FOR YOUR SAFETY
If you smell gas:

1. Open windows.
2. DO NOT try to light any appliance.
3. DO NOT use electrical switches.
4. DO NOT use any telephone in your building.
5. Extinguish any open flame.
6. Leave the building.
7. Immediately call your local gas supplier after leaving the building. Follow the gas supplier's instructions.
8. If you cannot reach your gas supplier, call Emergency Services.

⚠ WARNING

Fire Hazard

Keep all flammable objects, liquids and vapours 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.

Combat® HEATING SOLUTIONS LIMITED

Vacuum Assisted Linear, Double Linear, U-Tube, and Multi-Burner Gas Fired Heating Systems

Installation, Operation & Service Manual

CMP15UT
CMP20UT
CMP25UT
CMP30UT
CMP35UT
CMP40UT
CMP45UT
CMP50UT

CMP15ST
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CMP25ST
CMP30ST
CMP35ST
CMP40ST
CMP45ST
CMP50ST
CMP55ST

CMP30DL
CMP40DL
CMP50DL
CMP60DL
CMP70DL

⚠ WARNING

Improper installation, adjustment, alteration, service or maintenance can result in death, injury or property damage. Read the installation, operation and service manual thoroughly before installing or servicing this equipment.

Installation must be done by a registered installer/ contractor qualified in the installation and service of gas-fired heating equipment or your gas supplier.

Installer

Please take the time to read and understand these instructions prior to any installation. Installer must give a copy of this manual to the owner.

Owner

Keep this manual in a safe place in order to provide your service technician with necessary information.

CE

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Printed in U.K.

Product Approval

COMBAT® equipment has been tested and CE certified as complying with the essential requirements of the Gas Appliance Directive, the Low Voltage Directive, the Electromagnetic Compatibility Directive and the Machinery Directive for use on natural gas and LPG when installed, commissioned and maintained in accordance with these instructions.

These instructions refer to appliances designed to operate in the European Union.

Appliances designed for other countries (Non-European Union) are available on request.

This appliance must be installed in accordance with the local and national codes in force and used only in a sufficiently ventilated space, as specified in these instructions.

Before installation, check that the local gas distribution systems, nature of gas and pressure, and adjustment of the appliance are compatible.

SECTION 1: HEATER SAFETY

Your Safety is Important to Us!

This symbol is used throughout the manual to notify you of possible fire, electrical or burn hazards. Please pay special attention when reading and following the warnings in these sections.

Installation, service and annual inspection of heater must be done by a registered installer/contractor qualified in the installation and service of gas-fired heating equipment.

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

This heater is designed for heating nonresidential indoor spaces. Do not install in residential spaces. These instructions, the layout drawing, local codes and ordinances, and applicable standards that apply to gas piping, electrical wiring, venting, etc., must be thoroughly understood before proceeding with the installation.

Protective gear is to be worn during installation, operation and service. Thin sheet metal parts, such as the reflector portion of the heater and the various venting components, have sharp edges. To prevent injury, the use of work gloves is recommended. The use of gloves will also prevent the transfer of body oils from the hands to the surface of the reflector.

Before installation, check that the local distribution conditions, nature of gas and pressure, and adjustment of the appliance are compatible.

The heater must be applied and operated under the general concepts of reasonable use and installed using best building practices.

This appliance is not intended for use by persons (including children) with reduced physical, sensory or mental capabilities, or lack of experience and knowledge, unless they have been given supervision or instruction concerning use of the appliance by a person responsible for their safety. Children should be supervised to ensure that they do not play with the appliance.

For additional copies of the Installation, Operation and Service Manual, please contact Combat Heating Solutions Limited.

1.1 Manpower Requirements

To prevent personal injury and damage to the heater, a minimum of two persons will be required for installation.

SECTION 2: INSTALLER RESPONSIBILITY

- To install the heater, as well as the gas and electrical supplies, in accordance with applicable specifications and codes. Combat Heating Solutions Limited recommends the installer contact a local Building Inspector or Site safety officer for information relating to combustible materials and substances used in the environment where the equipment is to be installed for guidance when required.
- To use the information given in a layout drawing and in the manual together with the cited codes and regulations to perform the installation.
- To install the heater in accordance with the clearances to combustibles.
- To furnish all needed materials not furnished as standard equipment.
- To plan location of supports.
- To provide access to burners for servicing on all sides, for burner removal.
- To provide the owner with a copy of this installation, operation and service manual.
- To never use heater as support for a ladder or other access equipment and never hang or suspend anything from heater.
- To ensure there is adequate air circulation around the heater and to supply air for combustion, ventilation and distribution in accordance with local codes.
- To safely and adequately install heater using materials with a minimal working load of 33 kg.
- To ensure the heater is placed in an approved application.

2.1 Low Level User Instructions

In all situations, clearances to combustibles must be maintained. Signs should be posted in storage areas to specify the maximum stacking height of items placed below heater to maintain required clearances to combustibles. Minimum clearances must be maintained from vehicles parked below the heater. Caution should be used when running the system near combustible materials such as wood, paper, rubber, etc. Consideration should be given to partitions, storage racks, hoists, building construction, etc.

A laminated wall tag is available for the heater as a permanent reminder of the safety instructions and the importance of the required clearances to combustibles. Please contact Combat Heating Solutions Limited or your COMBAT® HEATING SOLUTIONS LIMITED independent distributor to obtain the wall tag. Affix the tag by peeling off the backing of the adhesive strips on the rear surface and position the tag on a wall near the heater (e.g. thermostat or COMBAT® HEATING SOLUTIONS LIMITED Controller).

A copy of the wall tag (P/N 91037912) is illustrated on the back cover. This copy of the wall tag can be affixed on the wall near the heater. 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 on the tag.

2.2 Corrosive Chemicals

⚠ CAUTION

Product Damage Hazard

Do not use heater in area containing corrosive chemicals.

Refer to appropriate Material Safety Data Sheets (MSDS).

Failure to follow these instructions can result in product damage.

Combat Heating Solutions Limited cannot be responsible for ensuring that all appropriate safety measures are undertaken prior to installation; this is entirely the responsibility of the installer. It is essential that the contractor, the sub-contractor, or the owner identifies the presence of combustible materials, corrosive chemicals or halogenated hydrocarbons* anywhere in the premises.

** **Halogenated Hydrocarbons** are a family of chemical compounds characterized by the presence of halogen elements (fluorine, chlorine, bromine, etc.). These compounds are frequently used in refrigerants, cleaning agents, solvents, etc. If these compounds enter the air supply of the burner, the lifespan of the heater components will be greatly reduced. An outside air supply must be provided to the burners whenever the presence of these compounds is suspected. Warranty will be invalid if the heater is exposed to halogenated hydrocarbons.*

2.3 National Standards and Applicable Codes

All appliances must be installed in accordance with the latest revision of the applicable standards and national codes. This refers also to the electric, gas and venting installation. Note: Additional standards for installations in public garages, aircraft hangars, etc. may be applicable.

SECTION 3: CLEARANCES TO COMBUSTIBLES

⚠ 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.

3.1 Required Clearances to Combustibles

Clearances are the required distances that combustible objects must be away from the heater to prevent fire hazards. Caution should be used when running the system near combustibles. Combustibles are materials, which may catch on fire and include common items such as wood, paper, rubber, fabric, etc. **Maintain clearances to combustibles at all times for safety.**

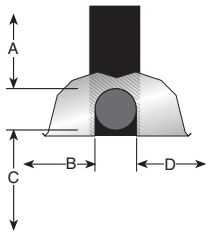
Clearances for all heater models are located *on Page 5, Figure 1 through Page 8, Figure 15* in this manual. Check the clearances on each burner for the model heater being installed to make sure the product is suitable for your application and the clearances are maintained. Read and follow the safety guidelines below:

- Keep petrol or other combustible materials including flammable objects, liquids, dust or vapours away from this heater or any other appliance.
- Do not spray aerosols in the vicinity of this appliance.
- The stated clearances to combustibles represents a surface temperature of 50° C (90° F) above room temperature. Building materials with a low heat tolerance (such as plastics, vinyl siding, canvas, tri-ply, etc) may be subject to degradation at lower temperatures. It is the installer's responsibility to assure that adjacent materials are protected from degradation.
- Maintain clearances from heat sensitive equipment and workstations.
- Maintain clearances from vehicles parked below the heater.
- Maintain clearances from swinging and overhead doors, overhead cranes, vehicle lifts, partitions, storage racks, hoists, building construction, etc.
- In locations used for the storage of combustible materials, signs must be posted to specify the maximum permissible stacking height to maintain required clearances from the heater to the combustibles. Signs must be posted adjacent to the heater thermostat. In the absence of a thermostat, signs must be posted in a conspicuous location.
- Consult local Building Inspector, Insurance Provider or other authorities for approval of proposed installation when there is a possibility of exposure to combustible airborne materials or vapours.
- Hang heater in accordance to the minimum suspension requirements on *Page 69, Section 18.7 through Section 18.9*.
- If the radiant tubes must pass through the building structure, be sure that adequate sleeving and fire stop is installed to prevent scorching and/or fire hazard.

3.2 Clearance Data - Linear and Double Linear

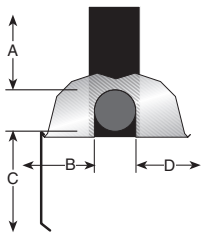
NOTE:
1. All dimensions are from the surfaces of all tubes, couplings, tees, elbows and crosses.
2. Clearances B, C and D can be reduced by 50% after 7500 mm of tubing downstream from the burner.
3. All measurements are in millimeters.

FIGURE 1: LINEAR & DOUBLE LINEAR, HORIZONTAL MOUNTS



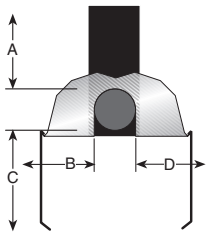
Model	CMP15ST CMP30DL	CMP20ST CMP40DL	CMP25ST CMP50DL	CMP30ST CMP60DL	CMP35ST CMP70DL	CMP40ST	CMP45ST	CMP50ST & CMP55ST*
A	150	150	150	150	150	150	200	200
B	890	970	970	1020	1170	1220	1280	1330
C	1570	1650	1650	1780	1930	1970	2010	2080
D	890	970	970	1020	1170	1220	1280	1330

FIGURE 2: LINEAR & DOUBLE LINEAR, ONE SIDE REFLECTOR



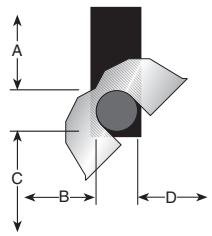
Model	CMP15ST CMP30DL	CMP20ST CMP40DL	CMP25ST CMP50DL	CMP30ST CMP60DL	CMP35ST CMP70DL	CMP40ST	CMP45ST	CMP50ST & CMP55ST*
A	150	150	150	150	150	150	200	200
B	230	230	230	230	230	230	230	230
C	1580	1760	1760	1930	2090	2130	2160	2240
D	1200	1380	1380	1500	1660	1710	1760	1860

FIGURE 3: LINEAR & DOUBLE LINEAR, TWO SIDE REFLECTORS



Model	CMP15ST CMP30DL	CMP20ST CMP40DL	CMP25ST CMP50DL	CMP30ST CMP60DL	CMP35ST CMP70DL	CMP40ST	CMP45ST	CMP50ST & CMP55ST*
A	150	150	150	150	150	150	200	200
B	590	640	640	690	820	860	890	1020
C	1660	1810	1810	1960	2110	2160	2210	2320
D	590	640	640	690	820	860	890	1020

FIGURE 4: LINEAR & DOUBLE LINEAR, 45° MOUNT

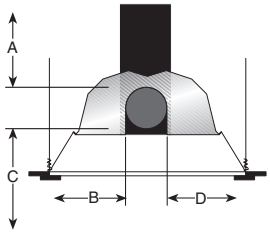


Model	CMP15ST CMP30DL	CMP20ST CMP40DL	CMP25ST CMP50DL	CMP30ST CMP60DL	CMP35ST CMP70DL	CMP40ST	CMP45ST	CMP50ST & CMP55ST*
A	200	200	200	250	250	275	300	300
B	200	200	200	200	200	200	200	200
C	1500	1660	1660	1860	1960	2030	2110	2160
D	1370	1520	1520	1630	1750	1820	1880	2000

* CMP55ST only available in multiburner.

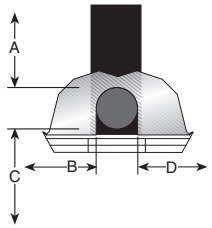
NOTE:
1. All dimensions are from the surfaces of all tubes, couplings, tees, elbows and crosses.
2. Clearances B, C and D can be reduced by 50% after 7500 mm of tubing downstream from the burner.
3. All measurements are in millimeters.

FIGURE 5: LINEAR & DOUBLE LINEAR, 2 FOOT DECO GRILLE



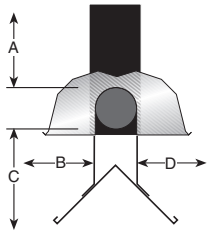
Model	CMP15ST CMP30DL	CMP20ST CMP40DL	CMP25ST CMP50DL	CMP30ST CMP60DL	CMP35ST CMP70DL	CMP40ST	CMP45ST	CMP50ST & CMP55ST*
A	150	150	150	150	150	150	200	200
B	890	970	970	1020	1170	1220	1280	1330
C	1570	1650	1650	1780	1930	1970	2010	2080
D	890	970	970	1020	1170	1220	1280	1330

FIGURE 6: LINEAR & DOUBLE LINEAR, PROTECTIVE GRILLE



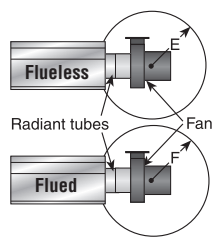
Model	CMP15ST CMP30DL	CMP20ST CMP40DL	CMP25ST CMP50DL	CMP30ST CMP60DL	CMP35ST CMP70DL	CMP40ST	CMP45ST	CMP50ST & CMP55ST*
A	150	150	150	150	150	150	200	200
B	890	970	970	1020	1170	1220	1280	1330
C	1570	1650	1650	1780	1930	1970	2010	2080
D	890	970	970	1020	1170	1220	1280	1330

FIGURE 7: UNDERSHIELD



Model	CMP15ST CMP30DL	CMP20ST CMP40DL	CMP25ST CMP50DL	CMP30ST CMP60DL	CMP35ST CMP70DL	CMP40ST	CMP45ST	CMP50ST & CMP55ST*
A	150	150	150	150	150	150	-	-
B	990	1020	1270	1270	1370	1400	-	-
C	840	965	1120	1120	1220	1270	-	-
D	990	1020	1270	1270	1370	1400	-	-

FIGURE 8: LINEAR & DOUBLE LINEAR, FLUED/FLUELESS CLEARANCE RADIUS REQUIREMENT FOR FLUE FAN



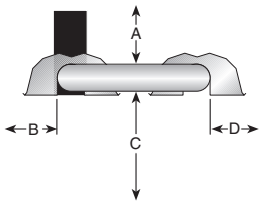
Model	CMP15ST CMP30DL	CMP20ST CMP40DL	CMP25ST CMP50DL	CMP30ST CMP60DL	CMP35ST CMP70DL	CMP40ST	CMP45ST	CMP50ST & CMP55ST*
E	1000	1000	1000	1000	1000	1000	1000	1000
F	500	500	500	500	500	500	500	500

* CMP55ST only available in multiburner.

3.3 Clearance Data -U Tube

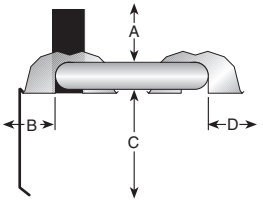
NOTE:
1. All dimensions are from the surfaces of all tubes, couplings, tees, elbows and crosses.
2. Clearances B, C and D can be reduced by 50% after 7500 mm of tubing downstream from the burner.
3. All measurements are in millimeters.
4. Add 60 mm clearance to uncovered U-tube.

FIGURE 9: U-TUBE, HORIZONTAL MOUNT



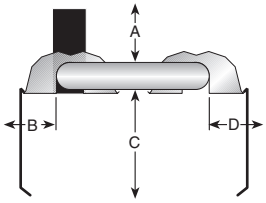
Model	CMP15UT	CMP20UT	CMP25UT	CMP30UT	CMP35UT	CMP40UT	CMP45UT	CMP50UT
A	150	150	150	150	150	150	200	200
B	890	970	970	1020	1170	1220	1270	1380
C	1580	1730	1730	1910	1980	2050	2110	2210
D	760	940	940	1000	1090	1150	1200	1300

FIGURE 10: U-TUBE, ONE SIDE REFLECTOR



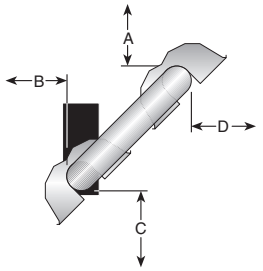
Model	CMP15UT	CMP20UT	CMP25UT	CMP30UT	CMP35UT	CMP40UT	CMP45UT	CMP50UT
A	150	150	150	150	150	150	200	200
B	230	230	230	230	230	230	230	230
C	1580	1760	1760	1930	2090	2130	2160	2240
D	1200	1380	1380	1500	1660	1710	1760	1860

FIGURE 11: U-TUBE, TWO SIDE REFLECTORS



Model	CMP15UT	CMP20UT	CMP25UT	CMP30UT	CMP35UT	CMP40UT	CMP45UT	CMP50UT
A	150	150	150	150	150	150	200	200
B	590	640	640	690	820	860	890	1020
C	1660	1810	1810	1960	2110	2160	2210	2320
D	590	640	640	690	820	860	890	1020

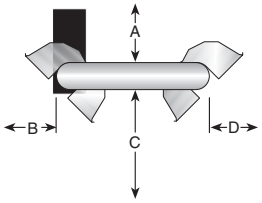
FIGURE 12: U-TUBE, FULL 45° MOUNT



Model	CMP15UT	CMP20UT	CMP25UT	CMP30UT	CMP35UT	CMP40UT	CMP45UT	CMP50UT
A	200	200	200	200	200	200	200	200
B	200	200	200	200	200	200	200	200
C	1500	1650	1650	1860	1960	2040	2110	2160
D	1070	1170	1170	1320	1550	1620	1680	1780

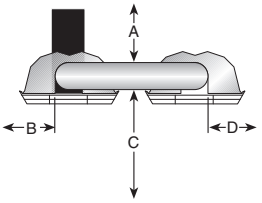
NOTE:
1. All dimensions are from the surfaces of all tubes, couplings, tees, elbows and crosses.
2. Clearances B, C and D can be reduced by 50% after 7500 mm of tubing downstream from the burner.
3. All measurements are in millimeters.
4. Add 60 mm clearance to uncovered U-tube.

FIGURE 13: U-TUBE, OPPOSITE 45° TILT



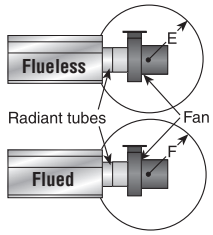
Model	CMP15UT	CMP20UT	CMP25UT	CMP30UT	CMP35UT	CMP40UT	CMP45UT	CMP50UT
A	200	200	200	250	250	275	300	300
B	1370	1530	1530	1630	1780	1830	1880	1930
C	1500	1650	1650	1860	1960	2040	2110	2160
D	560	560	560	560	560	560	560	560

FIGURE 14: U-TUBE, PROTECTIVE GRILLE



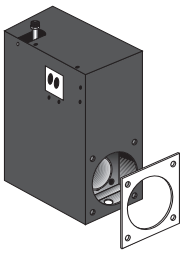
Model	CMP15UT	CMP20UT	CMP25UT	CMP30UT	CMP35UT	CMP40UT	CMP45UT	CMP50UT
A	150	150	150	150	150	150	200	200
B	890	970	970	1020	1170	1220	1270	1380
C	1580	1730	1730	1910	1980	2050	2110	2210
D	760	940	940	1000	1090	1150	1200	1300

FIGURE 15: U-TUBE, FLUED/FLUELESS CLEARANCE RADIUS REQUIREMENT FOR FLUE FAN



Model	CMP15UT	CMP20UT	CMP25UT	CMP30UT	CMP35UT	CMP40UT	CMP45UT	CMP50UT
E	1000	1000	1000	1000	1000	1000	1000	1000
F	500	500	500	500	500	500	500	500

SECTION 4: MAJOR COMPONENT DESCRIPTIONS

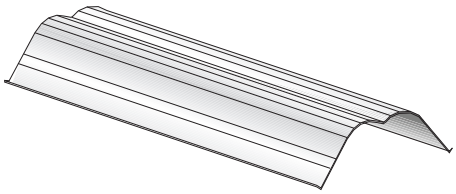


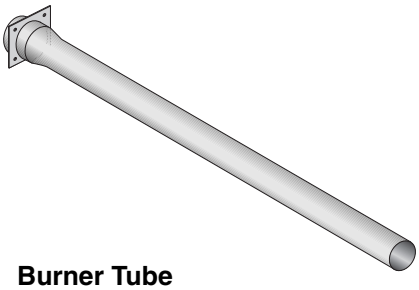
Burner (shown with Tube Gasket)

Must be installed with the flame observation window facing down.

Reflector (Aluminium or Stainless Steel)

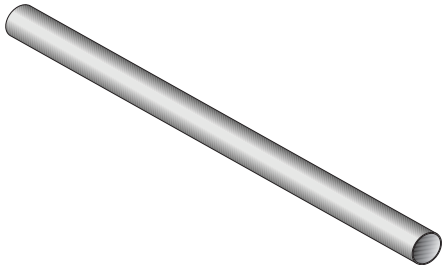
Alternate overlap as shown on overview. Minimum overlap is 160 mm.





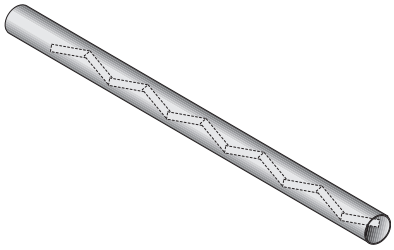
Burner Tube

Supplied in 3,000 mm lengths. Burner tube is always the first tube after the burner.



Tube

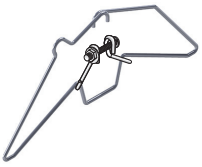
Heat treated aluminised tube supplied in 3,000 mm lengths.



Fan Tube with Internal Swirler

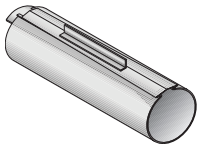
Supplied in 3,000 mm lengths. Fan tube is always the last tube on the heater where the fan is attached.

The swirler is welded to the inside of the tube end.

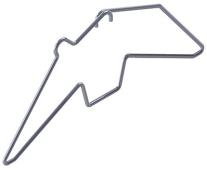


Tube and Reflector Hanger with Clamp Package

Position this hanger no more than 100 mm away from the burner assembly.

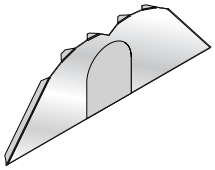


Coupling Assembly with Lock



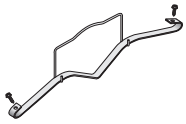
Tube and Reflector Hanger

Suspend system from these hangers.

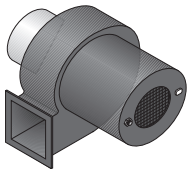


Reflector End Cap

Punch out center section to accommodate tube.

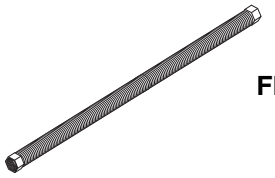


Reflector Support Strap, Wire Form & #8 x 3/4 (3.9 x 19mm) Screw

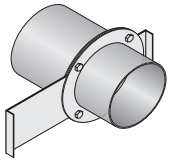


Fan Assembly (Includes Flange)

Fan Assembly is attached to the last section of heat exchanger tubing (Fan Tube).

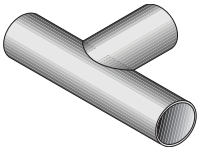


Flex Gas Line

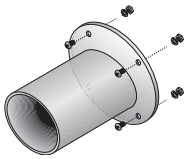


Damper Flange Assembly

For use on Multiburner Systems.

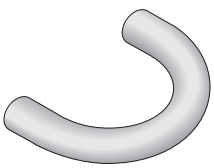


Tee Assembly

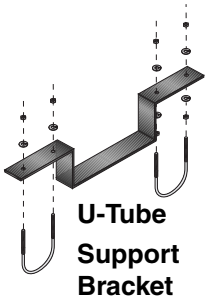


Fan Flange Assembly and Screws

Height Adjuster



U-Tube



U-Tube Support Bracket

Spring Hook

Bow Shackle

SECTION 5: GENERAL SUSPENSION DETAILS

⚠WARNING

Severe Injury Hazard

Secure burner to burner tube with nuts 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.

To ensure your safety, and comply with the terms of the warranty, all units must be installed in accordance with these instructions.

The gas or the electrical supply lines must not be used to support the heater.

Do not locate the gas or electric supply lines directly over the path of the flue products from the heater.

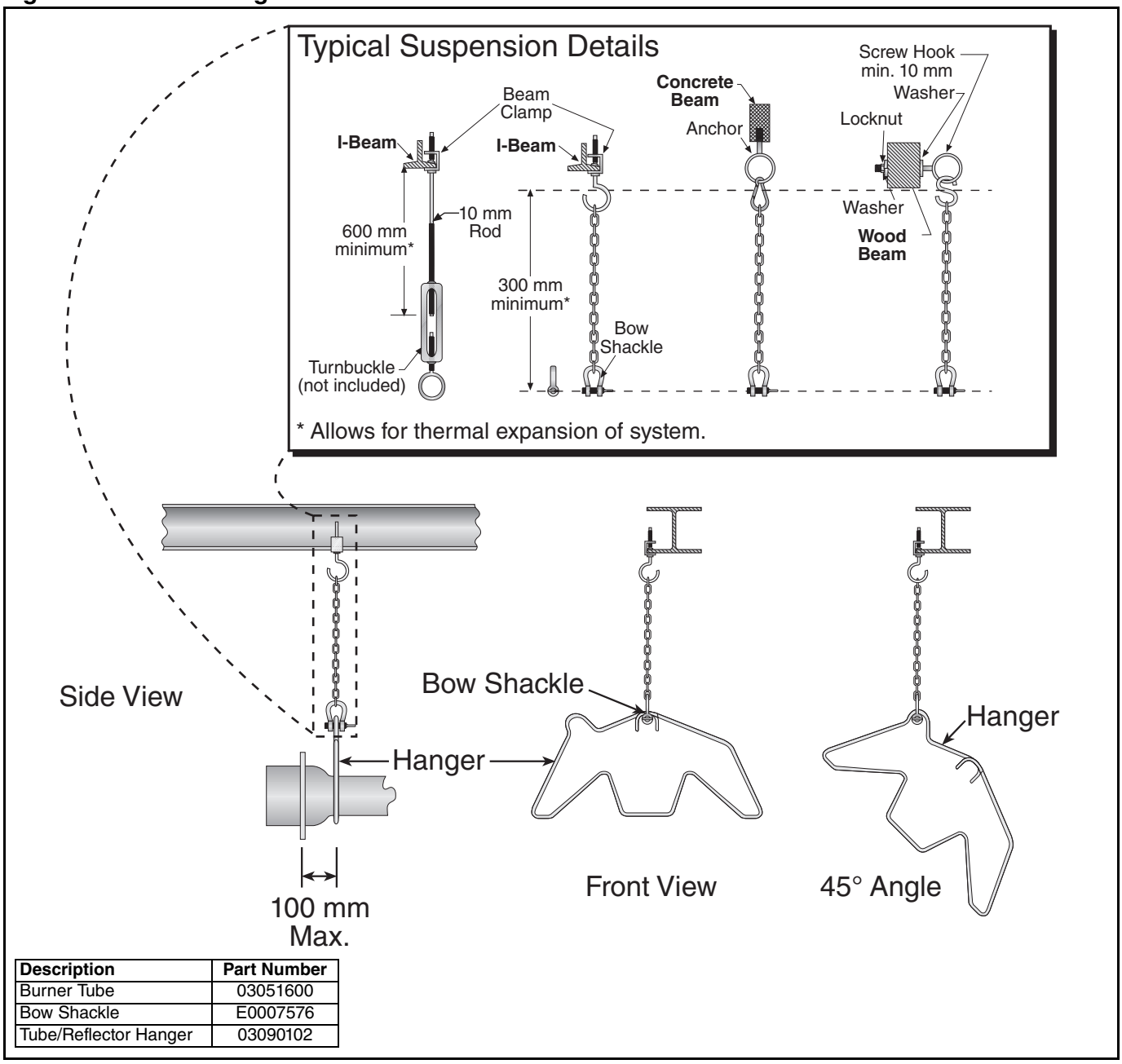
The heater must be installed in a location that it is readily accessible for servicing.

The heater must be installed in accordance with clearances to combustibles as indicated in this manual.

The minimum and maximum gas inlet pressures must be maintained as indicated on the rating plate. Typical installation configurations are shown *on Page 11, Figure 16*.

Suspension chain is not supplied as standard equipment.

Figure 16: Critical Hanger Placement



Description	Part Number
Burner Tube	03051600
Bow Shackle	E0007576
Tube/Reflector Hanger	03090102

For suspension angles other than shown, additional chain supports may be required.

SECTION 6: LINEAR & DOUBLE LINEAR HEATER INSTALLATION

⚠WARNING

Cut/Pinch Hazard

Wear protective gear during installation, operation and service.

Edges are sharp.

Failure to follow these instructions can result in injury.

The figures in this section provide a general overview of component placement in a Linear and Double Linear system. The location of some components such as supports and couplings is crucial for proper installation. Assemble the heater components as shown *on Page 13, Figure 17*.

For optional reflector configurations for linear heaters *see Page 5, Figure 1 through Page 6, Figure 8*. Install appropriate suspension hardware, beam clamps, chain or rod at predetermined locations. Adjustments of chain length will provide uniform pitch.

If any step is unclear, please contact Combat Heating Solutions Limited at +44 (0)121 506 7700.

6.1 Linear Standard Parts List

Part No.	Description	CMP15ST	CMP20ST	CMP25ST	CMP30ST	CMP35ST	CMP40ST	CMP45ST	CMP50ST	CMP55ST
072XXXXX	Burner Assembly (Input and Fuel Varies)	1	1	1	1	1	1	1	1	1
07260001	Fan Package XP 1	1	1	-	-	-	-	-	-	-
07260002	Fan Package XP2	-	-	1	1	1	-	-	-	-
07260003	Fan Package XP 3	-	-	-	-	-	1	1	1	-
07260004	Linear Package	1	1	1	1	1	1	1	1	1
03051600	Burner Tube, 100 mm x 3048 mm	1	1	1	1	1	1	1	1	1
91409408	Tube, 100 mm x 3048 mm	-	1	1	2	2	2	3	3	4
S5127W	Fan Tube, 100 mm x 3048 mm, with 3048 mm Swirler	-	1	1	1	1	1	1	1	1
S5134W	Fan Tube, 100 mm x 3048 mm, with 2134 mm Swirler	1	-	-	-	-	-	-	-	-
01329600	Standard Coupling Assembly	1	2	2	3	3	3	4	4	5
01329700	Coupling Lock	1	2	2	3	3	3	4	4	5
02750313	Reflector, Aluminium, 2439 mm	3	4	4	6	6	6	7	7	8
02705802	Reflector End Cap, Aluminium	2	2	2	2	2	2	2	2	2
03090102	Tube and Reflector Hanger	3	4	4	5	5	5	6	6	7
01318902	Tube Clamp Package (including Nut, Washer & Bolt)	1	1	1	1	1	1	1	1	1
91908004	Wire Form	2	3	3	5	5	5	6	6	7
94320812	Screw #8 x 3/4 (3.9 mm x 19 mm), (goes with 03050002)	4	6	6	10	10	10	12	12	14
03050002	Reflector Support Strap	2	3	3	5	5	5	6	6	7
E0007576	Bow Shackle**	3	4	4	5	5	5	6	6	7
91107720	U-Clip Package (20 Pieces)	1	1	1	1	1	1	1	1	1
S7199K	Damper Flange Assembly (For use on Multiburner Systems)	1 Per Heater								

Figure 17: Linear General Assembly Overview

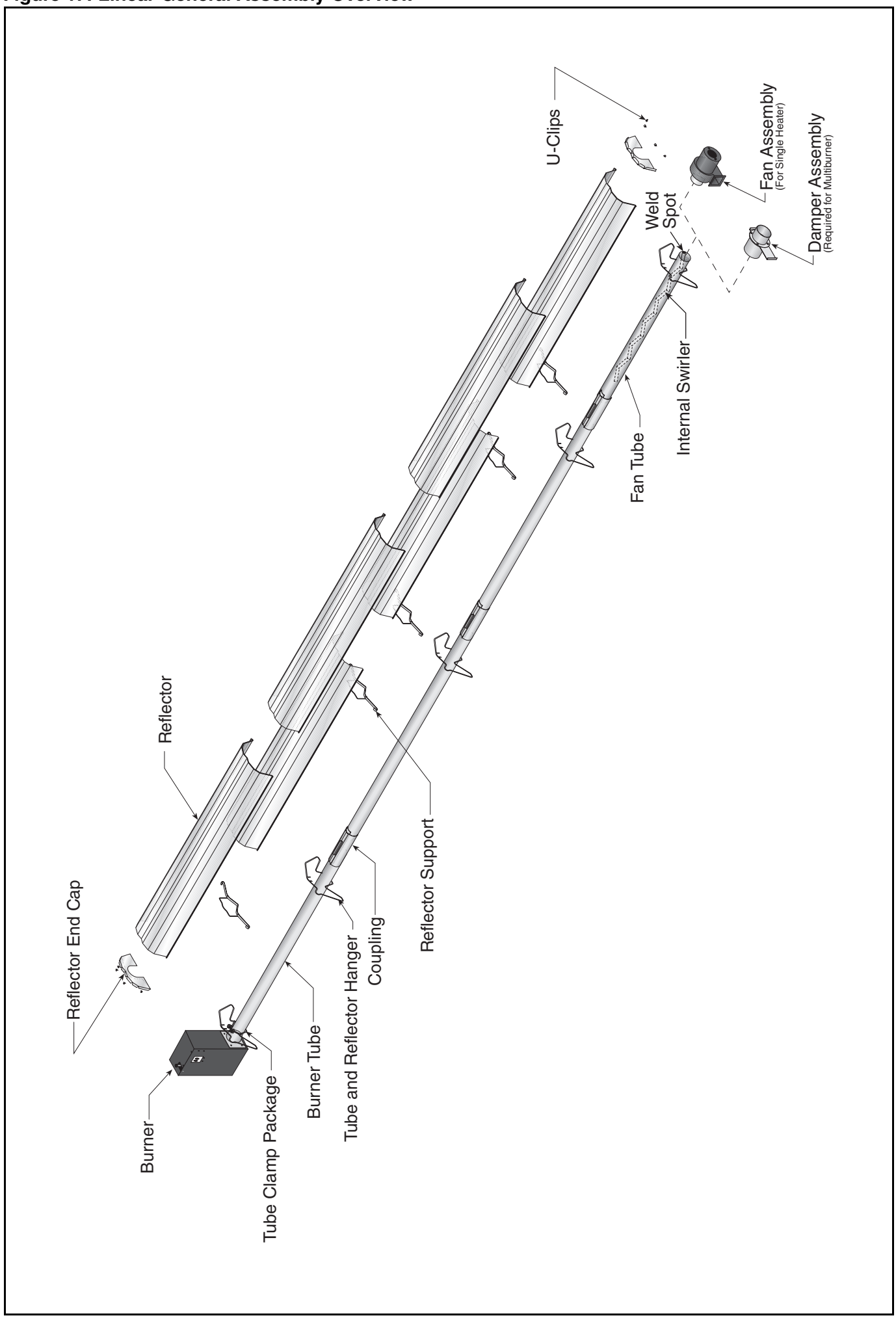
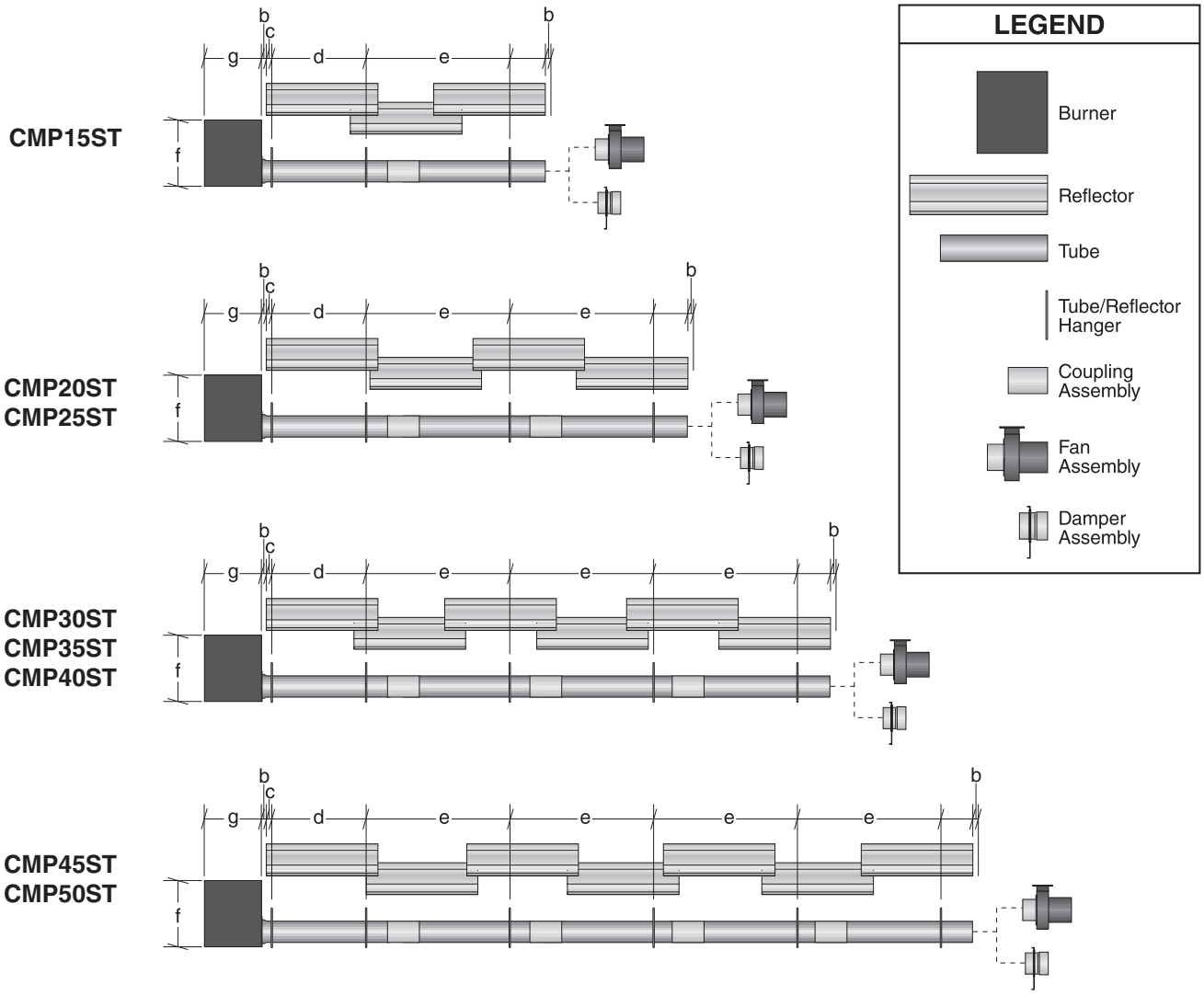


Figure 18: Linear Layout Overview



a = reflector width (not shown) - 508 mm
b = end cap to burner/fan - 50 mm
c = end cap to hanger - 50 mm
d = distance first hanger - 2290 mm
e = distance typical between hangers - 3050 mm
f = burner height - 366 mm
g = burner length - 291 mm

Model	CMP15 ST	CMP20 ST	CMP25ST	CMP30ST	CMP35ST	CMP40ST	CMP45ST	CMP50ST	CMP55 ST
Reflector Overlap (approx.)	700 mm	250 mm	250 mm	530 mm	530 mm	530 mm	330 mm	330 mm	200 mm

6.2 Double Linear Standard Parts List

Part No.	Description	CMP30DL	CMP40DL	CMP50DL	CMP60DL	CMP70DL
072XXXXX	Burner Assembly (Input and Fuel Varies)	2	2	2	2	2
07260002	Fan Package XP2	-	-	-	-	-
07260003	Fan Package XP 3	1	1	1	1	1
07260004	Linear Package	2	2	2	2	2
03051600	Burner Tube, 100 mm x 3048 mm	2	2	2	2	2
91409408	Tube, 100 mm x 3048 mm	-	2	2	4	4
S5127W	Fan Tube, 100 mm x 3048 mm, with 3048 mm Swirler	-	2	2	2	2
S5134W	Fan Tube, 100 mm x 3048 mm, with 2134 mm Swirler	2	-	-	-	-
01330203	Tee, 100 mm x 100 mm x 100 mm	1	1	1	1	1
01329600	Standard Coupling Assembly	4	6	6	8	8
01329700	Coupling Lock	4	6	6	8	8
02750313	Reflector, Aluminium, 2439 mm	6	8	8	12	12
02750802	Reflector End Cap, Aluminium	4	4	4	4	4
03090102	Tube and Reflector Hanger	6	8	8	10	10
01318902	Tube Clamp Package (including Nut, Washer & Bolt)	2	2	2	2	2
91908004	Wire Form	4	6	6	10	10
03050002	Reflector Support Strap	4	6	6	10	10
E0007576	Bow Shackle	6	8	8	10	10
91107720	U-Clip Package (20 Pieces)	2	2	2	2	2
E0007582	Height Adjuster	6	8	8	10	10
94320812	Screw #8 x 3/4 (3.9 mm x 19 mm), (goes with 03050002)	8	12	12	20	20

Figure 19: Double Linear General Assembly Overview

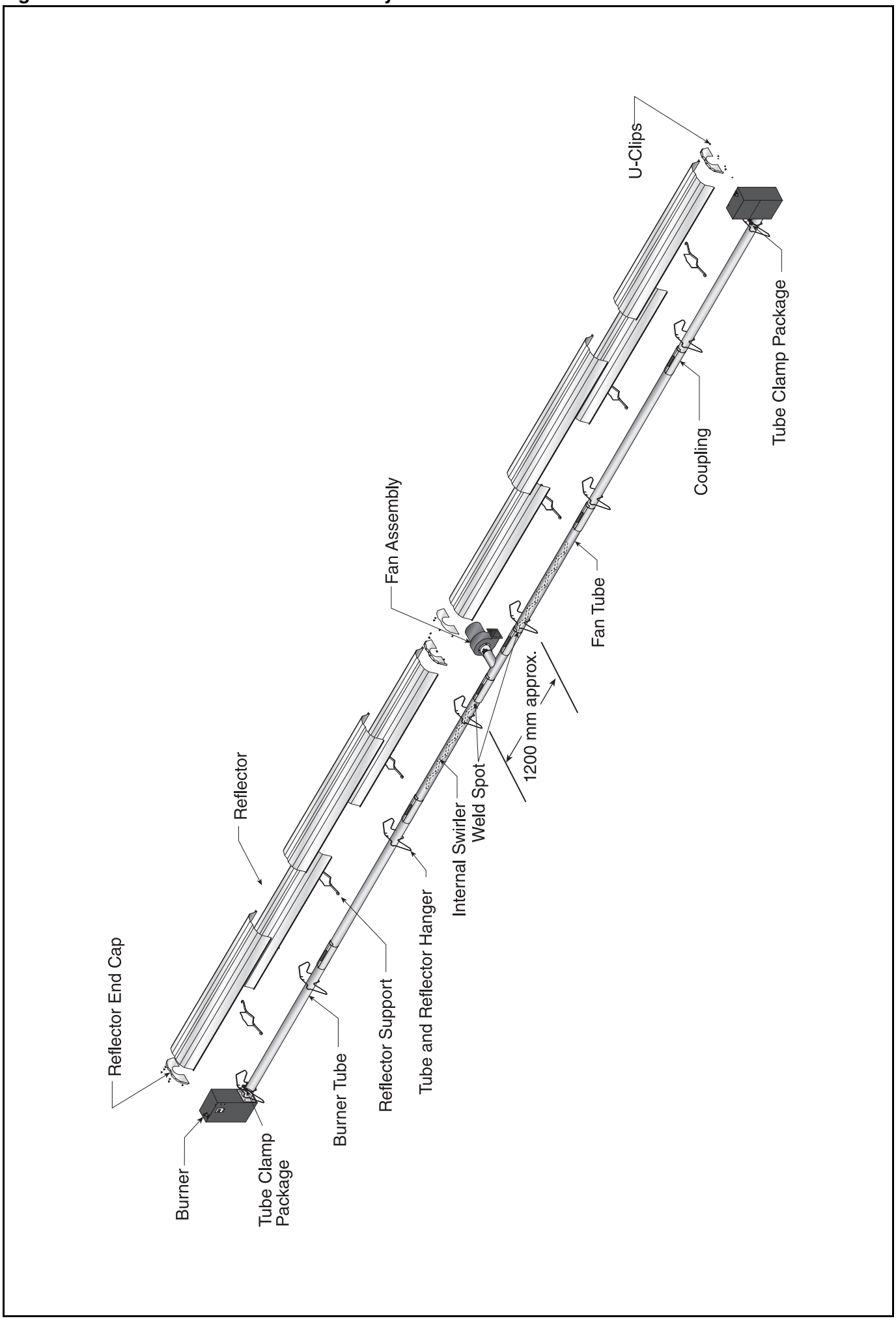
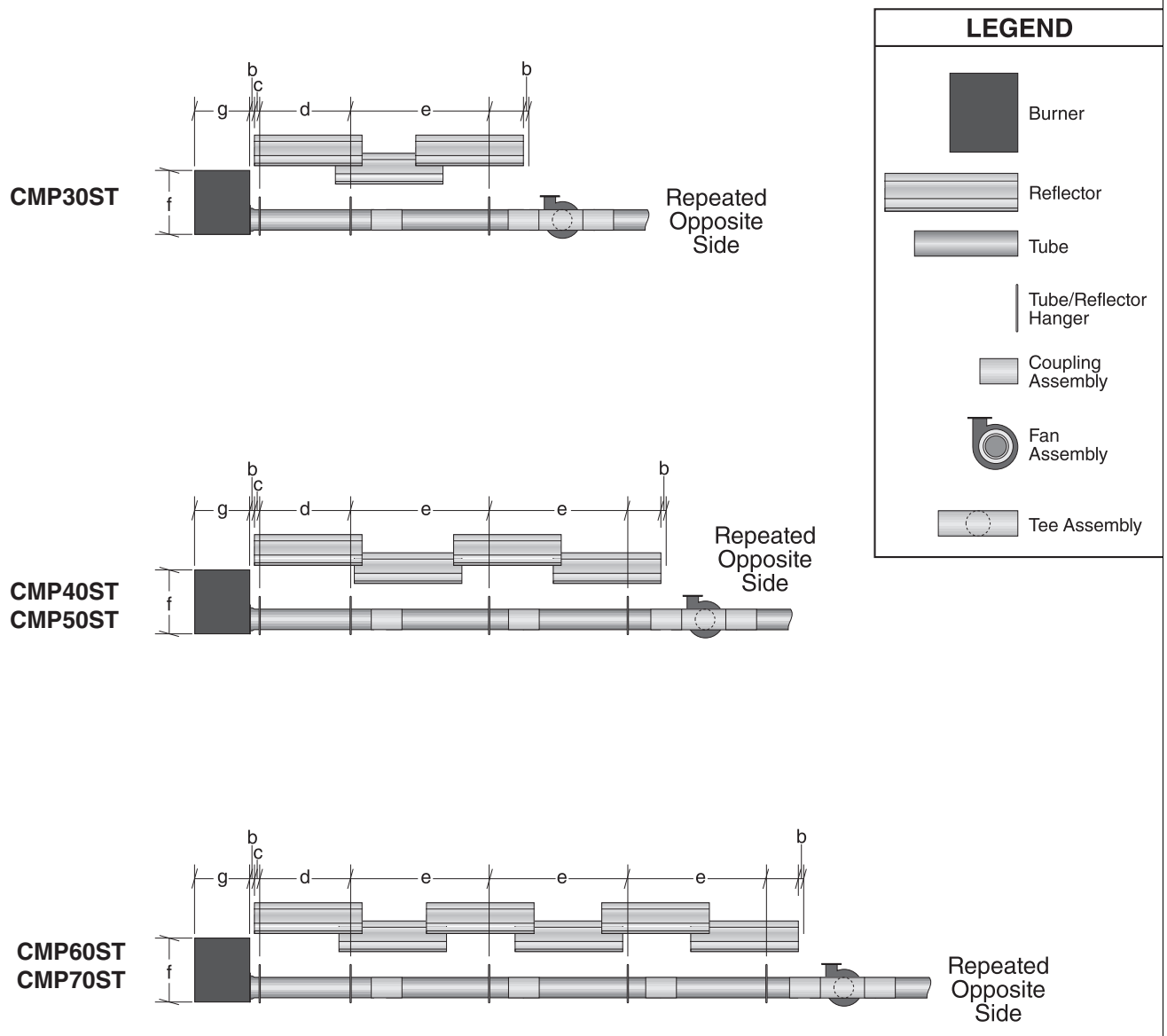


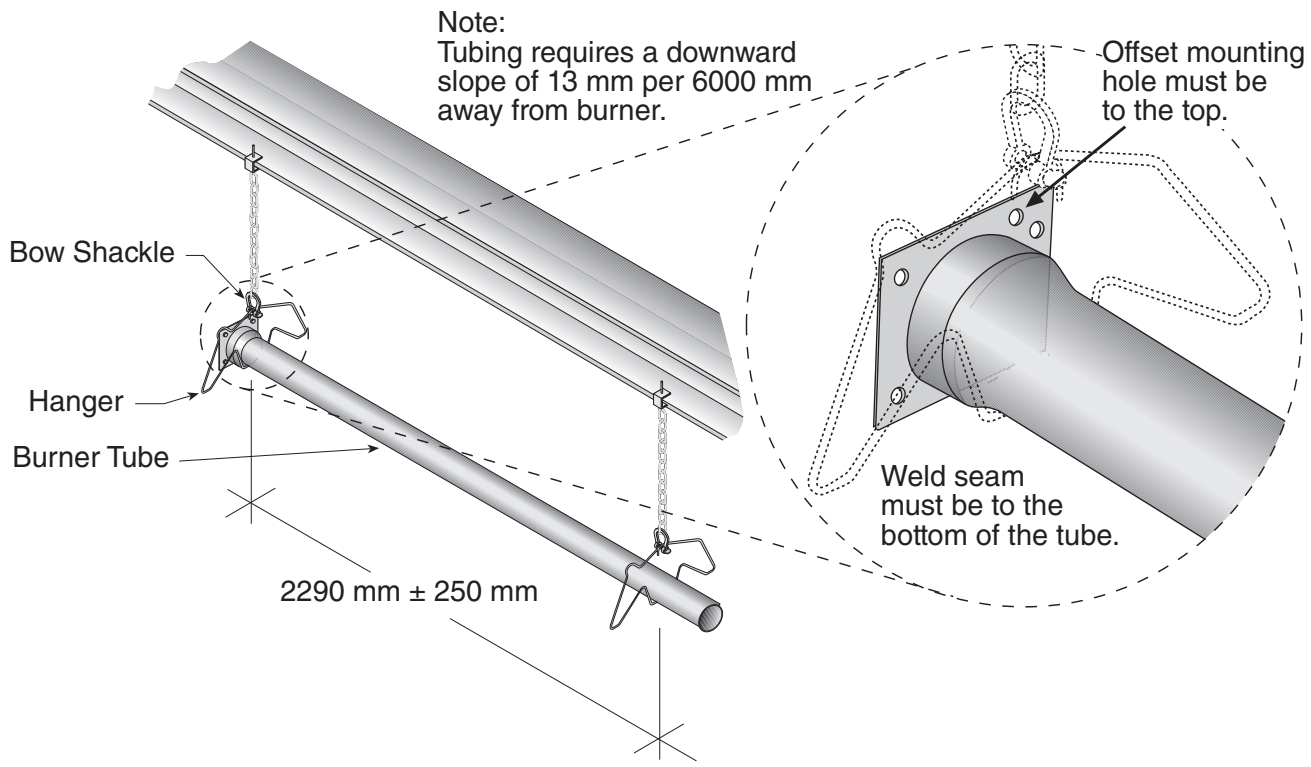
Figure 20: Double Linear Layout Overview



a = reflector width (not shown) - 508 mm
b = end cap to burner/fan - 50 mm
c = end cap to hanger - 50 mm
d = distance first hanger - 2290 mm
e = distance typical between hangers - 3050 mm
f = burner height - 366 mm
g = burner length - 291 mm

Model	CMP30DL	CMP40DL	CMP50DL	CMP60DL	CMP70DL
Reflector Overlap (approx.)	700 mm	250 mm	250 mm	530 mm	530 mm

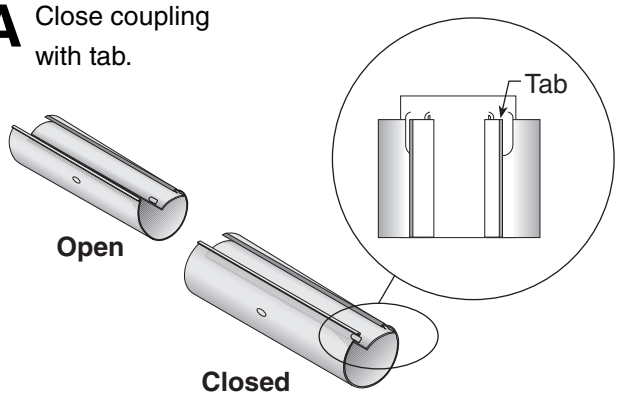
Step 6.3 Burner Tube Installation



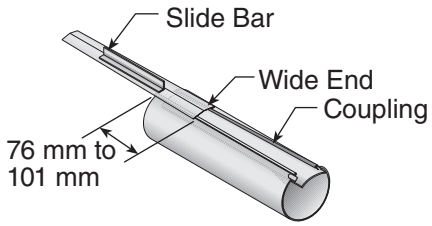
Description	Part Number
Burner Tube	03051600
Bow Shackle	E0007576
Tube/Reflector Hanger	03090102

Step 6.4 Coupling and Tube Assembly

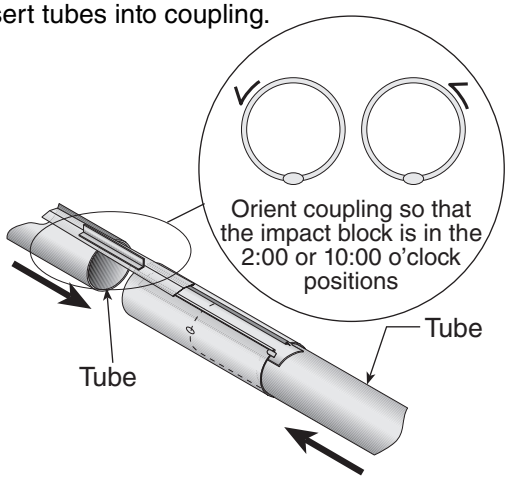
A Close coupling with tab.



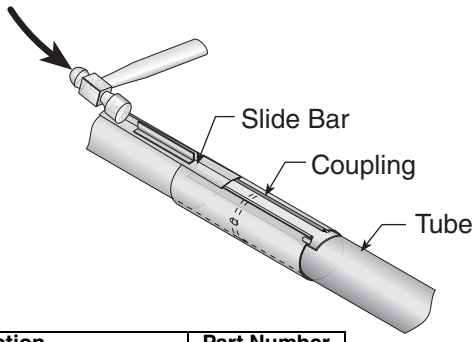
B Start slide bar/coupling lock onto coupling.



C Insert tubes into coupling.



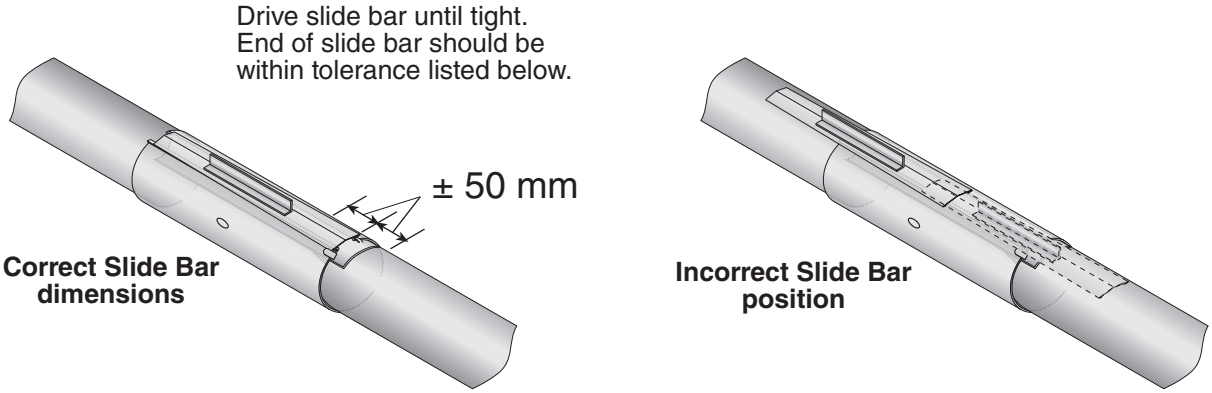
D Tighten coupling to join tubes.



Description	Part Number
Coupling	01329600
Slide Bar/Coupling Lock	01329700
Tube	91409408

Step 6.4.1 Coupling and Tube Assembly (Continued)

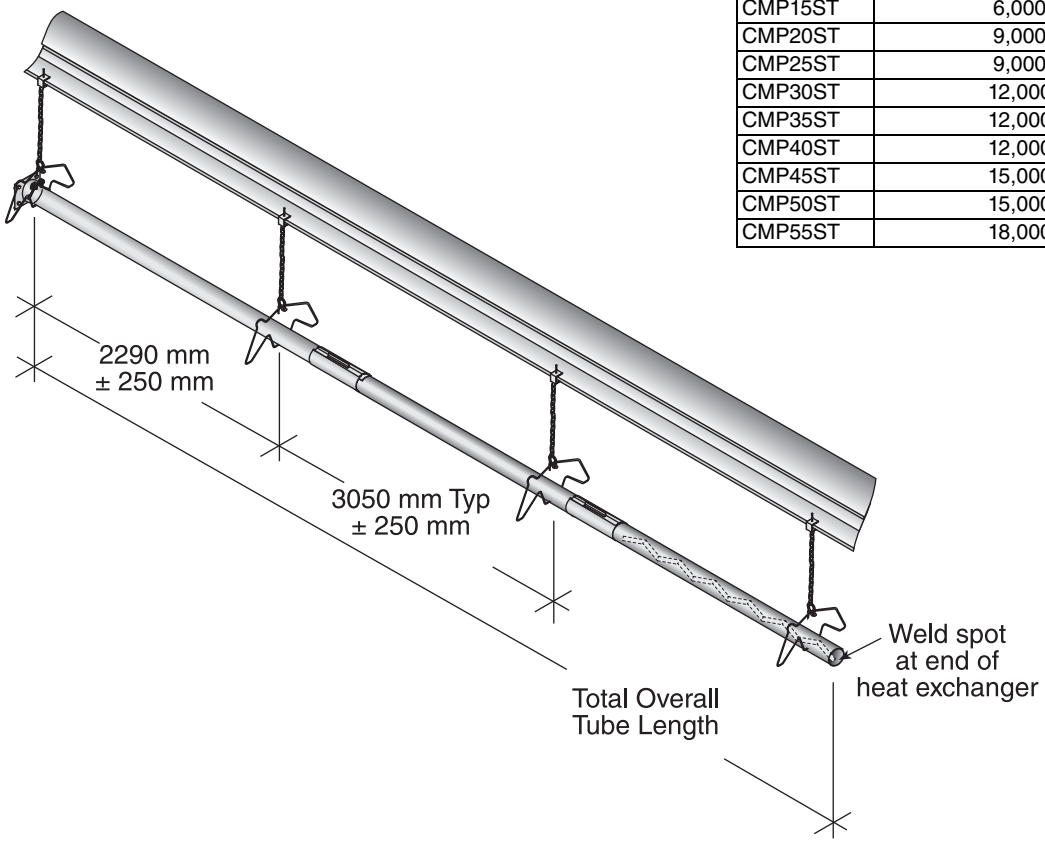
Tighten slide bar as shown below.



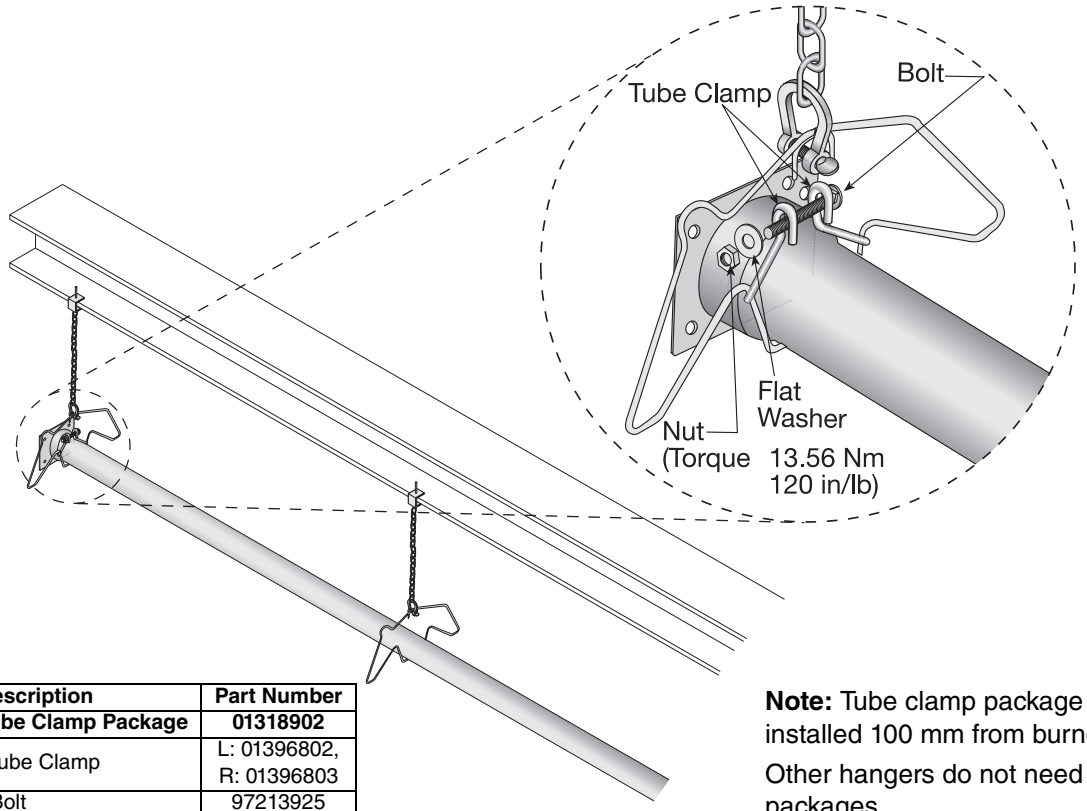
- **Repeat *Step 6.4* A - D until all tubes are assembled. *See Page 19, Section 6.4.2* shown below.**

Step 6.4.2 Coupling and Tube Assembly (Continued)

Model	Overall Tube Length (mm)	Number of Tubes
CMP15ST	6,000	2
CMP20ST	9,000	3
CMP25ST	9,000	3
CMP30ST	12,000	4
CMP35ST	12,000	4
CMP40ST	12,000	4
CMP45ST	15,000	5
CMP50ST	15,000	5
CMP55ST	18,000	6



Step 6.5 Tube Clamp Package Installation



Description	Part Number
Tube Clamp Package	**01318902**
Tube Clamp	L: 01396802, R: 01396803
Bolt	97213925
Flat Washer	95211600
Nut	92113900
Lockwasher	96411600

Note: Tube clamp package should be installed 100 mm from burner tube plate.

Other hangers do not need tube clamp packages.

Step 6.6 Reflector Installation

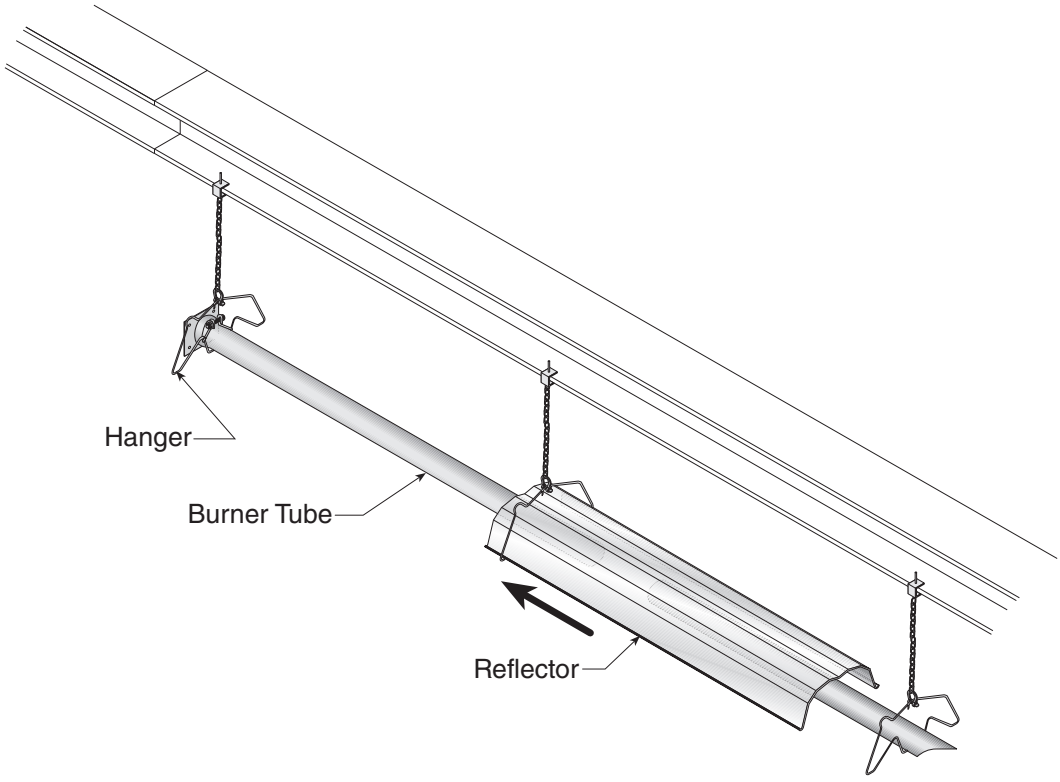
⚠ WARNING

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.



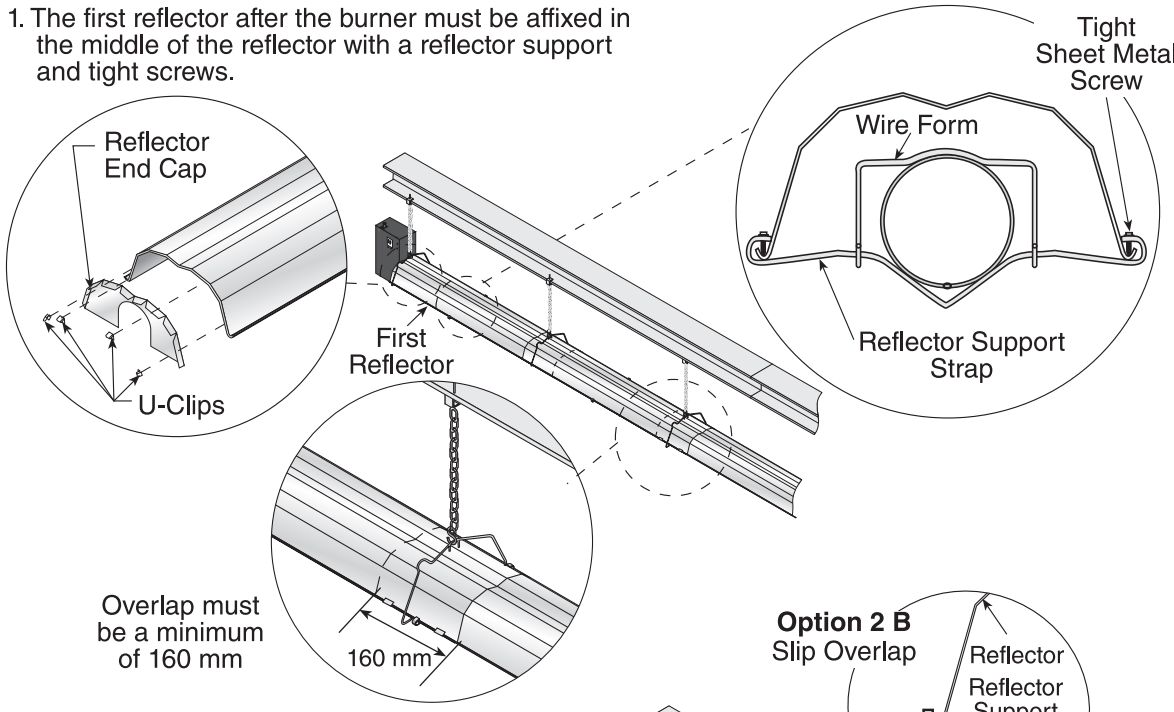
Description	Part Number
Tube/Reflector Hanger	03090102
Burner Tube	03051600
Reflector	02750313

Step 6.6.1 Reflector, U-Clip and Reflector Support Installation

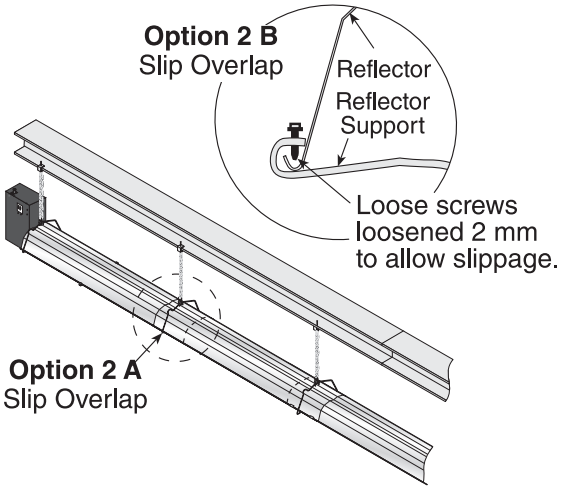
The pictorial drawings of the heater construction in *Section 6* are schematic only and provide a general guideline of where hangers, reflector supports and U-clips are to be installed.

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.

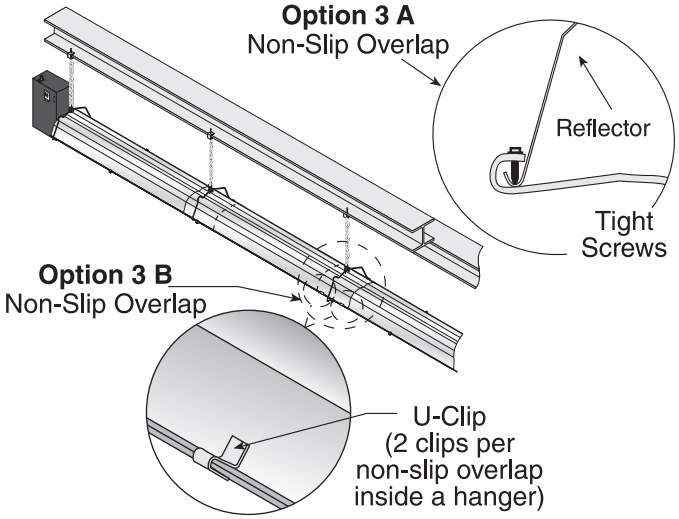


2. The overlap at the first and second reflector is a slip overlap. Thereafter, every third reflector joint is a slip overlap. A slip overlap is achieved by either:
   a.) both reflectors lay inside a hanger. (no reflector support needed).
   b.) using a reflector support with loose screws at the reflector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



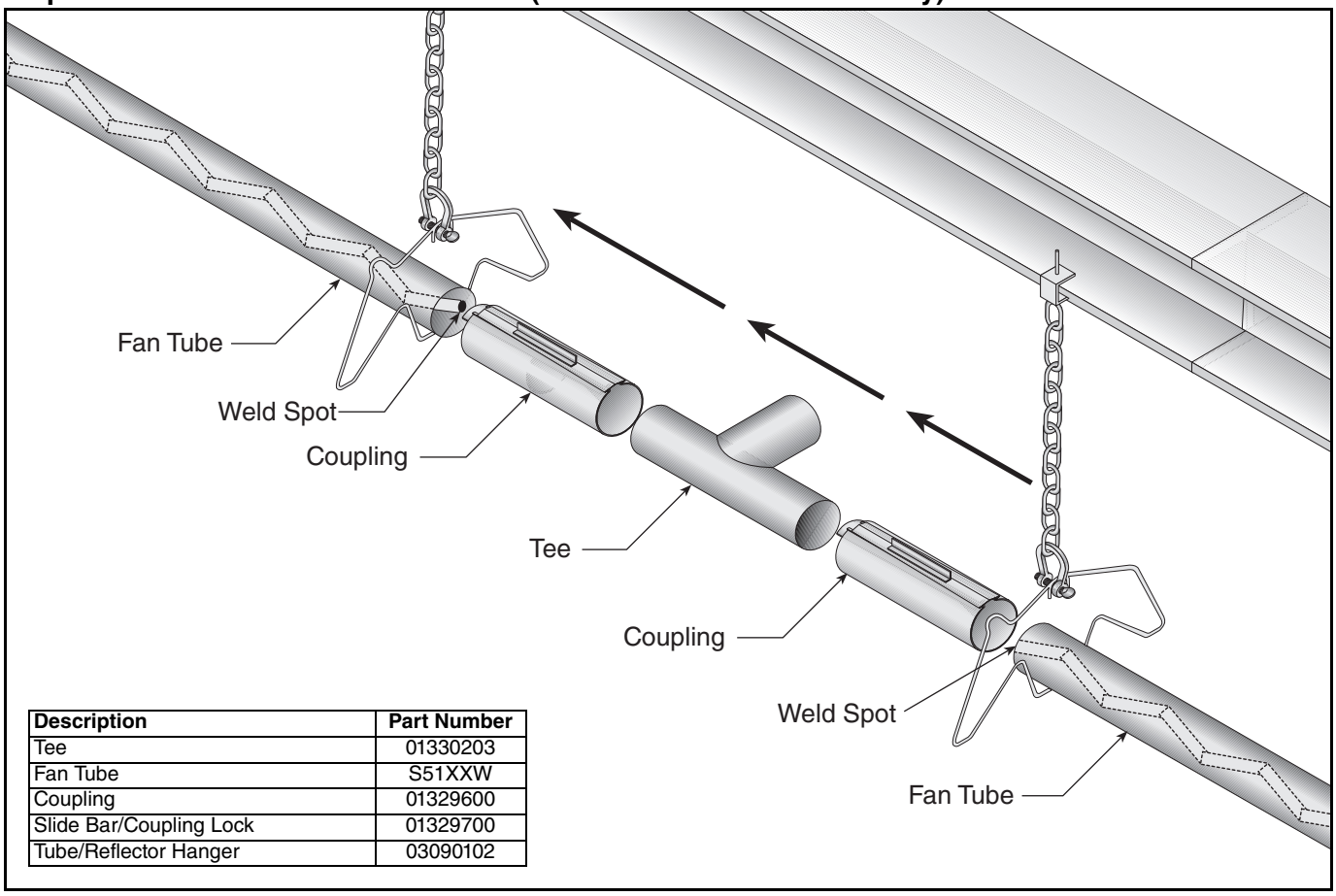
3. The remaining reflector overlaps require a non-slip overlap connection. To affix the reflectors together in a non-slip overlap either:
   a.) use reflector support and tight screws.
   b.) if both reflectors lay inside a hanger, u-clips or sheet metal screws may be used.

   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	**03050012**
Wire Form	91908004
Reflector Support Strap	03050002
Screw #8 x 3/4	94320812
U-Clip Package	91107720
Reflector End Cap	02750802

Step 6.7 Double Linear Tee Installation (for double linear heaters only)



Description	Part Number
Tee	01330203
Fan Tube	S51XXW
Coupling	01329600
Slide Bar/Coupling Lock	01329700
Tube/Reflector Hanger	03090102

SECTION 7: U-TUBE HEATER INSTALLATION

⚠WARNING

Cut/Pinch Hazard

Wear protective gear during installation, operation and service.

Edges are sharp.

Failure to follow these instructions can result in injury.

The figures in this section provide a general overview of component placement in a U-tube system. The location of some components such as supports and couplings is crucial for proper installation. Assemble the heater components as shown *on Page 26, Figure 21*.

For optional reflector configurations for U-tube heaters, *See Page 7, Figure 9 through Page 8, Figure 15*. Install appropriate suspension hardware, beam clamps, chain or rod at predetermined locations. Adjustments of chain length will provide uniform pitch.

If any step is unclear, please contact Combat Heating Solutions Limited at +44(0)121 506 7700.

7.1 U-Tube Standard Parts List

Part No.	Description	CMP15UT	CMP20UT	CMP25UT	CMP30UT	CMP35UT	CMP40UT	CMP45UT	CMP50UT
072XXXXX	Burner Assembly (Input and Fuel Varies)	1	1	1	1	1	1	1	1
07260001	Fan Package XP1	1	1	-	-	-	-	-	-
07260002	Fan Package XP2	-	-	1	1	1	-	-	-
07260003	Fan Package XP3	-	-	-	-	-	1	1	1
03051600	Burner Tube, 100 mm x 3048 mm	1	1	1	1	1	1	1	1
91409408	Tube, 100 mm x 3048 mm	-	-	-	2	2	2	2	2
91409423	Tube, 100 mm x 1524 mm	-	2	2	-	-	-	2	2
S5127W	Fan Tube, 100 mm x 3048 mm, with 3048 mm Swirler	-	1	1	1	1	1	1	1
S5134W	Fan Tube, 100 mm x 3048 mm, with 2134 mm Swirler	1	-	-	-	-	-	-	-
01335911	U-Bend	1	1	1	1	1	1	1	1
01329600	Standard Coupling Assembly	2	4	4	4	4	4	6	6
01329700	Coupling Lock	2	4	4	4	4	4	6	6
02750313	Reflector, Aluminium, 2439 mm	4	4	4	6	6	6	8	8
02750802	Reflector End Cap, Aluminium	4	4	4	4	4	4	4	4
03090102	Tube and Reflector Hanger	4	6	6	6	6	6	8	8
01318902	Tube Clamp Package (including Nut, Washer & Bolt)	1	1	1	1	1	1	1	1
91908004	Wire Form	2	4	4	4	4	4	6	6
03050002	Reflector Support Strap	2	4	4	4	4	4	6	6
03020511	U Tube Support Bracket (new deeper version required)	1	1	1	1	1	1	1	1
E0007576	Bow Shackle**	4	6	6	6	6	6	8	8
91107720	U-Clip Package (20 Pieces)	2	2	2	2	2	2	2	2
91912501	U-Bolt M6	2	2	2	2	2	2	2	2
C0090B	Nut M6	6	6	6	6	6	6	6	6
96411500	Lockwasher 6 mm	6	6	6	6	6	6	6	6

Part No.	Description	CMP15UT	CMP20UT	CMP25UT	CMP30UT	CMP35UT	CMP40UT	CMP45UT	CMP50UT
94320812	Screw #8 x 3/4 (3.9 mm x 19 mm), (goes with 03050002)	4	8	8	8	8	8	12	12
S7199K	Damper Flange Assembly (For use on Multiburner Systems)	1 Per Heater							

Figure 21: U-Tube Assembly Overview

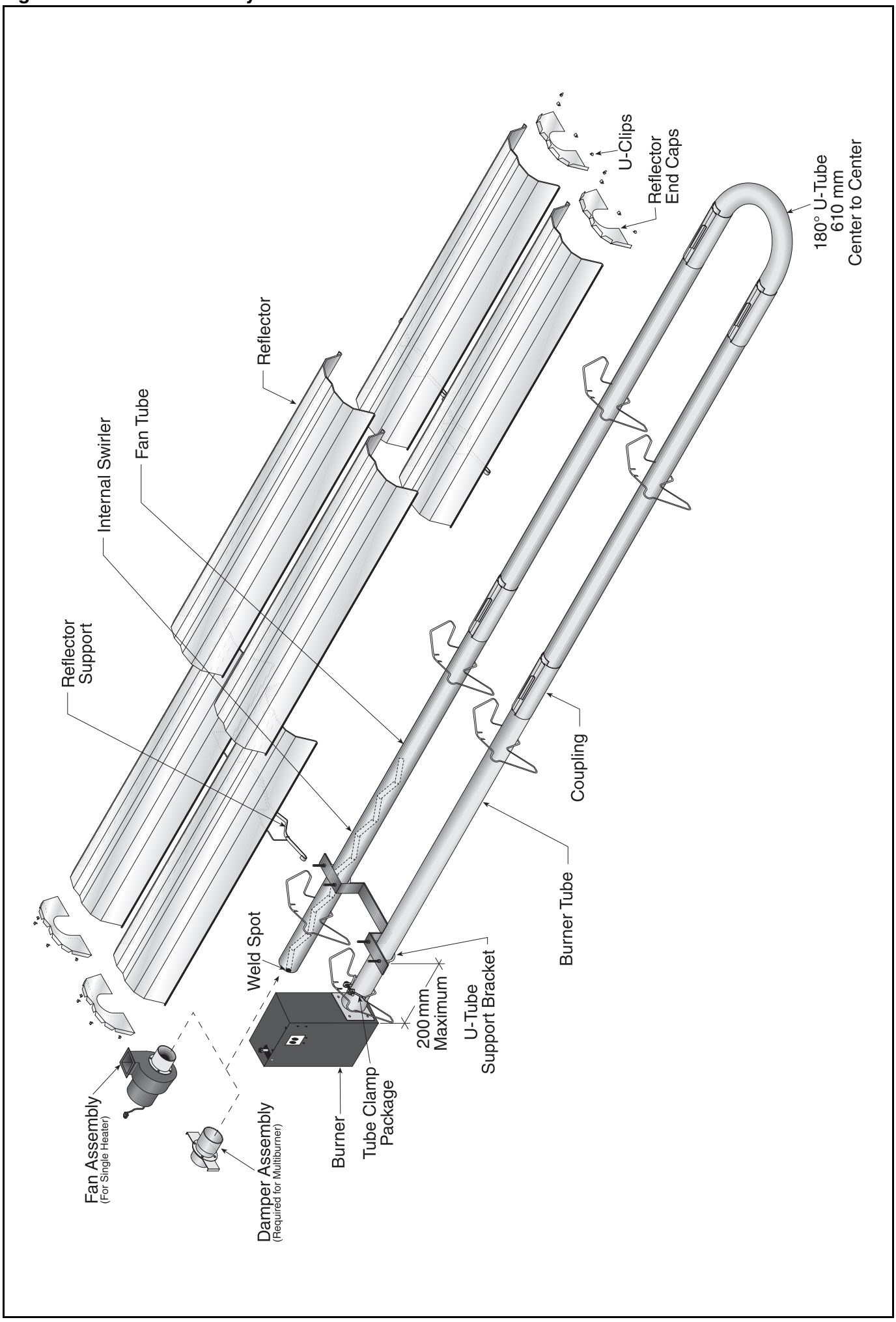
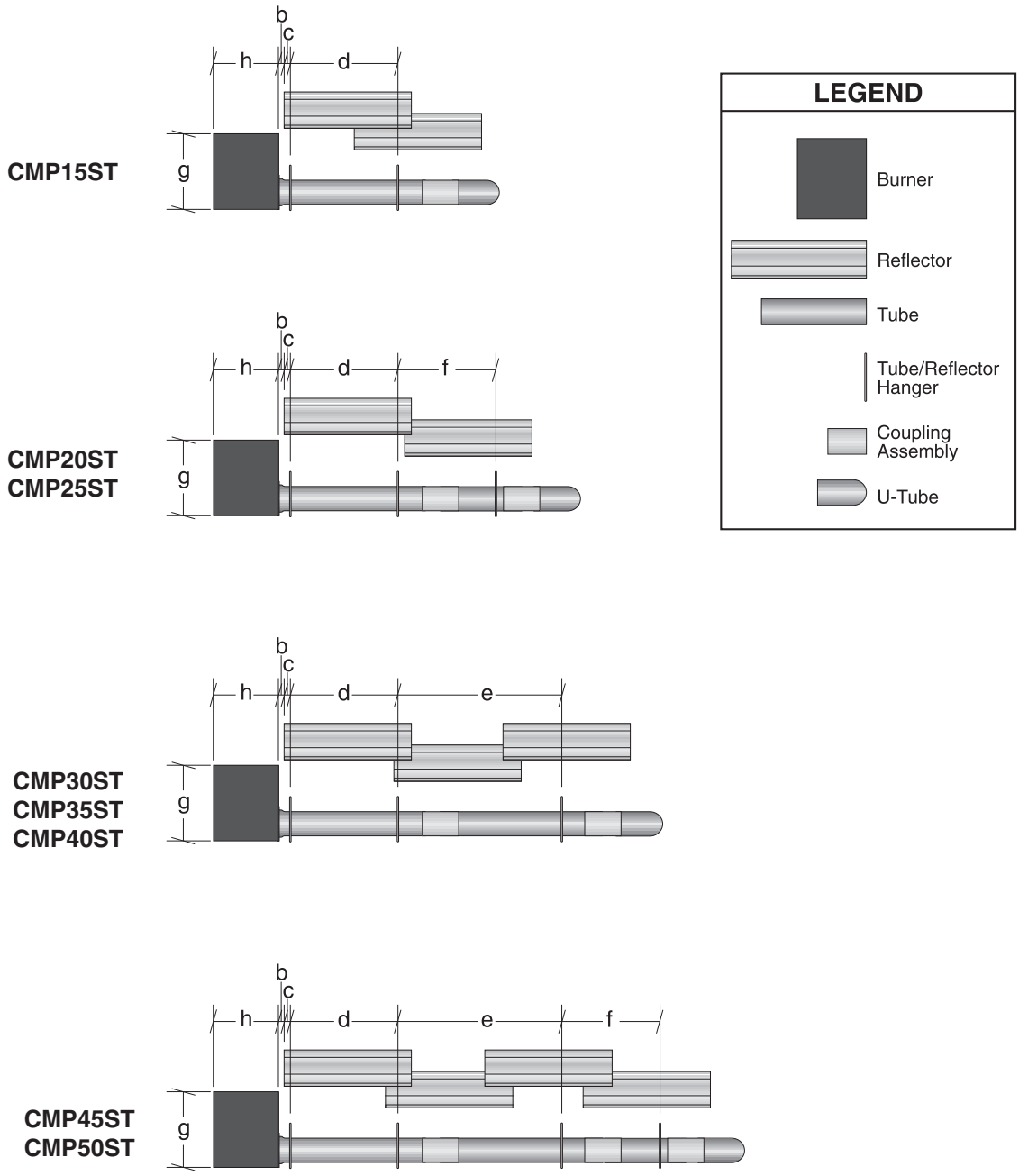


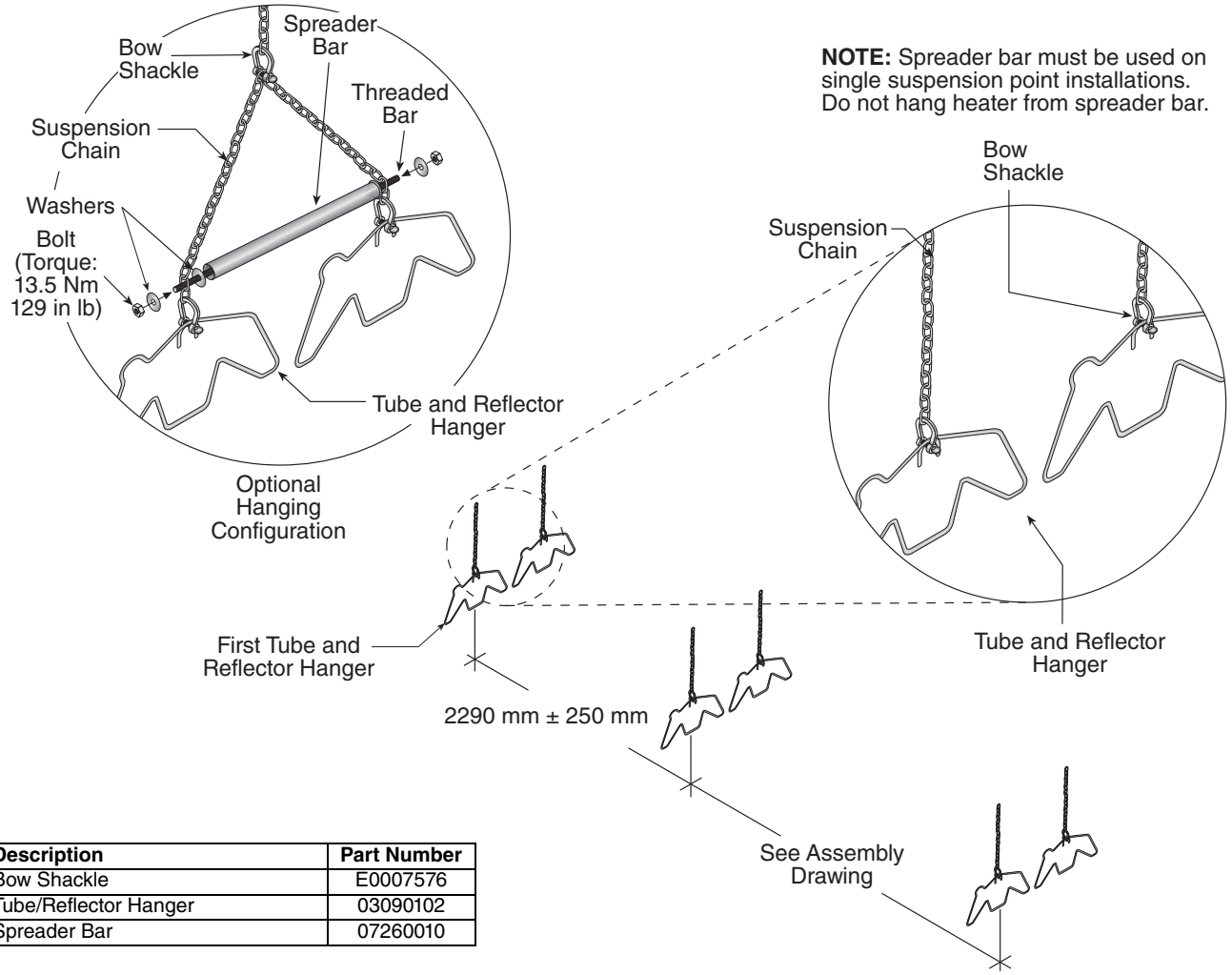
Figure 22: U-Tube Layout Overview



a = overall width (not shown) - 1163 mm
b = end cap to burner/fan - 50 mm
c = end cap to hanger - 50 mm
d = distance first hanger - 2290 mm
e = distance typical between hangers - 3050 mm
f = distance between last full tube hanger and half tube hanger - 1900 mm
g = burner height - 366 mm
h = burner length - 291 mm

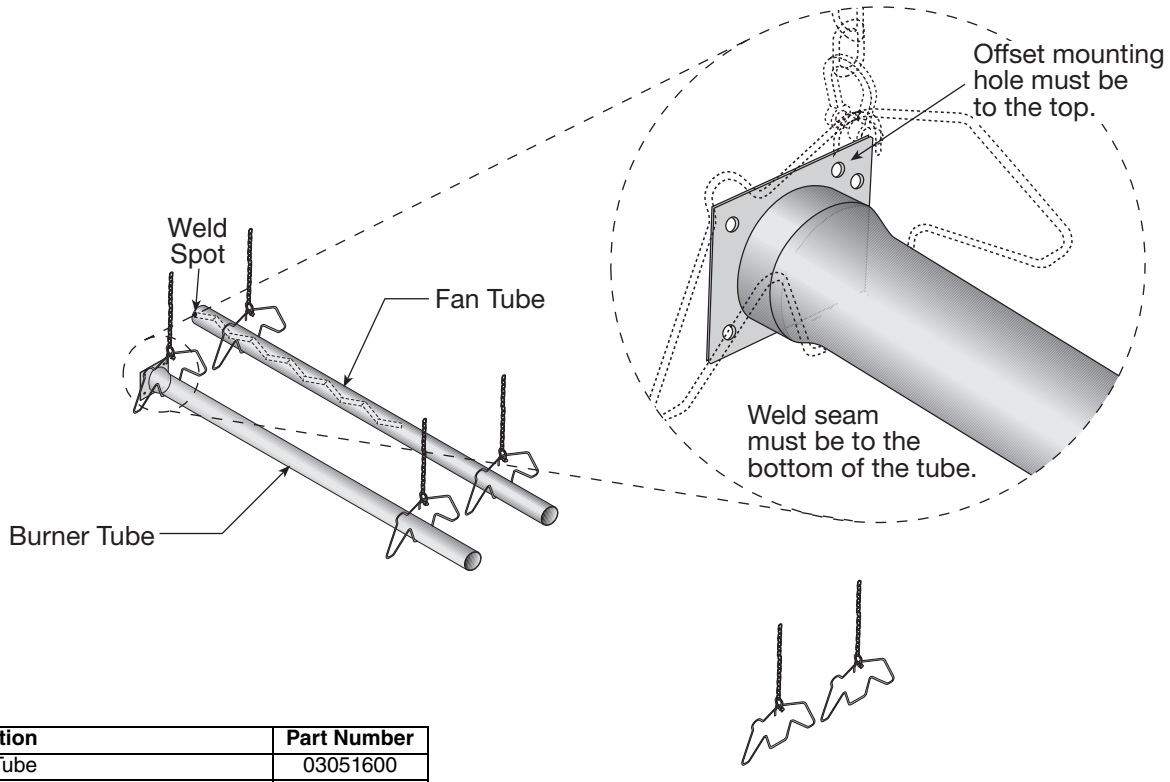
Model	CMP15 UT	CMP20 UT	CMP25UT	CMP30UT	CMP35UT	CMP40UT	CMP45UT	CMP50UT
Reflector Overlap (approx.)	1780 mm	250 mm	250 mm	580 mm	580 mm	580 mm	690 mm	690 mm

Step 7.2 U-Tube Hanger Placement



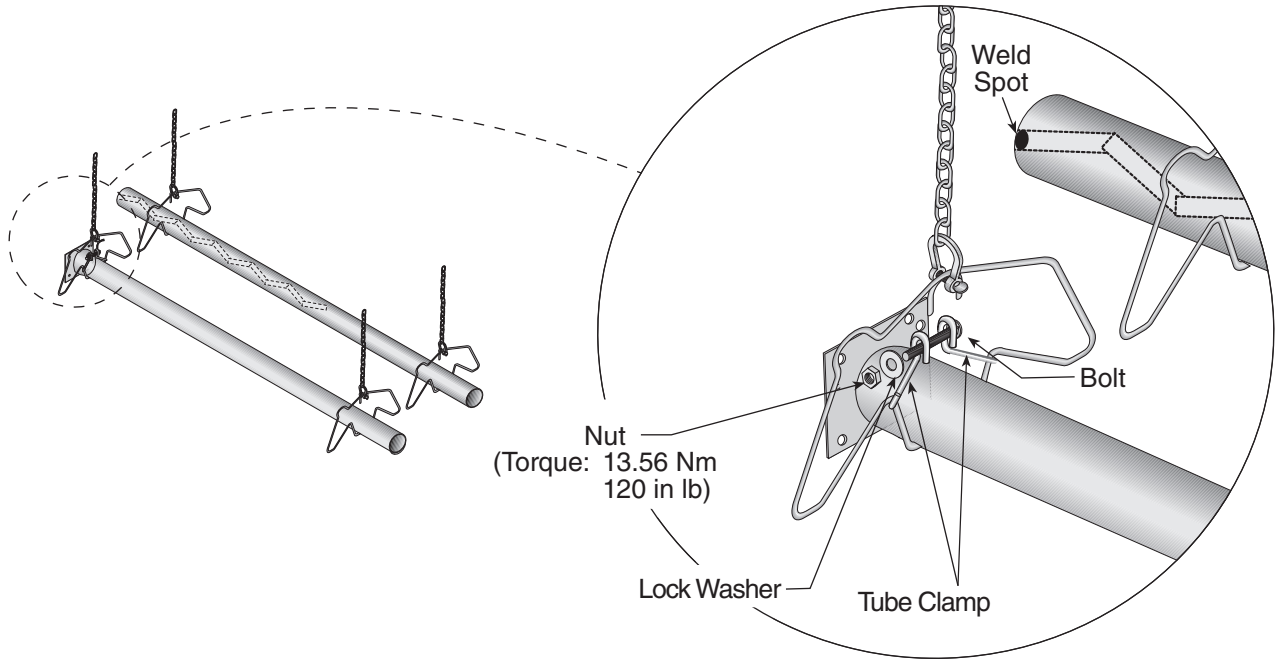
Description	Part Number
Bow Shackle	E0007576
Tube/Reflector Hanger	03090102
Spreader Bar	07260010

Step 7.3 Burner Tube and Fan Tube Installation



Description	Part Number
Burner Tube	03051600
Fan Tube	S5127W

Step 7.3.1 Tube Clamp Package Installation

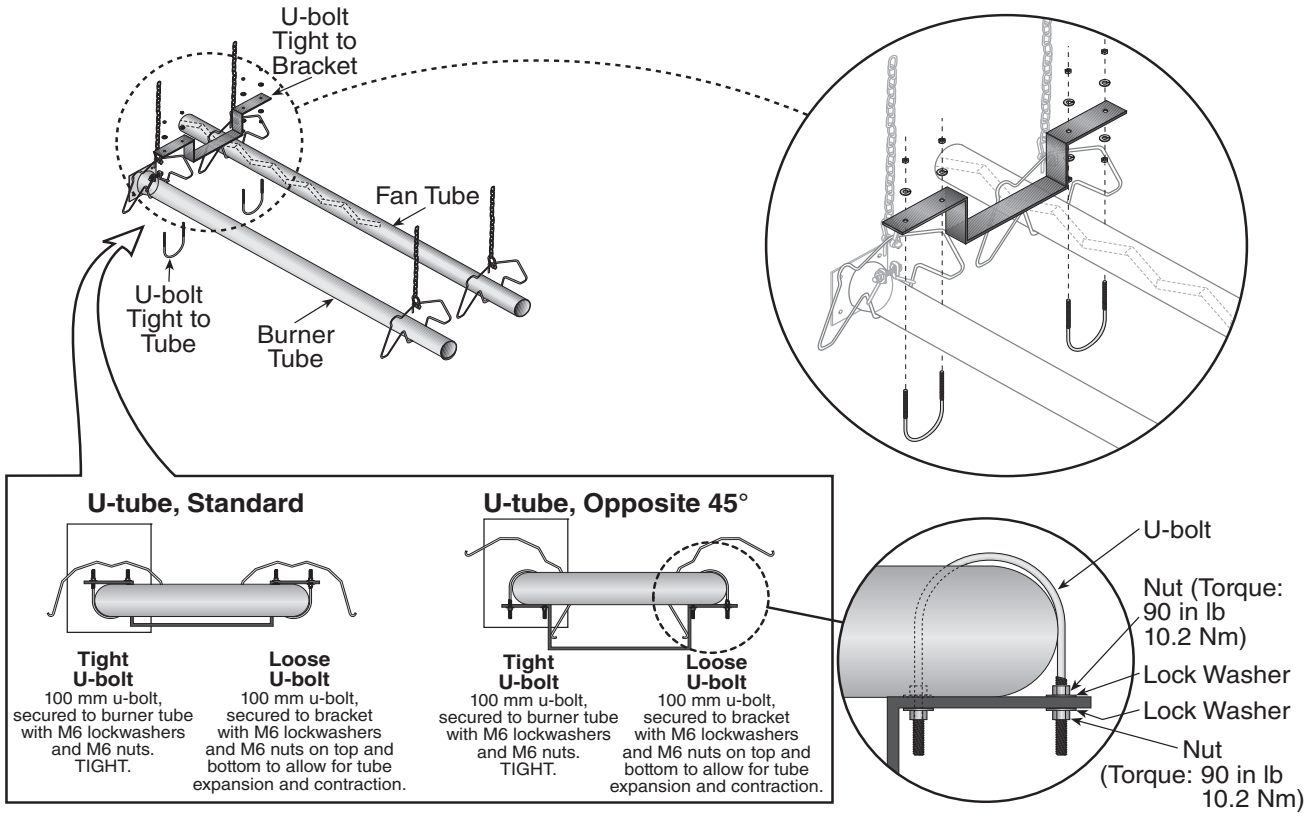


Description	Part Number
Tube Clamp Package	**01318902**
Tube Clamp	L: 01396802, R: 01396803
Bolt	97213925
Flat Washer	95211600
Nut	92113900
Lockwasher	96411600

Note: Tube clamp package should be installed 100 mm from burner tube plate.

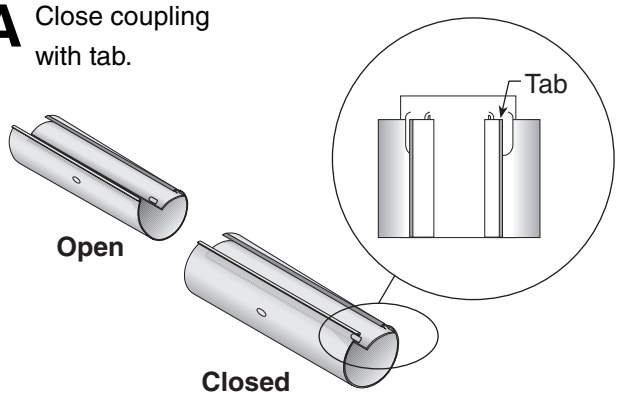
Other hangers do not need tube clamp packages.

Step 7.4 U-Tube Support Bracket Assembly Installation

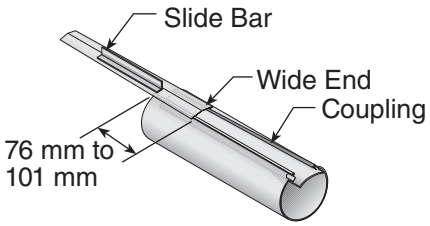


Step 7.5 Coupling and Tube Assembly

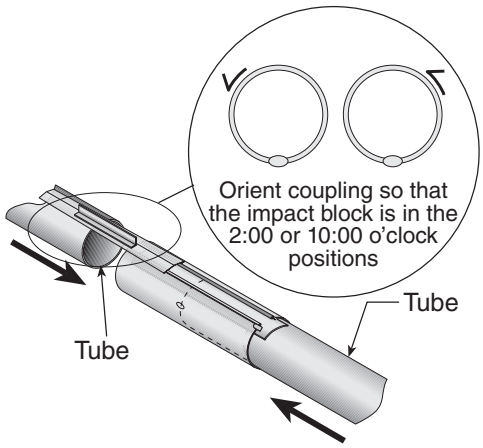
A Close coupling with tab.



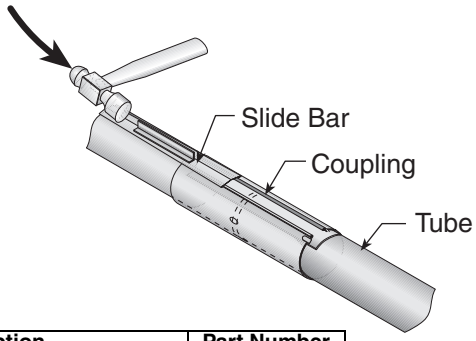
B Start slide bar/coupling lock onto coupling.



C Insert tubes into coupling.



D Tighten coupling to join tubes.

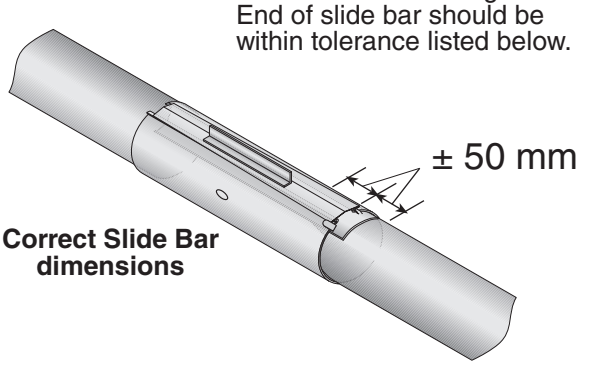


Description	Part Number
Coupling	01329600
Slide Bar/Coupling Lock	01329700
Tube	91409408

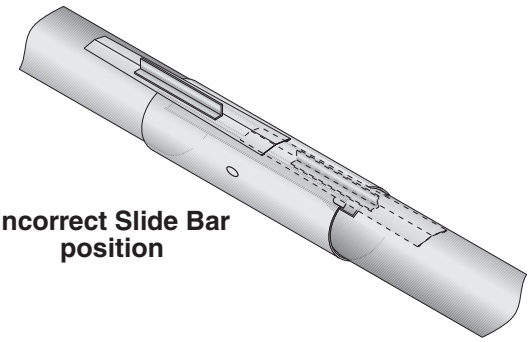
Step 7.5.1 Coupling and Tube Assembly (Continued)

Tighten slide bar as shown below.

Drive slide bar until tight.
End of slide bar should be within tolerance listed below.



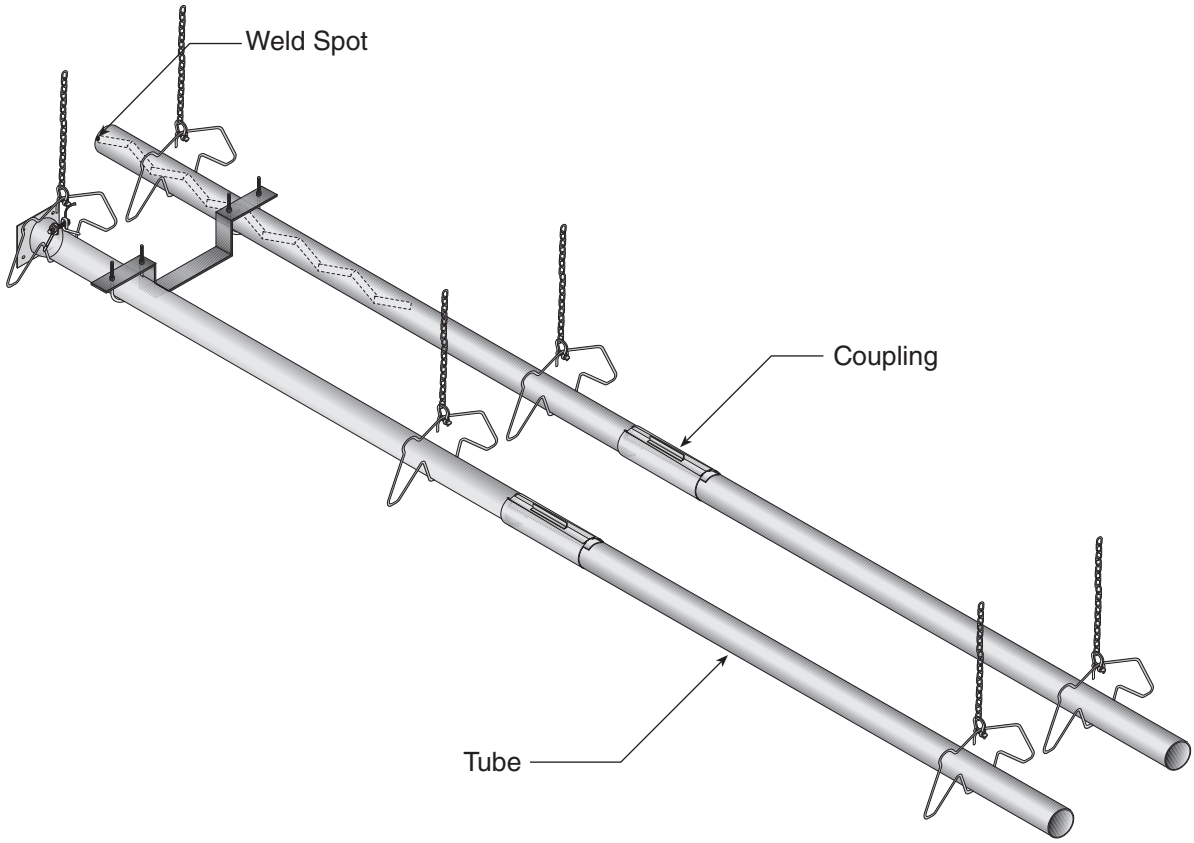
Correct Slide Bar dimensions



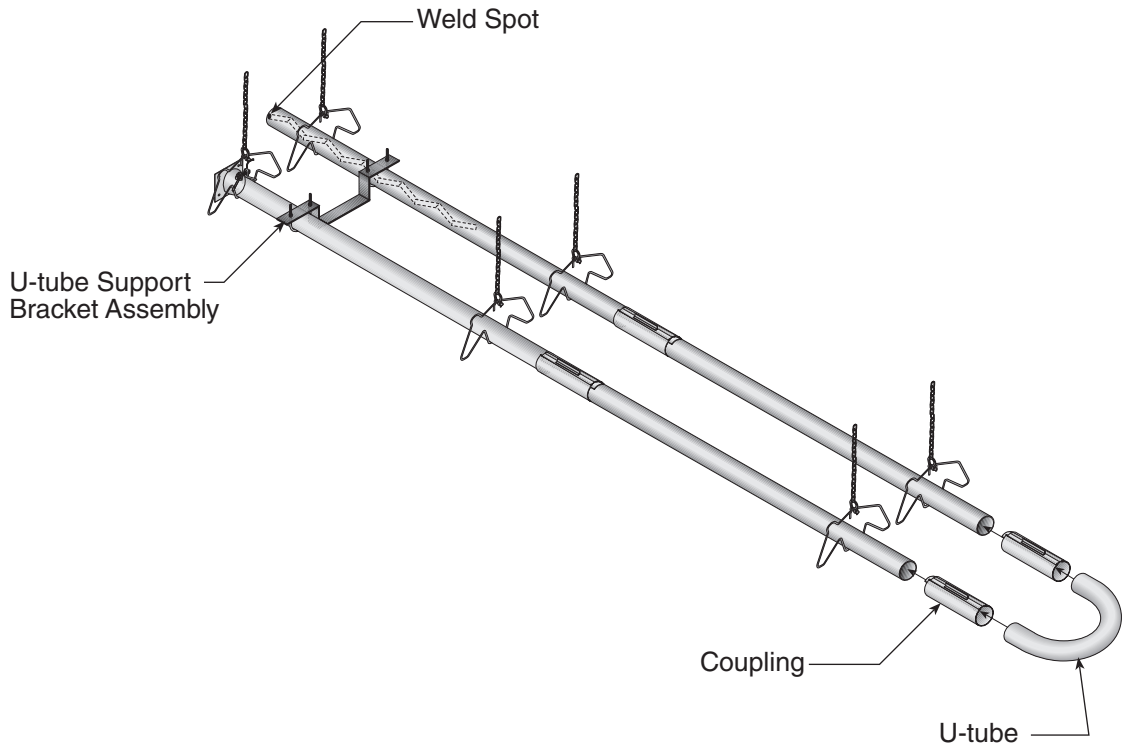
Incorrect Slide Bar position

- **Repeat *Step 7.5* A - D until all tubes are assembled.**

Step 7.6 Tube Installation



Step 7.7 U-Tube Installation



Description	Part Number
Coupling	01329600
Slide Bar/Coupling Lock	01329700
U-Tube	01335911

Step 7.8 Reflector Installation

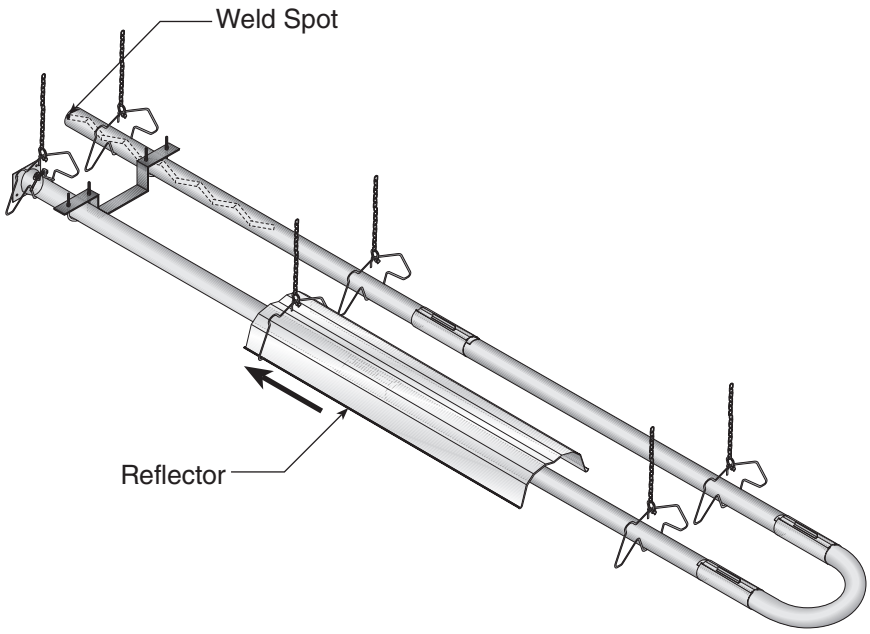
⚠ WARNING

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.



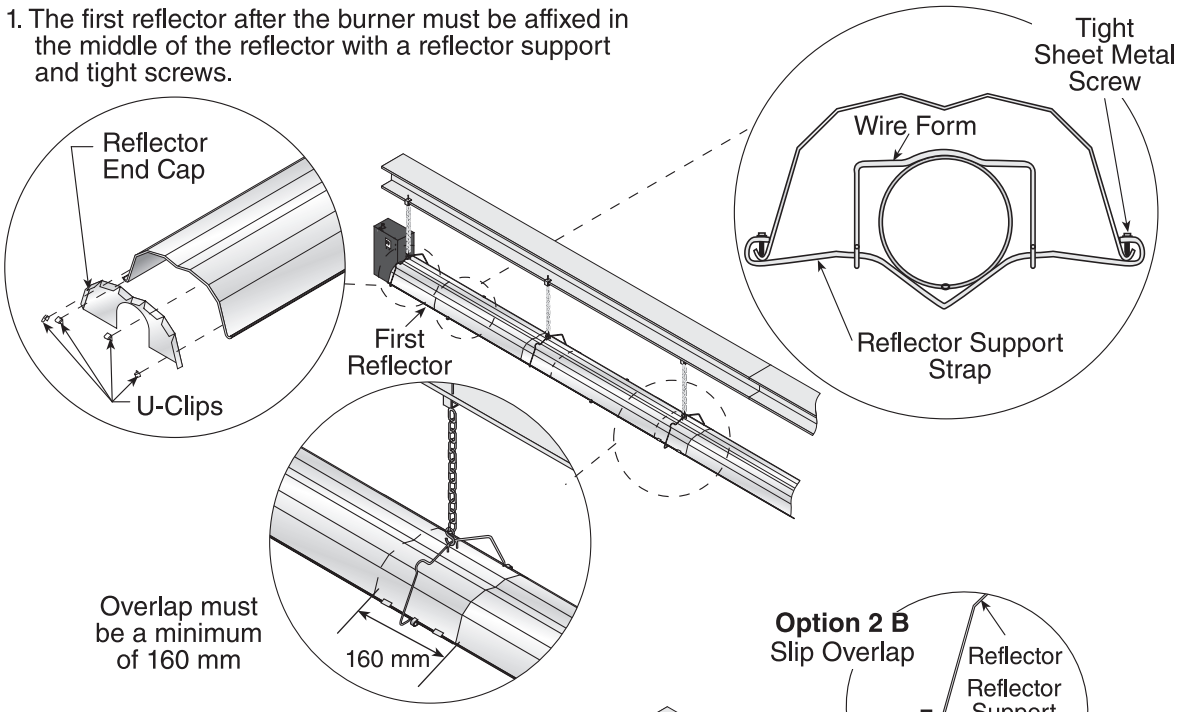
Description	Part Number
Reflector	02750313

Step 7.8.1 Reflector, U-Clip and Reflector Support Installation

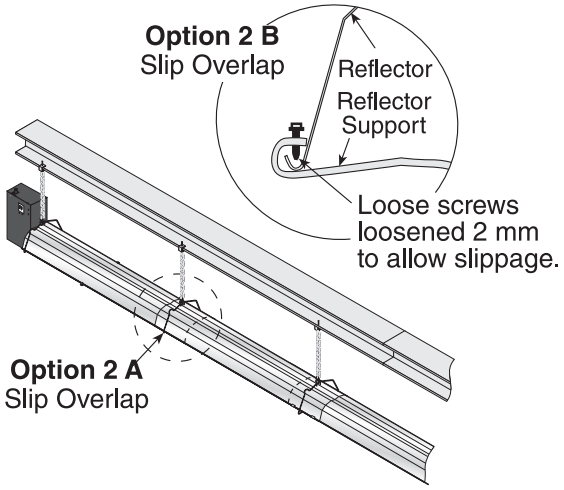
The pictorial drawings of the heater construction in *Section 6* are schematic only and provide a general guideline of where hangers, reflector supports and U-clips are to be installed.

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.

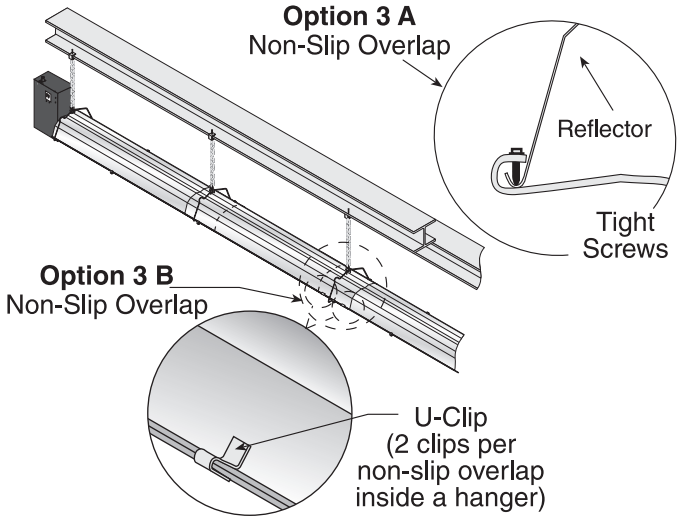


2. The overlap at the first and second reflector is a slip overlap. Thereafter, every third reflector joint is a slip overlap. A slip overlap is achieved by either:
   a.) both reflectors lay inside a hanger. (no reflector support needed).
   b.) using a reflector support with loose screws at the reflector 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	**03050012**
Wire Form	91908004
Reflector Support Strap	03050002
Screw #8 x 3/4 (3.9 x 19 mm)	94320812
U-Clip Package	91107720
Reflector End Cap	02750802

SECTION 8: MULTIBURNER CONFIGURATION & INSTALLATION

⚠WARNING

Severe Injury Hazard

Secure burner to burner tube with nuts 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 12, Section 6 for linear heater assembly instructions.

See Page 24, Section 7 for U-tube heater assembly instructions.

Check layout drawings for location of manifold pipe installation.

Figure 23: Multiburner Damper Flange Installation

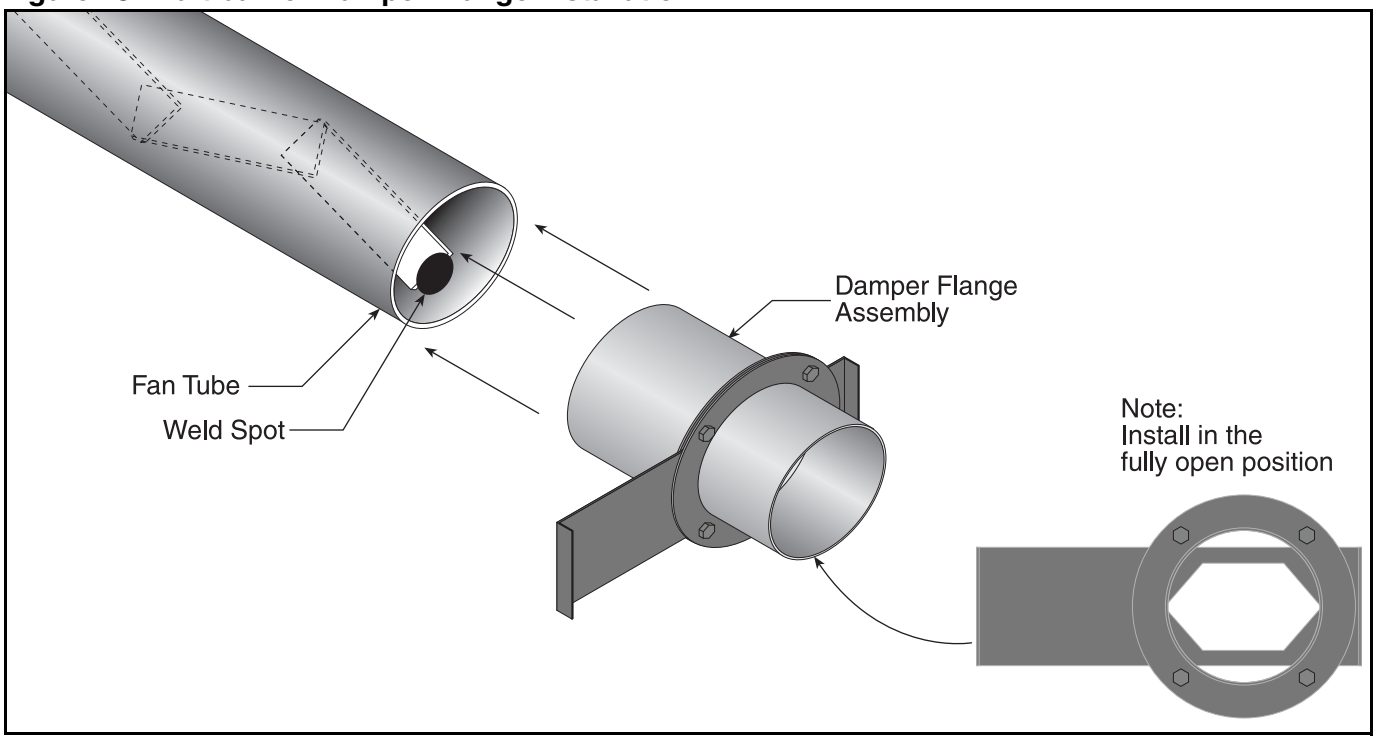
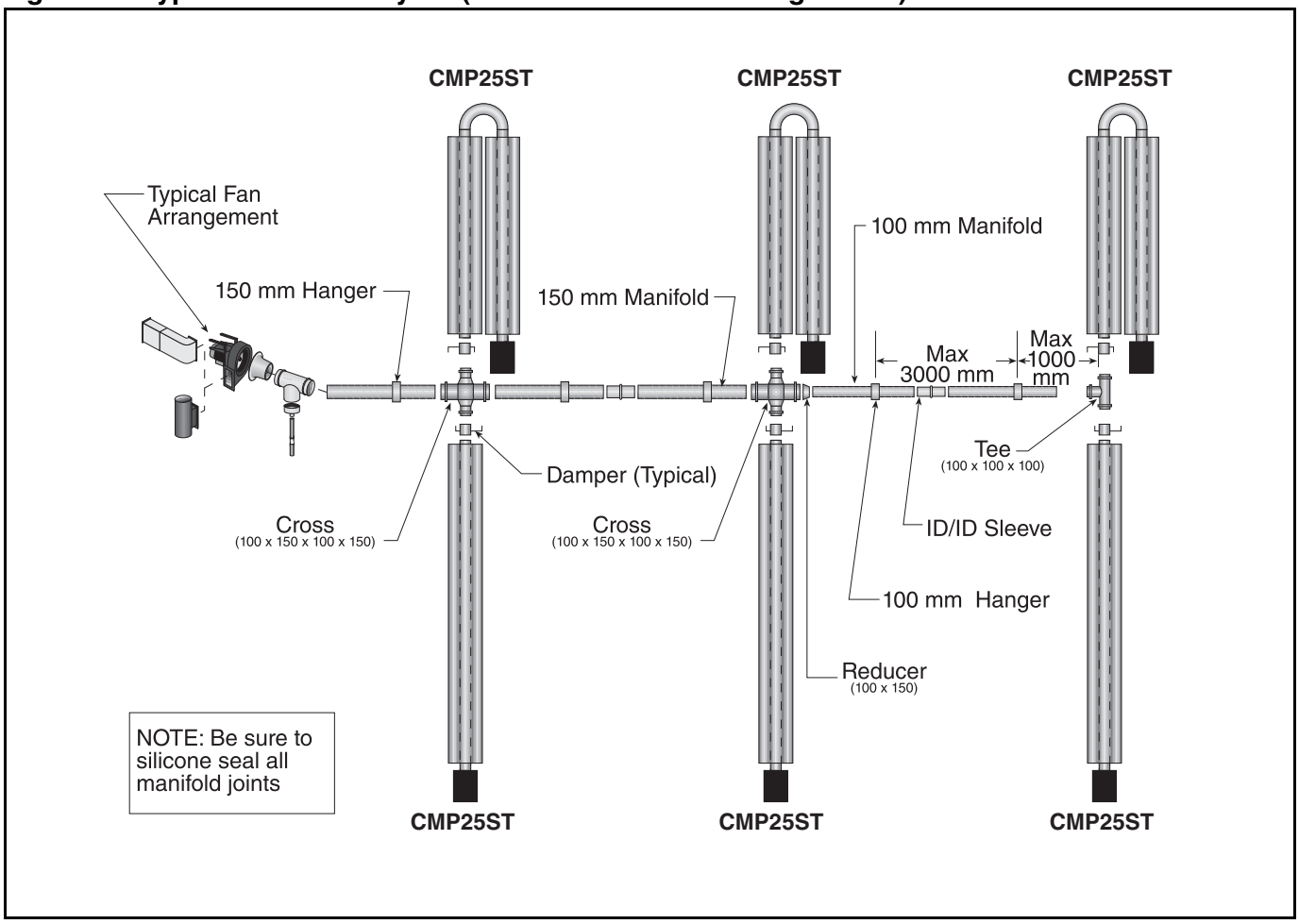
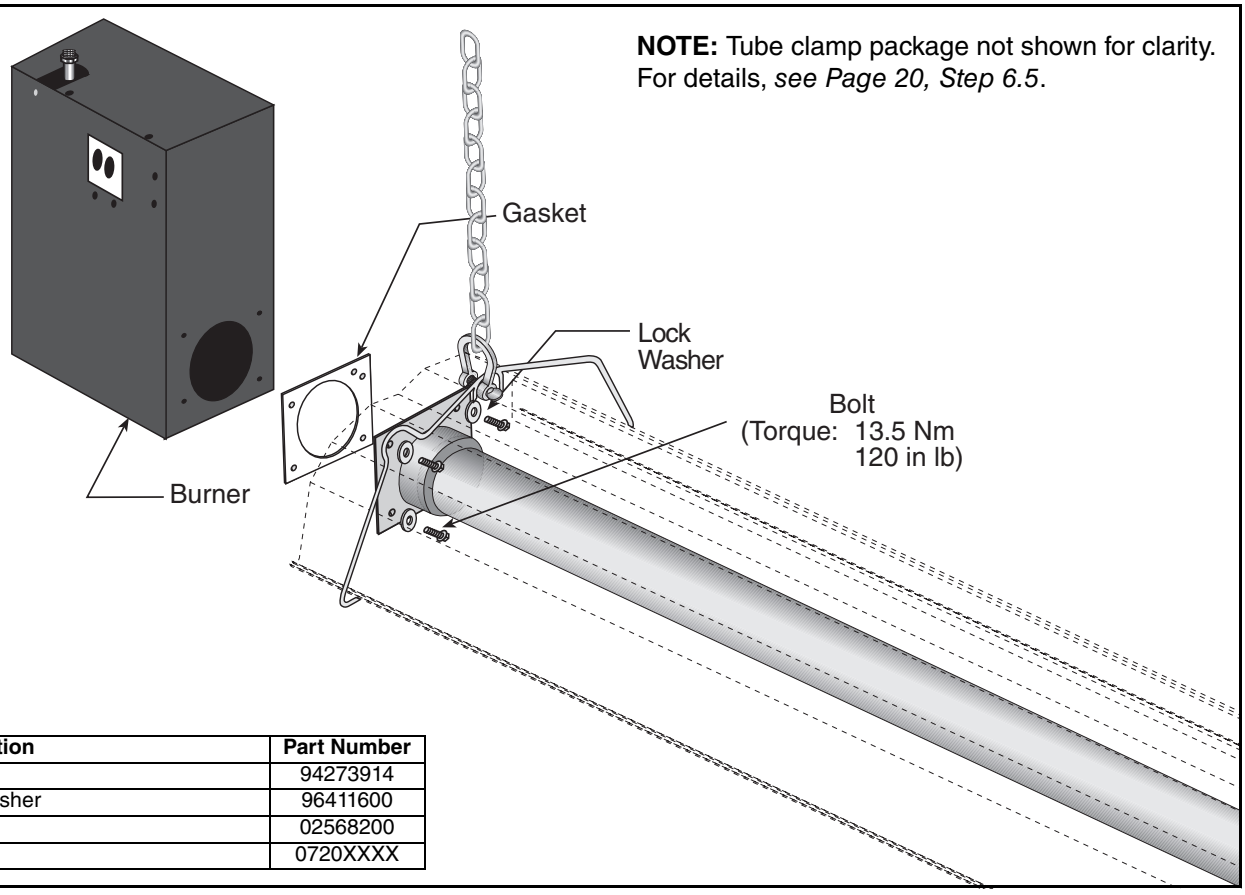


Figure 24: Typical Manifold Layout (Linear and U-Tube Configuration)



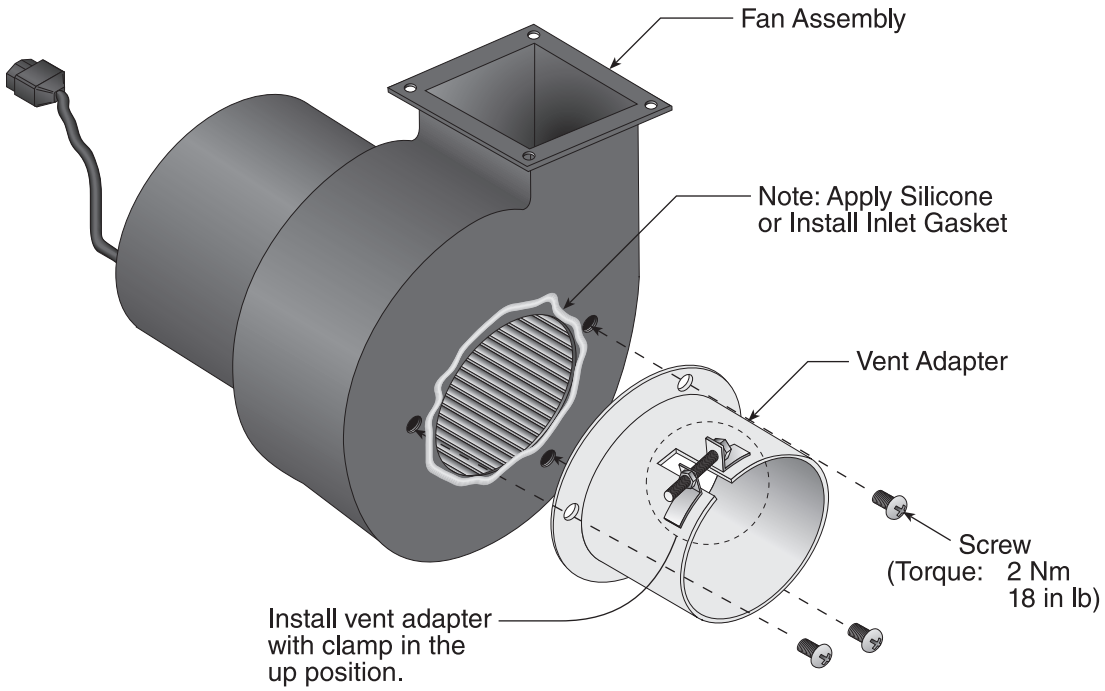
SECTION 9: BURNER & FAN INSTALLATION

Step 9.1 Burner Installation



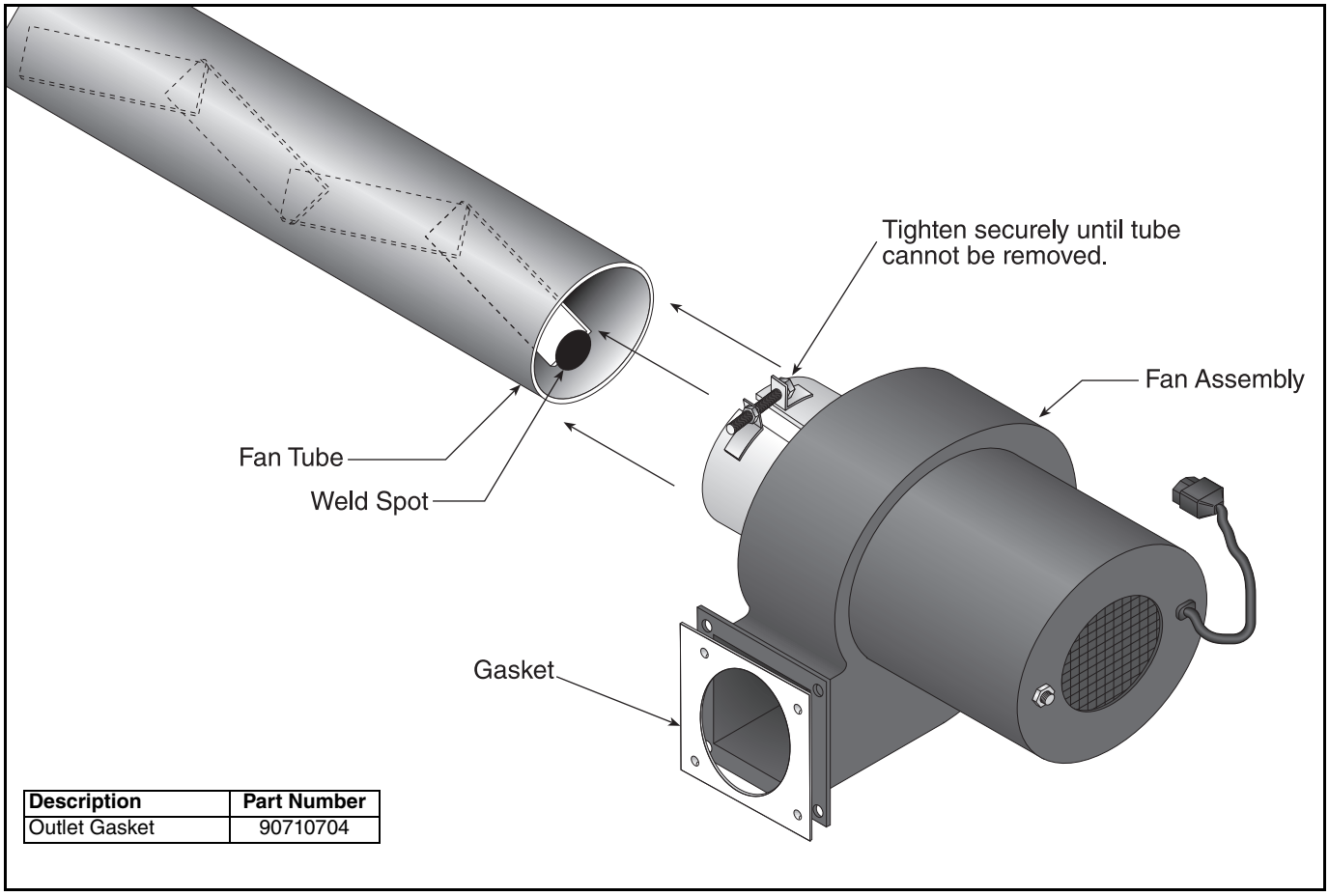
Description	Part Number
Bolt	94273914
Lock Washer	96411600
Gasket	02568200
Burner	0720XXXX

Step 9.2 Fan Assembly



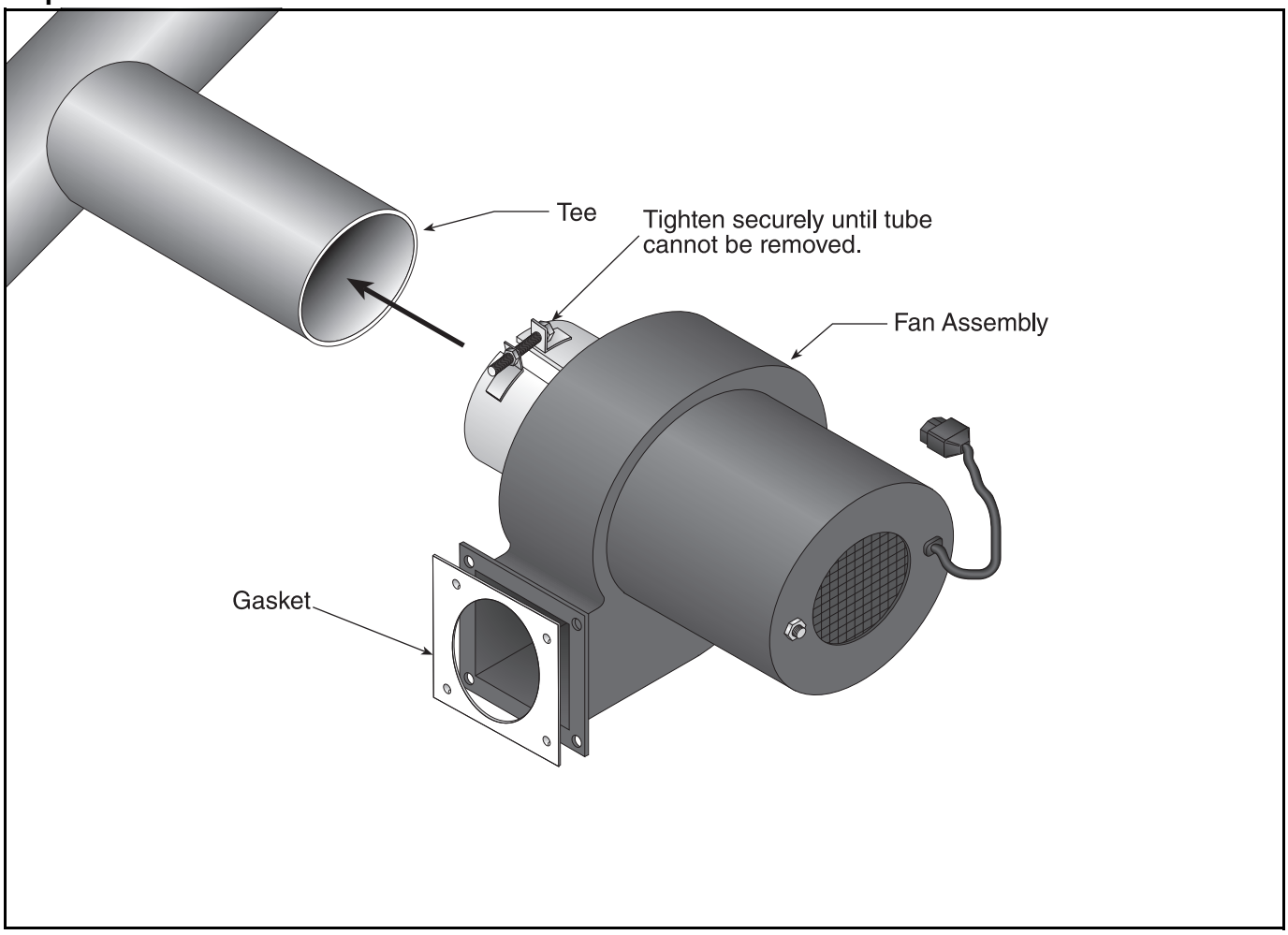
Description	Part Number
Fan Assembly	072600XX
Vent Adapter	9071060X
Screw	E00075XX
Inlet Gasket (not shown)	90710703

9.3 Linear & U-Tube Fan Installation

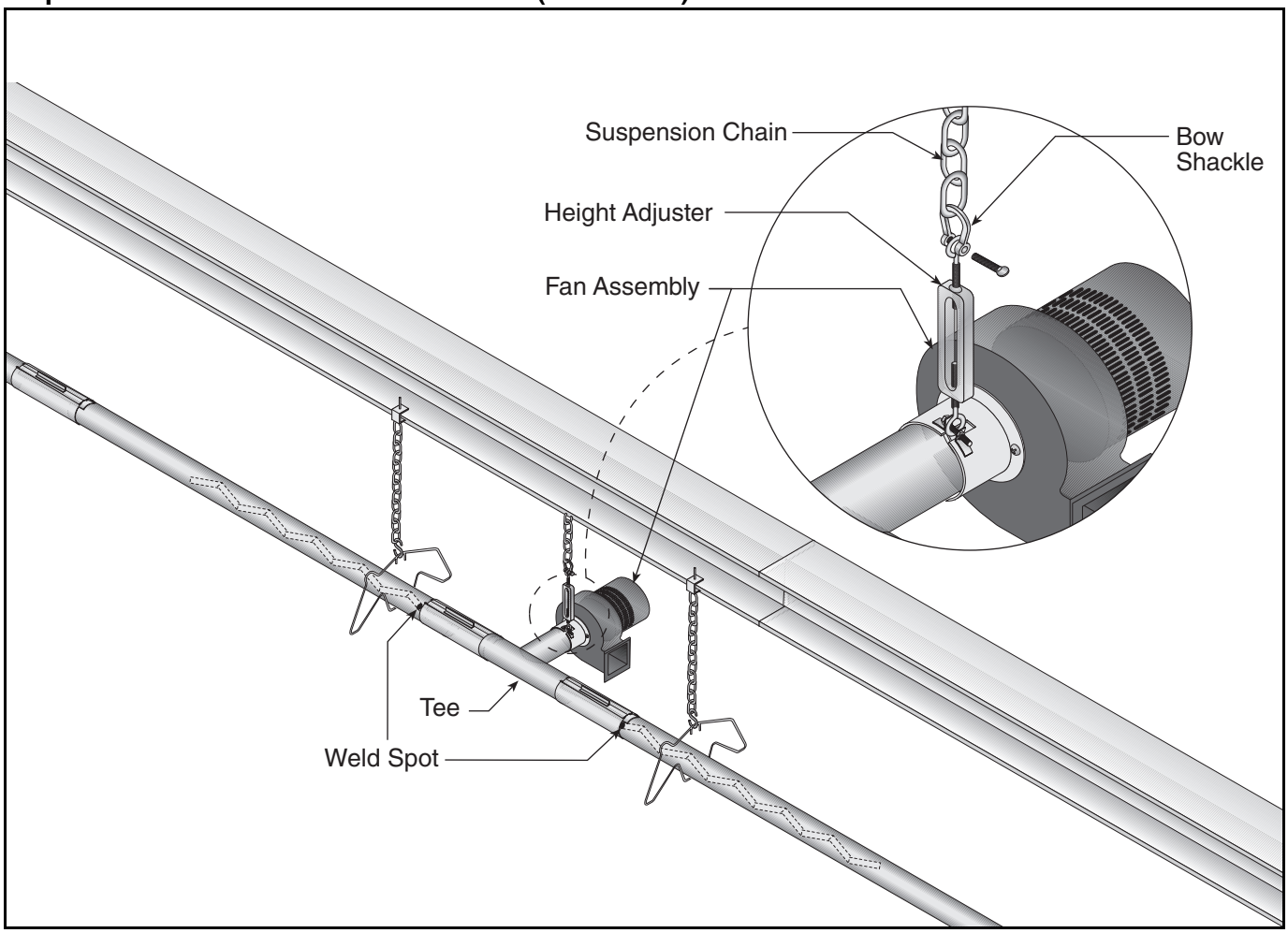


Description	Part Number
Outlet Gasket	90710704

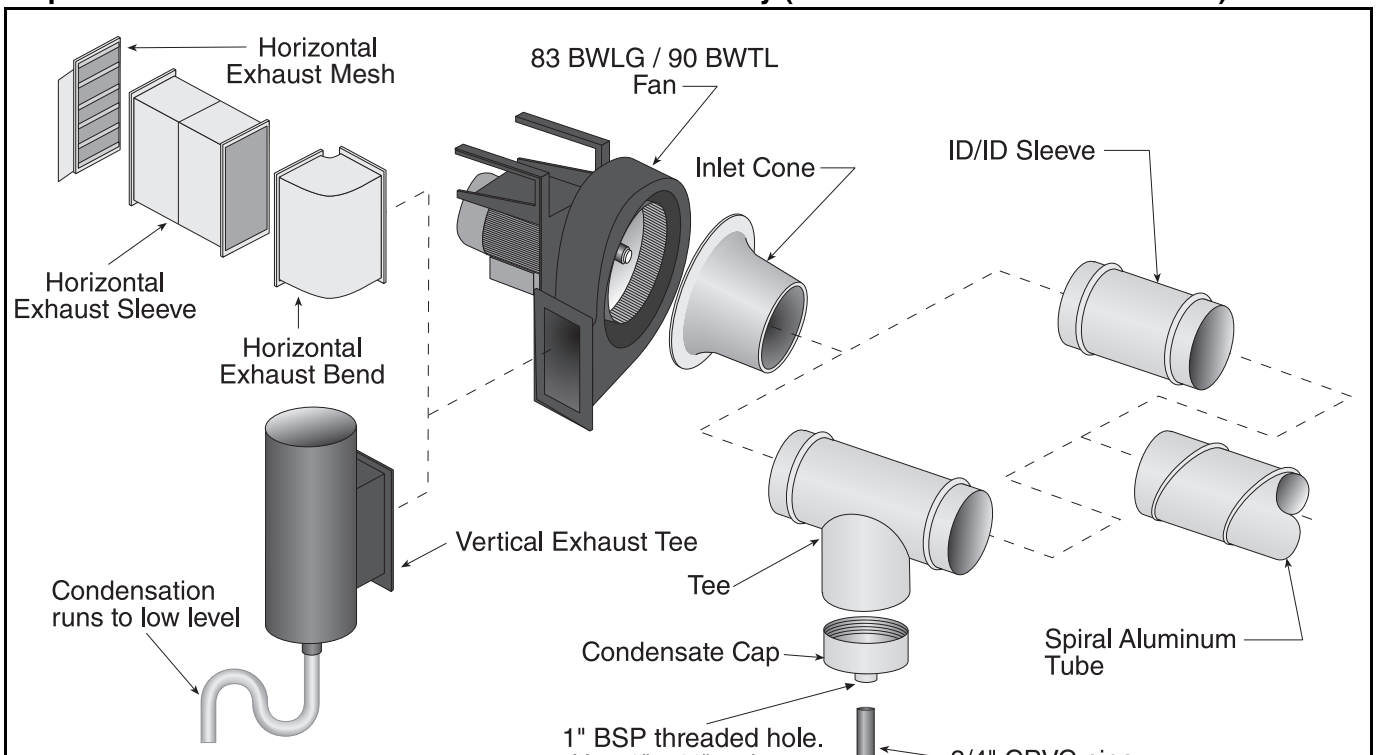
Step 9.4 Double Linear Fan Installation



Step 9.4.1 Double Linear Fan Installation (Continued)

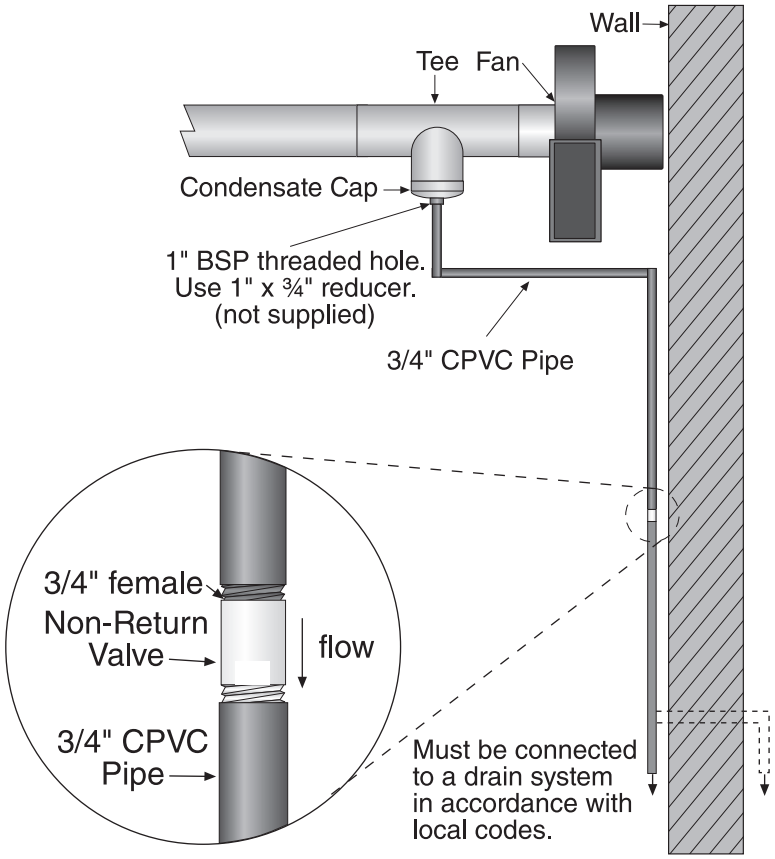


Step 9.5 Multiburner 83 BWLG / 90 BWTL Fan Assembly (Horizontal and Vertical Outlets)



Description	Part Number
Vertical Exhaust Tee	C1324B
Horizontal Exhaust Bend	C1325B
Horizontal Exhaust Sleeve	C1326B
Horizontal Exhaust Louver	S5055F
Condensate Cap 4"	02718851
Condensate Cap 6"	02718852
Non-Return Valve	C2383B

Step 9.6 Condensate Drain Assembly



Description	Part Number
Non-Return Valve	C2383B

SECTION 10: OPTIONAL HEATER ACCESSORIES

⚠WARNING

Cut/Pinch Hazard

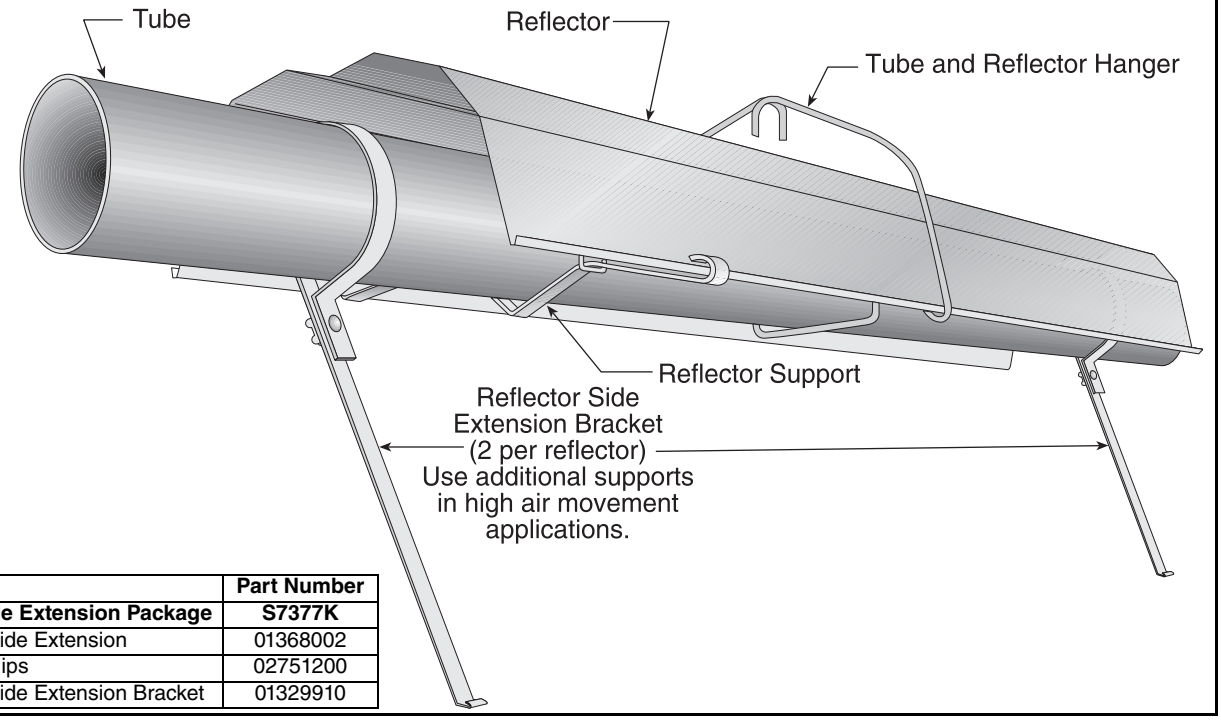
Wear protective gear during installation, operation and service.

Edges are sharp.

Failure to follow these instructions can result in injury.

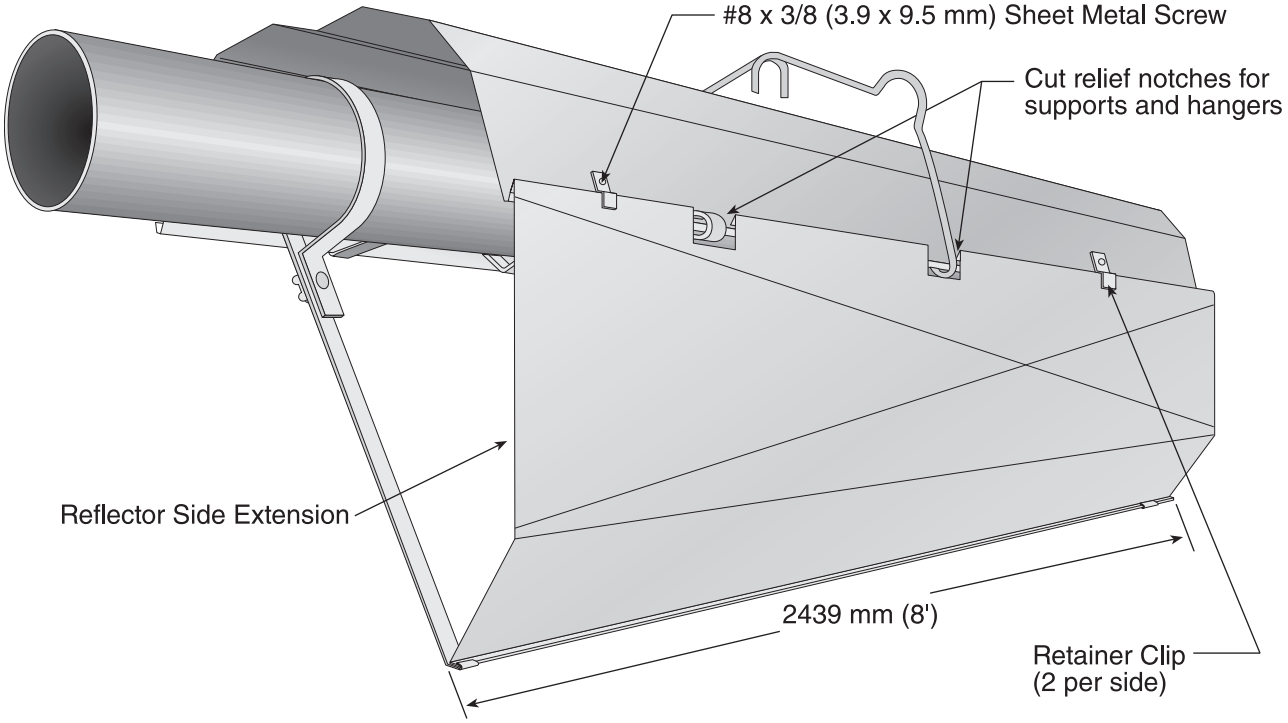
10.1 Reflector Side Extension Installation

Step 10.1.1 Bracket Installation



Description	Part Number
Reflector Side Extension Package	**S7377K**
Reflector Side Extension	01368002
Retainer Clips	02751200
Reflector Side Extension Bracket	01329910

Step 10.1.2 Side Reflector Installation



10.2 U-Tube Cover Installation

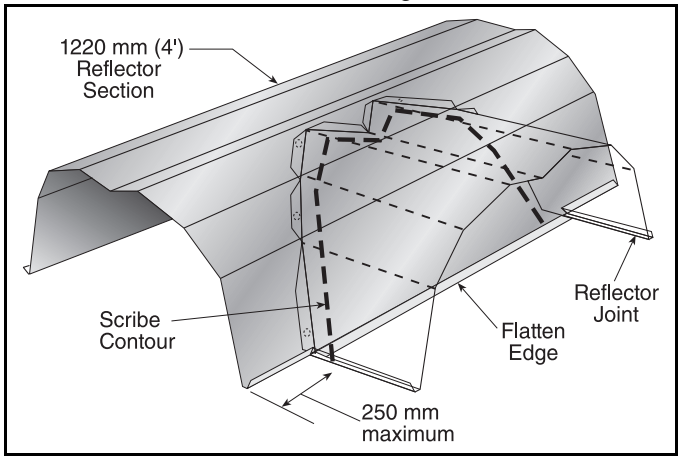
The package contains two reflector joint pieces (P/N 02750913), one 2439 mm (8') reflector and 18 x #8 sheet metal screws. Install the U-tube cover using the following procedure.

Step 10.2.1

Cut the 2439 mm (8') reflector in half to be used on both sides to cover the U-tube.

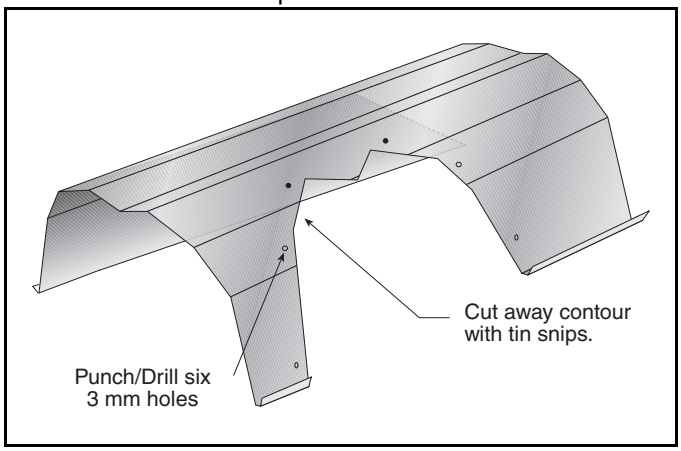
Step 10.2.2

Flatten 1220 mm (4') reflector edge where joint piece matches. Put a mark on the 1220 mm (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.



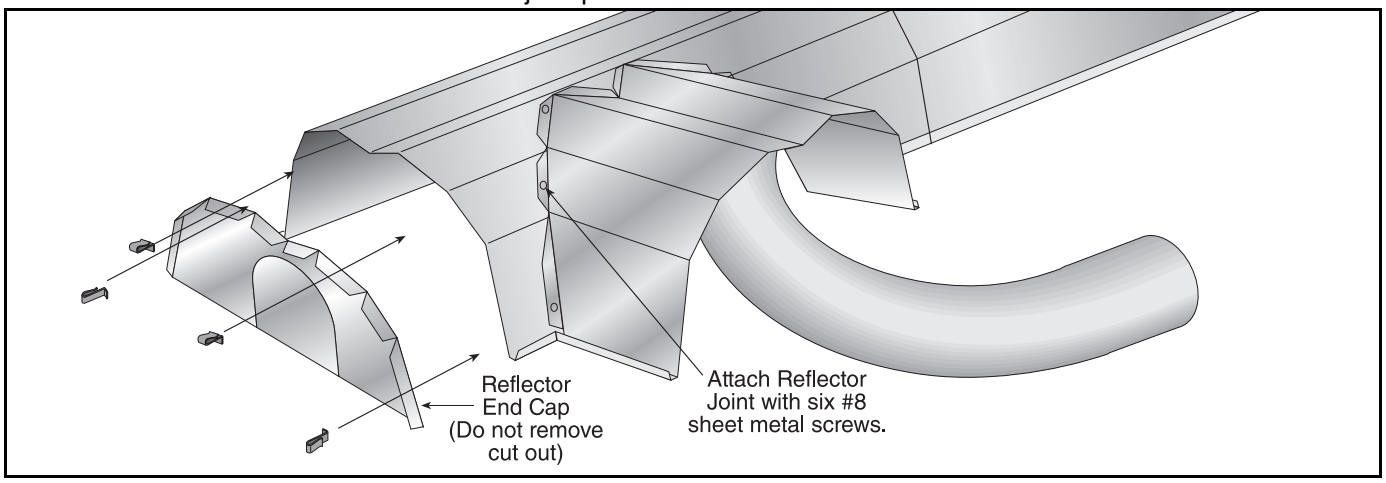
Step 10.2.3

Cut away the reflector to clear the tube, leaving about 250 mm (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

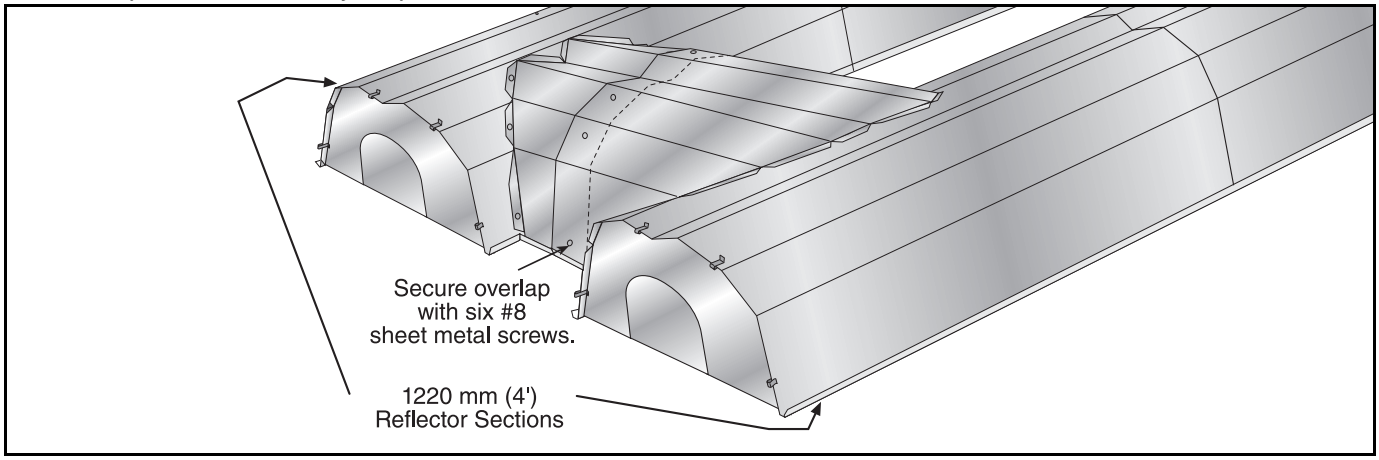
Use six #8 sheet metal screws to attach the joint piece.



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

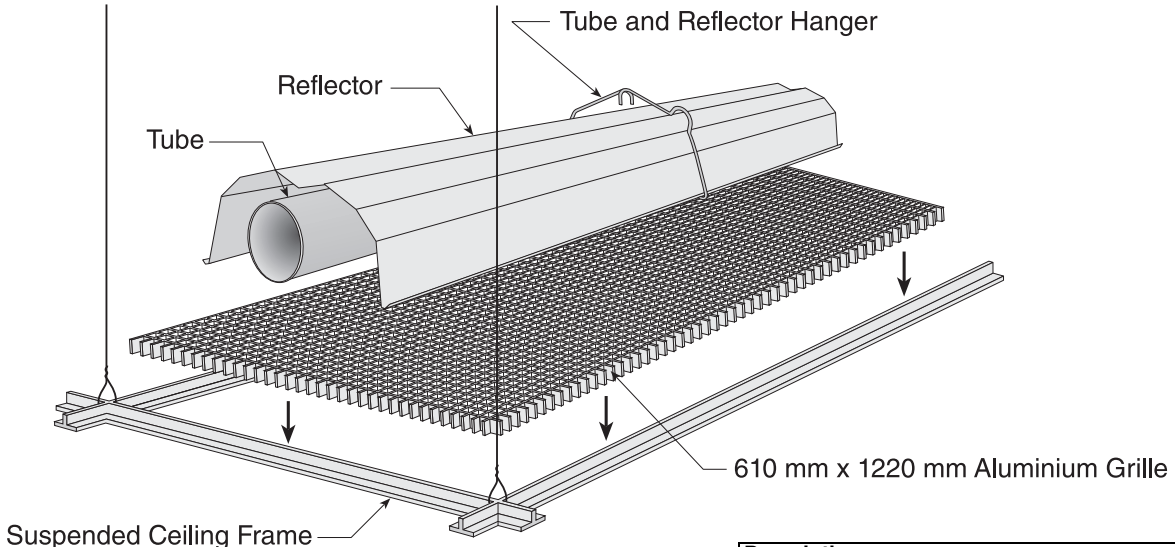
Step 10.2.5

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



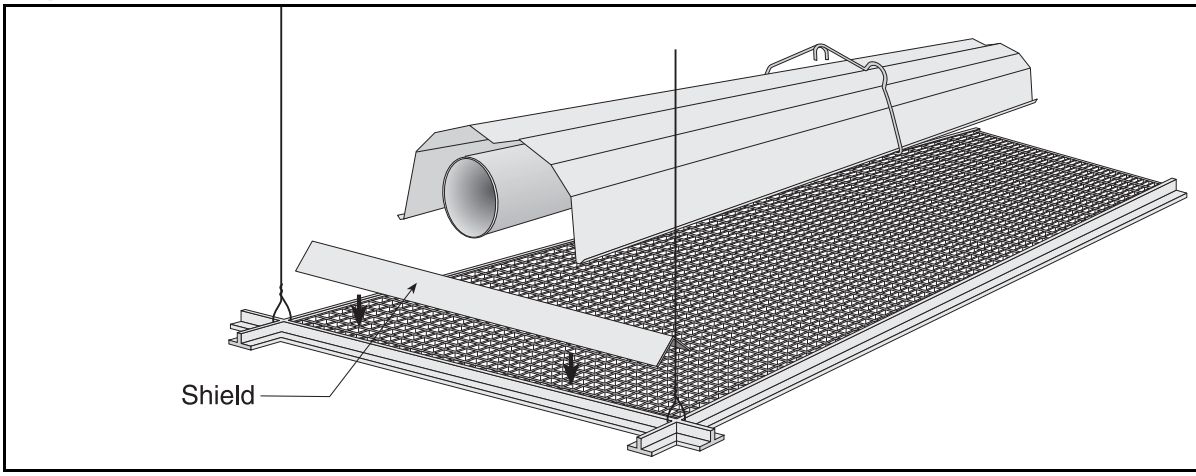
10.3 Decorative Grille Installation

Step 10.3.1 Grille Installation



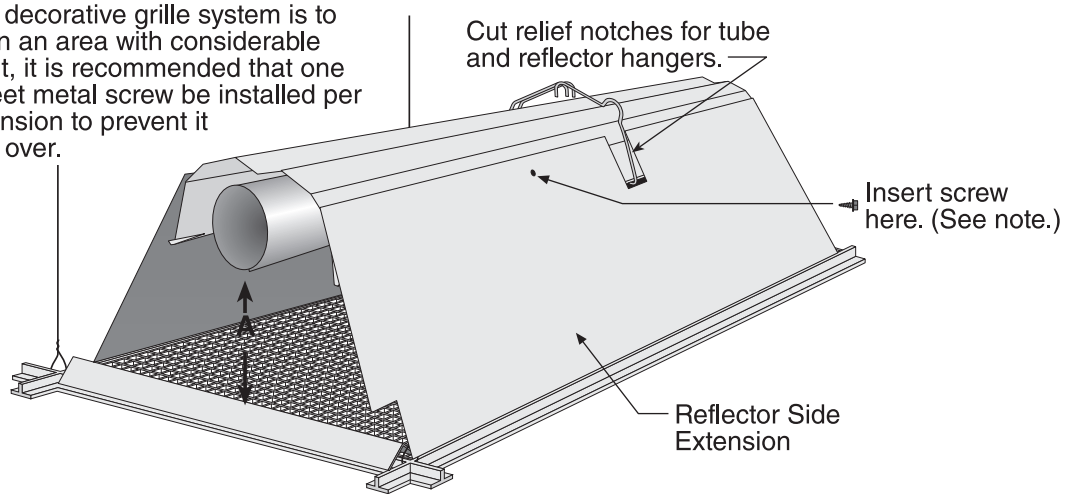
Description	Part Number
Aluminium Grille 610 mm X1220 mm	91407000

Step 10.3.2 Frame Shield Installation



Step 10.3.3 Reflector Side Extension Installation for Decorative Grilles

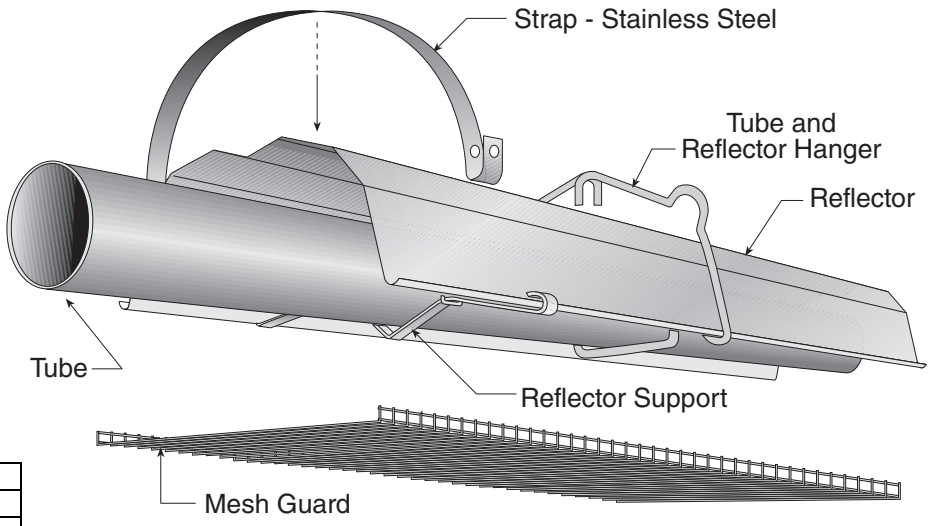
NOTE: If the decorative grille system is to be installed in an area with considerable air movement, it is recommended that one #8 x 3/8" sheet metal screw be installed per reflector extension to prevent it from blowing over.



Distance "A"	
Minimum	Maximum
150	260 mm

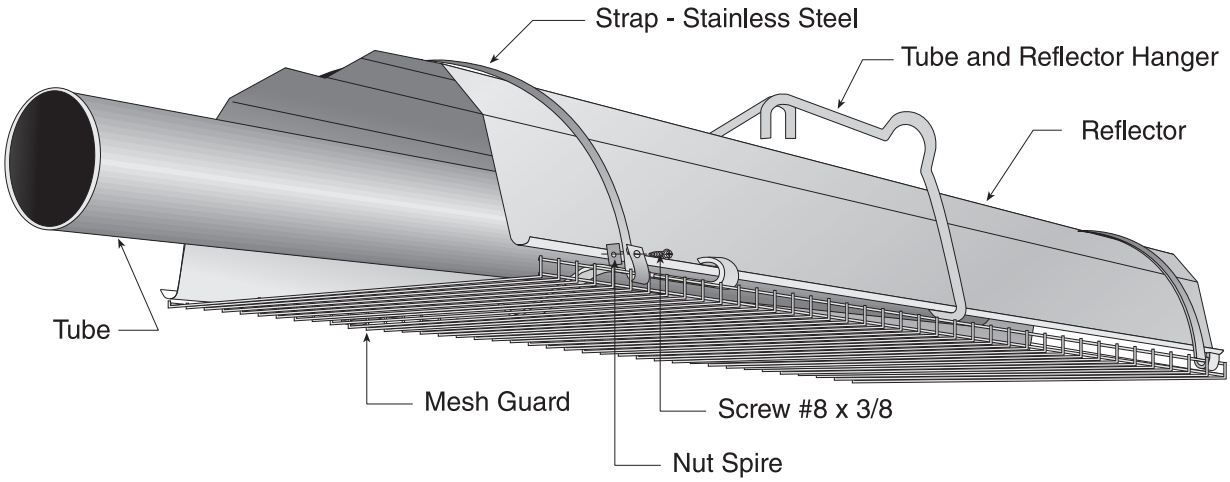
10.4 Sports Hall Guard Installation

Step 10.4.1 Grille Installation



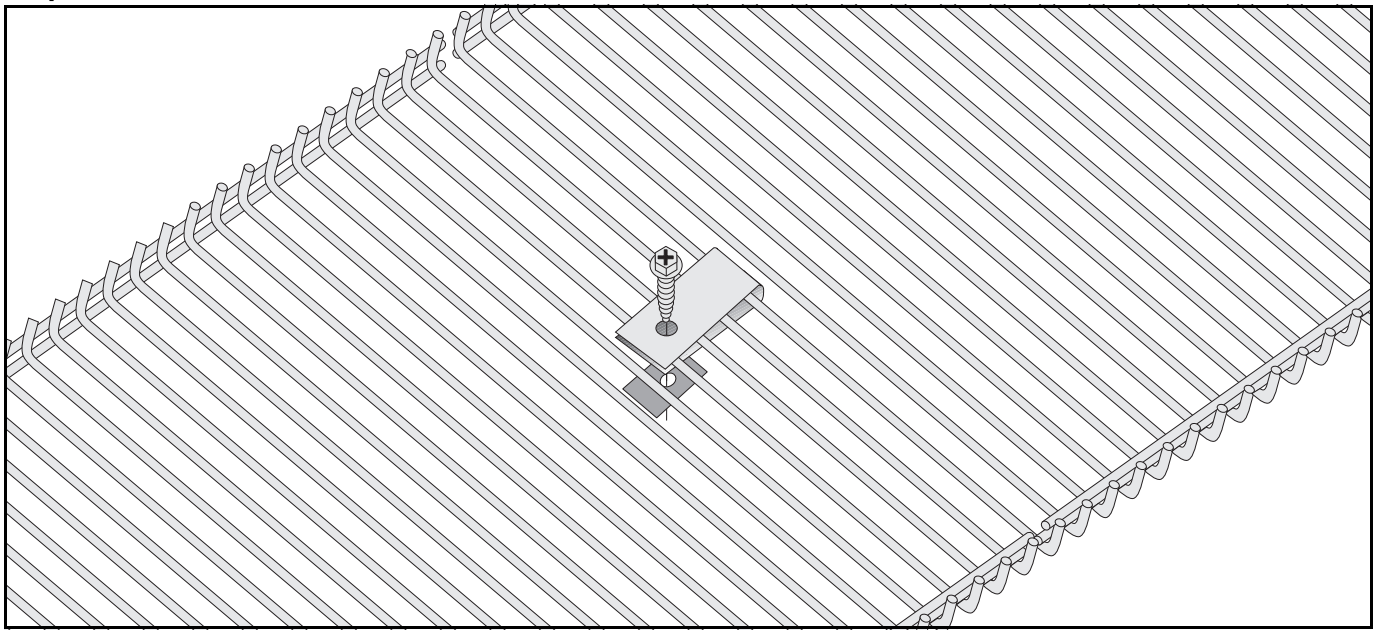
Description	Part Number
Mesh Guard 2438 mm	E0009855
Mesh Guard 1524 mm	C2329B
Strap Stainless Steel	S5218W

Step 10.4.2 Fastener Installation



Description	Part Number
Nut Spire	C1088B
Screw #8 x 3/8	C1089B

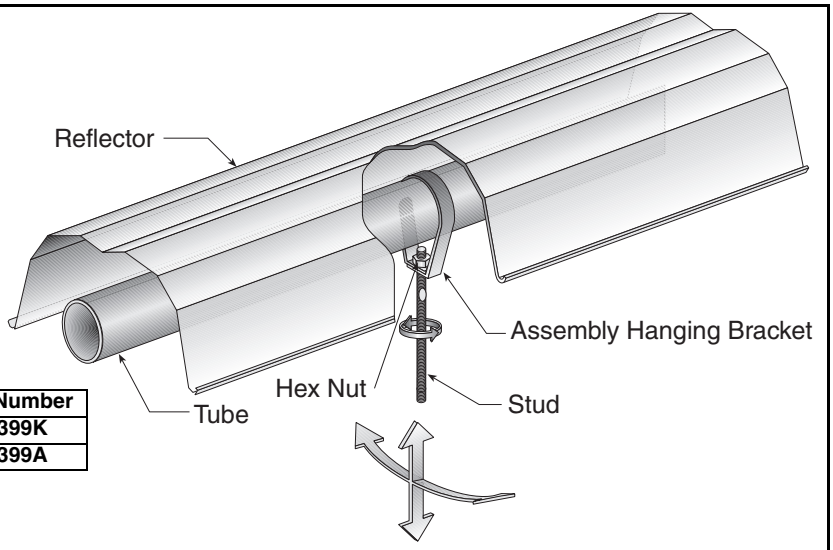
Step 10.4.3 Mesh Guard Connection



10.5 Undershield Installation

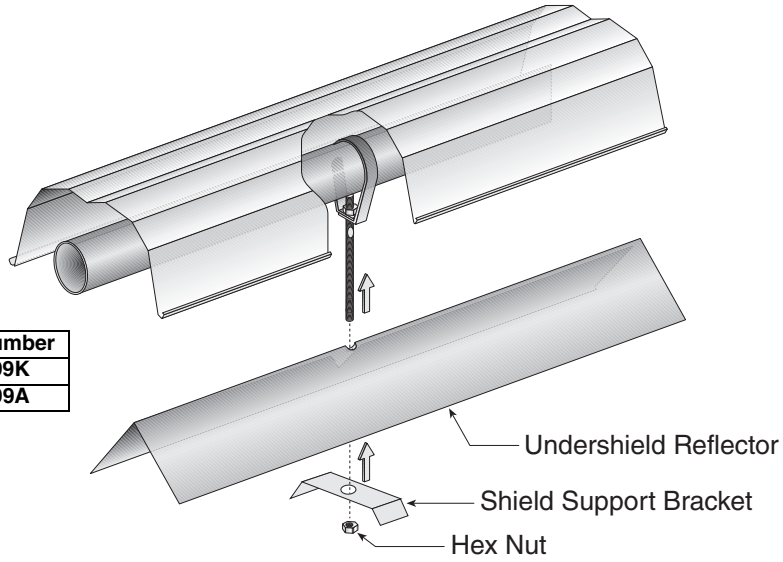
10.5.1 Hanger Installation

Description	Part Number
Undershield Reflector Package 1220 mm (4')	S7399K
Undershield Reflector Package 2438 mm (8')	S7399A

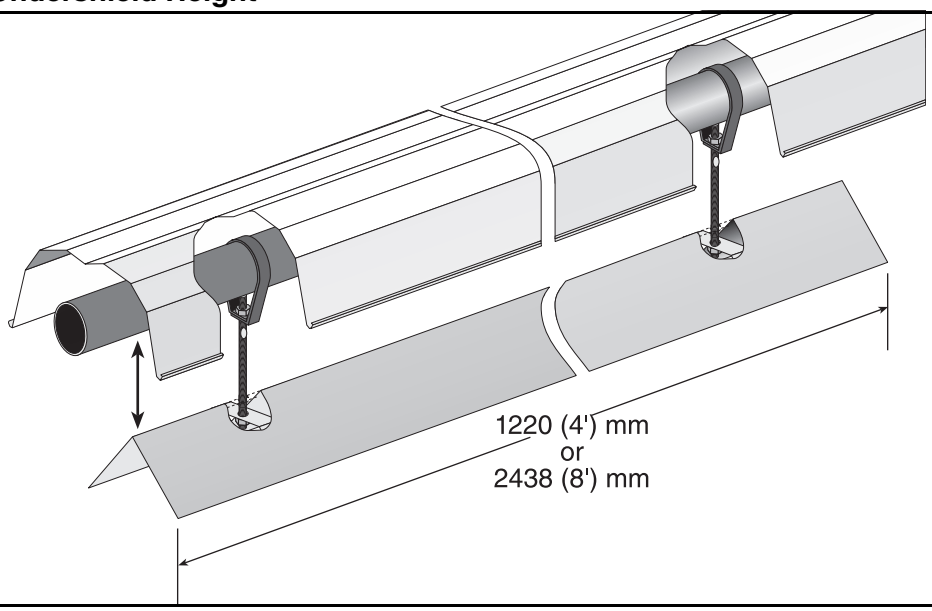


10.5.2 Undershield Installation

Description	Part Number
Undershield Reflector Package 1220 mm (4')	S7399K
Undershield Reflector Package 2438 mm (8')	S7399A



10.5.3 Adjust Undershield Height



10.6 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 14, Figure 18*, for double linear heaters *see Page 17, Figure 20* and for U-tube heaters *see Page 27, Figure 22*.

10.6.1 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
CMP15UT	2	CMP15ST	3
CMP20UT	3	CMP20ST	4
CMP25UT	3	CMP25ST	4
CMP30UT	3	CMP30ST	5
CMP35UT	3	CMP35ST	5
CMP40UT	3	CMP40ST	5
CMP45UT	4	CMP45ST	6
CMP50UT	4	CMP50ST	6

Figure 25: U-Tube (Horizontal)

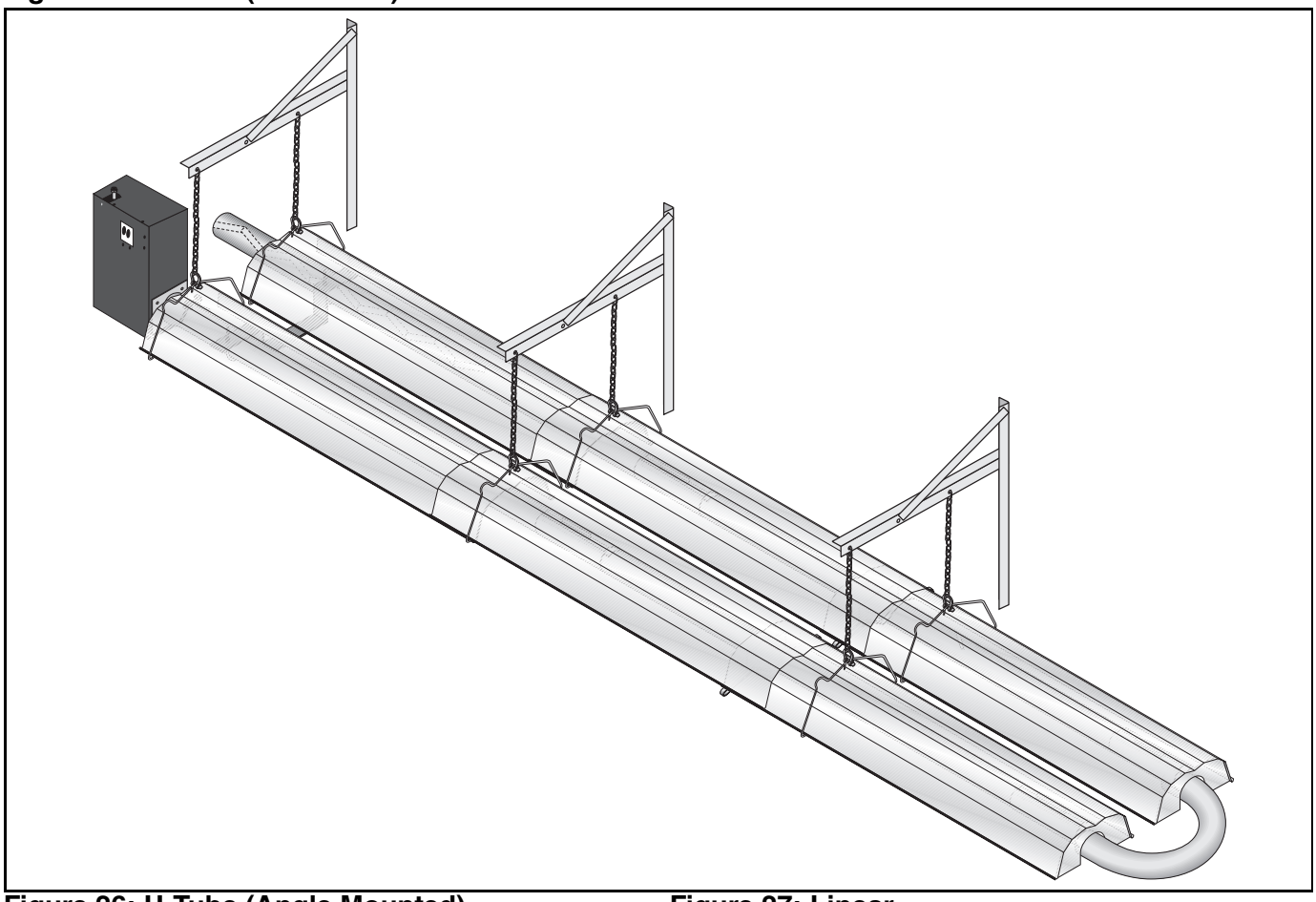


Figure 26: U-Tube (Angle Mounted)

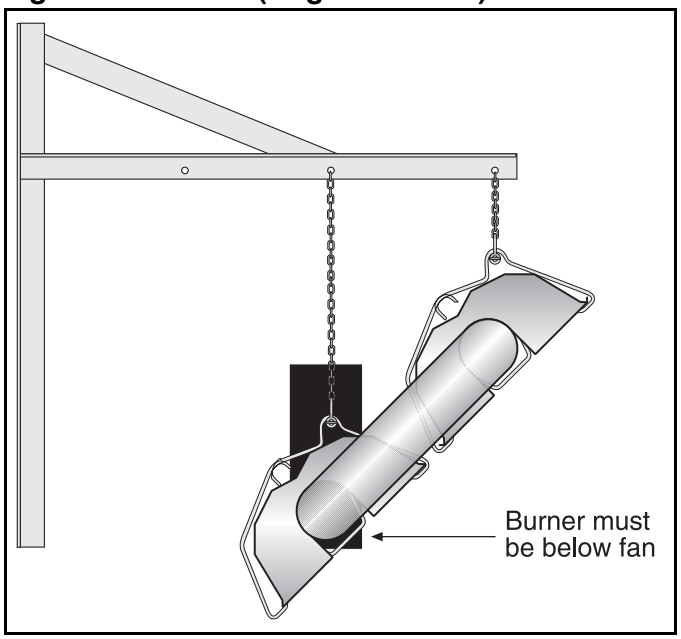
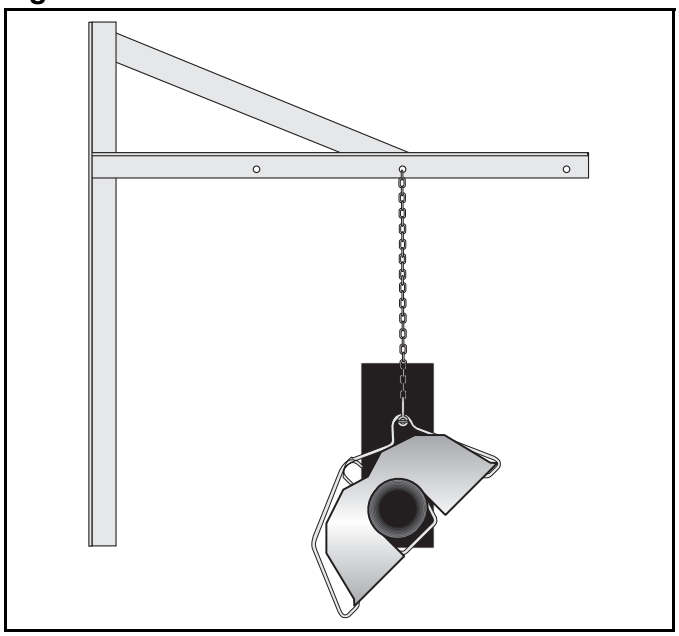


Figure 27: Linear



SECTION 11: FLUING

⚠WARNING

Carbon Monoxide Hazard

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

Unitary heaters installed flueless design 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.

11.1 General Venting Requirements

Flue materials are not included with the heater.

11.1.1 Type C_{12} , C_{32} & C_{62} 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 dust arrest baffle plate on the heater must be removed prior to installation. *See Page 49, Figure 31*.

11.1.2 Type B_{22} Appliance

The flue must be fitted with a low resistance terminal. *See Page 49, Figure 31*.

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. CMP15 and CMP20 flue must be insulated if longer than 5,000 mm. CMP25 flue must be 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	Horizontal	Vertical
83 BWLG	190 x 75 (hole)	150 mm dia.
90 BWTL	190 x 75 (hole)	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

For design air changes less than 0.5/h following requirements apply.

Type B heaters

For natural ventilation low level openings must be provided of at least 2 cm^2/kW input installed. For mechanical ventilation an air change rate of at least 0.5/h must be ensured.

Type C heaters

Room sealed heaters need no additional building ventilation.

11.2.2 Flueless Installation (EN 13410)

The installation room must have a volume of at least 10m^3/kW of installed nominal heat input. A minimum of 10m^3/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/m^3.

Figure 28: Individual Flue Connection Detail

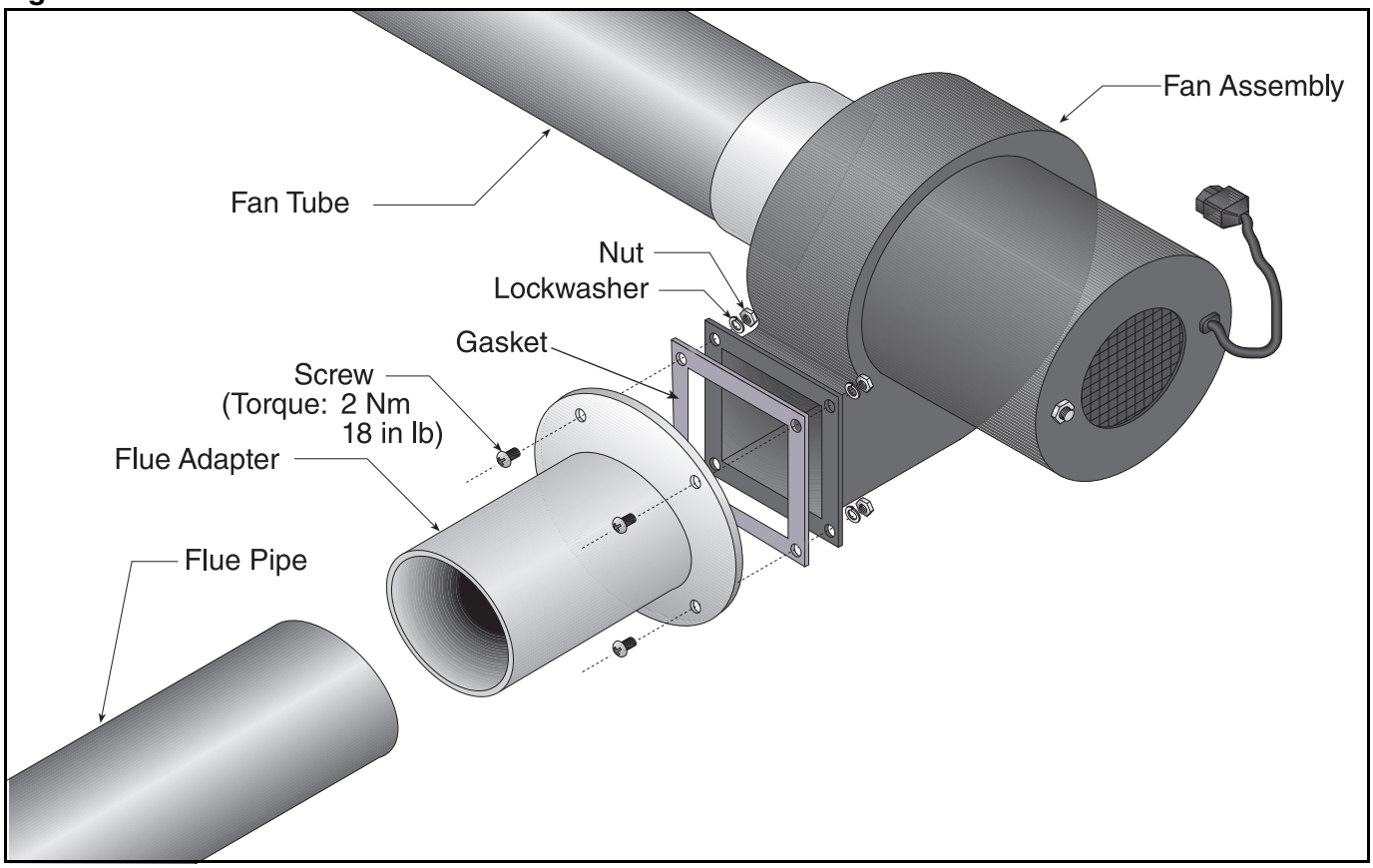
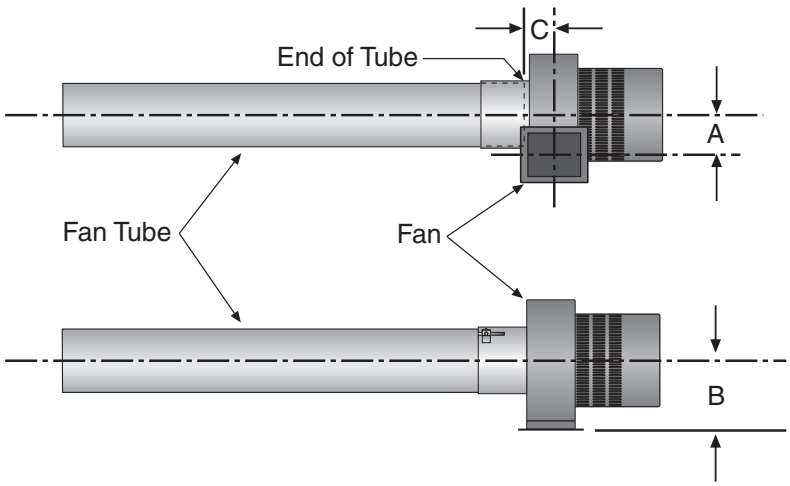


Figure 29: Flue Connection Dimensions



Fan Model	A	B	C
Torin DSF-133-42	79 mm	95 mm	45 mm
Torin DSA-524-202	86 mm	102 mm	51 mm
McMillan N1398A	89 mm	102 mm	51 mm

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.

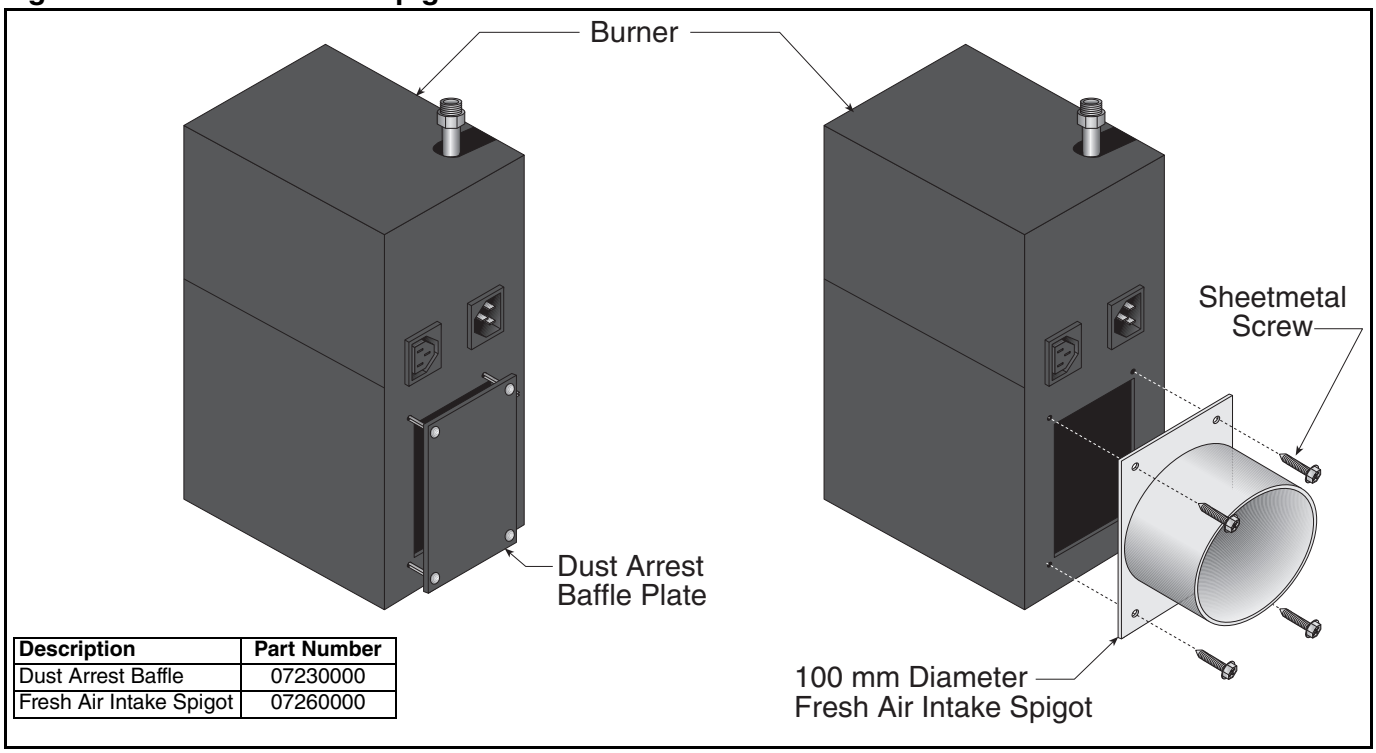
See Page 47, Section 11.1.3 for recommendations on duct length. Air duct should be as straight as possible. Do not use bends in excess of 45°. Consult the manufacturer if more than 2 x 45° offset bends are necessary. The fresh air duct must be self supporting.

11.3.1 Air Supply Requirements

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

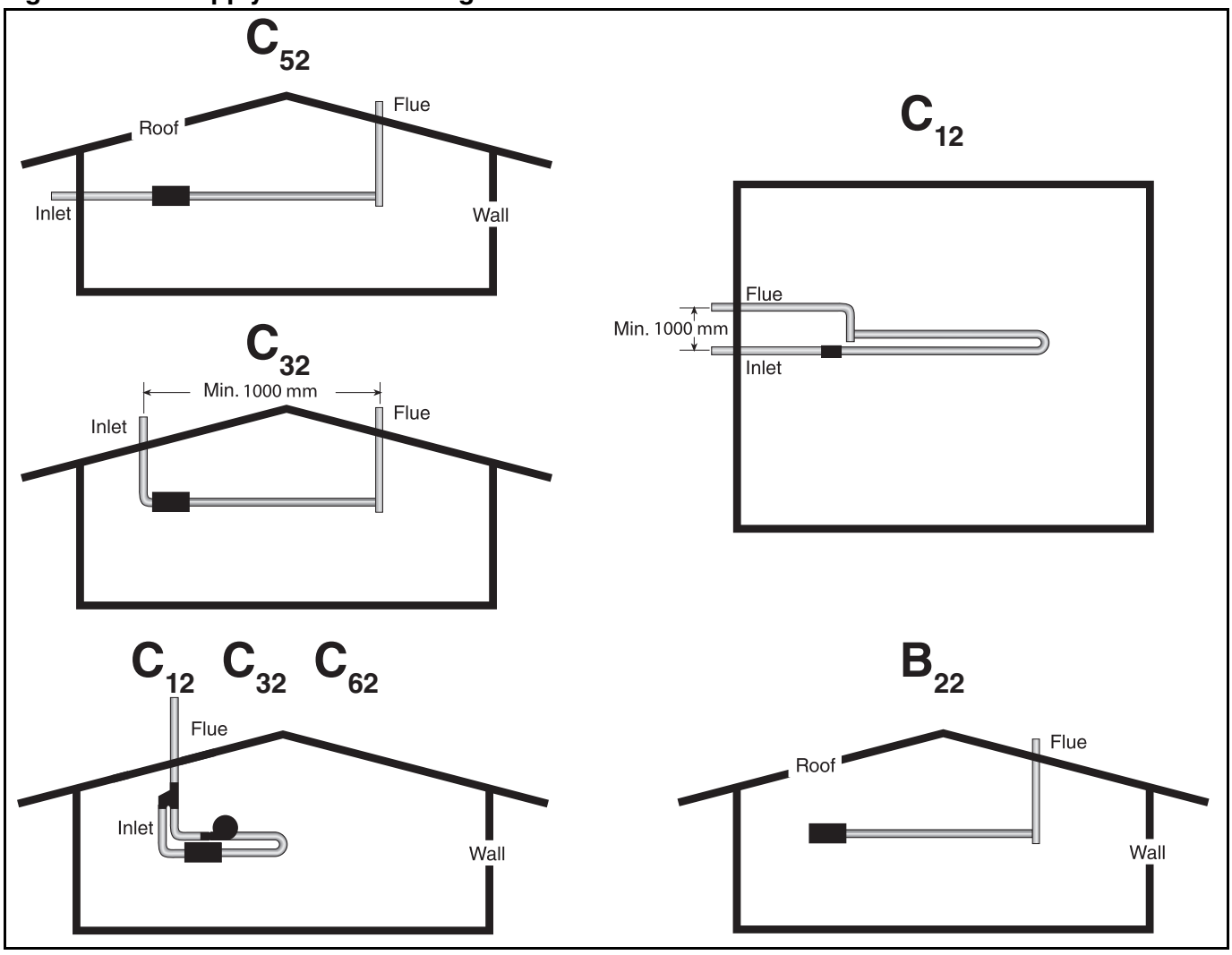
- The flue must penetrate the roof while fresh air can penetrate any wall. (*See Page 49, Figure 31*)
- The flue and fresh air supply must penetrate the same roof, at a minimum of 1 m apart. (*See Page 49, Figure 31*)
- The flue must penetrate 1 m higher than the fresh air inlet on the same wall. (*See Page 49, Figure 31*)

Figure 30: Fresh Air Intake Spigot



Description	Part Number
Dust Arrest Baffle	07230000
Fresh Air Intake Spigot	07260000

Figure 31: 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.

⚠WARNING

Explosion Hazard

Leak test all components of gas pipe work before operation.

Gas can leak if pipe work is not installed properly.

Do not high pressure test gas pipe work 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 51, Figure 32*. 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.

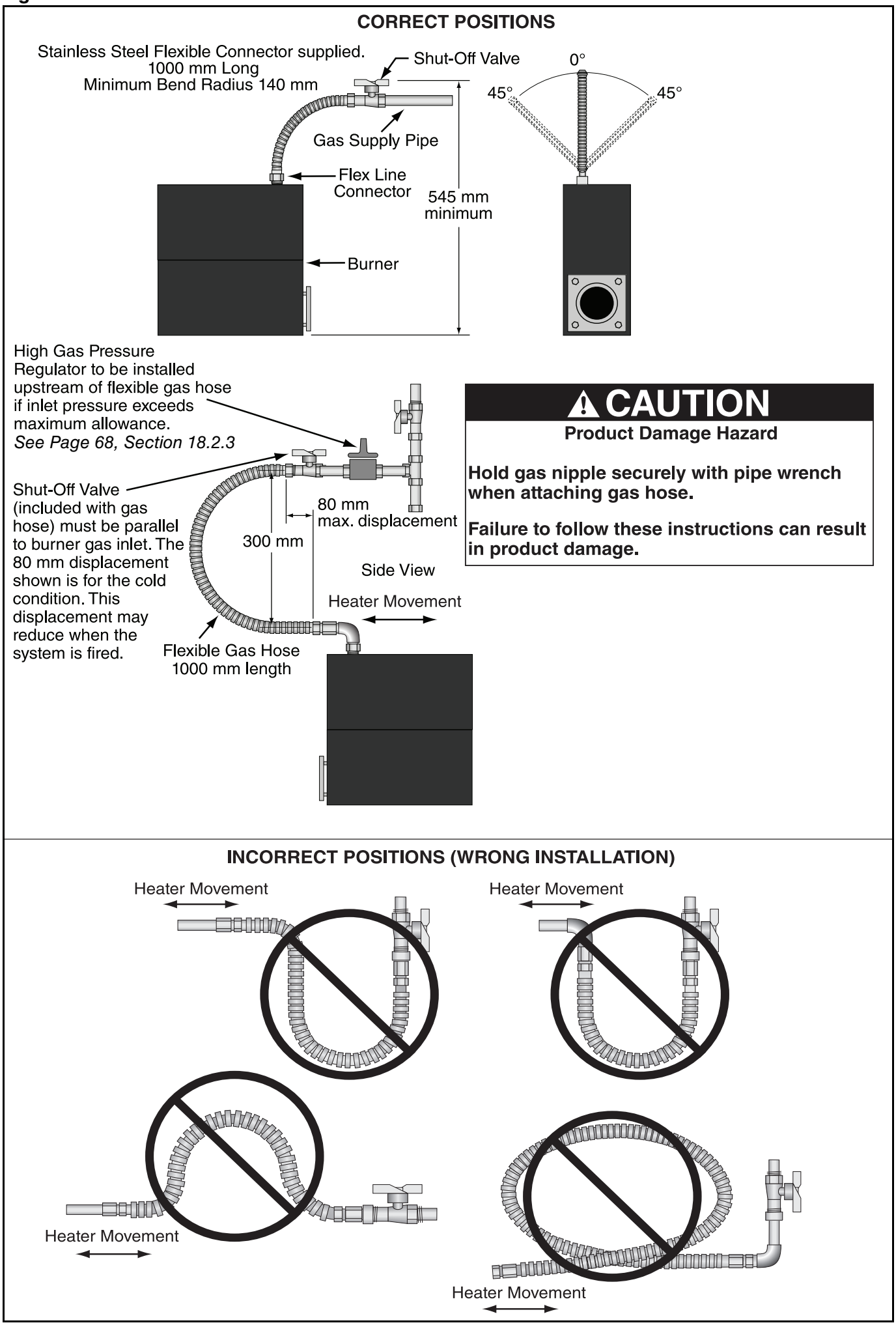
There is an expansion of the tube with each firing cycle. This will cause the burner to move with respect to the gas hose. This can cause a gas leak resulting in an unsafe condition if the gas connection is not made in strict accordance with *Figure 32*.

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.

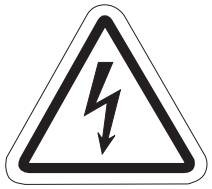
- **Check the pipe and tubing ends for leaks before placing heating equipment into service. When checking for gas leaks, use a soap and water solution; never use an open flame.**
- **An additional gas regulator will be required, at the gas input connection point for each burner when LP gas types are required to facilitate required burner pressure see Page 72 Ref 18.10.1**

Figure 32: Gas Connection with Stainless Steel Flex Connector



SECTION 13: WIRING

⚠ DANGER



Electrical Shock Hazard

Disconnect electric before service.

Heater must be properly earthed.

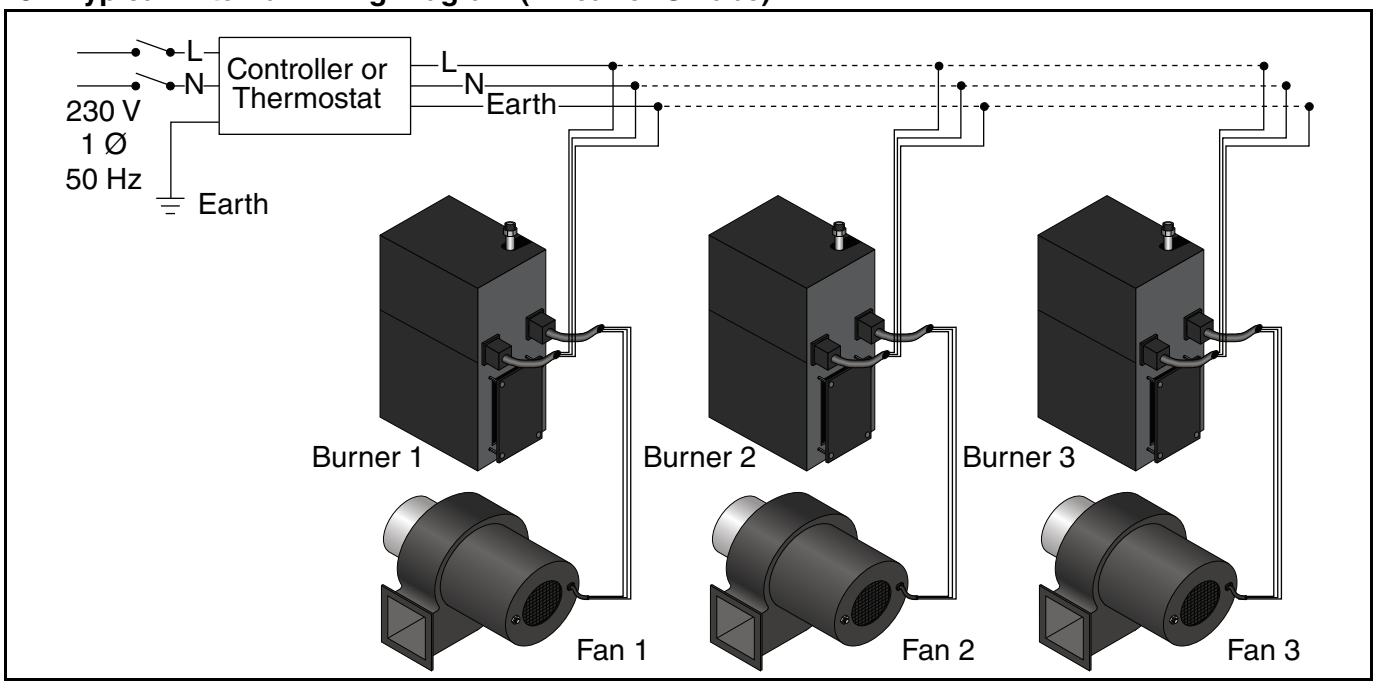
Failure to follow these instructions can result in death or electrical shock.

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 52, Section 13.1 through Page 53, Section 13.3* for the external wiring details for the single-burner, double linear and multiburner heater systems.

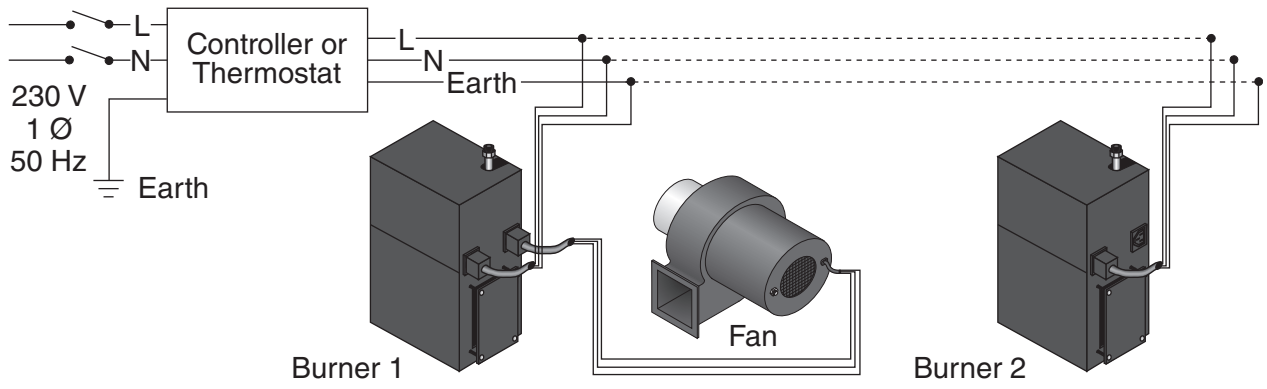
All wiring must comply with current wiring regulations and any local regulations which may apply. Always switch off the supply to the burner and disconnect by removing the plug before removing the burner side panel.

For lockout indication, establish connection inside burner with grey wire and ignition module connection (CON 5 Pin 4).

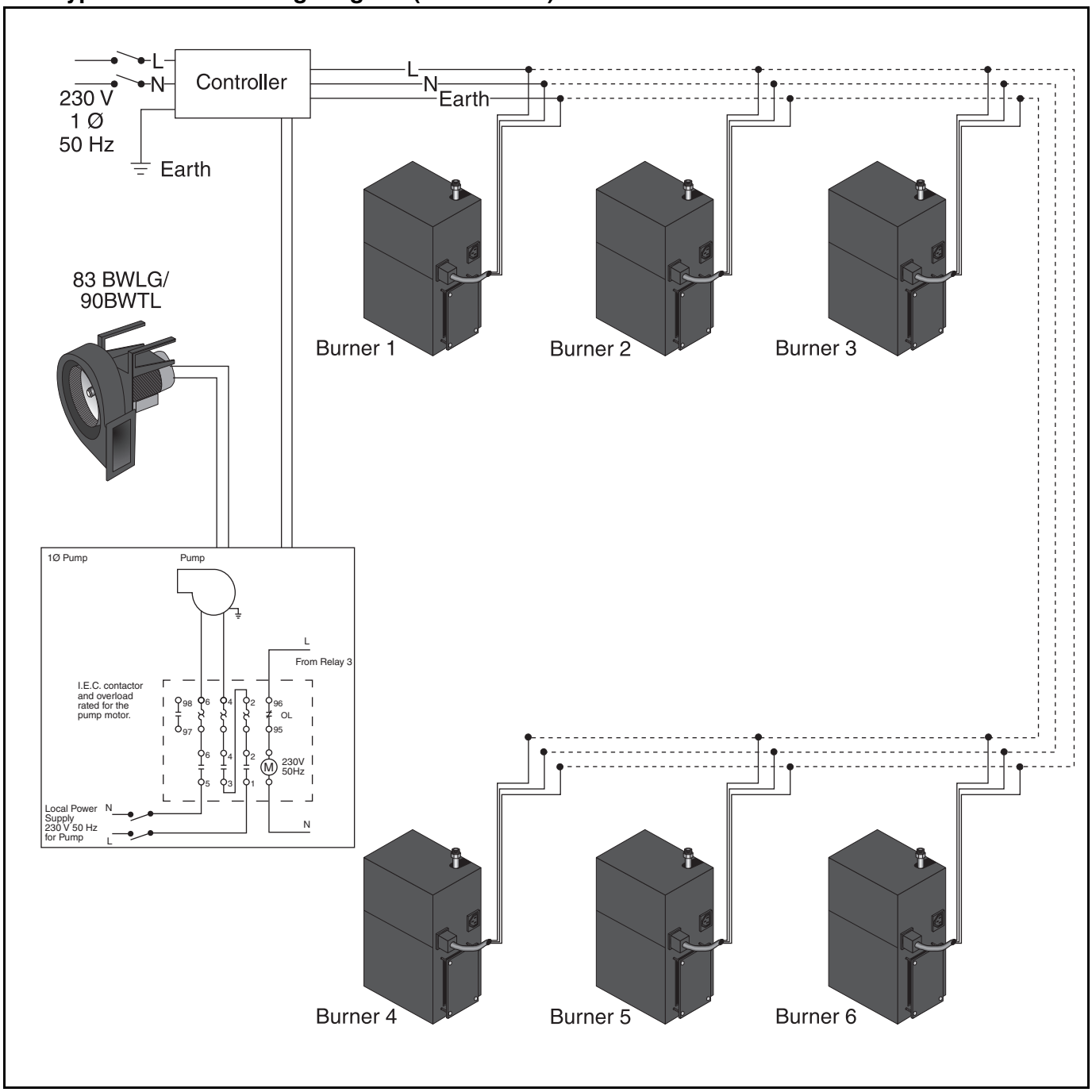
13.1 Typical External Wiring Diagram (Linear or U-Tube)



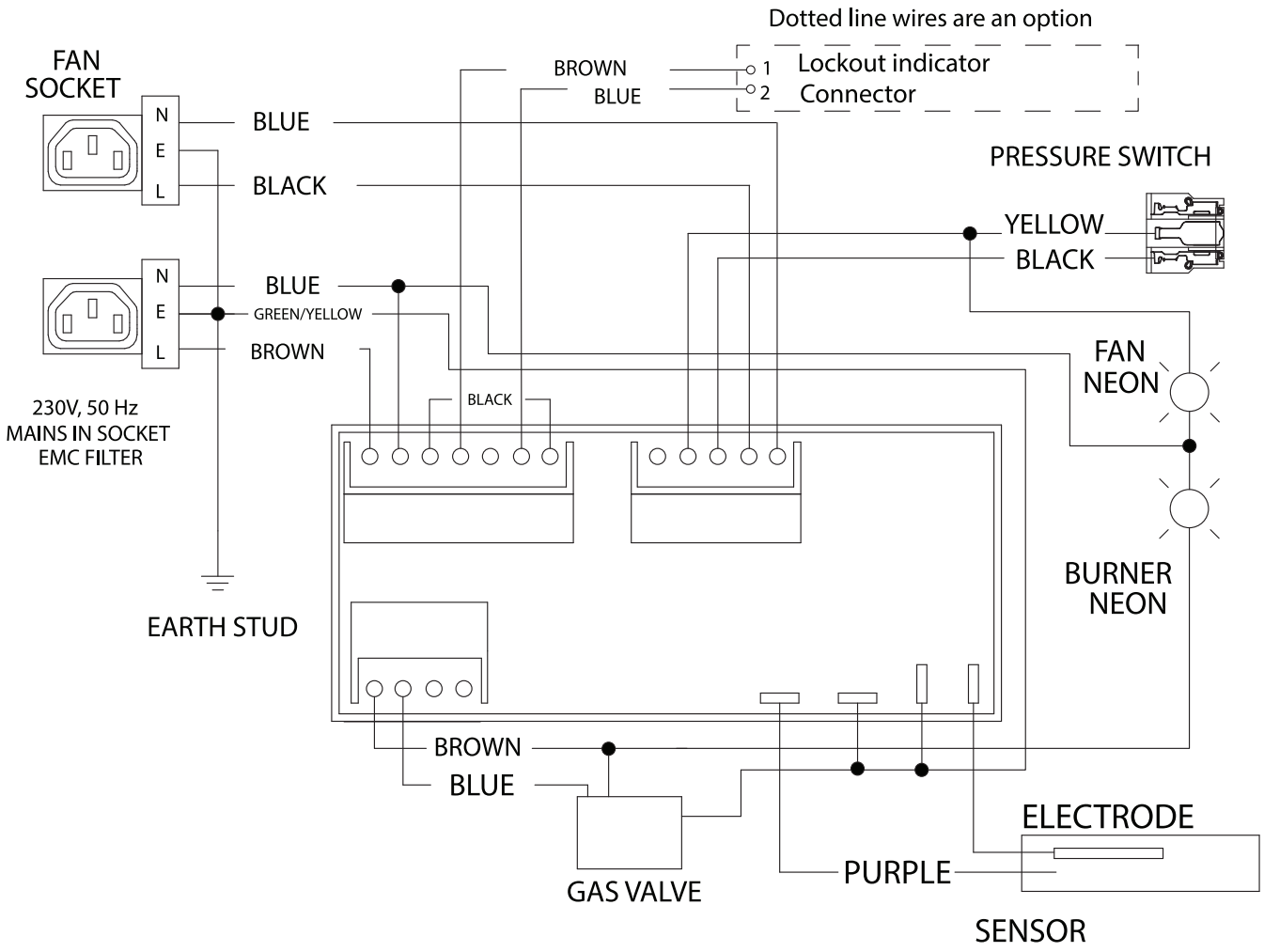
13.2 Typical External Wiring Diagram (Double Linear Option 2)



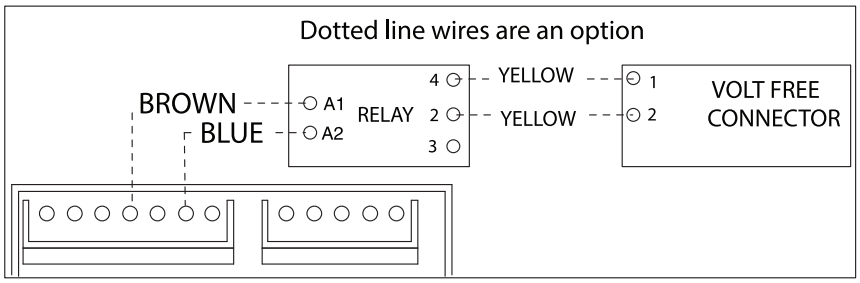
13.3 Typical External Wiring Diagram (Multiburner)

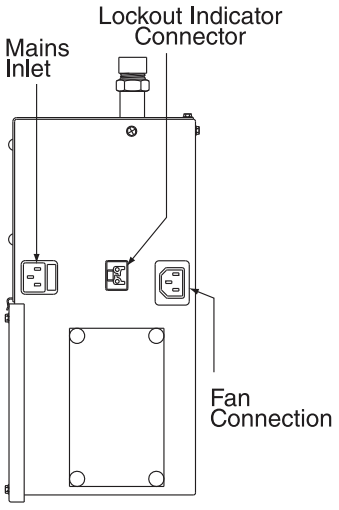


13.4 Internal Wiring Diagram



OPTIONAL VOLT FREE CONNECTOR



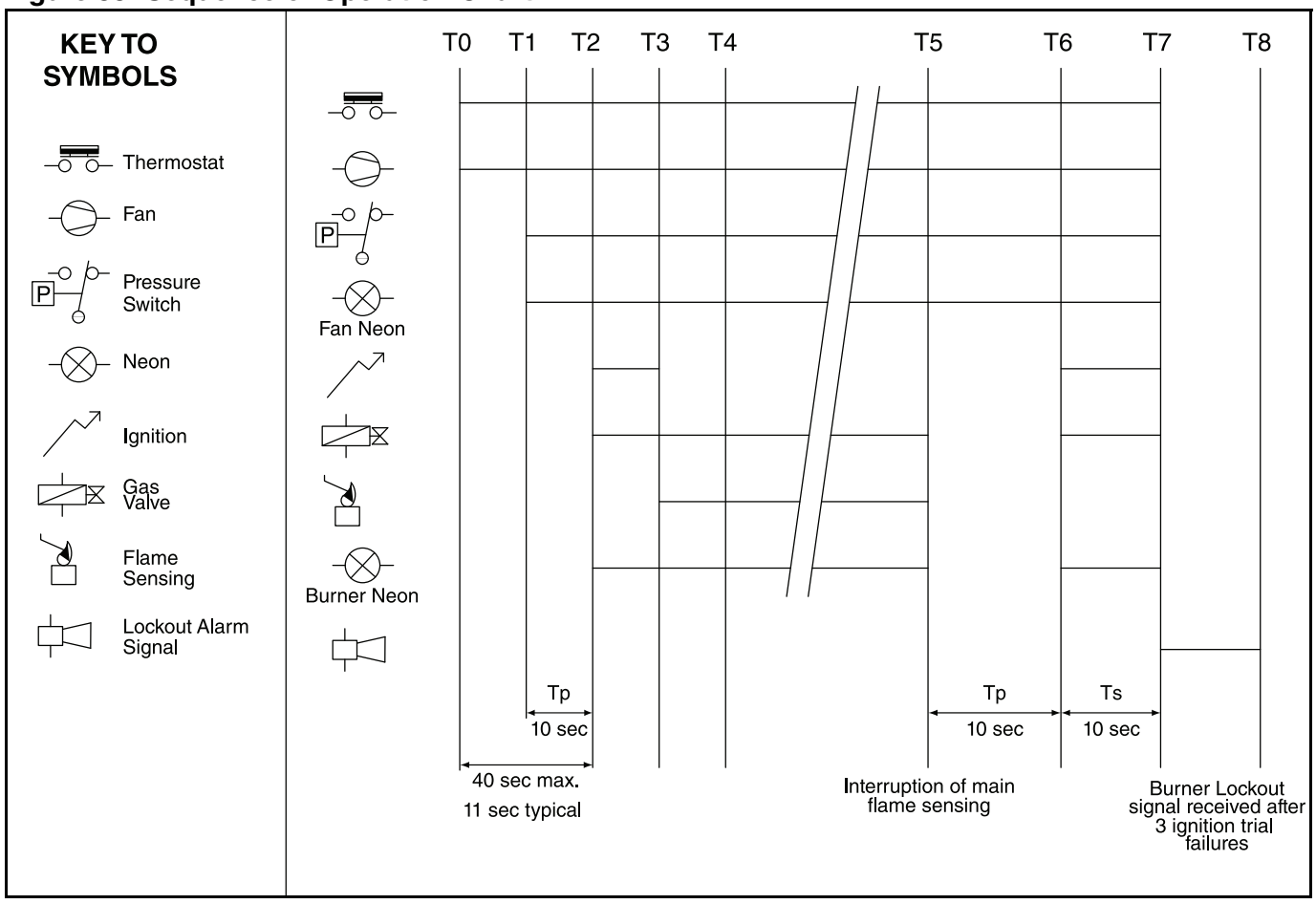


If any of the original wire as supplied with the heater must be replaced, it must be replaced with wiring material having a temperature rating of at least 105°C and 600 V.

SECTION 14: OPERATION

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

Figure 33: 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

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 COMBAT® HEATING SOLUTIONS LIMITED 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 COMBAT® HEATING SOLUTIONS LIMITED 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 54, Section 13.4*.

14.1.2 Heater Lockout Indicator by Volt Free Connector (Optional)

A volt free contact relay is closed which enables the COMBAT® HEATING SOLUTIONS LIMITED 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 54, Section 13.4*.

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 70, Section 18.10.1* 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 55, 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 70, Section 18.10.1* 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 CMP40) 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.

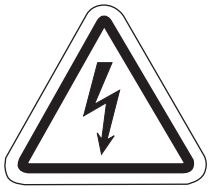
Linear and Double Linear only:

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.

SECTION 15: SERVICING INSTRUCTIONS

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

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

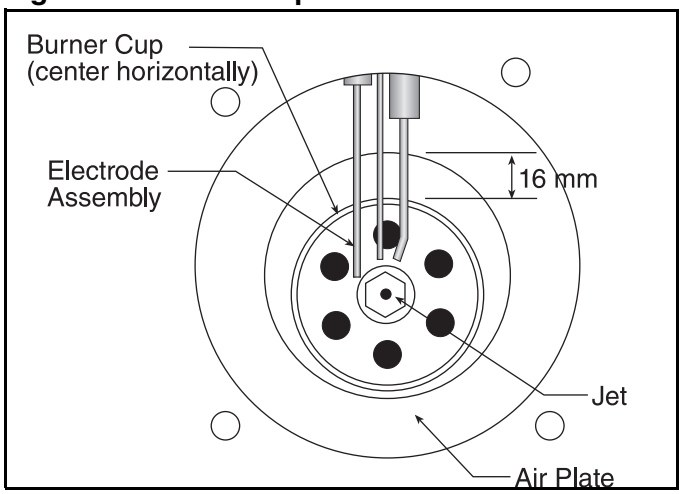
With burner and fan removed, clean the outer surfaces of the tubes using a brush and wipe the inner surface of the reflector with a soft damp cloth - use a household detergent if necessary. Never use abrasive cleaners on the reflectors. Reassemble the burner and fan in reverse order. Carry out the Testing Procedure. *See Page 56, 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 34: 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. Disconnect the control wiring to the valve solenoids, along with the earth wire to the valve body. The solenoid/governor and fittings can now be withdrawn from the compartment. The new valve and reassemble in reverse order back into burner compartment. 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 two 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

Common - Black

15.2.6 Neons

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

All installation and service of COMBAT® HEATING SOLUTIONS LIMITED equipment must be performed by a contractor qualified in the installation and service of equipment sold and supplied by Combat Heating Solutions Limited and conform to all requirements set forth in the COMBAT® HEATING SOLUTIONS LIMITED manuals and all applicable governmental authorities pertaining to the installation, service, operation and labeling of the equipment. To help facilitate optimum performance and safety, Combat Heating Solutions Limited recommends that a qualified contractor conduct, at a minimum, annual inspections of your COMBAT® HEATING SOLUTIONS LIMITED equipment and perform service where necessary, using only replacement parts sold and supplied by Combat Heating Solutions Limited.

15.3 Maintenance Checklist

Installation Code and Annual Inspections:

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 4, 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 4, 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 22, Section 6.6.1. or Page 33, Section 7.8.1*. Clean outside surface with a damp cloth.
Flue	Flue 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.
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. *See Page 10, Section 5*. Make sure there is no sagging, bending or distortion.
Gas Line	Check for gas leaks. *See Page 50, Section 12*.
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.
Electrode	Replace if there are cracked ceramics, excessive carbon residue, or erosion of the electrode. The electrode gap should be 3 mm.
Thermostat	There should be no exposed wire or damage to the thermostat. *See Page 52, Section 13*.
Suspension Points	Make sure the heater is hanging securely. Look for signs of wear on the chain or ceiling. *See Page 10, Section 5*.
Sports Hall Guard, Decorative and Protective Grilles (optional)	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. Check that side reflector extensions are installed correctly and secured in place if necessary (decorative grille only). *See Page 41, Section 10.1 and Page 43, Section 10.3.3*. Make sure shield is installed correctly and secured in place if necessary. (Decorative grille only.) *See Page 43, Section 10.3.2*.
Wall Tag	If a wall tag is present, make sure it is legible and accurate. Please contact Combat Heating Solutions Limited or your COMBAT® HEATING SOLUTIONS LIMITED independent distributor if you need a wall tag. *See Page 3, Section 2.1*.
Safety Labels	Product safety signs or labels should be replaced by the product user when they are no longer legible. Please contact Combat Heating Solutions Limited or your COMBAT® HEATING SOLUTIONS LIMITED independent distributor to obtain replacement signs or labels. *See Page 3, Figure 2*.

SECTION 16: TROUBLESHOOTING

⚠ DANGER

Electrical Shock Hazard

Disconnect electric before service.

Heater must be properly earthed.

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

⚠ 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.

Explosion Hazard

Turn off gas supply to heater before service.

Burn Hazard

Allow heater to cool before service.

Tubing may still be hot after operation.

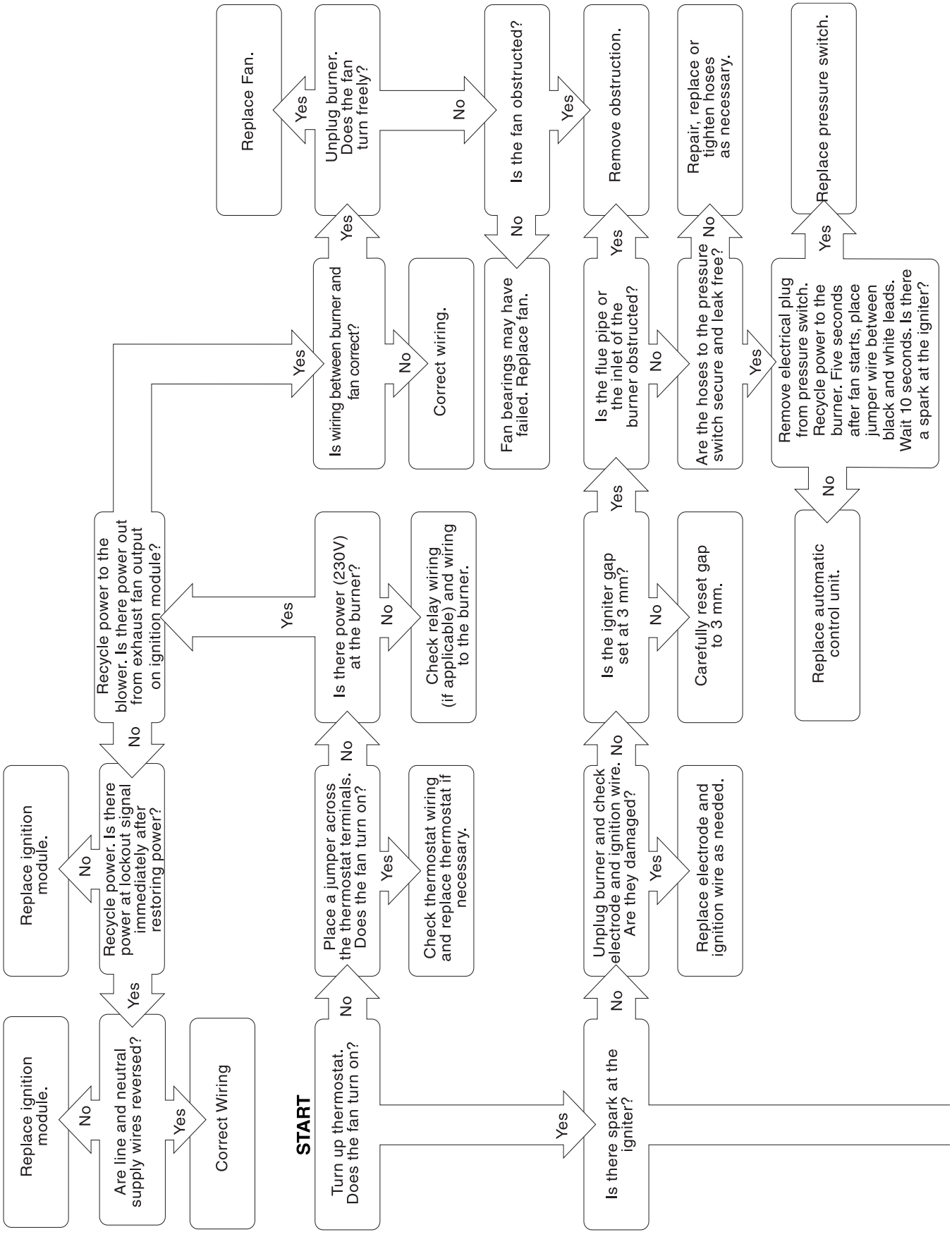
Cut/Pinch Hazard

Wear protective gear during installation, operation and service.

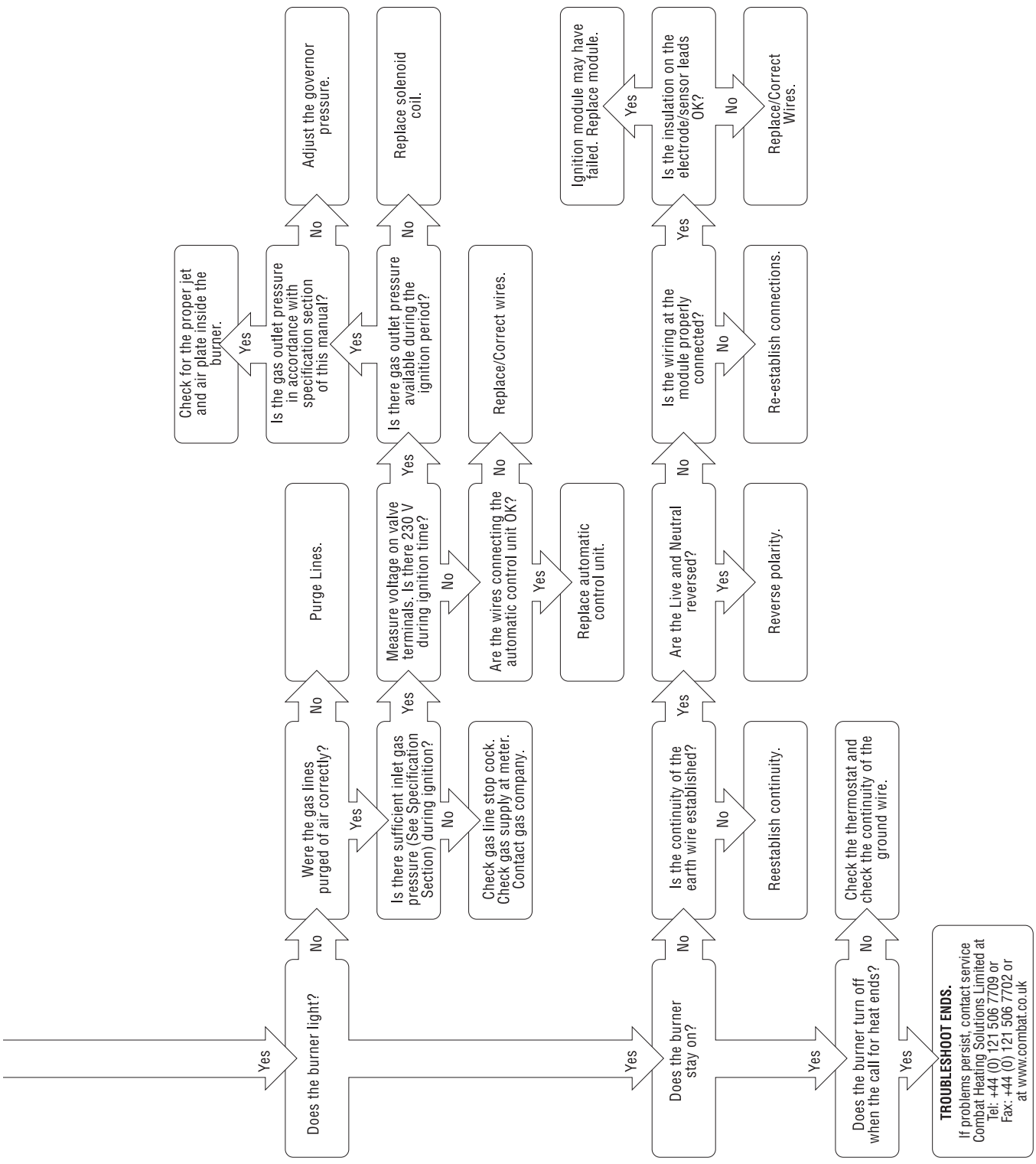
Edges are sharp.

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

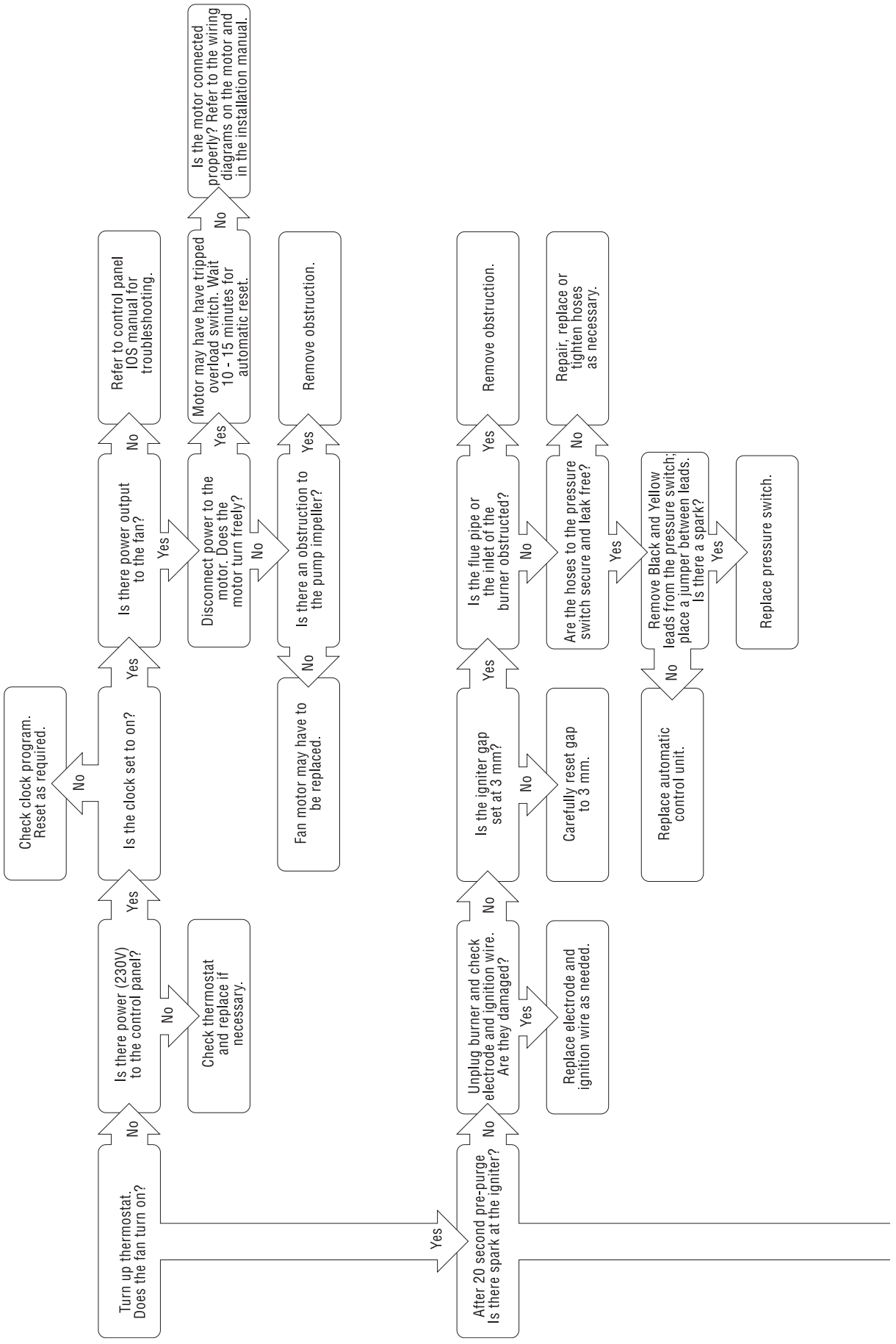
16.1 Troubleshooting Flow Chart (Linear, Double Linear and U-Tube)



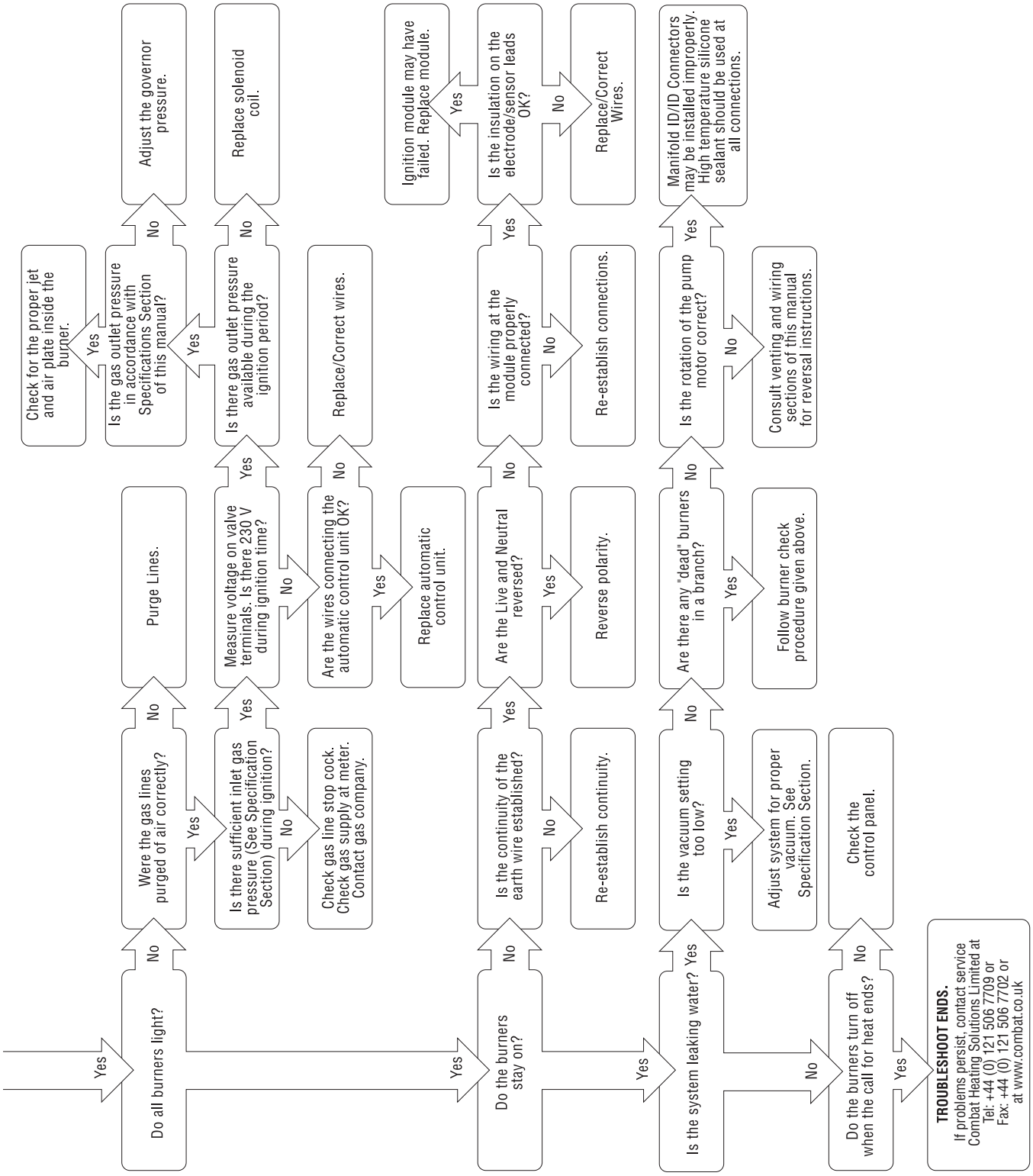
Troubleshooting Flow Chart (Linear, Double Linear and U-Tube)



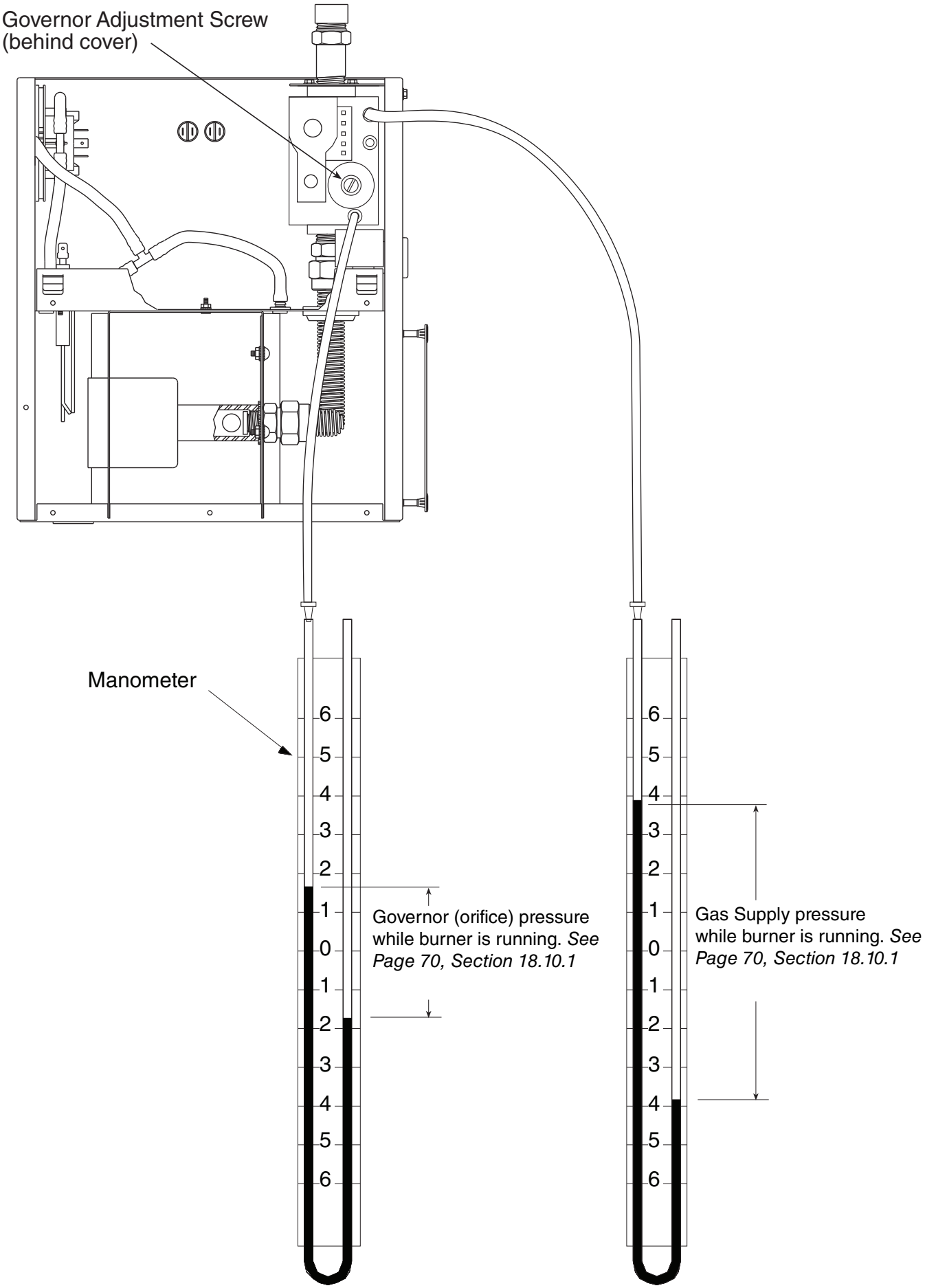
16.2 Troubleshooting Flow Chart (Multiburner)



Troubleshooting Flow Chart (Multiburner)



16.3 Manifold Gas Pressure Setting



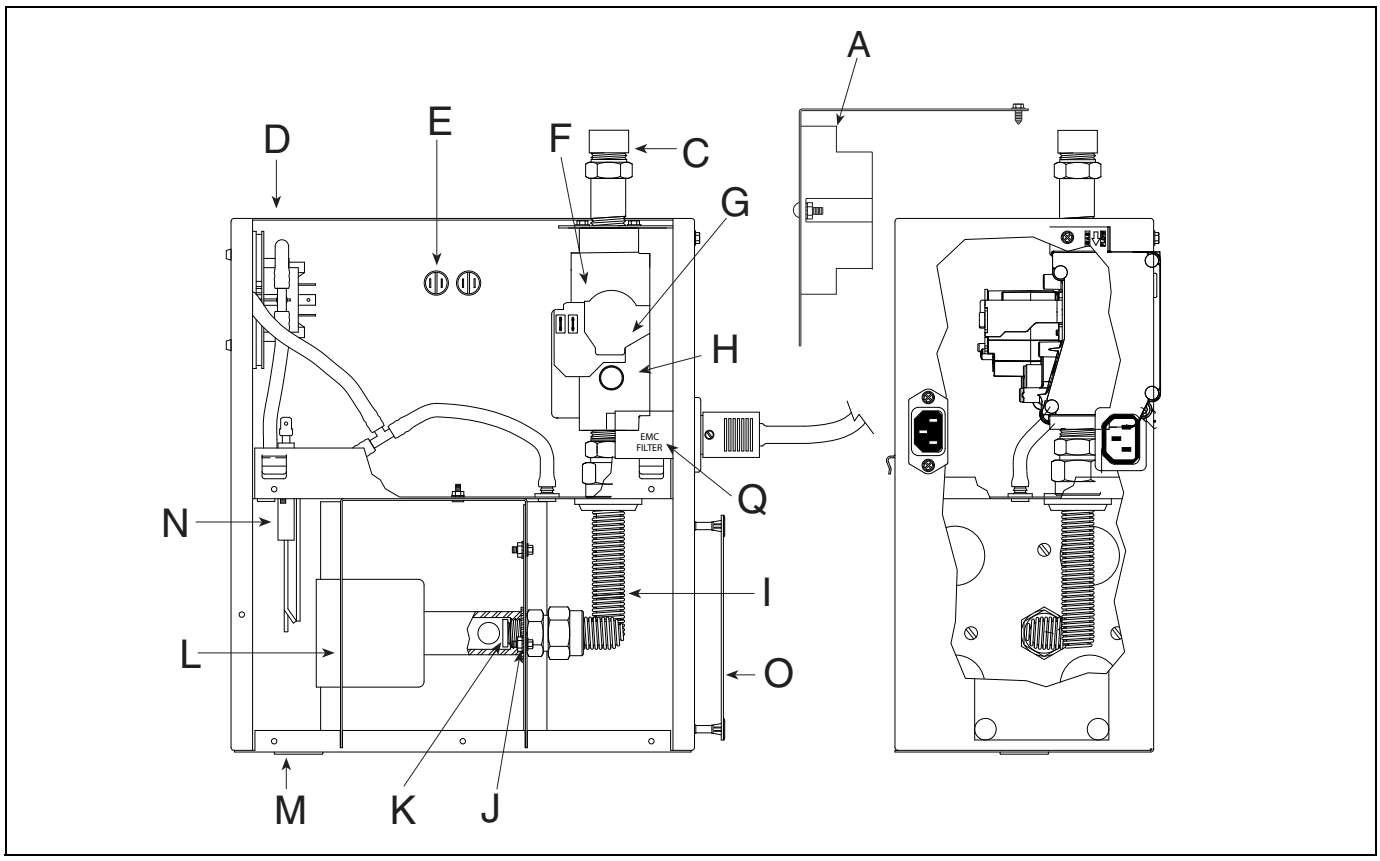
SECTION 17: REPLACEMENT PARTS

⚠ DANGER	⚠ WARNING		
			
Electrical Shock Hazard	**Explosion Hazard**	**Fire Hazard**	**Carbon Monoxide Hazard**

Use only genuine COMBAT® HEATING SOLUTIONS LIMITED replacement parts per this installation, operation and service manual.

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

See warnings and important information before removing or replacing parts. After any maintenance or repair work, always test fire the heater in accordance with the start-up instructions *on Page 55, Section 14* to help ensure all safety systems are in working order before leaving the heater to operate. Minor faults may be traced by using the troubleshooting charts *on Page 60, Section 16 through Page 65, Section 16.3*.



Item	Description	Part Number
A	Automatic Control Unit	90438704
C	Flex Line Adapter	91220700
D	Pressure Switch for CMP50(G20), GMP55(G20), CMP25, 30, 35, 40, 45, 50, 55(G31)	90439801
	CMP15, 20(G20 & G31)	90439802
	CMP30, 35(G20)	90439803
	CMP45(G20)	90439804
	CMP40(G20)	90439808
	CMP25(G20)	90439809
E	Amber Neon Lamp	91320602
F	Gas Valve	90033106
G	Governor Screw	N/A
H	Outlet Pressure Tap	N/A
I	Flex Manifold	03090702
J	Star Washer	96212100
K	Jet Orifice (*See Page 70, Section 18.10.1*)	N/A
L	Burner Cup Assembly	03020100
M	Mica Window Assembly	02552303
N	Electrode Assembly	90427403
N/S	Electrode Gasket	02558501

Item	Description	Part Number
O	Dust Arrest Baffle Plate	07230000
Q	Mains in socket with EMC Filter	90438902
N/S	Ignition Wire	90427704
N/S	Outside Air Kit	07260000
N/S	Burner Tube Gasket	02568200
N/S	Wire Purple 12.5"	07250007
N/S	Wire Harness CMP Ground	07250008
	Wire Harness CMP Valve	07250009
N/S	Wire Harness CMP Pressure Switch	07250005
N/S	Wire Harness CMP Main Power	07250004
N/S	Lockout Indicator Connector (male)	91324000
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

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)

An additional gas regulator will be required, at the gas input connection point for each burner when LP gas types are required to facilitate required burner pressure

18.3 Venting Specifications

18.3.1 Fans

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

CMP-25(G20), 30(G20), 35, 40, 45.....Model: Torin DSA 524-202

CMP-40(G20), 45(G20), 50.....Model: McMillan N1398A

CMP-30DL, 40DL, 50DL, 60DL, 70DL .....Model: McMillan N1398A

Multiburner .....Model: Airflow 83 BWLG

.....Model: Airflow 90 BWTL

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 will be 100mm or 150mm diameter and sized to suit the arrangement. Connection to the fan inlet cone would be 150mm diameter only. Refer to Figure 26 for a typical arrangement. 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 Environment

The heater is limited to operate in an ambient temperature range of 0° C – 32° C (32° F – 86° F) with a maximum relative humidity of 95%.

18.7 Linear Heater	CMP15ST	CMP20ST	CMP25ST	CMP30ST	CMP35ST	CMP40ST	CMP45ST	CMP50ST	CMP55ST*
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)	42	57	57	75	75	75	90	97	102
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

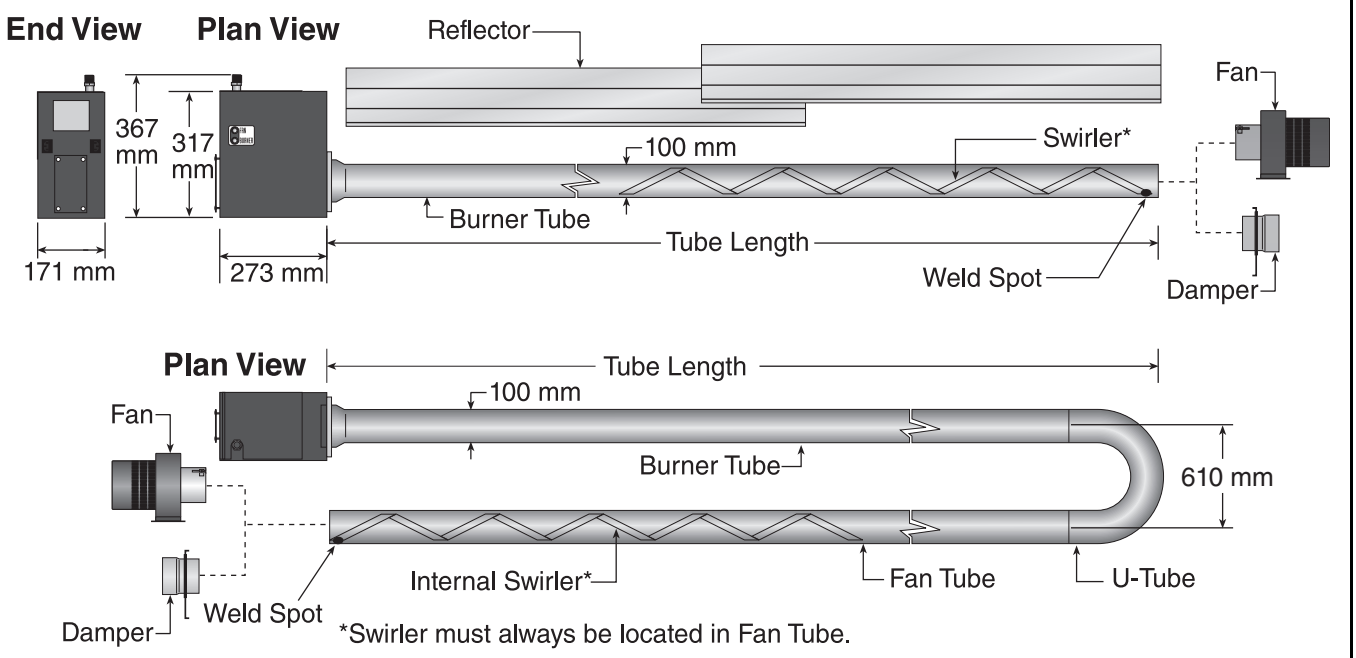
* Only available in Multiburner.

18.8 Double Linear Heater	CMP30DL	CMP40DL	CMP50DL	CMP60DL	CMP70DL
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)	85	115	122	157	157
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

18.9 U-Tube Heater	CMP15UT	CMP20UT	CMP25UT	CMP30UT	CMP35UT	CMP40UT	CMP45UT	CMP50UT
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)	51	65	65	81	81	81	100	107
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

18.10 Burner Specifications

Figure 35: Linear and U-Tube Specifications



18.10.1 Standard Burner Specifications	CMP15	CMP20	CMP25	CMP30	CMP35	CMP40	CMP45	CMP50	CMP55
Burner Airplate ID Number- Natural G20&25	20	15	14	5	6	5	6	10	19
Burner Airplate ID Number- Propane/Butane	20	15	12	6	7	9	10	11	19
Jet Numbers - Natural G20 & 25	#30	#25	#20	#16	#9	#5	#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 (m^3/h)	1.43	1.91	2.38	2.86	3.36	3.81	4.29	4.86	5.24
Gas Consumption** Natural G25 (m^3/h)	1.66	2.22	2.77	3.32	3.91	4.43	4.99	5.65	6.09
Gas Consumption** Propane (m^3/h) [kg/h]	0.56 [1.08]	0.75 [1.44]	0.94 [1.80]	1.13 [2.16]	1.32 [2.52]	1.51 [2.88]	1.69 [3.25]	1.88 [3.61]	2.07 [3.97]
Gas Consumption** Butane (m^3/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 CMP 55*:	9.5 mbar	3.8 in wg

18.11 Burner Efficiencies (G20 Natural)

Linear

Model	Symbol	Units	CMP15ST	CMP20ST	CMP25ST	CMP30ST	CMP35ST	CMP40ST	CMP45ST	CMP50ST	CMP55ST
Nominal Heat Output	P_{nom}	[kW]	15.0	20.0	25.0	30.0	35.0	40.0	45.0	50.0	55.0
Radiant Factor at Nominal Heat Output	Rf_{nom}	[%]	62.2	63.3	62.8	69.6	62.6	66.7	65.1	63.3	63.8
Electrical Consumption at Nominal Output	el_{max}	[kW]	0.071	0.071	0.060	0.060	0.060	0.081	0.081	0.081	0.081
Electrical Consumption in Standby Mode	el_{SB}	[kW]	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Useful Efficiency at Nominal Output	$\eta_{th,nom}$	[%]	74.4	77.3	80.8	81.1	79.4	81.1	84.7	80.9	82.3
Seasonal Space Heating Efficiency	η_s	[%]	73.3	76.9	80.3	83.9	78.8	82.6	85.7	80.7	82.4
Envelope Loss Factor	F_{env}	[%]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Nitrogen Oxides	NO_x	[mg/kWh$_{input}$]	166.1	157.2	163.0	160.8	135.7	188.1	184.3	152.9	101.2

U-Tube

Model	Symbol	Units	CMP15ST	CMP20ST	CMP25ST	CMP30ST	CMP35ST	CMP40ST	CMP45ST	CMP50ST
Nominal Heat Output	P_{nom}	[kW]	15.0	20.0	25.0	30.0	35.0	40.0	45.0	50.0
Radiant Factor at Nominal Heat Output	Rf_{nom}	[%]	62.3	63.1	62.8	62.8	63.0	66.5	64.8	64.2
Electrical Consumption at Nominal Output	el_{max}	[kW]	0.071	0.071	0.060	0.060	0.060	0.081	0.081	0.081
Electrical Consumption in Standby Mode	el_{SB}	[kW]	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Useful Efficiency at Nominal Output	$\eta_{th,nom}$	[%]	77.7	80.8	82.5	81.8	80.7	81.1	80.5	79.3
Seasonal Space Heating Efficiency	η_s	[%]	76.8	80.5	82.1	81.3	80.3	82.4	81.0	79.4
Envelope Loss Factor	F_{env}	[%]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Nitrogen Oxides	NO_x	[mg/kWh$_{input}$]	168.7	174.2	171.3	138.6	166.6	139.8	162.7	151.5

Double Linear

Model	Symbol	Units	CMP15ST	CMP20ST	CMP25ST	CMP30ST	CMP35ST
Nominal Heat Output	P_{nom}	[kW]	30.0	40.0	50.0	60.0	70.0
Radiant Factor at Nominal Heat Output	Rf_{nom}	[%]	62.2	63.2	62.8	66.2	62.8
Electrical Consumption at Nominal Output	el_{max}	[kW]	0.081	0.081	0.081	0.081	0.081
Electrical Consumption in Standby Mode	el_{SB}	[kW]	0.000	0.000	0.000	0.000	0.000
Useful Efficiency at Nominal Output	$\eta_{th,nom}$	[%]	76.1	79.1	81.7	81.4	80.0
Seasonal Space Heating Efficiency	η_s	[%]	75.1	78.7	81.2	82.6	79.5
Envelope Loss Factor	F_{env}	[%]	0.0	0.0	0.0	0.0	0.0
Nitrogen Oxides	NO_x	[mg/kWh$_{input}$]	167.4	170.1	165.7	164.3	167.2

18.12 Burner Efficiencies (G31 Propane)

Linear

Model	Symbol	Units	CMP15ST	CMP20ST	CMP25ST	CMP30ST	CMP35ST	CMP40ST	CMP45ST	CMP50ST	CMP55ST
Nominal Heat Output	P_{nom}	[kW]	15.0	20.0	25.0	30.0	35.0	40.0	45.0	50.0	55.0
Radiant Factor at Nominal Heat Output	Rf_{nom}	[%]	62.4	63.1	63.1	65.4	64.6	66.1	64.8	64.5	63.7
Electrical Consumption at Nominal Output	el_{max}	[kW]	0.071	0.071	0.071	0.071	0.060	0.060	0.060	0.081	0.081
Electrical Consumption in Standby Mode	el_{SB}	[kW]	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Useful Efficiency at Nominal Output	$\eta_{th,nom}$	[%]	76.7	79.1	77.8	80.9	77.0	77.7	79.9	79.1	80.8
Seasonal Space Heating Efficiency	η_s	[%]	75.8	78.7	77.3	81.7	77.2	78.6	80.2	79.4	80.8
Envelope Loss Factor	F_{env}	[%]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Nitrogen Oxides	NO_x	[mg/kWh$_{input}$]	151.5	142.5	161.5	141.0	144.9	112.0	148.8	140.5	122.0

U-Tube

Model	Symbol	Units	CMP15ST	CMP20ST	CMP25ST	CMP30ST	CMP35ST	CMP40ST	CMP45ST	CMP50ST
Nominal Heat Output	P_{nom}	[kW]	15.0	20.0	25.0	30.0	35.0	40.0	45.0	50.0
Radiant Factor at Nominal Heat Output	Rf_{nom}	[%]	62.1	63.2	62.8	65.4	64.6	66.3	64.7	64.5
Electrical Consumption at Nominal Output	el_{max}	[kW]	0.071	0.071	0.060	0.060	0.060	0.081	0.081	0.081
Electrical Consumption in Standby Mode	el_{SB}	[kW]	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Useful Efficiency at Nominal Output	$\eta_{th,nom}$	[%]	77.9	81.5	80.4	82.2	80.2	79.1	82.8	81.5
Seasonal Space Heating Efficiency	η_s	[%]	76.9	81.3	79.9	83.1	80.7	80.2	83.4	81.9
Envelope Loss Factor	F_{env}	[%]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Model	Symbol	Units	CMP15ST	CMP20ST	CMP25ST	CMP30ST	CMP35ST	CMP40ST	CMP45ST	CMP50ST
Nitrogen Oxides	NO_x	[mg/kWh$_{input}$]	111.0	139.1	155.4	160.0	132.2	121.7	127.3	134.2

Double Linear

Model	Symbol	Units	CMP15ST	CMP20ST	CMP25ST	CMP30ST	CMP35ST
Nominal Heat Output	P_{nom}	[kW]	30.0	40.0	50.0	60.0	70.0
Radiant Factor at Nominal Heat Output	Rf_{nom}	[%]	62.2	63.2	63.0	65.4	64.8
Electrical Consumption at Nominal Output	el_{max}	[kW]	0.081	0.081	0.081	0.081	0.081
Electrical Consumption in Standby Mode	el_{SB}	[kW]	0.000	0.000	0.000	0.000	0.000
Useful Efficiency at Nominal Output	$\eta_{th,nom}$	[%]	77.3	80.3	79.1	81.6	78.6
Seasonal Space Heating Efficiency	η_s	[%]	76.4	80.0	78.6	82.4	78.9
Envelope Loss Factor	F_{env}	[%]	0.0	0.0	0.0	0.0	0.0
Nitrogen Oxides	NO_x	[mg/kWh$_{input}$]	131.2	140.8	158.4	150.5	138.6

Attach this information to a wall near the COMBAT® HEATING SOLUTIONS LIMITED heater.

Combat® HEATING SOLUTIONS LIMITED

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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Installation Code and Annual Inspections:
All installation and service of COMBAT® HEATING SOLUTIONS LIMITED equipment must be performed by a contractor qualified in the installation and service of equipment sold and supplied by COMBAT® HEATING SOLUTIONS LIMITED and conform to all requirements set forth in the COMBAT® HEATING SOLUTIONS LIMITED manuals and all applicable governmental authorities pertaining to the installation, service, operation and labeling of the equipment. To help facilitate optimum performance and safety COMBAT® HEATING SOLUTIONS LIMITED recommends that a qualified contractor conduct at a minimum annual inspections of your COMBAT® HEATING SOLUTIONS LIMITED equipment and perform service where necessary, using only replacement parts sold and supplied by COMBAT® HEATING SOLUTIONS LIMITED

Further Information: Applications, engineering and detailed guidance on systems design, installation and equipment performance is available through COMBAT® HEATING SOLUTIONS LIMITED 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.