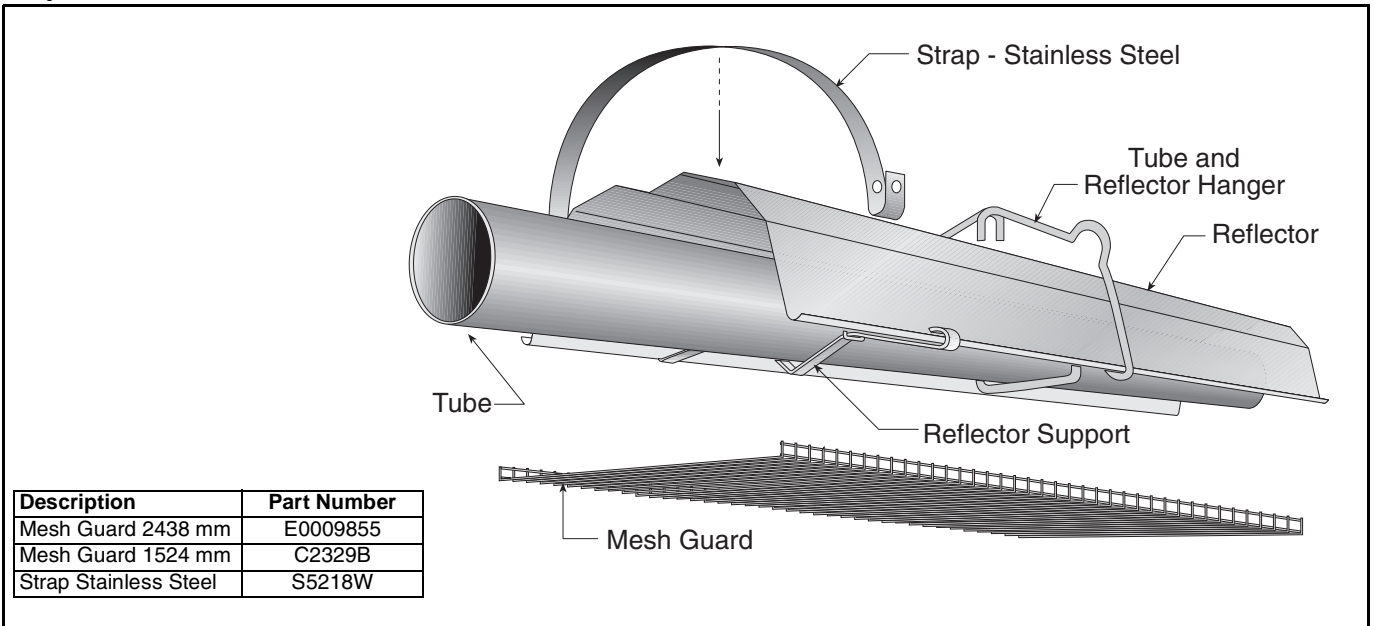


Step 11.3.3 Grille Installation

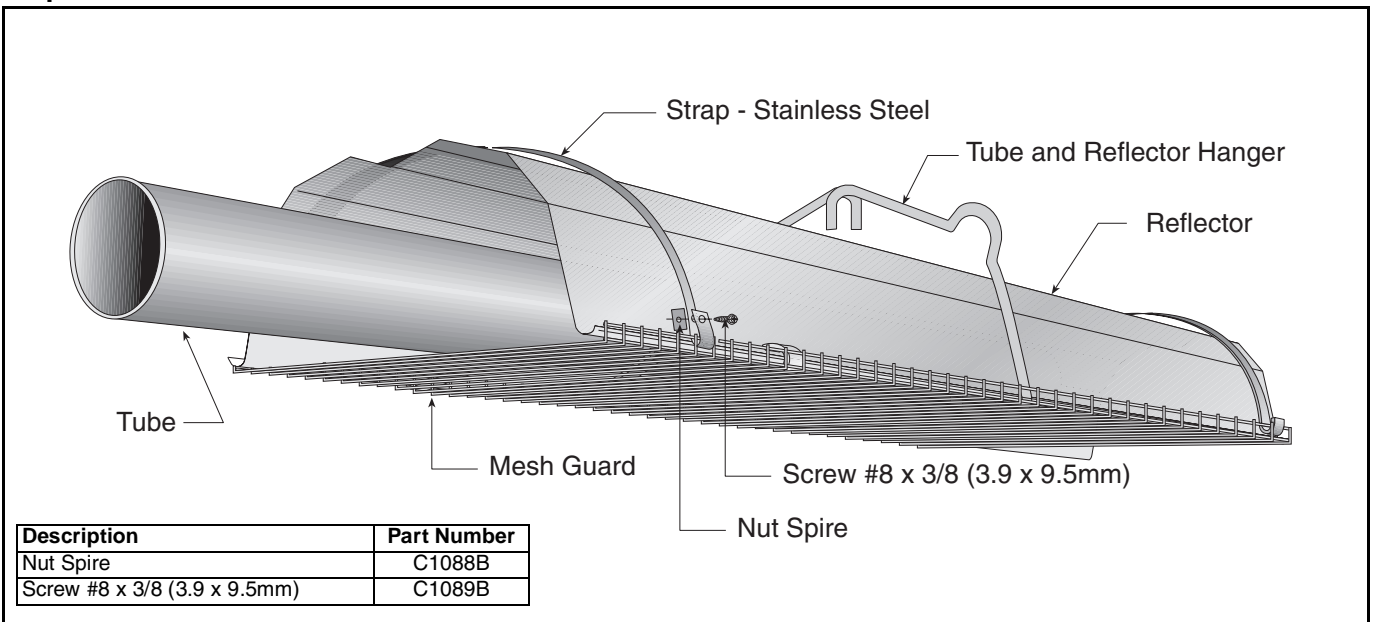


11.4 Sports Hall Guard Installation

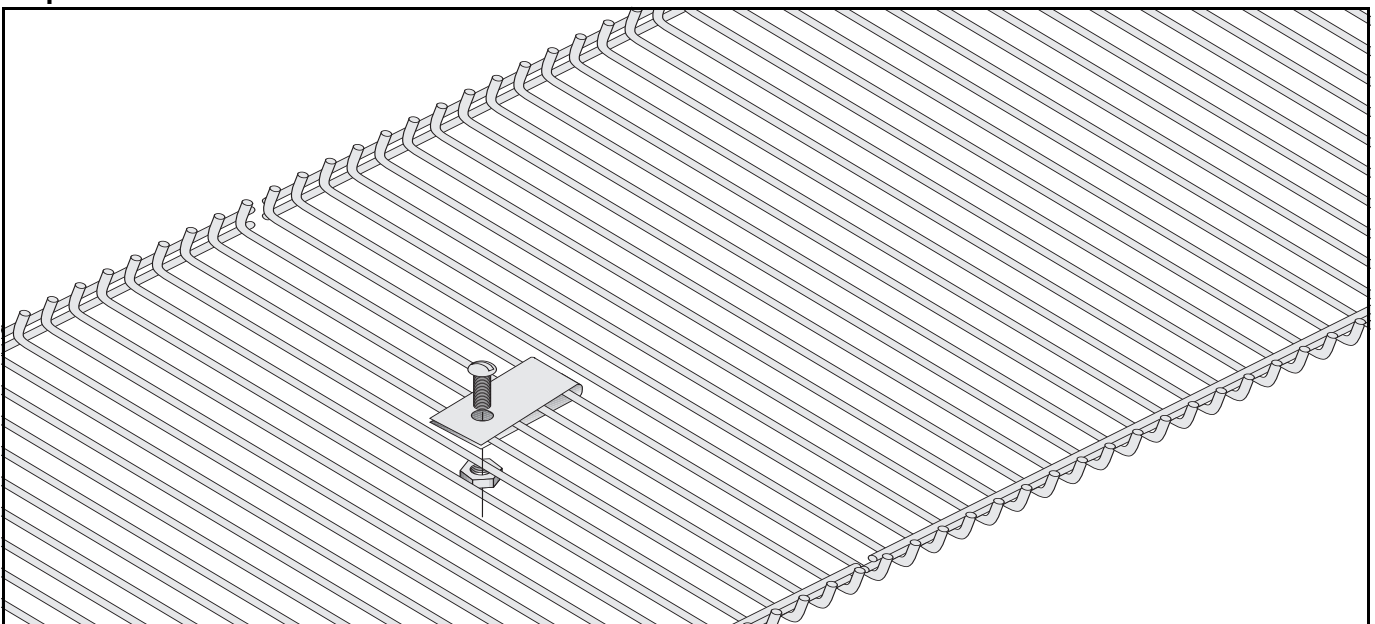
Step 11.4.1 Grille Installation



Step 11.4.2 Fastener Installation

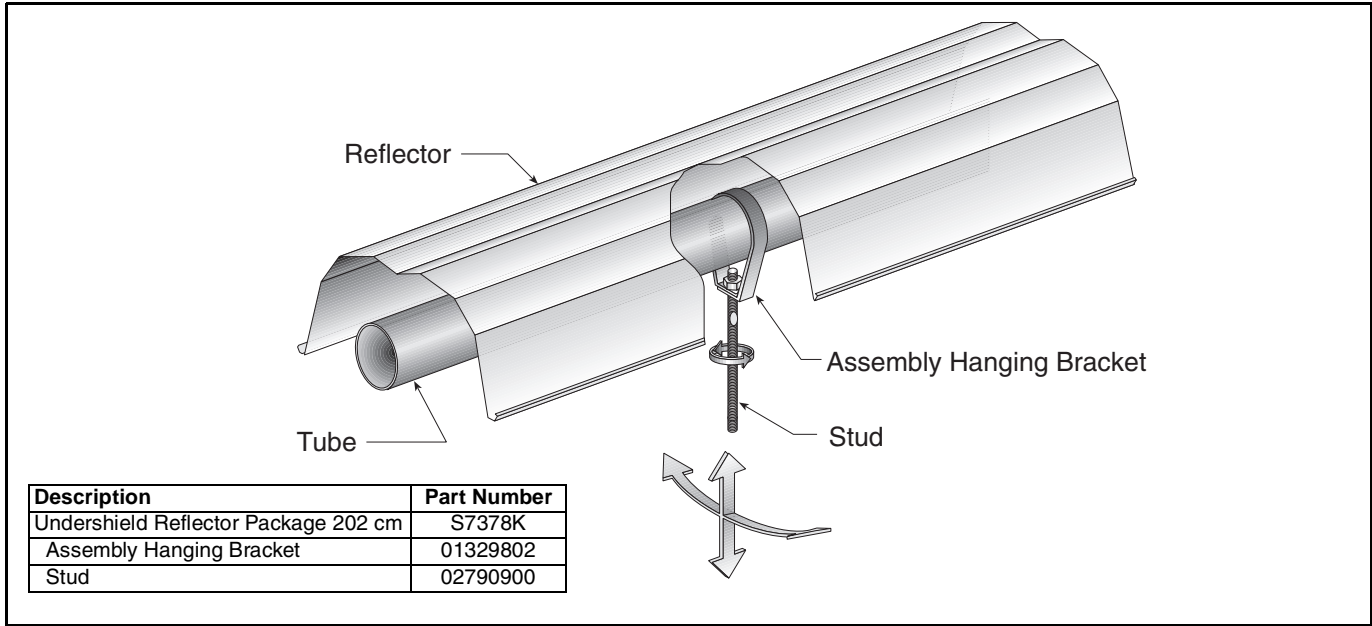


Step 11.4.3 Mesh Guard Connection

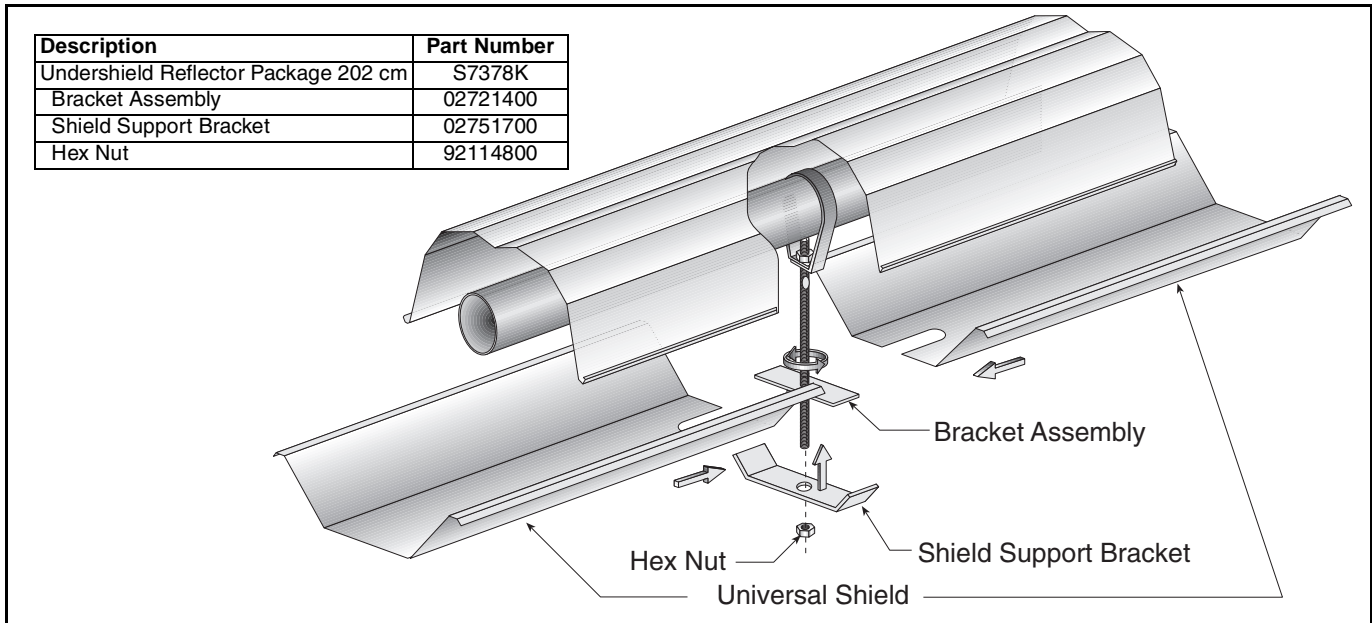


11.5 Universal Shield Installation

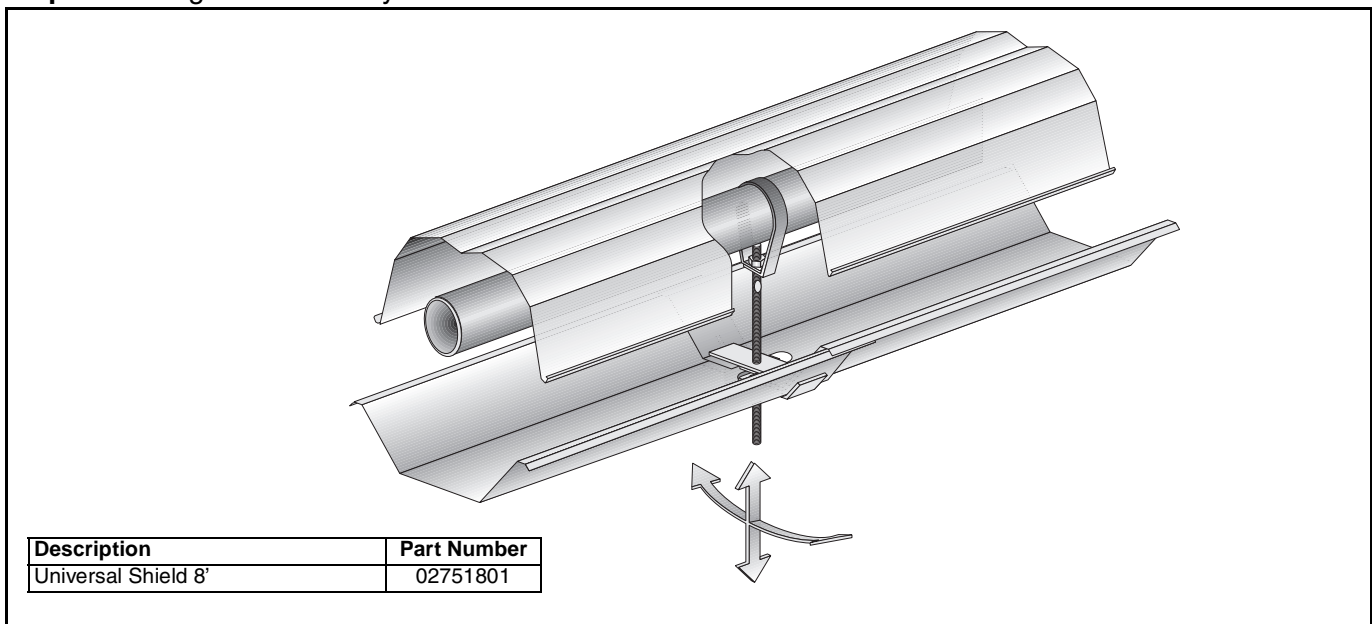
Step 11.5.1 Hanger Installation



Step 11.5.2 Support Installation

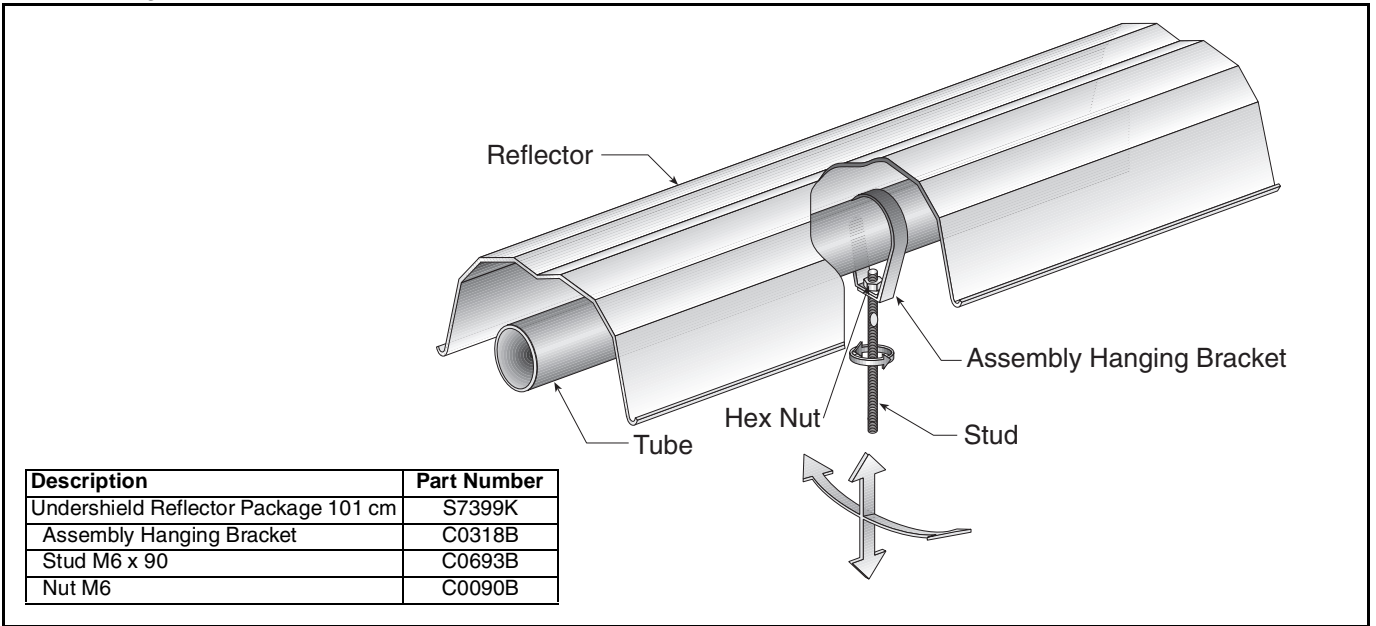


Step 11.5.3 Tighten Assembly

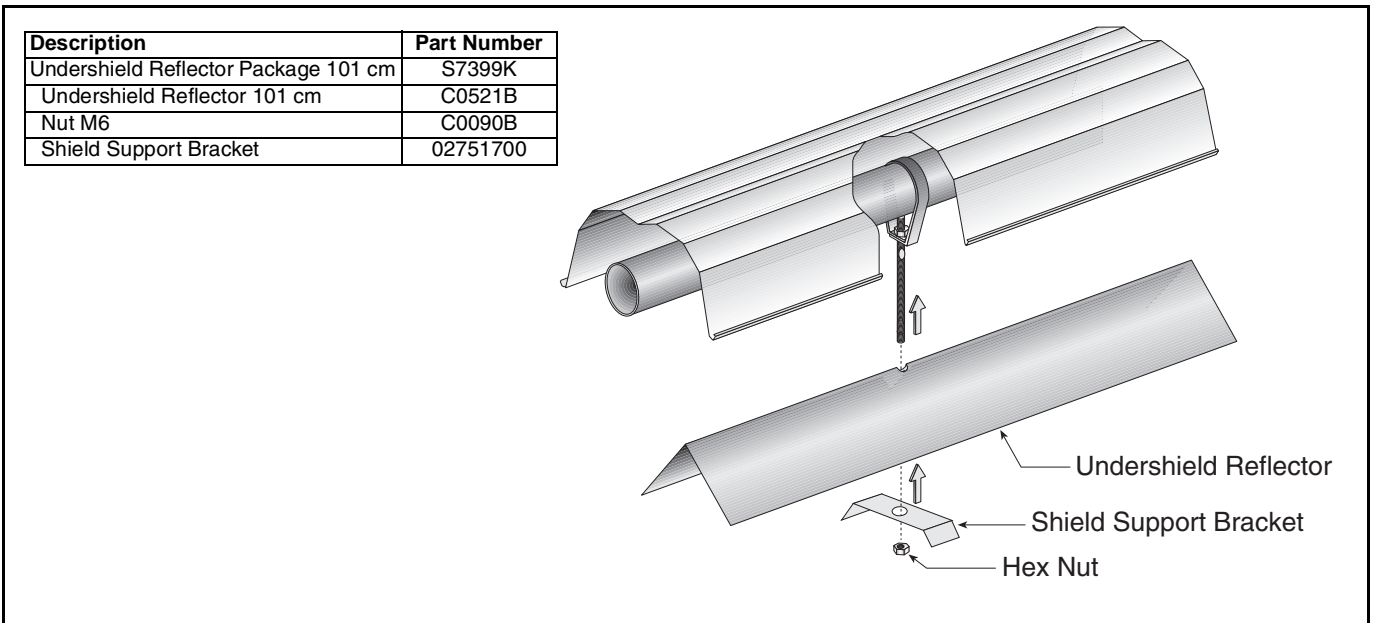


11.6 Undershield Installation

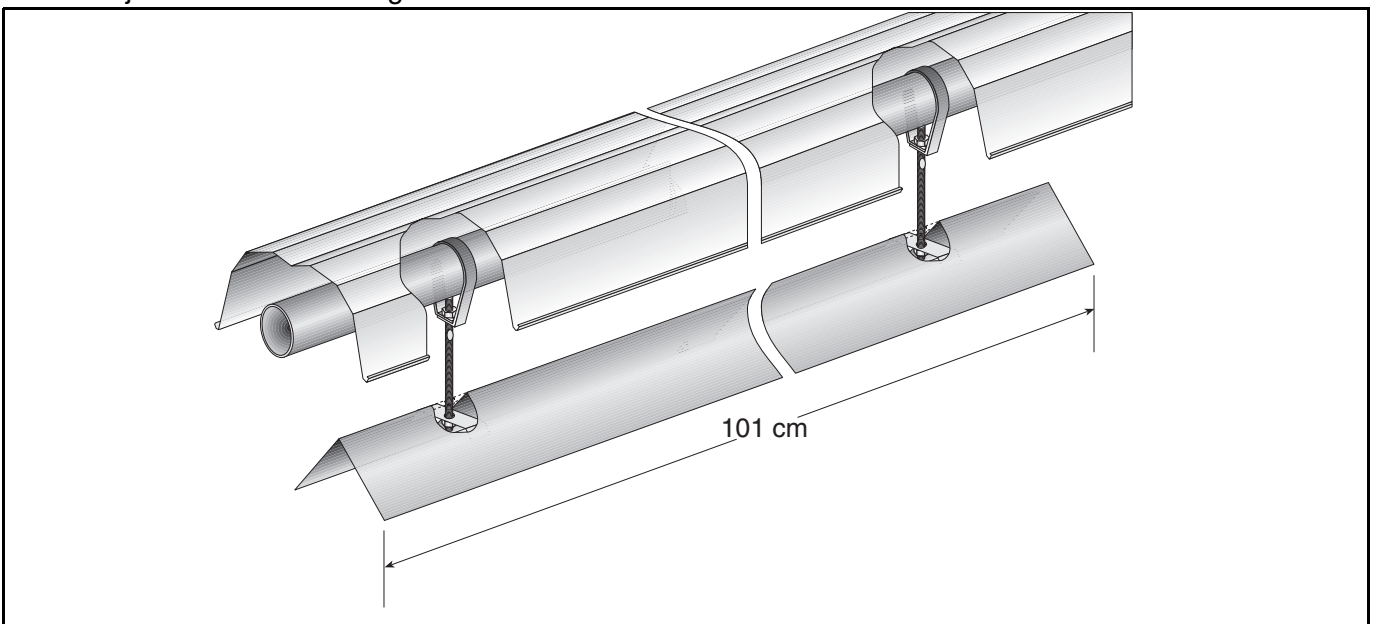
11.6.1 Hanger Installation



11.6.2 Undershield Installation




11.6.3 Adjust Undershield Height



SECTION 12: VENTING

⚠

WARNING



Carbon Monoxide Hazard

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.

12.1 Flue Installation

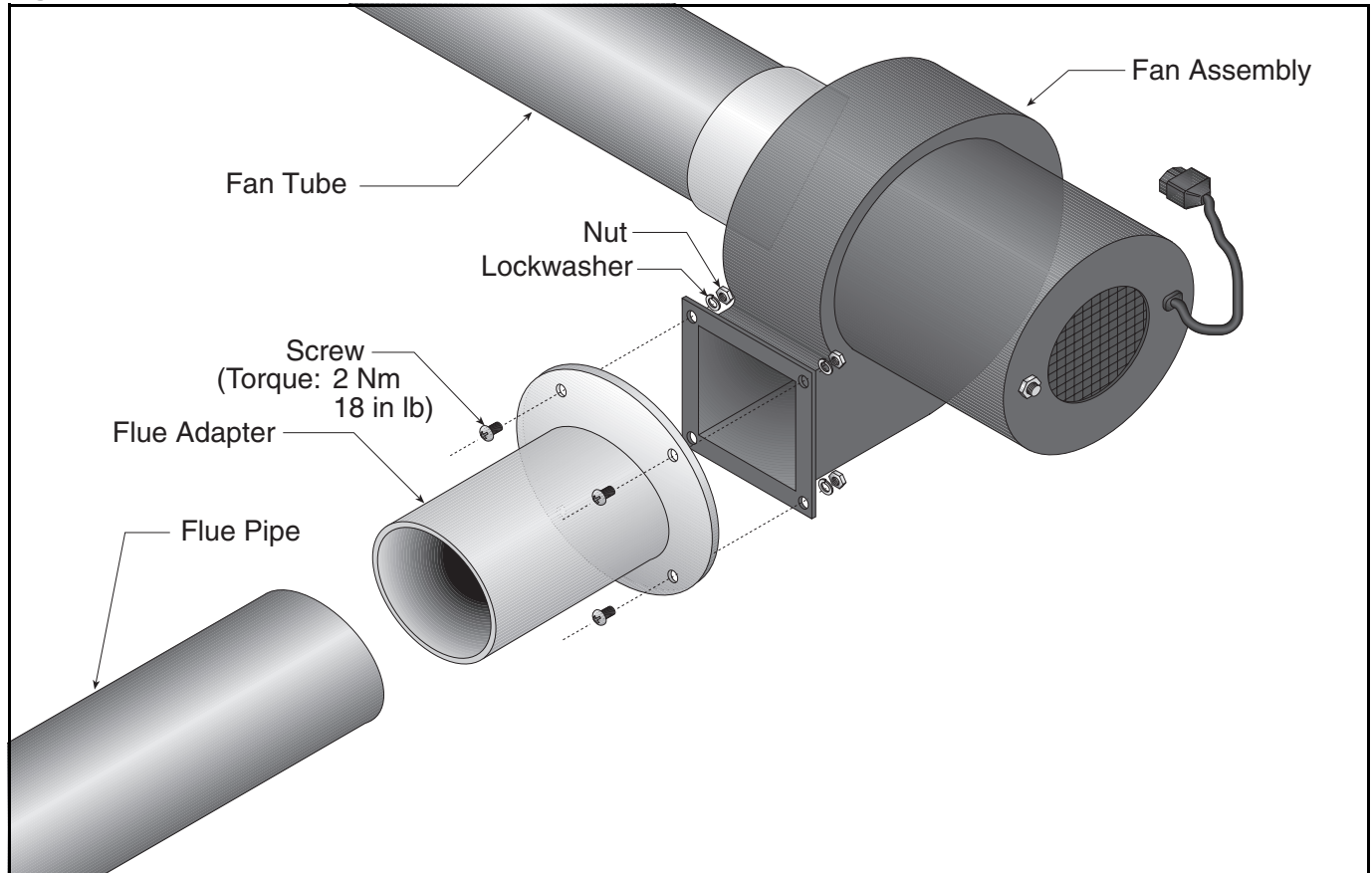
The fan outlet may discharge vertically or horizontally. Connection should be made using 100 mm minimum diameter Aluminium or Stainless Steel flue material to National Standard and must be adapted to insert into the 100 mm flue adapter. Both fresh air supply and flue duct shall not exceed 10 m. BH15 and BH20 flue must be insulated if longer than 5 m. BH25 flue must be insulated if longer than 8 m. Contact the manufacturer if more than 2 x 45° offset bends are necessary. The flue must be self supporting.

<u>Fans</u>	<u>Horizontal</u>	<u>Vertical</u>
83 BTLW	190 x 75 (hole)	150 mm dia.
90 BTLW	190 x 75 (hole)	150 mm dia.

12.2 Flueless Installation (U.K. & Australia Only)

If the heater is being installed in an area where combustion products can be dissipated within the

Figure 26: Individual Flue Connection Detail



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.

12.3 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.

12.3.1 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 2.35m³/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.

12.3.2 Flueless Installation (UK & Australia only)

Minimum airflow rate shall be 37.5 m³/h per kW of total rated heat input where mechanical ventilation is used. Where the air change rate is below this minimum, provide additional openings equal to 52 cm² per kW total rated heat input; or 1.45 cm² for each 1m³/h per kW below 37.5m³/h per kW of total rated heat input.

12.4 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 42, Section 12.1 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.

12.4.1 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 Figure 28, A)
- The flue and fresh air supply must penetrate the same roof, at a minimum of 1 meter apart. (See Figure 28, B)
- The flue must penetrate one meter higher than the fresh air inlet on the same wall. (See Figure 28, C)

Figure 27: Fresh Air Intake Spigot

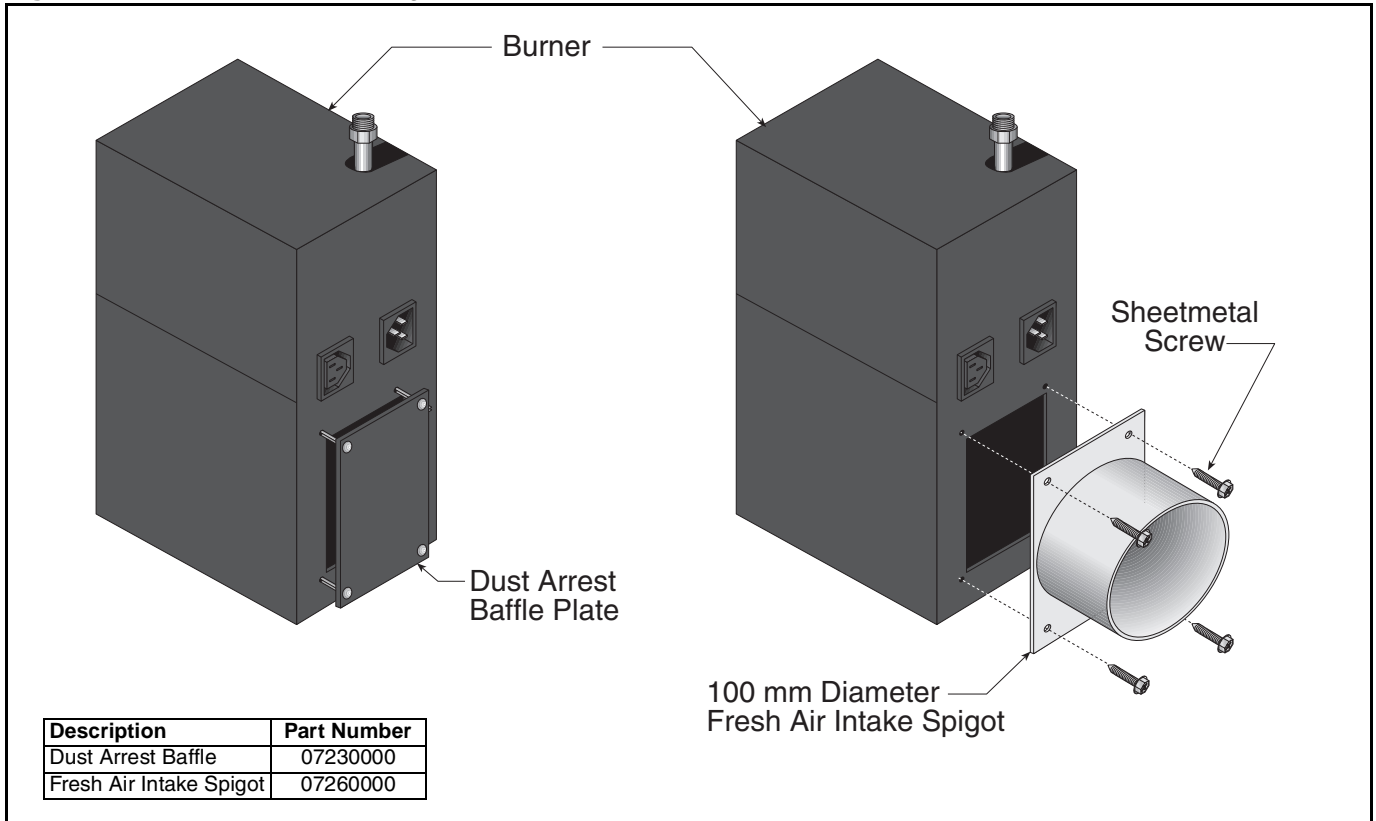
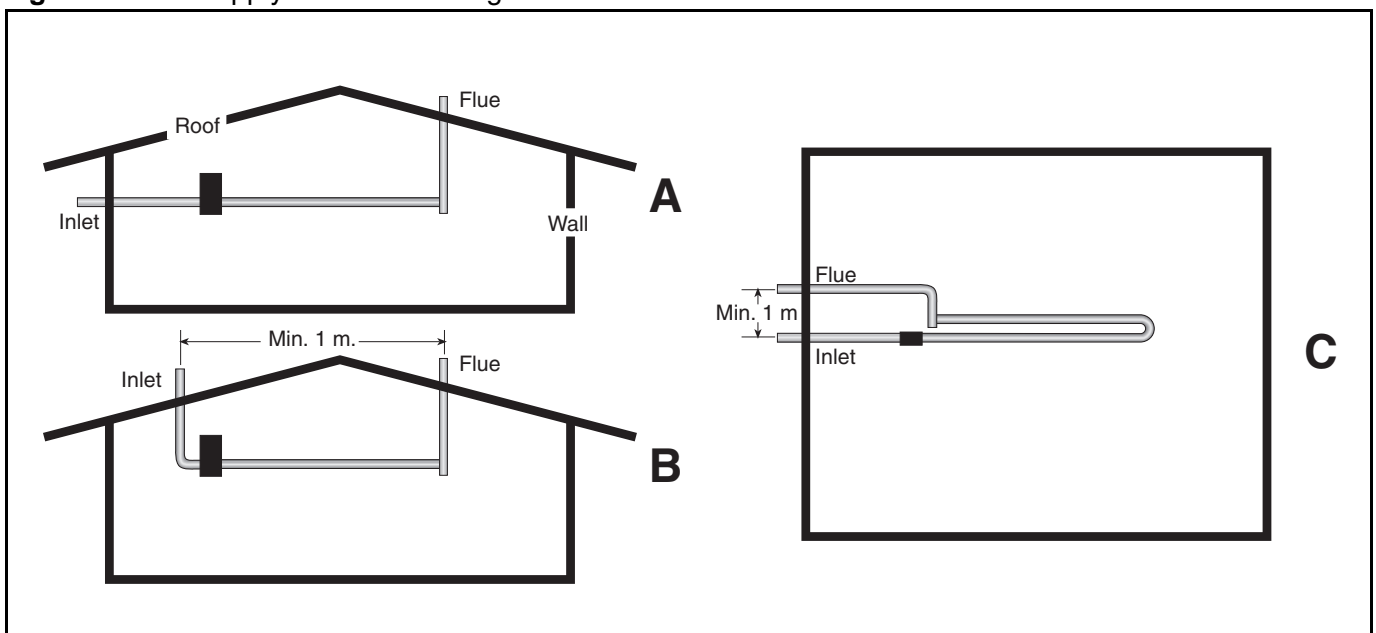




Figure 28: Air Supply with Flue Configurations



12.5 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 13: GAS PIPING

⚠ WARNING	
	
Fire Hazard	Explosion Hazard
<p>Tighten gas line fittings to connect gas supply according to <i>Figure 29</i>.</p> <p>Flex gas line can crack when twisted.</p> <p>Gas line moves during normal operation.</p> <p>Failure to follow these instructions can result in death, injury or property damage.</p>	<p>Do not high pressure test the gas piping with the burner connected.</p> <p>Failure to follow these instructions can result in death, injury or property damage.</p>

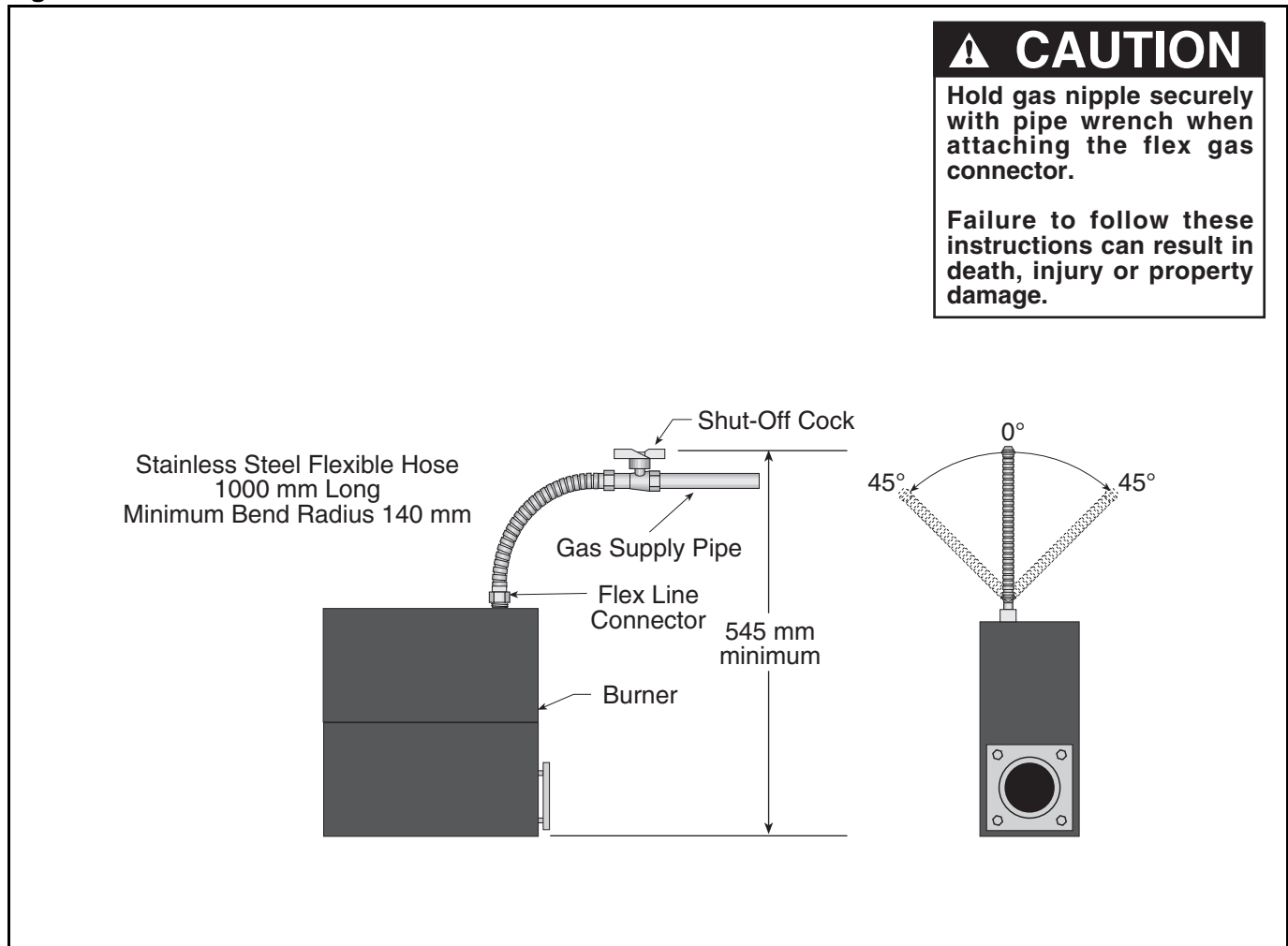
A gas meter is connected to the service pipe by the Gas Supply Company. An existing meter should be checked, preferably by the Company to ensure that the meter is adequate to deal with the rate of gas supply required. Installation pipes should be fitted in accordance with AG 601. Pipe work from the meter to the heater(s) must be of adequate size. Pipes of smaller size than the heater inlet gas connection should not be used.

Connect the heater to the gas supply ensuring that the final connections are as follows:


- Gas supply pipe work is run in medium or heavy gauge tubing to National Standards terminating in a Rc1/2 (1/2" BSP) thread orientated and located as shown on *Page 44, Figure 29*.
- An Rc1/2 (1/2" BSP) mm union cock should be used and fitted into the supply adjacent to the heater.
- A flexible metal hose is connected directly to the Rc1/2 (1/2" BSP int) connection on the burner. This metallic hose must conform to National Standards.

IMPORTANT - the complete installation must be tested for gas soundness in accordance with AG 6011

Figure 29: Gas Connection with Stainless Steel Flex Connector



SECTION 14: WIRING

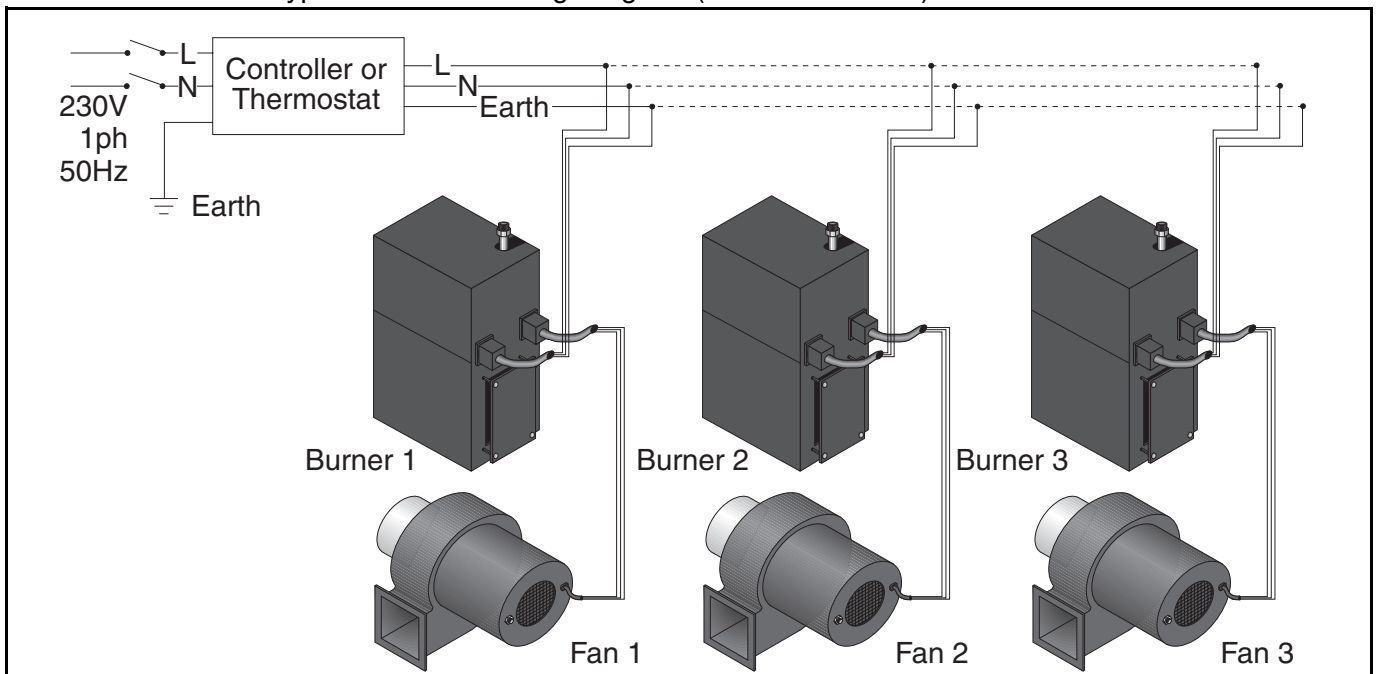
⚠ WARNING	
<p style="text-align: center;">Electrical Shock Hazard</p> <p>Disconnect electrical power before servicing.</p> <p>Replace door before operating.</p> <p>Failure to follow these instructions can result in death or electrical shock.</p>	

Connect to the electrical supply using a 3 pin plug via a locally mounted double pole 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 45, Section 14.1 through Page 46,

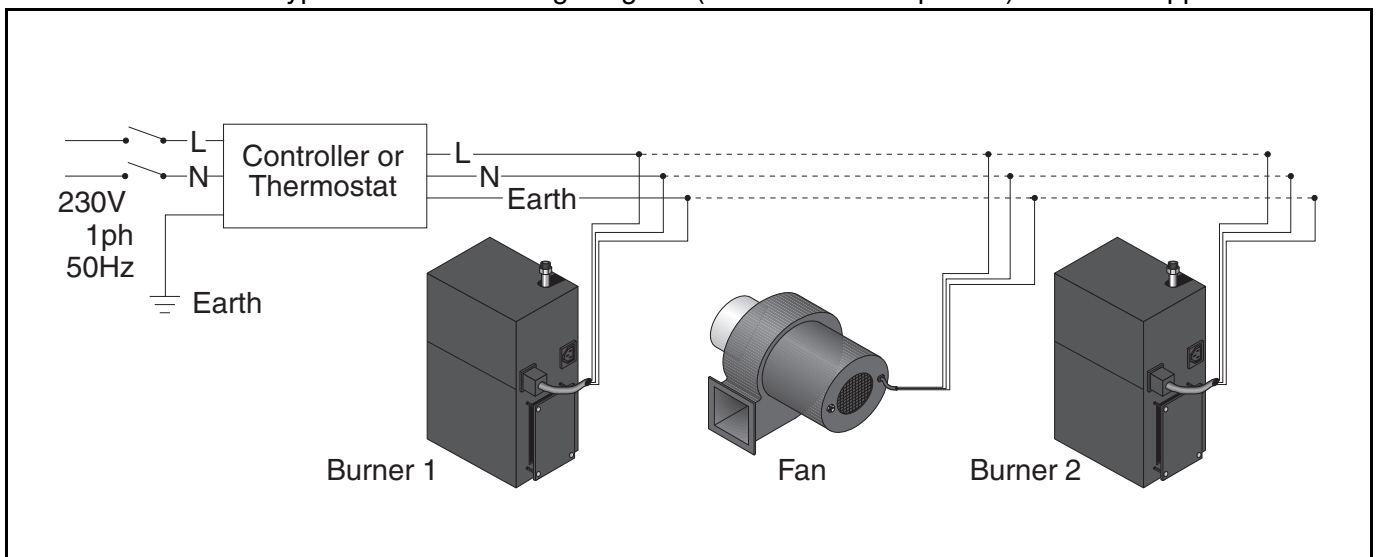
Section 14.3 for the external wiring details for the single-burner and double linear heater systems.

All wiring must comply with current I.E.E. 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.

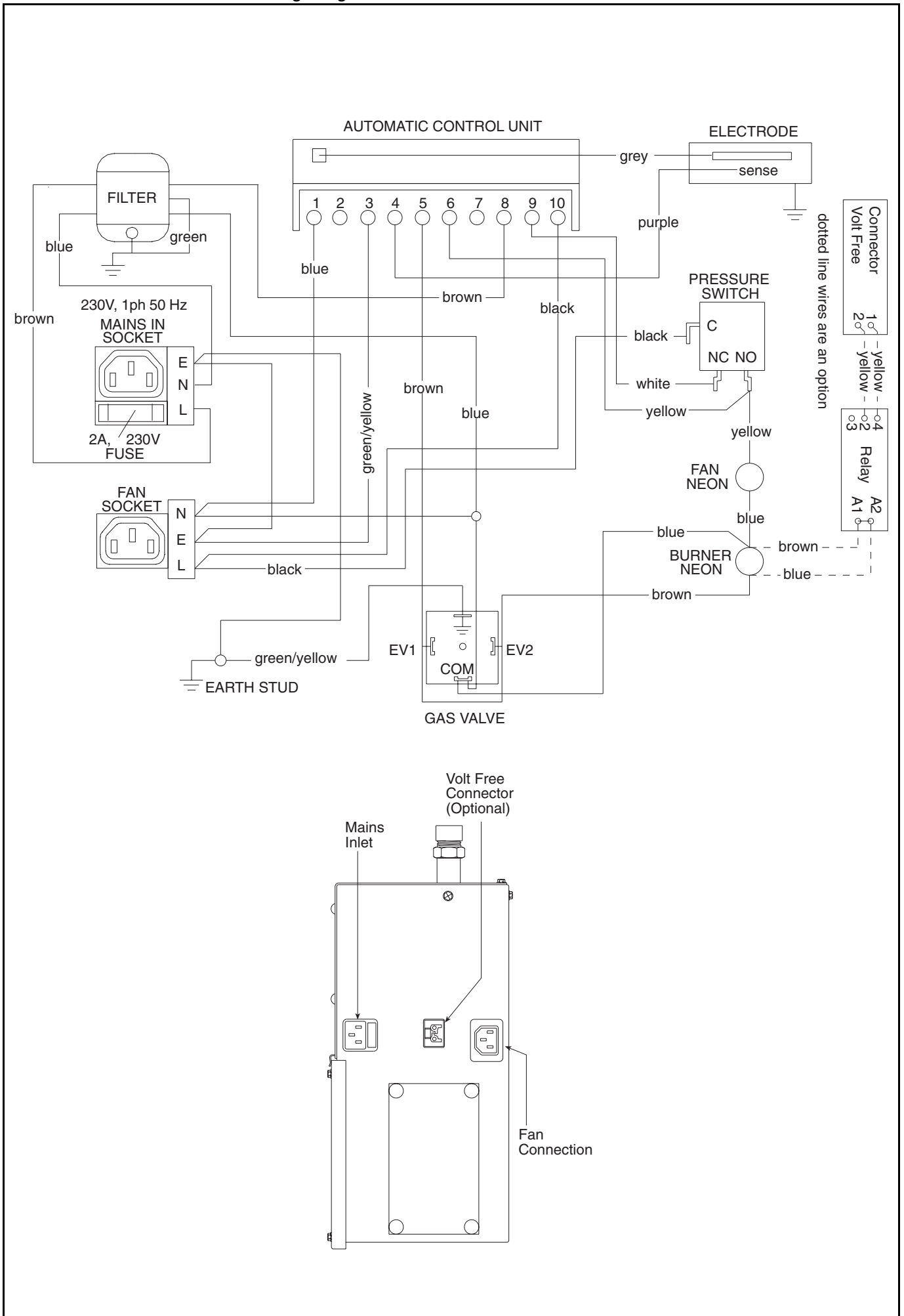
14.1 BLACKHEAT® Typical External Wiring Diagram (Linear or U Tube)



14.2 BLACKHEAT® Typical External Wiring Diagram (Double Linear Option 1) -Non AGA Appliances











14.5 BLACKHEAT® Internal Wiring Diagram

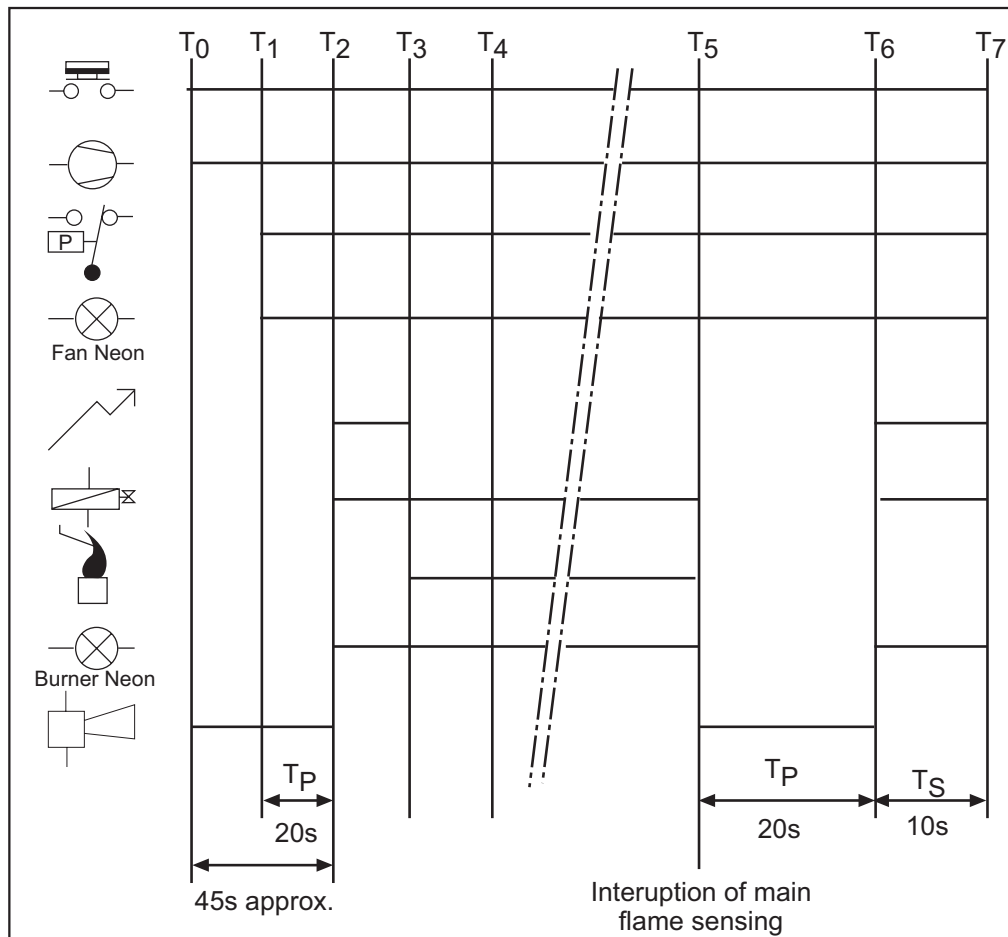


SECTION 15: OPERATION

Figure 30: Sequence of Operation Chart

KEY TO SYMBOLS

-  Thermostat
-  Fan
-  Pressure Switch
-  Neon
-  Ignition
-  Gas Valve
-  Flame Sensing
-  Lockout Alarm (optional)



15.1 Heater Lockout Indication (Optional)

In case of flame loss during operation of the heater, a volt free contact relay is closed which enables the ROBERTS GORDON® BZC microprocessor controller, BMS systems, etc. to receive a signal and indicate precisely which heater has failed. If your heater is equipped with "Heater Lockout" indication (volt free), an additional wire has to be installed from the heater's "volt free connector" to the monitoring computer. See Page 48, Figure 30 for alarm sequence. NOTE the 45 second pre purge signal must be suppressed.

15.2 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 centre screw. Remove the sealing screw from the pressure test point and remove the cover cap from the governor.

Turn on appliance isolating cock 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 to ensure minimum 0.75kPa pressure for natural gas or 2.60kPa pressure for ULPG

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. Close burner side cover.

15.3 Commissioning

15.3.1 Establish that a satisfactory purged gas supply and an electrical supply is available to the heater.

15.3.2 ENSURE that all the dampers are in the fully open position. [Non AGA Multiburner appliances only].

15.3.3 With the gas supply cut off at each of the burners (appliance shut-off cock), the electrical supply isolated by switching off at the local switch and with the appliance inlet plug removed, open the control chamber secured by two self tapping screws.

15.3.4 Ensure that all time clocks and thermostats are set to call for heat.

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

15.3.6 Balancing cold suction

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 suction is 1.9 mbar. Repeat for each burner.

15.3.7 Starting at the end burner (furthest from the exhaust fan). With the inclined pressure gauge connected as described above. Turn on appliance isolating cock and connect appliance electrical plug, reset the pressure switch by removing suction from the inlet side of the pressure switch waiting several seconds and reconnecting. The start up sequence described on *Page 48, Section 15.1* 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 to ensure minimum 0,75kPa pressure for natural gas or 2.6kPa pressure for ULPG.

Switch off the electrical supply (shutting down the heater), remove pressure gauge - refit pressure testpoint screw, ensuring a tight gas seal. Replace governor cover cap. Repeat this procedure for each burner in the system.

15.3.8 Balancing hot suction [Non AGA Multiburner only]

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 suction at the tee on the inlet to the pressure switch. Readjust the damper so that the hot suction of 1.5 mbar is achieved and lock the damper in position.

15.4 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 isolating cock. The heater will immediately shut down followed by one attempt at restoration followed by lockout.
When running, disconnect the fan plug from the burner. The unit should shut down within three seconds, proving operation of the pressure switch.

15.5 User Instructions

Having satisfactorily tested these BLACKHEAT® units, 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.

SECTION 16: SERVICING INSTRUCTIONS

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.

16.1 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.

Isolate the heater from the gas and electricity supply by shutting off the appliance cock and disconnecting the union connector, switching off the local electrical supply and removing the appliance plug.

Remove the fan plug from the burner. Unscrew the securing screws on the burner flange. The burner can now be removed. Unscrew the securing screw on the fan flange spigot. The fan can now be removed.

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 that free rotation is available. When removing burner, take care not to disturb the gasket on the flanged burner tube.

The electrodes are an integral part of the Burner Head. 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.

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 48, Section 15.2.

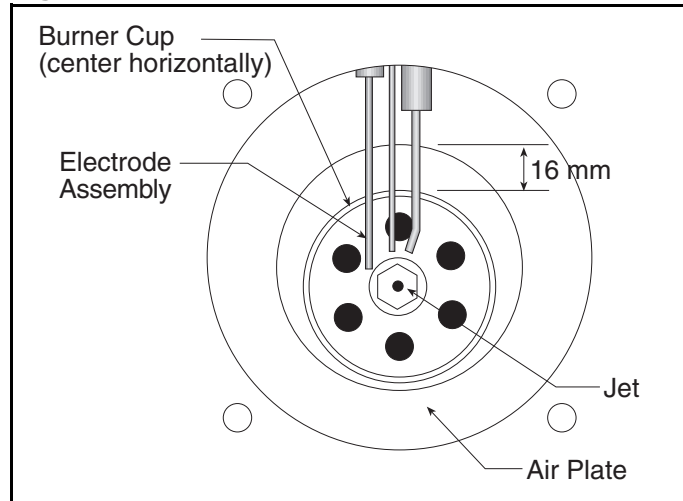
16.2 Component Removal

First, isolate the heater from the gas and electricity supply; shut off the appliance cock, disconnect the gas union connection; switch off the local electrical supply and remove the appliance plug.

Entry to the burner assembly is gained by removing the two (2) door screws and opening the hinged side cover. Entry to the combustion chamber is gained by removing the combustion chamber cover (7 screws).

16.2.1 Electrode

Figure 31: Burner Cup Position



16.2.2 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.

16.2.3 Solenoid Valve/Governor

Remove burner head. Unscrew 2 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.

16.2.4 Automatic Flame Control Unit

Remove black ignition lead. Withdraw the 10 point edge connector. Unscrew two (2) screws from the cover. Replace if faulty. Refit in reverse sequence.

16.2.5 Pressure Switch

Disconnect the two (2) silicone tubes. Remove wires from the three blades. Remove two (2) 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

16.2.6 Neons

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

16.2.7 Fuse

Pull out drawer containing fuse in the panel mounted mains socket.

⚠ WARNING

Installation, Service and Annual Inspection of heater must be done by a contractor qualified in the installation and service of gas-fired heating equipment.

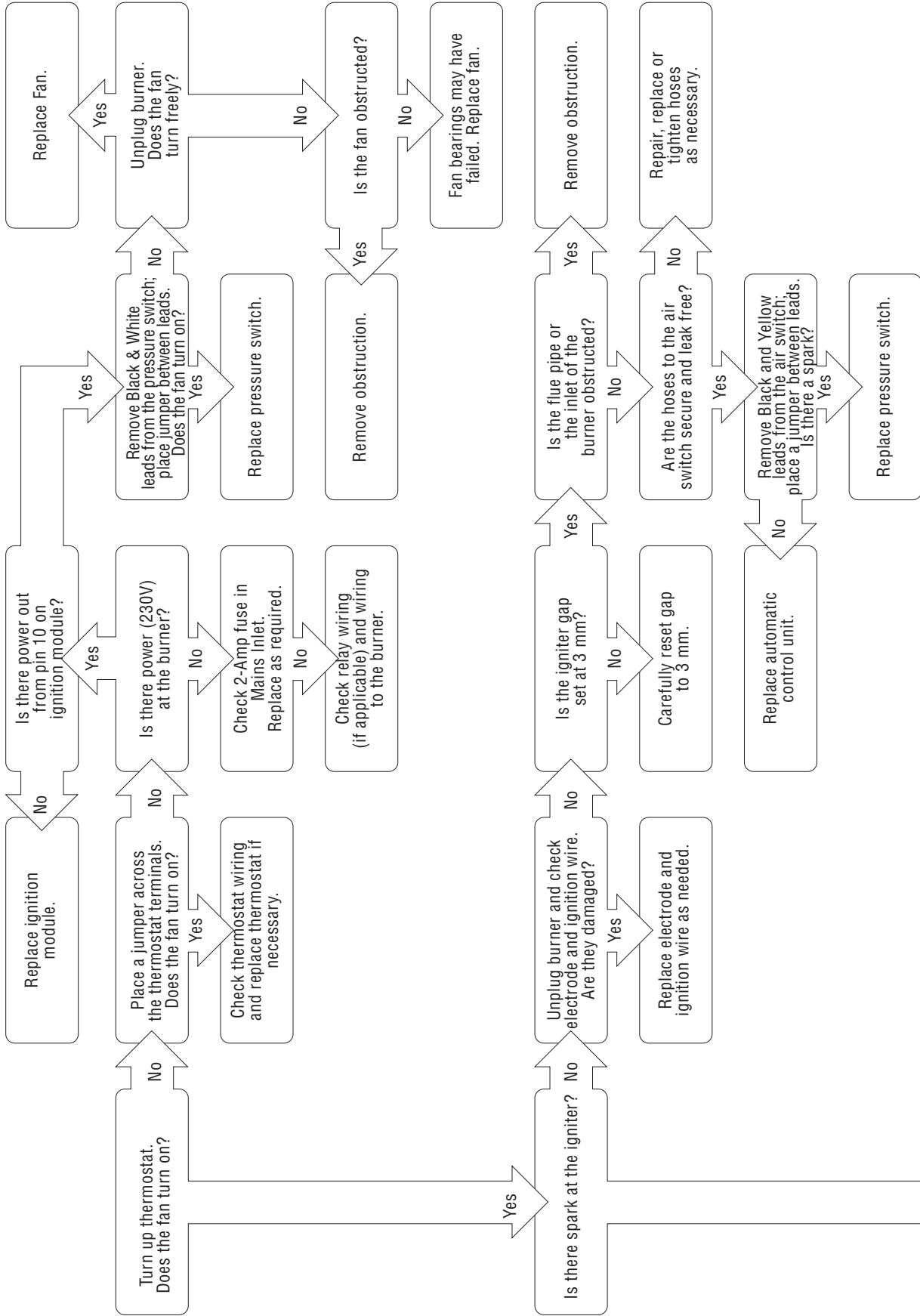
Read this manual carefully before installation, operation, or service of this equipment.

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

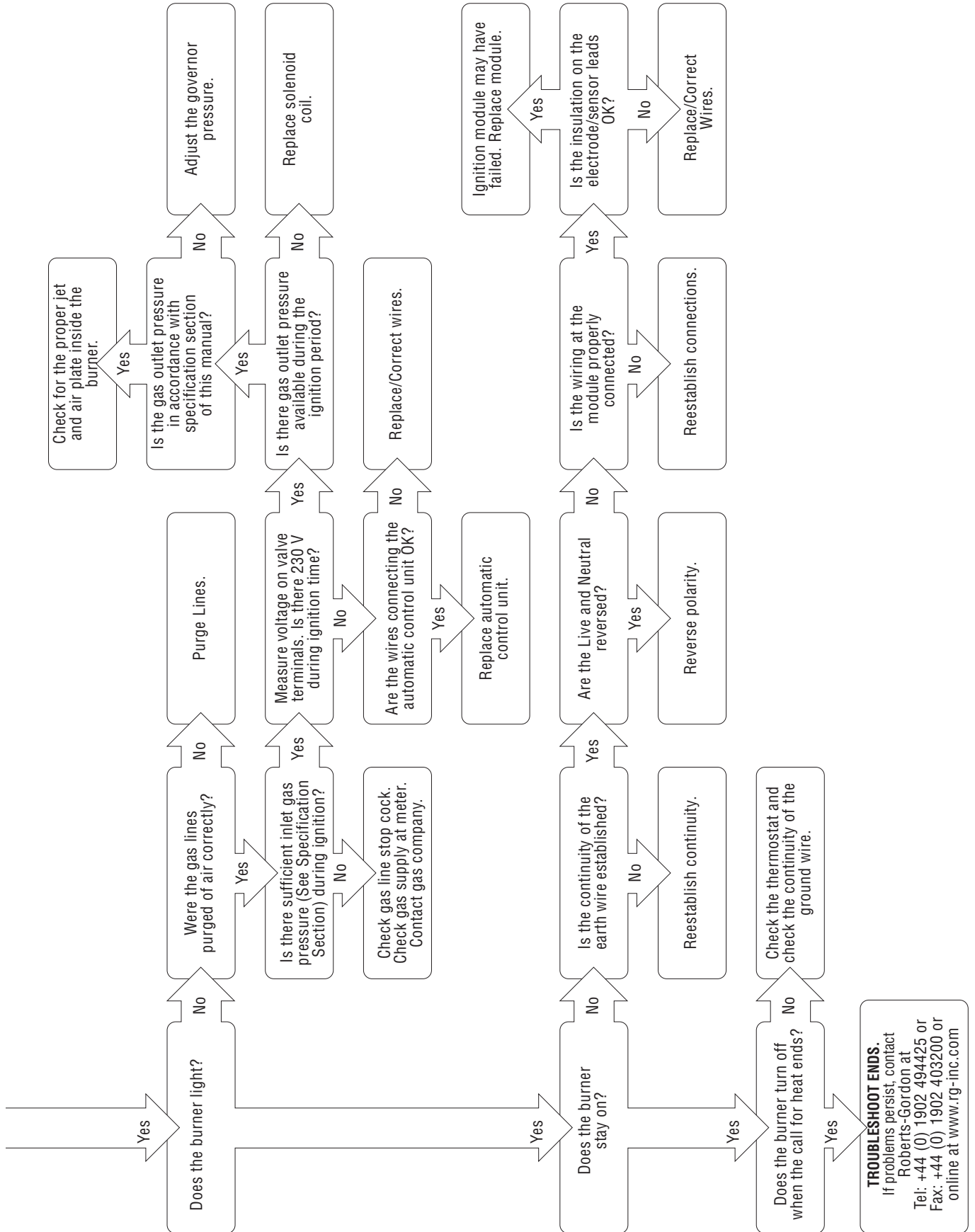
The Vicinity of the Heater	Do not store or use flammable objects, liquids or vapours near the heater. Immediately remove these items if they are present. <i>See Page 3, Section 3.</i>
Vehicles and Other Objects	Maintain the clearances to combustibles. Do not hang anything from, or place anything on, the heater. Make sure nothing is lodged underneath the reflector, in between the tubes or in the decorative or protective grilles. Immediately remove objects in violation of the clearances to combustibles. <i>See Page 3, Section 3.</i>
Reflector	Make sure there is no dirt, sagging, cracking or distortion. Make sure reflectors are correctly overlapped. Clean outside surface with a damp cloth.
Vent [Flue] 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. <i>See Page 42, Section 12.</i>
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	Make sure there are no cracks. Make sure tubes are connected and suspended securely. Make sure there is no sagging, bending or distortion.
Gas Line	Check for gas leaks according to <i>Page 44, Section 13.</i>
Burner Observation Window	Make sure it is clean and free of cracks or holes. Clean and replace as required.
Blower Scroll, Wheel and Motor	Compressed air or a vacuum cleaner may be used to clean dust and dirt.
Burner Cup and Orifice	Clear of obstructions (even spider webs will cause problems). Carefully remove any dust and debris from the burner.
Electrodes	Replace if there are cracked ceramics, excessive carbon residue, or erosion of the electrodes. The electrode gap should be (3 mm).
Thermostat	There should be no exposed wire or damage to the thermostat. <i>See Page 45, Section 14.</i>
Suspension Points	Make sure the heater is hanging securely. Look for signs of wear on the chain or ceiling. <i>See Page 12, Section 6 .</i>
Decorative and Protective Grille (optional)	The grille must be securely attached. Check that side reflector extensions are installed correctly and secured in place if necessary (decorative grille only). <i>See Page 37, Section 11.2 and Page 38, Section 11.3</i> Make sure shield is installed correctly and secured in place if necessary. (Decorative grille only.) <i>See Page 37, Section 11.2.2.</i>

SECTION 17: TROUBLESHOOTING

17.1 Troubleshooting Flow Chart (Linear and U-Tube)



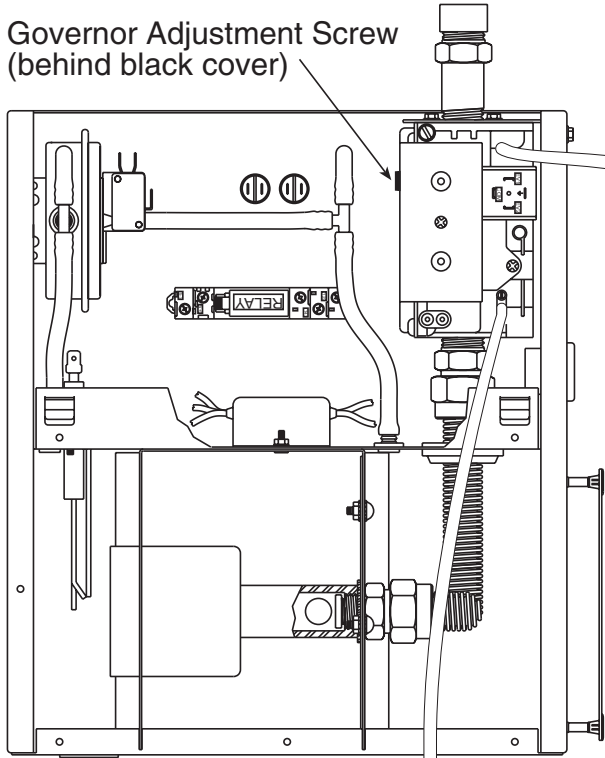
Troubleshooting Flow Chart (Linear and U-Tube)



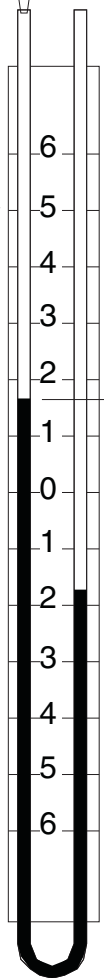
TROUBLESHOOT ENDS.
 If problems persist, contact
 Roberts-Gordon at
 Tel: +44 (0) 1902 494425 or
 Fax: +44 (0) 1902 403200 or
 online at www.rg-inc.com

17.3 Manifold Gas Pressure Setting

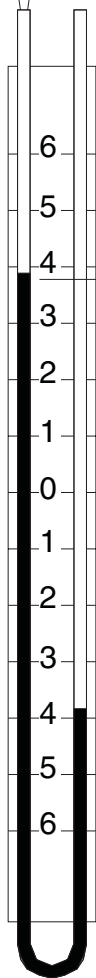
Governor Adjustment Screw
(behind black cover)



Manometer



Governor (orifice) pressure
while burner is running.
See Page 10, Section 4.9.4



Gas Supply pressure
while burner is running.
See Page 8, Section 4.2.3

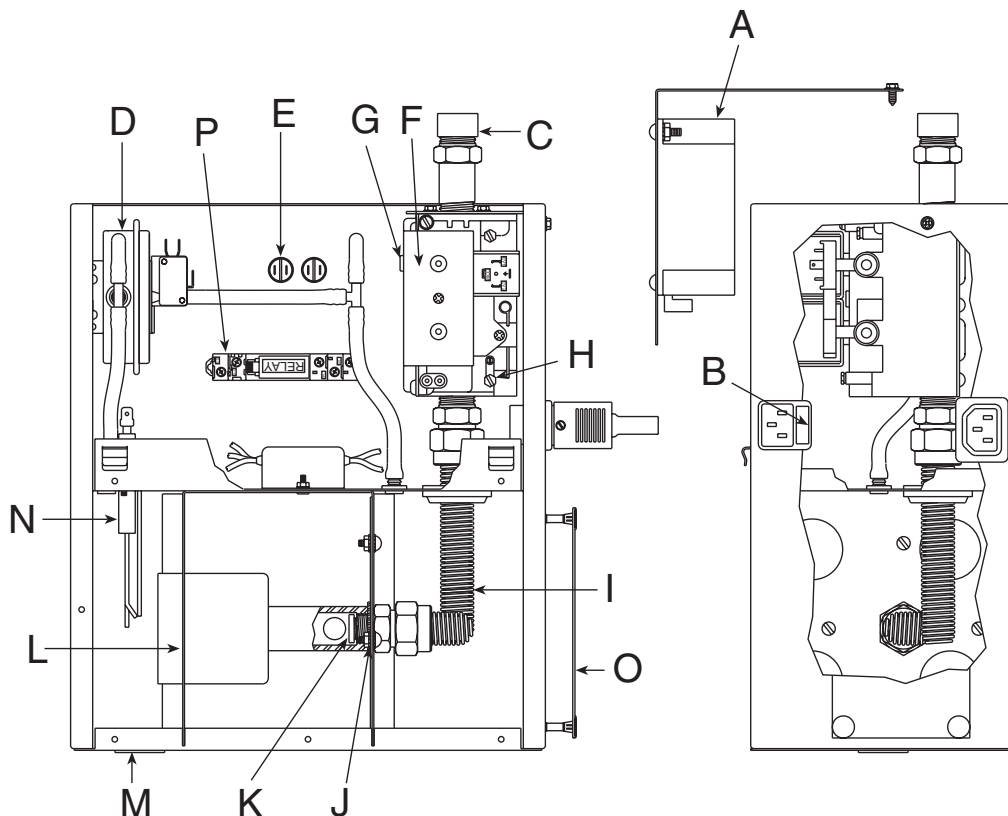
SECTION 18: REPLACEMENT PARTS

⚠ WARNING

Use only genuine ROBERTS GORDON® replacement parts.

Use of parts not specified by Roberts-Gordon voids warranty.

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



Item	Description	Part Number	Item	Description	Part Number
A	Automatic Control Unit	90438700	N	Electrode Assembly	90427403
B	Fuse, 2 amp, 5 mm x 20 mm	91319900	N/S	Electrode Gasket	02558501
C	Flex Line Adapter	91220700	O	Dust Arrest Baffle Plate	07230000
	Pressure Switch for 15-20 kW Burner	90439802	P	Relay Volt Free Contact (Optional)	C1048B
D	Pressure Switch for 25-45 kW Burner	90439801		Relay Volt Free Base (Optional)	C1059B
	Pressure Switch for 50 kW Burner	90439801	N/S	Filter, Noise - RFI	90438900
E	Amber Neon Lamp	91320602	N/S	Edge Connector - 10 way	91319601
F	Gas Valve	90033100	N/S	Ignition Wire	90427704
G	Governor Screw		N/S	Outside Air Kit	07260000
H	Outlet Pressure Tap		N/S	Flue Collar 100 mm	91911700
I	Flex Manifold	03090702T	N/S	Outside Air Mounting Plate	07261000
J	Star Washer	96212100	N/S	#8 x 3/8 (3.9 x 9.5mm) Washer Head Screw	94118106
K	Jet Orifice (see Section 2 of these instructions)		N/S	Burner Tube Gasket	02568200
L	Burner Cup Assembly	03020100			
M	Mica Window Assembly	02552303			

Notes: