

# Rapid™ BH

## The Economical Unitary Infrared Heater

### Installation, Operation & Service Manual

BH-40  
BH-60  
BH-80  
BH-100  
BH-115  
BH-125  
BH-140  
BH-150  
BH-175  
BH-200

#### 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. Leave the building.
6. Immediately call your local gas supplier after leaving the building. Follow the gas supplier's instructions.
7. If you cannot reach your gas supplier, call the Fire Department.

#### **WARNING**



##### Fire Hazard

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

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.

#### **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 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 serviceman with necessary information.



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## 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 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.

Thin sheet metal parts, the aluminum 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.

### 1.1 Manpower Requirements

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

## SECTION 2: INSTALLER RESPONSIBILITY

The installer is responsible for the following:

- To install the heater, as well as the gas and electrical supplies, in accordance with applicable specifications and codes. Rapid Engineering recommends the installer contact a local building inspector or Fire Marshal for guidance.
- 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 on all sides for burner servicing and removal.
- To provide the owner with a copy of this Installation, Operation and Service Manual.
- To never use heater as a 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 75 lbs (33 kg).

### 2.1 Wall Tag

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 Rapid Engineering or your RAPID™ 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).

A copy of the wall tag (P/N 91037920) is illustrated on the back cover. For an immediate solution, you may affix this copy 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. See Page 4, Figure 1 through Page 7, Figure 10. Write the proper clearance dimensions in permanent ink according to your model number and configuration in the open spaces on the tag.

## 2.2 Corrosive Chemicals

### CAUTION

**Do not use heater in an area containing corrosive chemicals.**

**Avoid the use of corrosive chemicals to ensure a longer life of the burner, tubing and other parts.**

**Failure to follow these instructions can result in property damage.**

Rapid Engineering 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 life span 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: CRITICAL CONSIDERATIONS

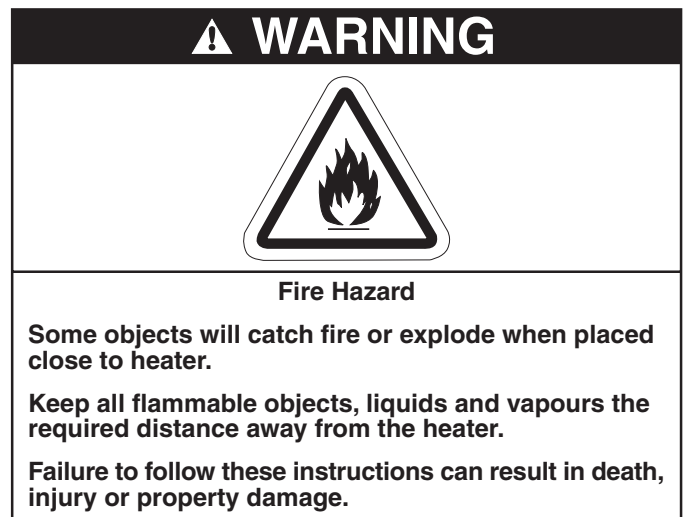
### 3.1 Required Clearances to Combustibles

Clearances are the required distances that combustible objects must be away from the heater to prevent serious fire hazards. Combustibles are materials, that 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 the burner of the heater and on *Page 4, Figure 1 through Page 7, Figure 10* 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 gasoline or other combustible materials including flammable objects, liquids, dust or vapors away from this heater or any other appliance.
- Maintain clearances from heat sensitive material, 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

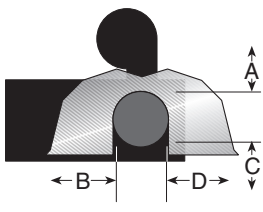


required clearances from the heater to the combustibles. Signs must be posted adjacent to the heater thermostat. In the absence of a thermostat, signs must be posted in a conspicuous location.

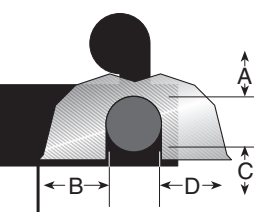
- Consult local Fire Marshal, Fire Insurance Carrier or other authorities for approval of proposed installation when there is a possibility of exposure to combustible airborne materials or vapors.
- Hang heater in accordance to the minimum suspension requirements on *Page 12, Figure 12*.
- If the radiant tubes must pass through the building structure, be sure that adequate sleeving and fire stop is installed to prevent scorching and/or fire hazard.

**NOTE:** 1. All dimensions are from the surfaces of all tubes, couplings and elbows.  
 2. Clearances B, C and D can be reduced by 50% after 25' (7.5 m) of tubing downstream from where the burner and burner tube connect.

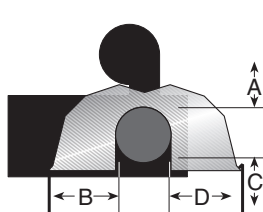
**FIGURE 1: Standard Reflector**

	Model	(inches)				(centimeters)			
		A	B	C	D	A	B	C	D
	BH-40	6	27	52	27	16	69	133	69
	BH-60	6	35	62	35	16	89	158	89
	BH-80	6	38	65	38	16	97	166	97
	BH-100	6	40	70	40	16	102	178	102
	BH-115/125	6	46	76	46	16	117	194	117
	BH-140/150	6	50	79	50	16	127	201	127
	BH-175/200	8	52	82	52	21	133	209	133

**FIGURE 2: One Side Reflector**

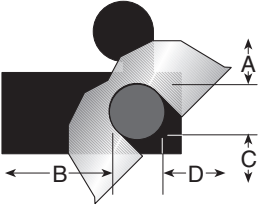
	Model	(inches)				(centimeters)			
		A	B	C	D	A	B	C	D
	BH-40	6	9	52	44	16	23	133	112
	BH-60	6	9	62	47	16	23	158	120
	BH-80	6	9	69	54	16	23	176	138
	BH-100	6	9	76	59	16	23	194	150
	BH-115/125	6	9	82	65	16	23	209	166
	BH-140/150	6	9	85	69	16	23	216	176
	BH-175/200	8	9	88	73	21	23	224	186

**FIGURE 3: Two Side Reflectors**

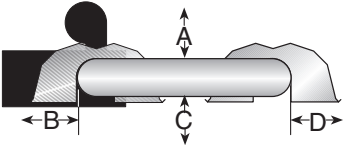
	Model	(inches)				(centimeters)			
		A	B	C	D	A	B	C	D
	BH-40	6	15	52	15	16	39	133	39
	BH-60	6	23	65	23	16	59	166	59
	BH-80	6	25	71	25	16	64	181	64
	BH-100	6	27	77	27	16	69	196	69
	BH-115/125	6	32	83	32	16	82	211	82
	BH-140/150	6	35	87	35	16	89	221	89
	BH-175/200	8	40	91	40	21	102	232	102

- NOTE:** 1. All dimensions are from the surfaces of all tubes, couplings and elbows.  
 2. Clearances B, C and D can be reduced by 50% after 25' (7.5 m) of tubing downstream from where the burner and burner tube connect.

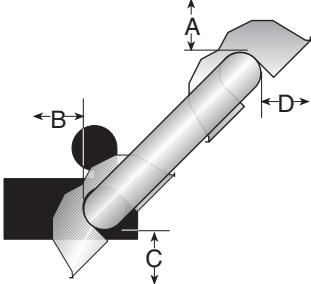
**FIGURE 4: 45° Tilt Reflector**

	Model	(inches)				(centimeters)			
		A	B	C	D	A	B	C	D
	BH-40	8	8	50	46	21	21	127	117
	BH-60	8	8	59	54	21	21	150	138
	BH-80	8	8	65	60	21	21	166	153
	BH-100	10	8	73	64	26	21	186	163
	BH-115/125	10	8	77	69	26	21	196	176
	BH-140/150	12	8	83	74	31	21	211	188
	BH-175/200	12	8	85	79	31	21	216	201

**FIGURE 5: U-Tube, Standard Reflector**

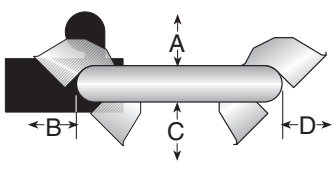
	Model	(inches)				(centimeters)			
		A	B	C	D	A	B	C	D
	BH-40	- UNAPPROVED -				- UNAPPROVED -			
	BH-60	6	35	62	30	16	89	158	77
	BH-80	6	38	68	37	16	97	173	94
	BH-100	6	40	75	39	16	102	191	100
	BH-115/125	6	46	78	43	16	117	199	110
	BH-140/150	6	50	83	47	16	127	211	120
	BH-175/200	8	54	87	51	21	138	221	130

**FIGURE 6: U-Tube, 45°**

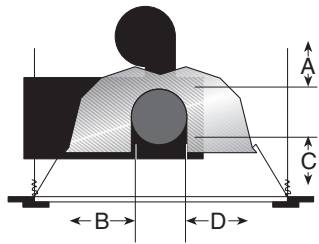
	Model	(inches)				(centimeters)			
		A	B	C	D	A	B	C	D
	BH-40	- UNAPPROVED -				- UNAPPROVED -			
	BH-60	8	8	59	42	21	21	150	107
	BH-80	8	8	65	46	21	21	166	117
	BH-100	8	8	73	52	21	21	186	133
	BH-115/125	8	8	77	61	21	21	196	155
	BH-140/150	8	8	83	66	21	21	211	168
	BH-175/200	8	8	85	70	21	21	216	178

**NOTE:** 1. All dimensions are from the surfaces of all tubes, couplings and elbows.  
 2. Clearances B, C and D can be reduced by 50% after 25' (7.5 m) of tubing downstream from where the burner and burner tube connect.

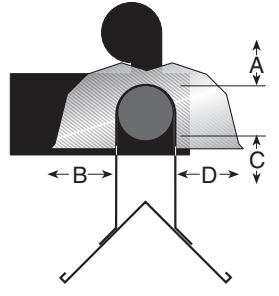
**FIGURE 7: U-Tube, Opposite 45° Reflector**

	Model	(inches)				(centimeters)			
		A	B	C	D	A	B	C	D
	BH-40	- UNAPPROVED -				- UNAPPROVED -			
	BH-60	8	54	59	22	21	138	150	56
	BH-80	8	60	65	22	21	153	166	56
	BH-100	10	64	73	22	26	163	186	56
	BH-115/125	10	70	77	22	26	178	196	56
	BH-140/150	12	74	83	22	31	188	211	56
	BH-175/200	12	76	85	22	31	194	216	56

**FIGURE 8: 2-Foot Deco Grille, 1-Foot Deco Grille and Protective Grille**

	Model	(inches)				(centimeters)			
		A	B	C	D	A	B	C	D
	BH-40	6	27	52	27	16	69	133	69
	BH-60	6	35	62	35	16	89	158	89
	BH-80	6	38	65	38	16	97	166	97
	BH-100	6	40	70	40	16	102	178	102
	BH-115/125	6	46	76	46	16	117	194	117
	BH-140/150	6	50	79	50	16	127	201	127
	BH-175/200	8	52	82	52	21	133	209	133

**FIGURE 9: Lower Clearance Shield\***

	Model	(inches)				(centimeters)			
		A	B	C	D	A	B	C	D
	BH-40	6	34	27	34	16	87	69	87
	BH-60	6	39	33	39	16	100	84	100
	BH-80	6	40	38	40	16	102	97	102
	BH-100	6	50	44	50	16	127	112	127
	BH-115/125	6	54	48	54	16	138	122	138
	BH-140/150	6	55	50	55	16	140	127	140
	BH-175/200	- UNAPPROVED -				- UNAPPROVED -			

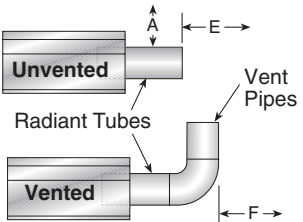
\*When installed in the first 20' (6 m).



**NOTE:**

1. All dimensions are from the surfaces of all tubes, couplings and elbows.
2. Clearances B, C and D can be reduced by 50% after 25' (7.5 m) of tubing downstream from where the burner and burner tube connect.

**FIGURE 10: Venting**

	Model	(inches)			(centimeters)		
		A	E	F	A	E	F
	BH-40	14	18	18	36	46	46
	BH-60	14	18	18	36	46	46
	BH-80	20	24	18	51	61	46
	BH-100	20	24	18	51	61	46
	BH-115/125	20	24	18	51	61	46
	BH-140/150	20	30	18	51	77	46
	BH-175/200	20	30	18	51	77	46

**SECTION 4: NATIONAL STANDARDS AND APPLICABLE CODES**

**4.1 Gas Codes**

The type of gas appearing on the nameplate must be the type of gas used. Installation must comply with national and local codes and requirements of the local gas company.

United States: Refer to National Fuel Gas Code, ANSI Z223.1 - latest revision (same as NFPA 54).

Canada: Refer to CAN/CGA B149.1 and B149.2: Installation Codes for Gas Burning Appliances.

**4.2 Aircraft Hangars**

Installation in aircraft hangars must be in accordance with the following codes:

United States: Refer to Standard for Aircraft Hangars, ANSI/NFPA 409 - latest revision.

Canada: Refer to Standard CAN/CGA B149.1 and B149.2.

- In aircraft storage and servicing areas, heaters shall be installed at least 10' (3 m) above the upper surface of wings or of engine enclosures of the highest aircraft which may be housed in the hangar. The measurement shall be made from the wing or engine enclosure (whichever is higher from the floor) to the bottom of the heater.
- In shops, offices and other sections of aircraft hangars communicating with aircraft storage or servicing areas, heaters shall be installed not less than 8' (2.4 m) above the floor.
- Suspended or elevated heaters shall be so located in all spaces of aircraft hangars that they shall not be subject to injury by aircraft, cranes, movable scaffolding or other objects. Provisions shall be made to assure accessibility to suspended heaters for recurrent maintenance purposes.

**4.3 Public Garages**

Installation in garages must be in accordance with the following codes:

United States: Standard for Parking Structures NFPA 88A - latest revision or the Code for Motor Fuel Dispensing Facilities and Repair Garages, NFPA 30A - latest revision. Canada: Refer to CAN/CGA B149.1 and B149.2: Installation Codes for Gas Burning Appliances.

- Heaters must not be installed less than 8' (2.4 m) above the floor. Minimum clearances to combustibles must be maintained from vehicles parked below the heater.
- When installed over hoists, minimum clearances to combustibles must be maintained from the upper most point of objects on the hoist.

**4.4 Electrical**

The heater must be electrically grounded in accordance with the following codes:

United States: Refer to National Electrical Code®, ANSI/NFPA 70 - latest revision. Wiring must conform to the most current National Electrical Code®, local ordinances and any special diagrams furnished.

Canada: Refer to Canadian Electrical Code, CSA C22.1 Part 1 - latest revision.

**4.5 Venting**

The venting must be installed in accordance with the requirements within this manual and the following codes:

United States: Refer to NFPA 54/ANSI Z223.1 - latest revision, National Fuel Gas Code.

Canada: Refer to CAN/CGA B149.1 and B149.2: Installation Codes for Gas Burning Appliances.

**4.6 High Altitude**

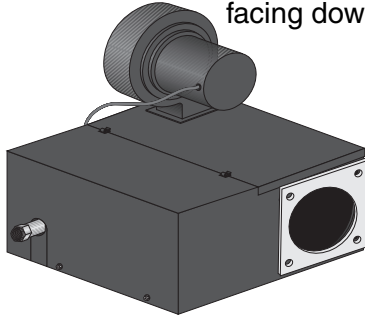
These heaters are approved for installations up to 2000 ft (US), 4500 ft (Canada) without modification. Consult factory if US installation is above 2000 ft (610 m) or Canadian installation is above 4500 ft (1370 m).

## SECTION 5: MAJOR COMPONENTS

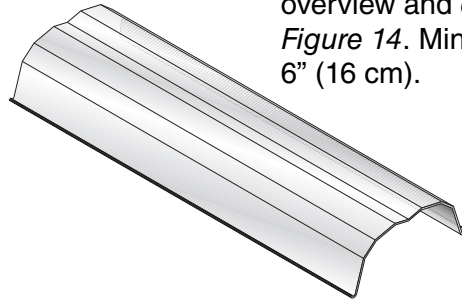
FIGURE 11: Major Component Descriptions

**Burner with Tube Gasket**

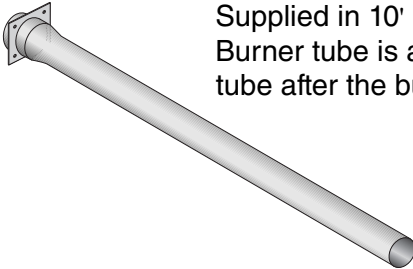
Must be installed with the flame observation window facing down.

**Reflector (Aluminum or Stainless Steel)**

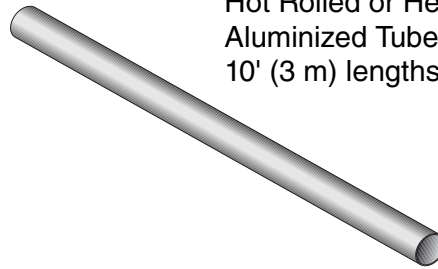
Alternate overlap as shown on overview and on Page 14, Figure 14. Minimum overlap is 6" (16 cm).

**Burner Tube**

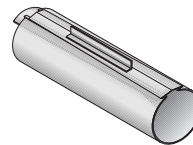
Supplied in 10' (3 m) lengths. Burner tube is always the first tube after the burner.

**Tube**

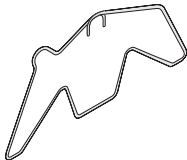
Hot Rolled or Heat Treated Aluminized Tube supplied in 10' (3 m) lengths.

**Tube and Reflector Hanger with Clamp Package**

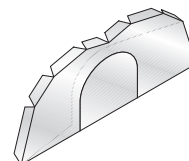
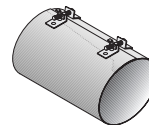
Position this hanger no more than 4" (10 cm) away from the burner.

**Coupling Assembly with Lock****Tube and Reflector Hanger**

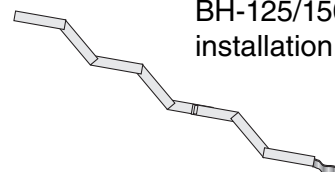
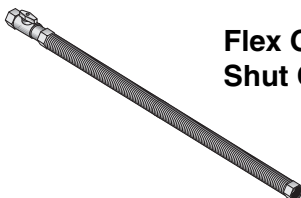
Suspend system from these hangers.

**Reflector End Cap**

Punch out center section to accommodate heat exchanger tube.

**Vent Adapter****Reflector Support Strap & Wire Form****Turbulator**

Turbulator must be installed in the last standard section of tube. Turbulator is not required on the BH-125/150/175/200. For installation, see Page 18, Step 6.4

**Flex Gas Line with Shut Off Cock**

### 5.1 Standard Parts List

**Table 1: Contents of Burner Carton**

Part No.	Description	BH-40	BH-60	BH-80	BH-100	BH-115	BH-125	BH-140	BH-150	BH-175	BH-200
RP71XXXXX	Burner (Rate and Fuel Varies)	1	1	1	1	1	1	1	1	1	1
90709700	Blower Assembly with Cord	1	1	1	1	1	1	1	1	1	1
02568200	Gasket (Burner to Burner Tube)	1	1	1	1	1	1	1	1	1	1
90709801	Gasket (Blower to Burner)	1	1	1	1	1	1	1	1	1	1
RPBH70101NA	Installation, Operation and Service Manual	1	1	1	1	1	1	1	1	1	1
91201708	Pipe Nipple (Black) 1/2" NPT x 4"	1	1	1	1	1	1	1	1	1	1
94273914	Hex Head Bolts 5/16 - 18 Rolok	4	4	4	4	4	4	4	4	4	4
96411600	Split Lock washer	4	4	4	4	4	4	4	4	4	4
*91412200	Flexible Stainless Steel Gas Hose, 1/2" NPT (US Models Only)	1	1	1	1	1	1	-	-	-	-
*91412203	Flexible Stainless Steel Gas Hose, 3/4" NPT (US Models Only)	-	-	-	-	-	-	1	1	1	1
91907302	S-Hooks	2	2	2	2	2	2	2	2	2	2
91911700	Outside Air Collar	1	1	1	1	1	1	1	1	1	1
94118106	#8 x 3/8 Hex Washer Head (for Outside Air Collar)	3	3	3	3	3	3	3	3	3	3
92311800	Keps Nut	4	4	4	4	4	4	4	4	4	4
03051503	Turbulator Adapter	1	1	1	1	1	-	1	-	-	-
03051504	Turbulator 2.5' (76 cm), Aluminized Steel	2	4	4	1	3	-	1	-	-	-
03051505	Turbulator 2.5' (76 cm), Stainless Steel	1	-	-	-	-	-	-	-	-	-

\*Canadian models: Rubber (Type 1) Gas Hoses available as an accessory. See Page 39.

**Table 2: Contents of Core and Extension Packages**

Part No.	Description	Core Packages								Extension Packages							
		Hot Rolled			Aluminized					Hot Rolled				Aluminized			
		20'	30'	40'	10'	20'	30'	40'	10'	20'	30'	40'	10'	20'	30'	40'	
		(6m)	(9m)	(12m)	(3m)	(6m)	(9m)	(12m)	(3m)	(6m)	(9m)	(12m)	(3m)	(6m)	(9m)	(12m)	
91409300	Tube, Hot Rolled Steel, 10' (3 m)	1	2	3	-	-	-	-	1	2	3	4	-	-	-	-	
91409408	Tube, HT Aluminized, 10' (3 m)	-	-	-	-	1	2	3	-	-	-	-	1	2	3	4	
03051101	Burner Tube, ALUMI-THERM® Steel, 10' (3 m)	-	1	1	-	-	1	1	-	-	-	-	-	-	-	-	
03051601	Burner Tube, HT ALUMI-THERM® Steel, 10' (3 m)	1	-	-	1	1	-	-	-	-	-	-	-	-	-	-	
01312700	Coupling Assembly	1	2	3	-	1	2	3	1	2	3	4	1	2	3	4	
02750303	Standard Reflector, 8' (3.5 m)	3	4	6	2	3	4	6	2	3	4	6	2	3	4	6	
02750800	End Cap	2	2	2	2	2	2	2	-	-	-	-	-	-	-	-	
03090100	Tube and Reflector Hanger	3	4	5	2	3	4	5	1	2	3	4	1	2	3	4	
91907302	S-Hook	3	4	5	2	3	4	5	1	2	3	4	1	2	3	4	
03050010	Reflector Support Package (Strap, Wire Form, Screws)	2	3	5	1	2	3	5	2	3	4	6	2	3	4	6	
91107720	U-Clip Package	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
90502700	Vent Adapter	1	1	1	1	1	1	1	-	-	-	-	-	-	-	-	
01318901	Tube Clamp Package	1	1	1	1	1	1	1	-	-	-	-	-	-	-	-	
	<b>Part Number</b>	CP20HRS	CP30HRS	CP40HRS	CP10ALUM	CP20ALUM	CP30ALUM	CP40ALUM	EXP10HRS	EXP20HRS	EXP30HRS	EXP40HRS	EXP10ALUM	EXP20ALUM	EXP30ALUM	EXP40ALUM	

**Table 3: BH-Series Component Package Guide**

Model	Tubing Length	Core Packages	
	Minimum	Standard	Aluminized
BH-40	10' (3 m)	-	CP10ALUM
BH-60	20' (6 m)	CP20HRS	CP20ALUM
BH-80	20' (6 m)	CP20HRS	CP20ALUM
BH-100	30' (9 m)	CP30HRS	CP30ALUM
BH-115	30' (9 m)	CP30HRS	CP30ALUM
BH-125	40' (12 m)	CP40HRS	CP40ALUM
BH-140	40' (12 m)	CP40HRS	CP40ALUM
BH-150	50' (15 m)	CP30HRS + EXP20HRS	CP30ALUM + EXP20ALUM
BH-175	50' (15 m)	CP30HRS + EXP20HRS	CP30ALUM + EXP20ALUM
BH-200	60' (18 m)	CP30HRS + EXP30HRS	CP30ALUM + EXP30ALUM

Additional tubing length may be added to heater. Tubing must be heat-treated, aluminized or porcelain coated. Any additional tubing lengths are considered as vent length for length determination. Maximum venting length for minimum heater length is 45' (13.7 m).

**SECTION 6: HEATER INSTALLATION**


⚠
WARNING

**Suspension Hazard**

**Burner is secured to burner tube by bolts and lockwashers.**

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

**Failure of the supports can result in death, injury or property damage.**



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 heaters must be installed with clearances to combustibles as indicated on the rating plate and in this instruction manual.

The minimum and maximum gas inlet pressures must be maintained as indicated on the rating plate.

Typical installation configurations are shown in *Figure 12*.

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

**FIGURE 12: Critical Hanger Placement**

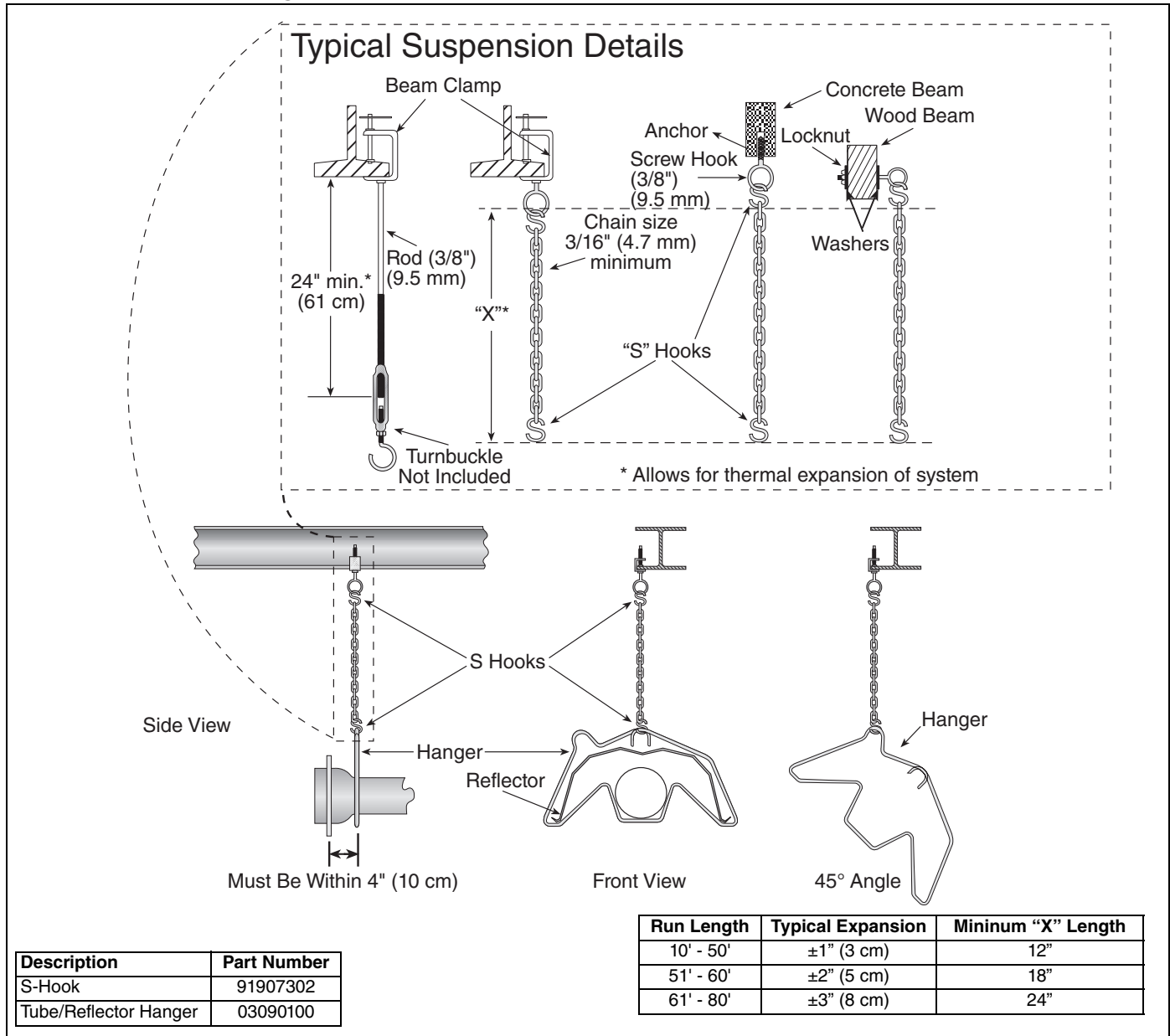
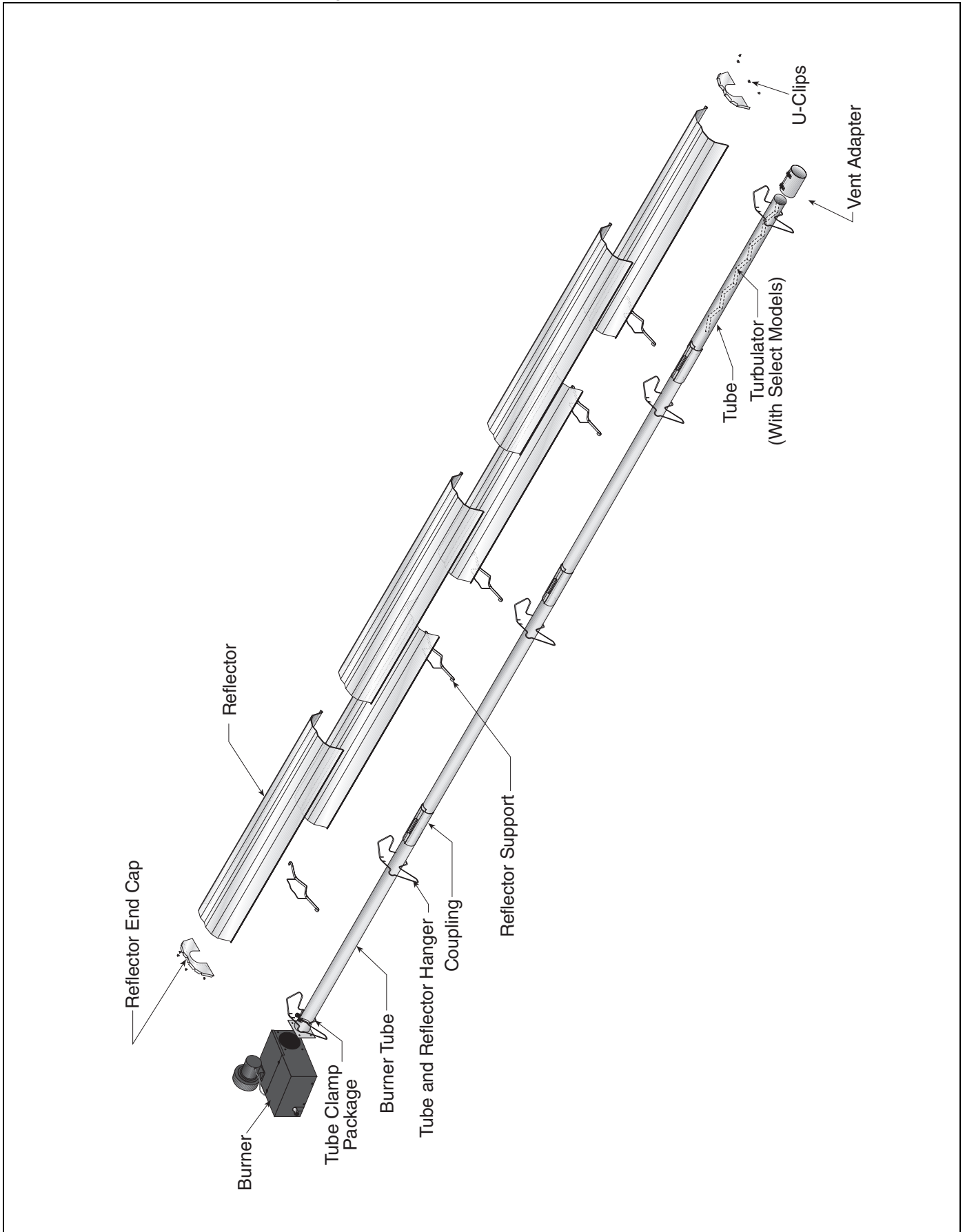






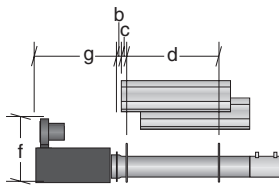


FIGURE 13: Linear Heater Assembly Overview

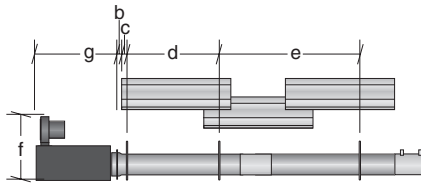


**FIGURE 14: Linear Heater Layout Overview**

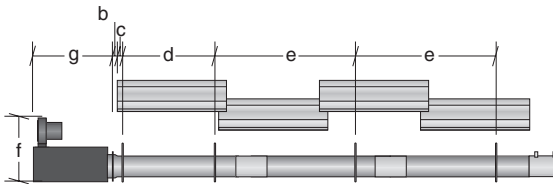
LEGEND	
	Burner
	Reflector
	Tube
	Tube/Reflector Hanger
	Coupling Assembly
	Vent Adapter
<p>a = 14" (36 cm) reflector width (not shown)</p> <p>b = 2" (5 cm) end cap to burner</p> <p>c = 2" (5 cm) end cap to hanger</p> <p>d = 7' 6" (229 cm) distance first hanger</p> <p>e = 10' (305 cm) distance between hangers</p> <p>f = 12.5" (32 cm) burner height</p> <p>g = 11" (28 cm) burner length</p>	



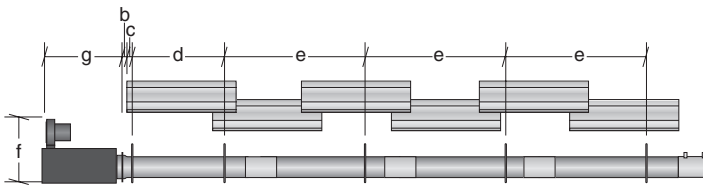
10' Tube Length



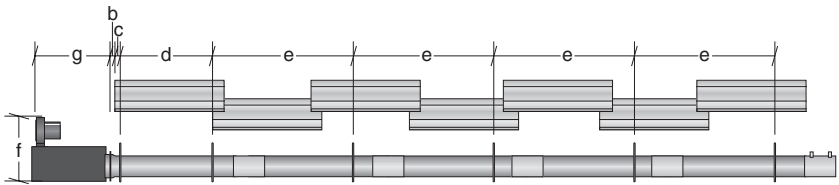
20' Tube Length



30' Tube Length



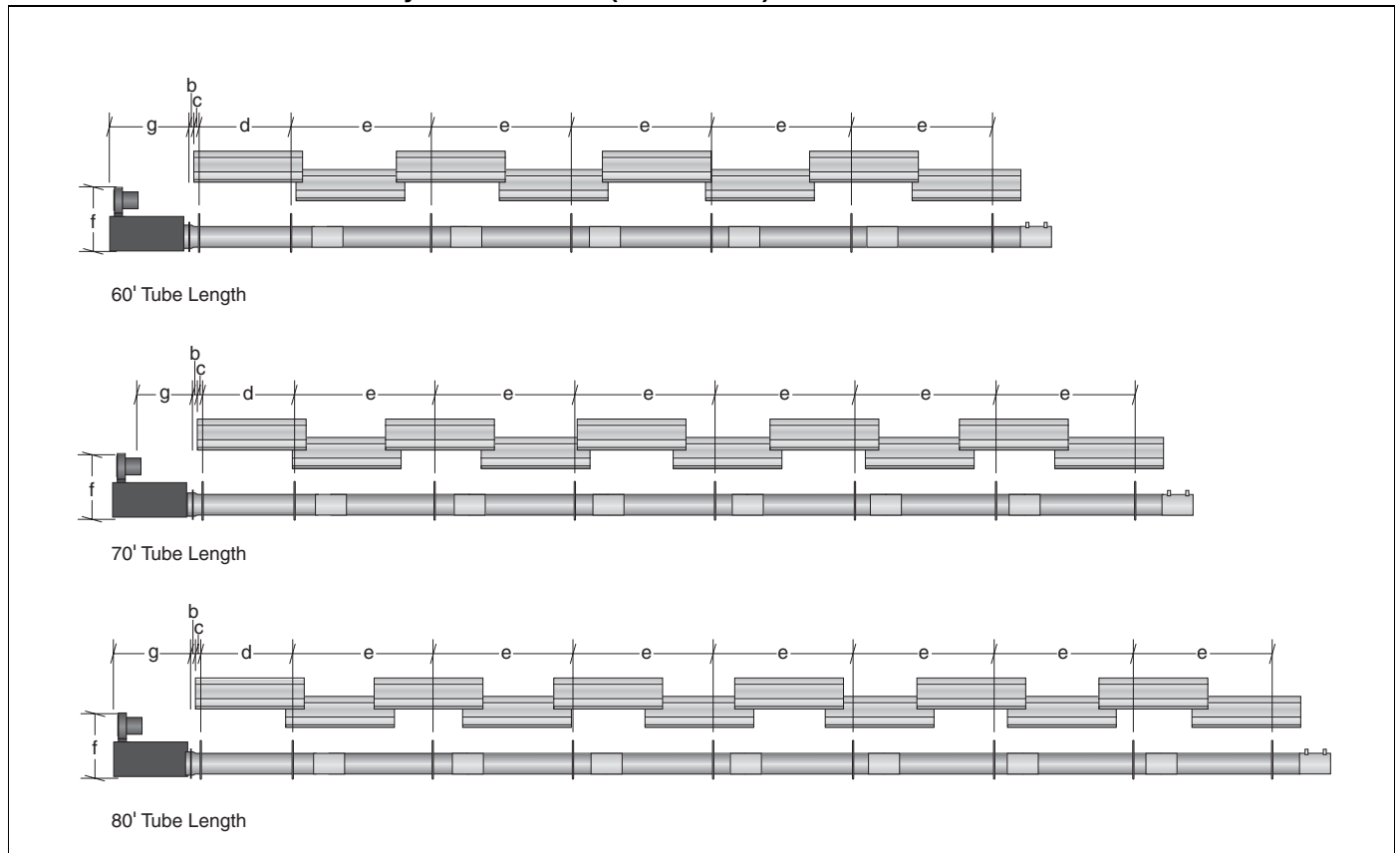
40' Tube Length



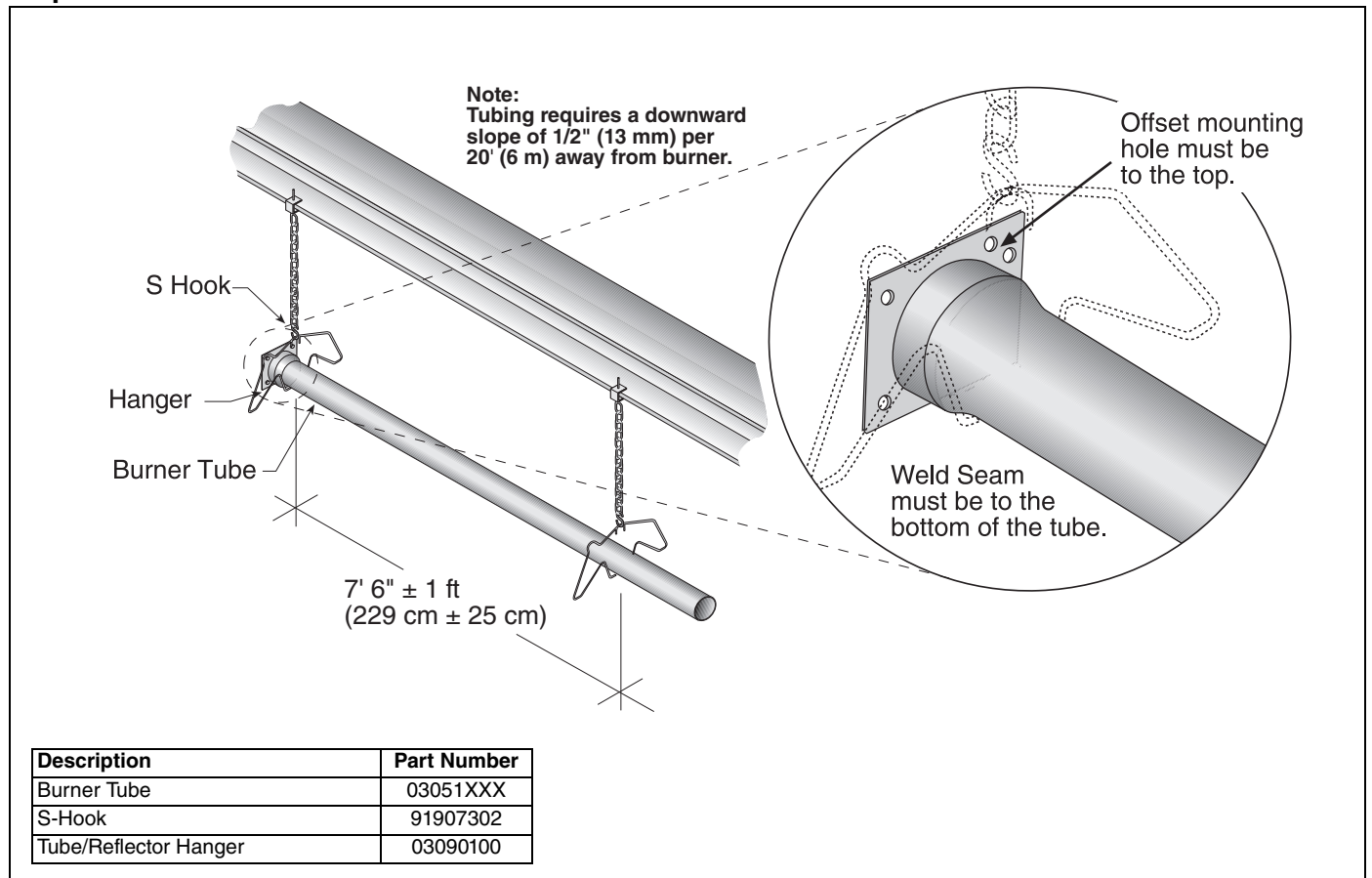
50' Tube Length



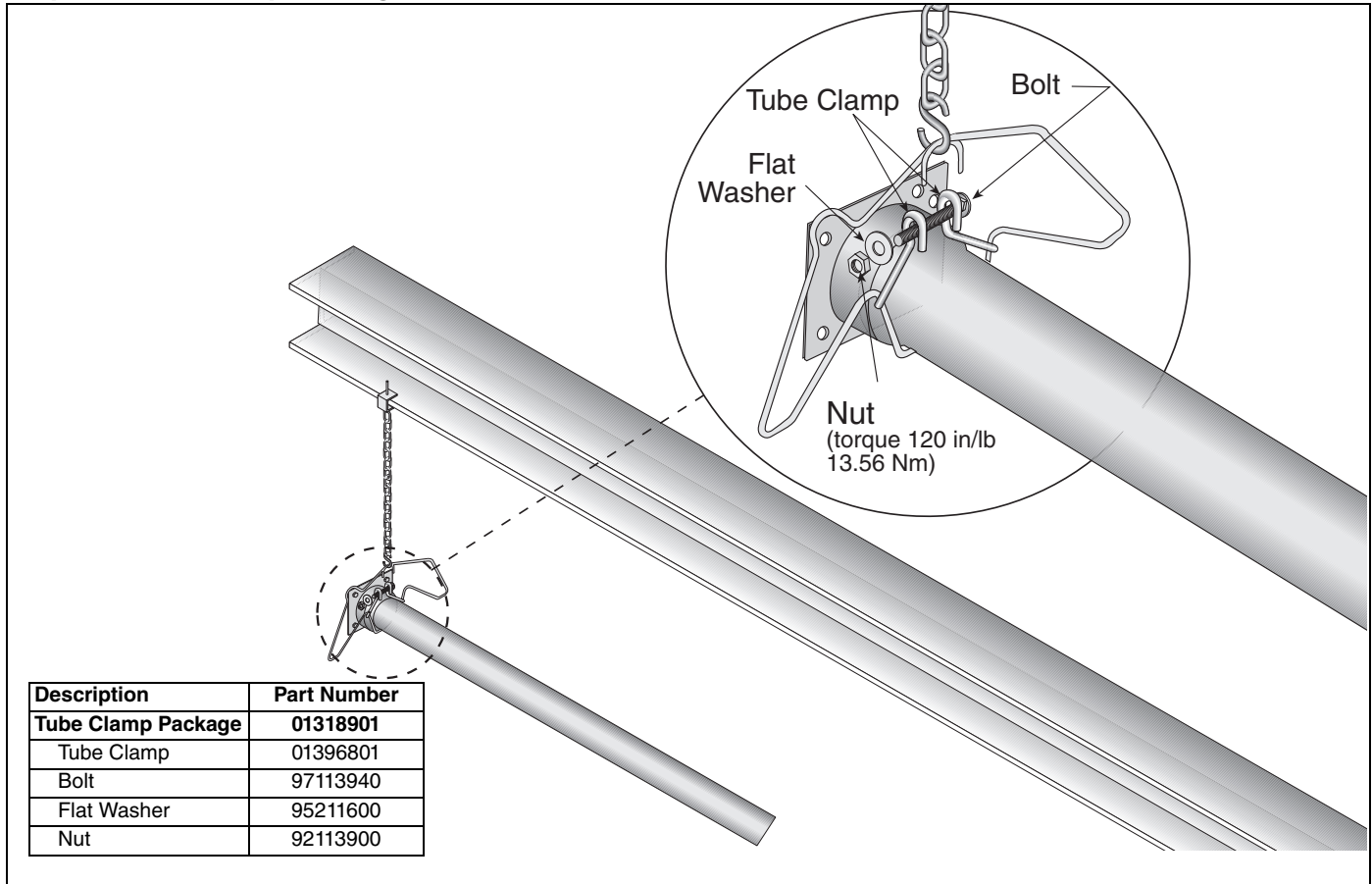
FIGURE 15: Linear Heater Layout Overview (Continued)



## Step 6.1 Burner Tube Installation



### Step 6.2 Tube Clamp Package Installation



### Step 6.3 Coupling and Tube Assembly

**A** Close coupling with tab.

Open

Closed

**B** Start slide bar/coupling lock onto coupling.

Slide Bar/Coupling Lock

Wide end Coupling

3" (8 cm) to 4" (10 cm)

**C** Insert tubes into coupling.

Tube

Tube

Orient coupling so that the impact block is in the 2:00 or 10:00 o'clock positions

**D** Tighten coupling to join tubes.

Slide Bar/Coupling Lock

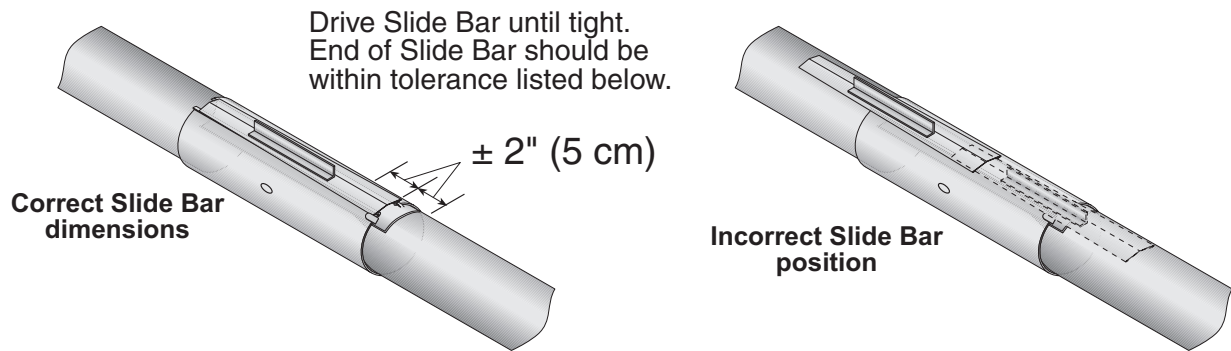
Coupling

Tube

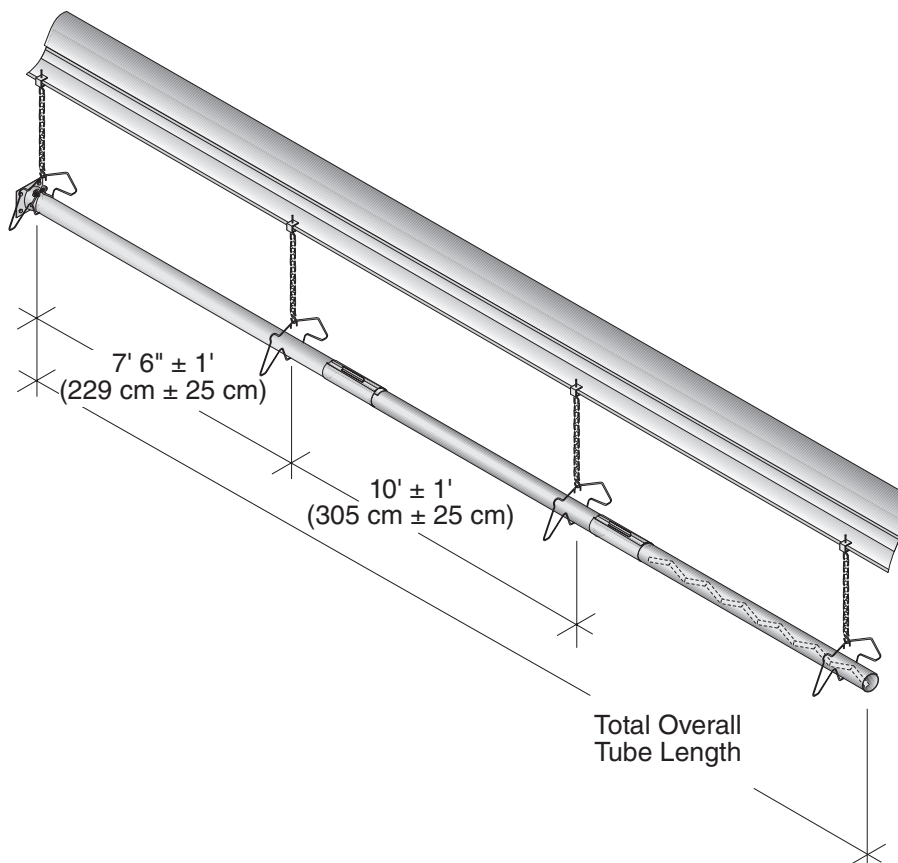
Description	Part Number
Coupling	01329600
Slide Bar/Coupling Lock	01329700
Tube	91409XXX

**Step 6.3.1 Coupling and Tube Assembly (Continued)**

Tighten slide bar as shown below.



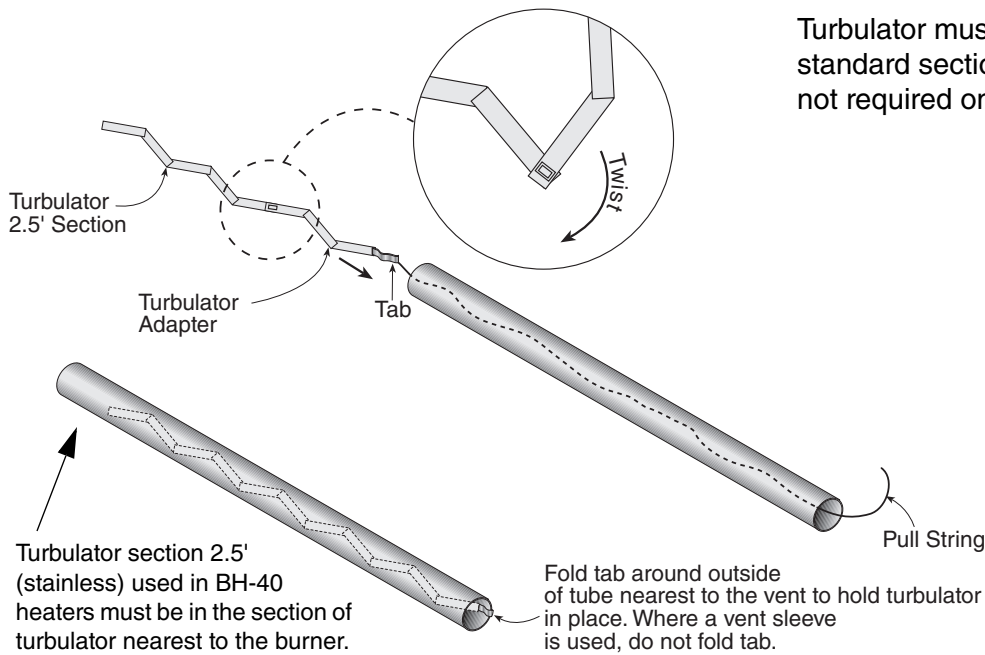
- Repeat Step 6.3 A - D until all tubes are assembled. See Page 17, Step 6.3.2.

**Step 6.3.2 Coupling and Tube Assembly (Continued)**

Model	Tube Length Minimum
BH-40	10' (3 m)
BH-60	20' (6 m)
BH-80	20' (6 m)
BH-100	30' (9 m)
BH-115	30' (9 m)
BH-125	40' (12 m)
BH-140	40' (12 m)
BH-150	50' (15 m)
BH-175	50' (15 m)
BH-200	60' (18 m)

### Step 6.4 Turbulator Installation

Turbulator must be installed in the last standard section of tube. Turbulator is not required on the BH-125/150/175/200.

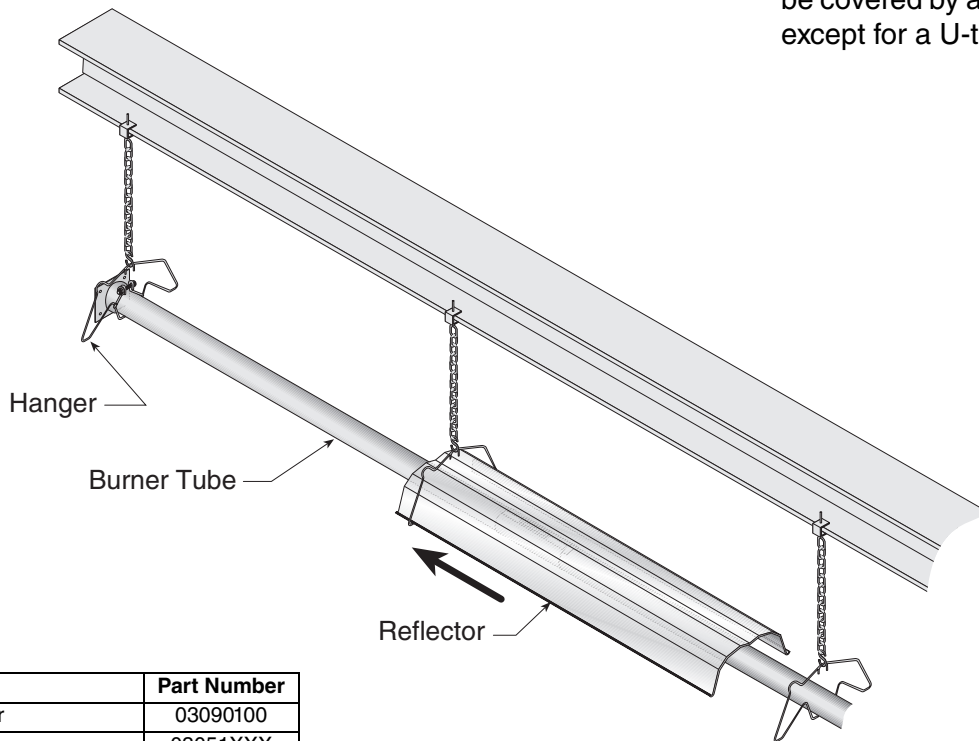


Turbulator Installation	
Model	Tube Section
BH-40	1st 10' Section
BH-60	2nd 10' Section
BH-80	2nd 10' Section
BH-100	3rd 10' Section
BH-115	3rd 10' Section
BH-125	N/A
BH-140	4th 10' Section
BH-150	N/A
BH-175	N/A
BH-200	N/A

Description	Part Number
Turbulator Adapter 2.5'	03051503
Turbulator Section 2	03051504
Turbulator Section 2.5' (Stainless)	03051505
Tube	91409XXX

### Step 6.5 Reflector Installation

**NOTE:** All tube surfaces must be covered by a reflector, except for a U-tube.



Description	Part Number
Tube/Reflector Hanger	03090100
Burner Tube	03051XXX
Reflector	02750303

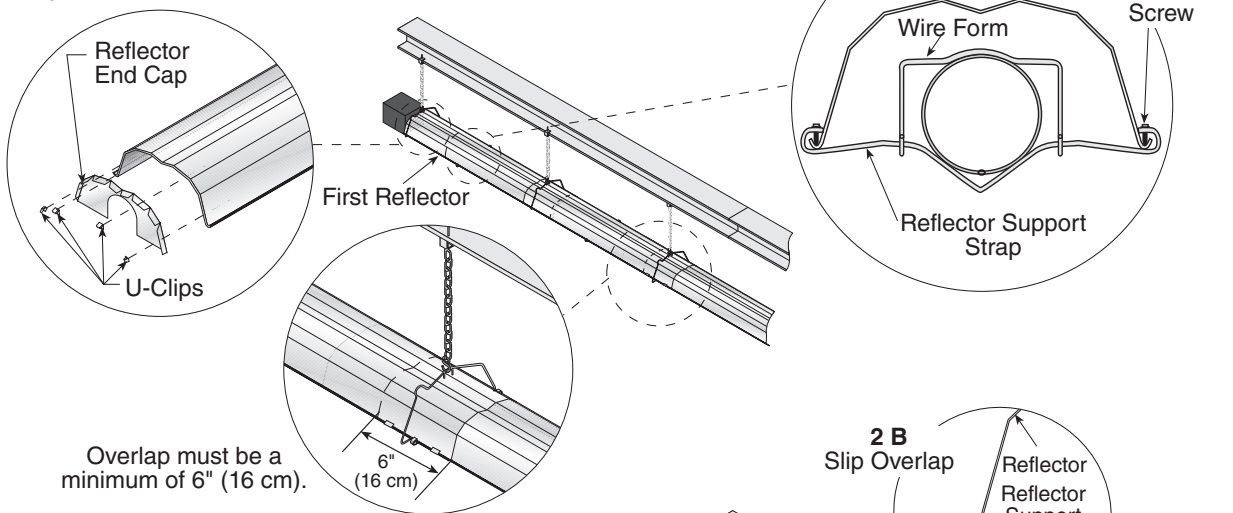
### Step 6.5.1 Reflector, U-Clip and Reflector Support Installation

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.

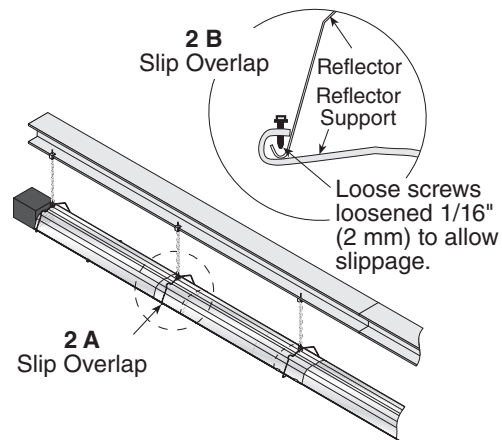
To ensure proper expansion and contraction movement of the reflectors, a combination of U-clips

and reflector supports are used. The positioning of reflector supports and U-clips depend on the individual installation. 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.

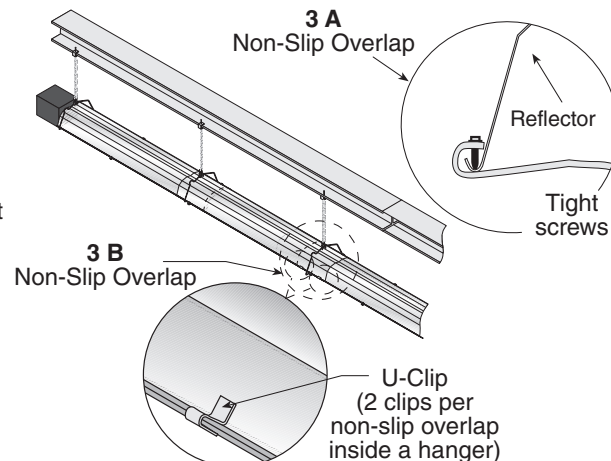


2. The overlap at the first and second reflector is a **slip overlap**. Thereafter, every third reflector joint is a slip overlap. A slip overlap is achieved by either:
  - a.) both reflectors lay inside a hanger. (No reflector support needed.)
  - b.) using a reflector support with loose screws at the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



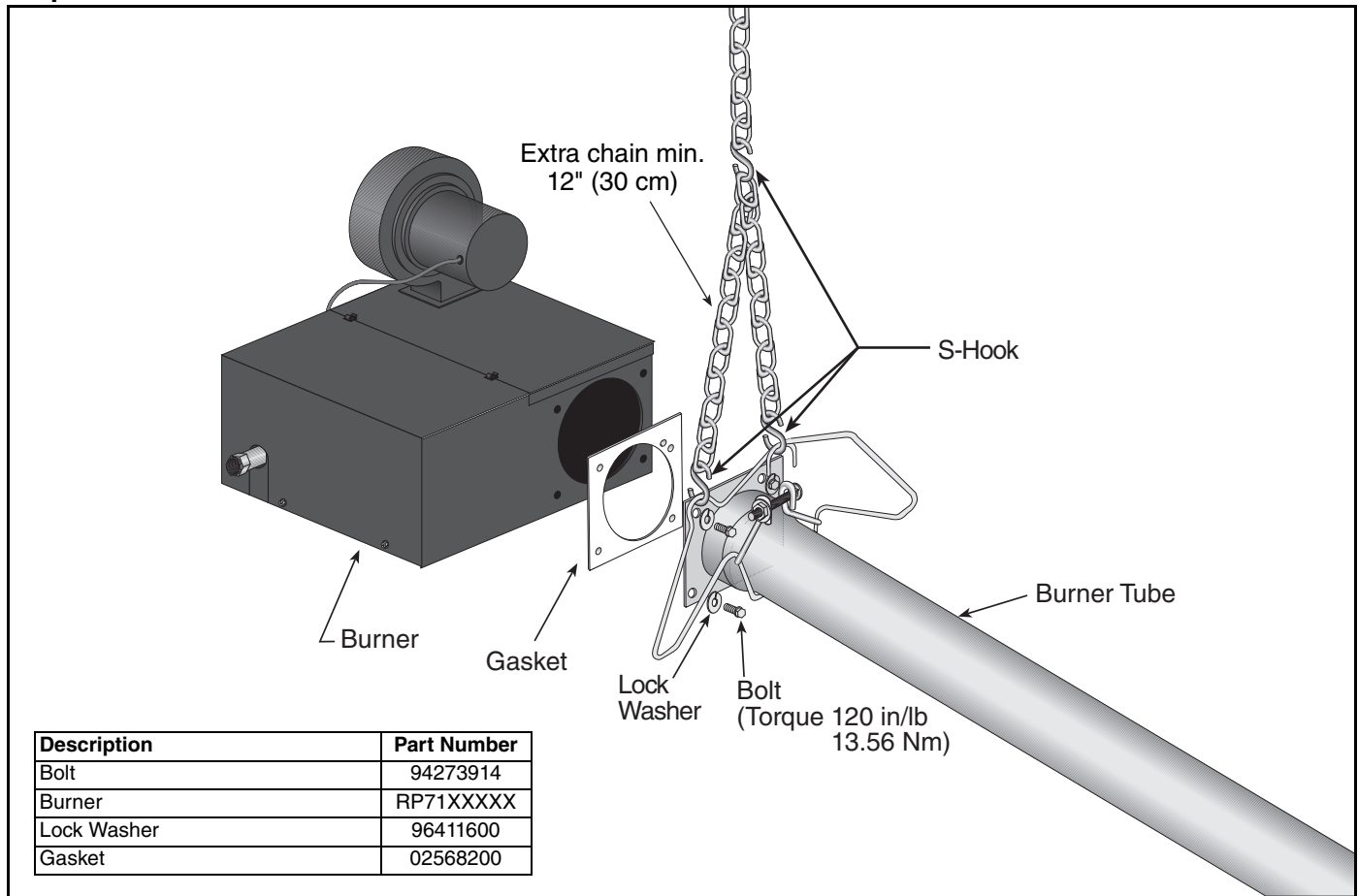
3. The remaining reflector overlaps require a **non-slip overlap** connection. To affix the reflectors together in a non-slip overlap either:
  - a.) use reflector support and tight screws.
  - b.) if both reflectors lay inside a hanger, u-clips or sheet metal screws may be used.

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
<b>Reflector Support Package</b>	<b>03050010</b>
Wire Form	91908004
Reflector Support Strap	03050000
Screw #8 x 3/4	94320812
U-Clip Package	91107720
Reflector End Cap	027508XX

### Step 6.6 Burner Installation





## SECTION 7: OPTIONAL HEATER ACCESSORIES

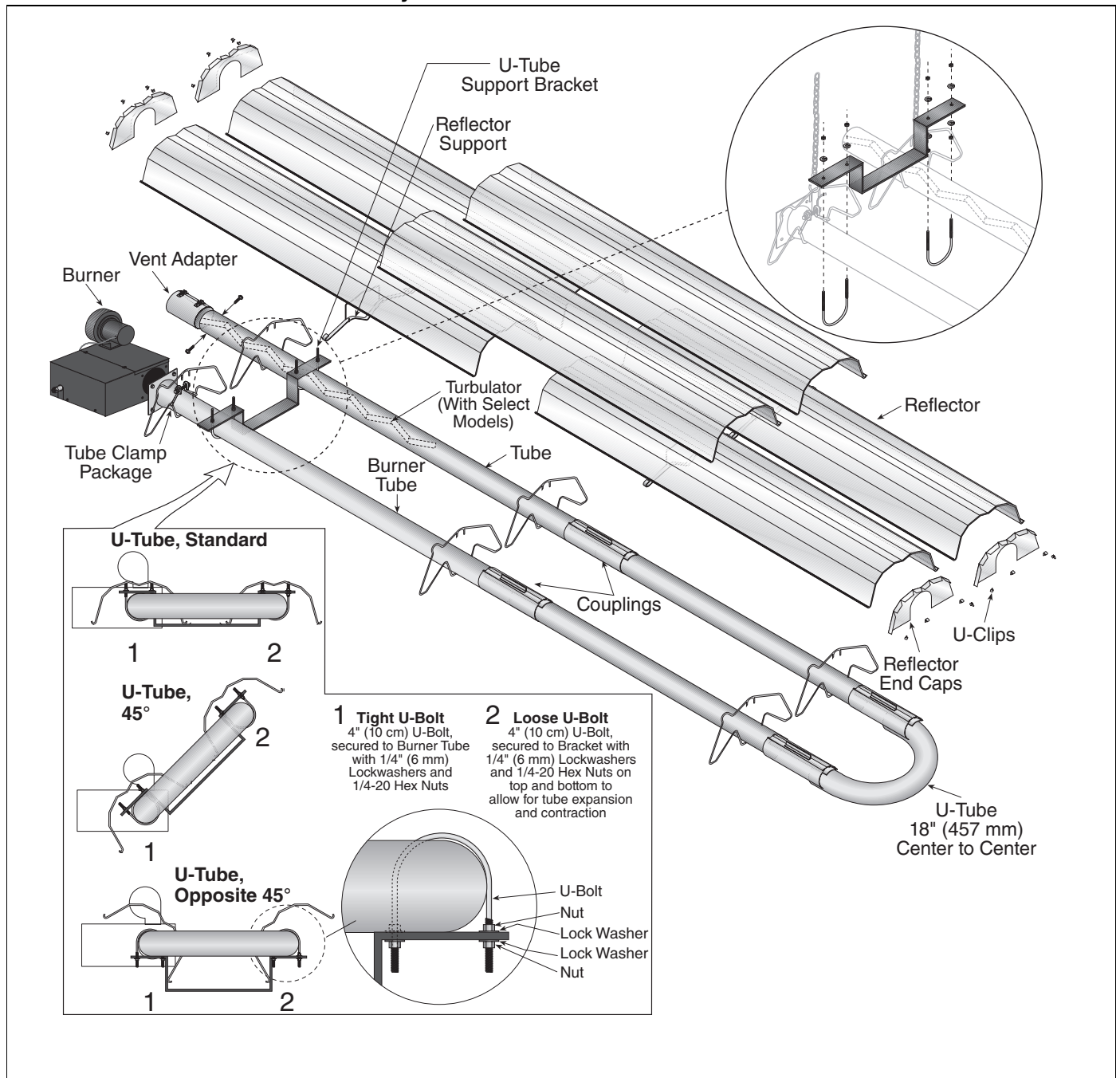
### 7.1 U-Tube Configuration

Heaters (except BH-40) are approved for optional U-Tube configurations.


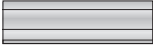






The U-Tube may be installed in either a standard horizontal position, a 45° position or in an opposite 45° position as shown on *Page 5, Figure 5 through Page 6, Figure 7*. When using a U-Tube configuration, the following additional rules must be adhered to:

- A minimum of 10' (3 m) on BH-60/80 and a minimum of 15' (4.5 m) on BH-100/115/125/140/150/175/200 is required between the burner and the U-Tube.
- The correct turbulator (See *Page 18, Step 6.4*) must be installed in the last standard section of the tube.
- The burner must never be operated in a tilted position.
- The heater must be properly supported at all locations. See *Page 22, Figure 17*.

**FIGURE 16: U-Tube Heater Assembly Overview**



**FIGURE 17: U-Tube Heater Layout Overviews**

LEGEND	
	Burner
	Reflector
	Tube 10'
	Tube 5' **
	Tube/Reflector Hanger
	Coupling Assembly
	U-Tube
	Vent Adapter (not shown)

a = 14" (36 cm)  
reflector width (not shown)

b = 2" (5 cm)  
end cap to burner

c = 2" (5 cm)  
end cap to hanger

d = 7' 6" (229 cm)  
distance first hanger

e = 10' (305 cm)  
distance between hangers

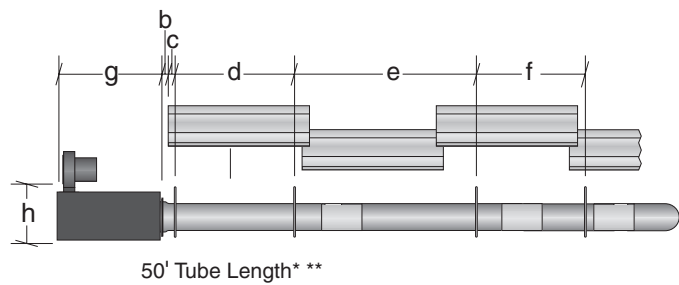
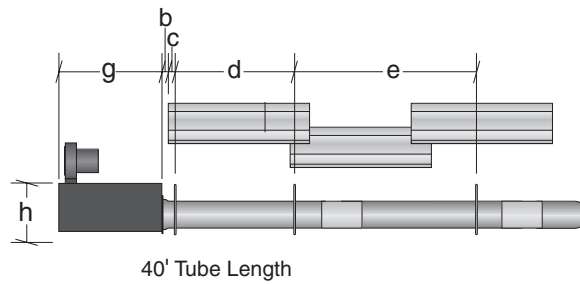
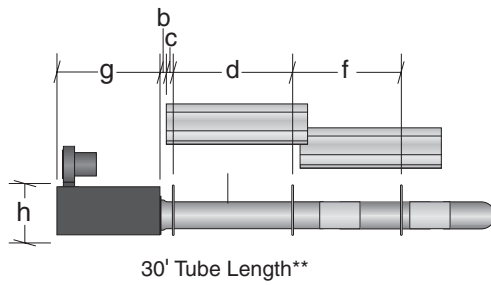
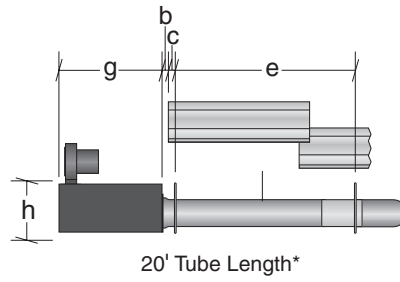
f = 5' (153 cm)  
distance between last full tube hanger and half tube hanger

g = 12.5" (32 cm) burner length

h = 11" (28 cm) burner height

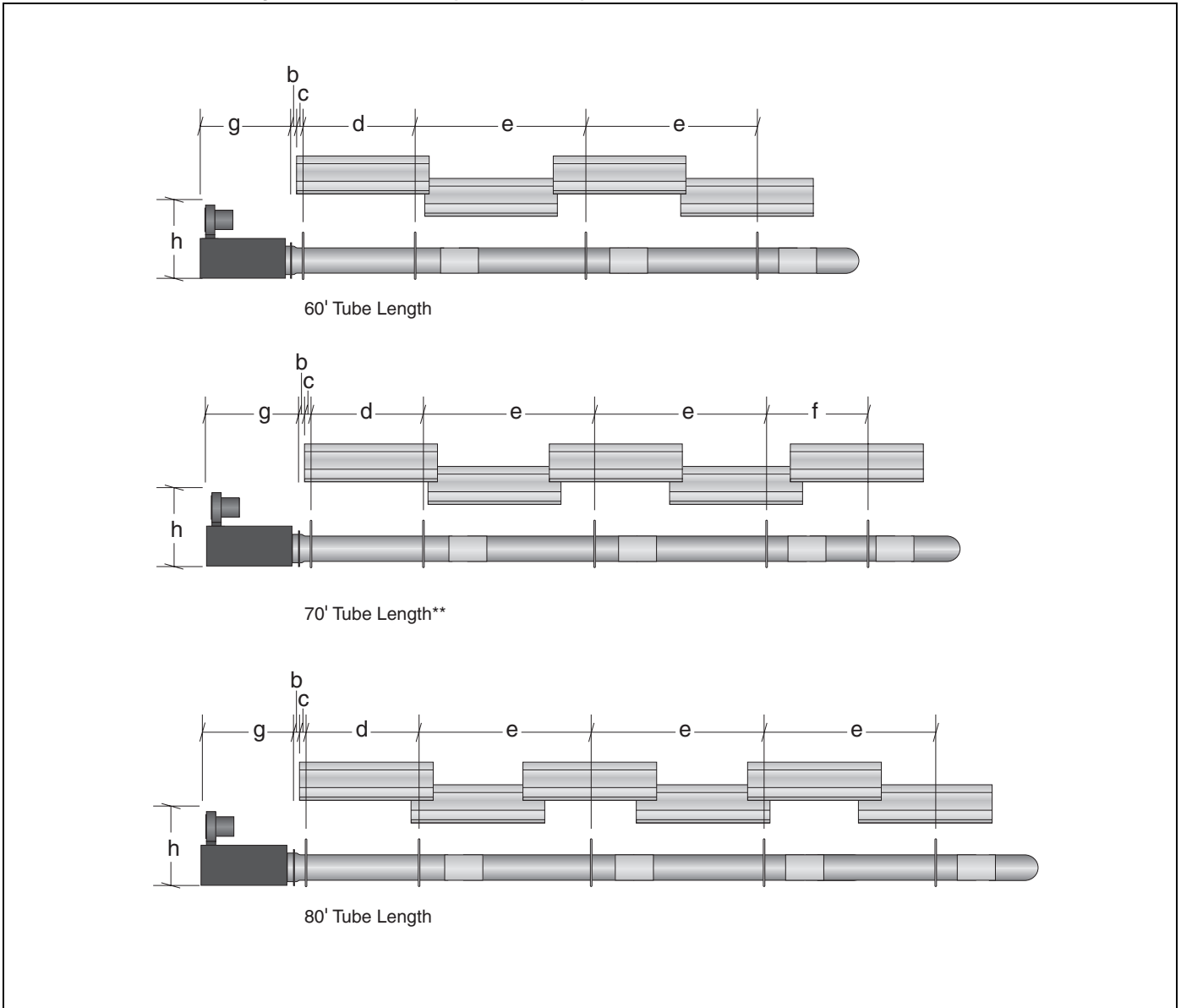
\* Requires the last **reflector** before the U-Tube to be cut in half for use on both sides.

\*\* Requires the last **tube** before the U-Tube to be cut in half for use on both sides.





**FIGURE 18: U-Tube Layout Overviews (Continued)**



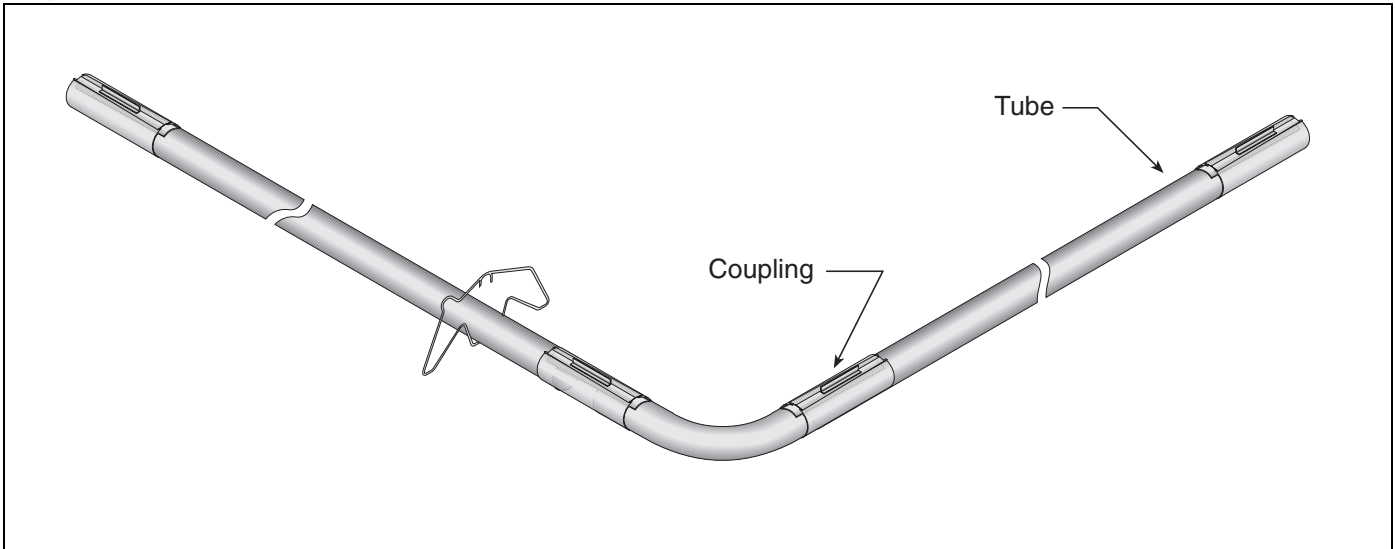
**7.2 Elbow Package Configuration**

**Step 7.2.1 Elbow Installation**

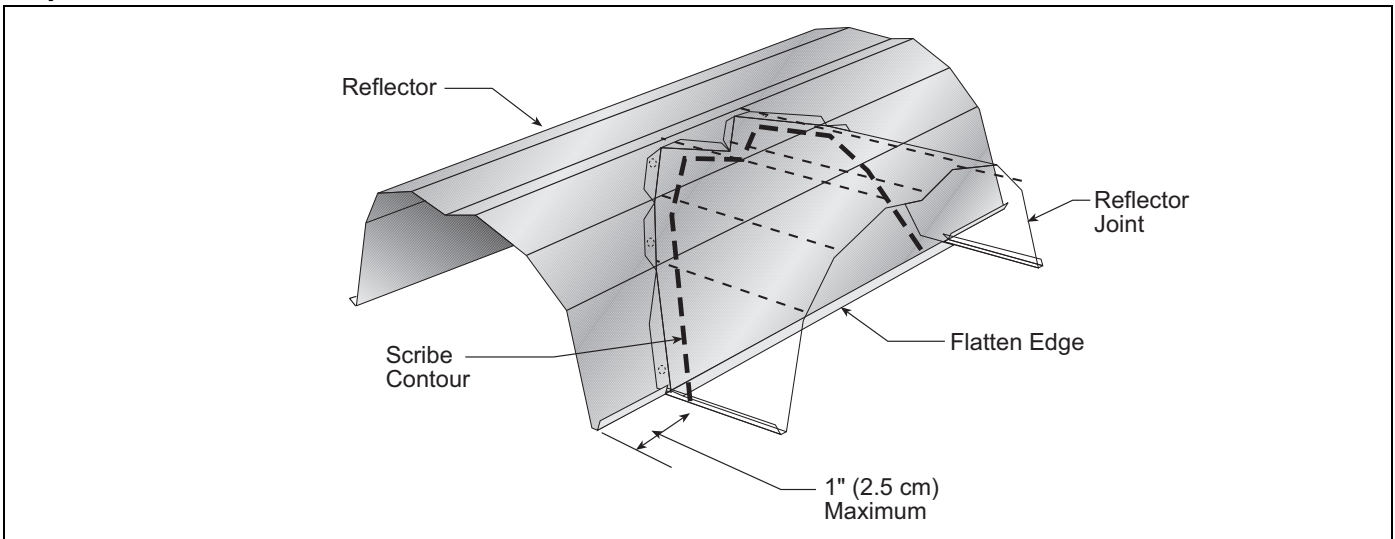
Description	Part Number
<b>Elbow Package</b>	<b>02718702</b>
90° Elbow	01335801
Coupling	01312700
Reflector End Cap	02750800
Reflector Joint Piece	02750900
<b>U-Clip Package</b>	<b>91107720</b>

Minimum Distance Required Between Burner and Elbow	
Model	Minimum Distance
BH-40	10' (3 m)
BH-60	10' (3 m)
BH-80	10' (3 m)
BH-100	15' (4.5 m)
BH-115	15' (4.5 m)
BH-125	15' (4.5 m)
BH-140	15' (4.5 m)
BH-150	15' (4.5 m)
BH-175	15' (4.5 m)
BH-200	15' (4.5 m)

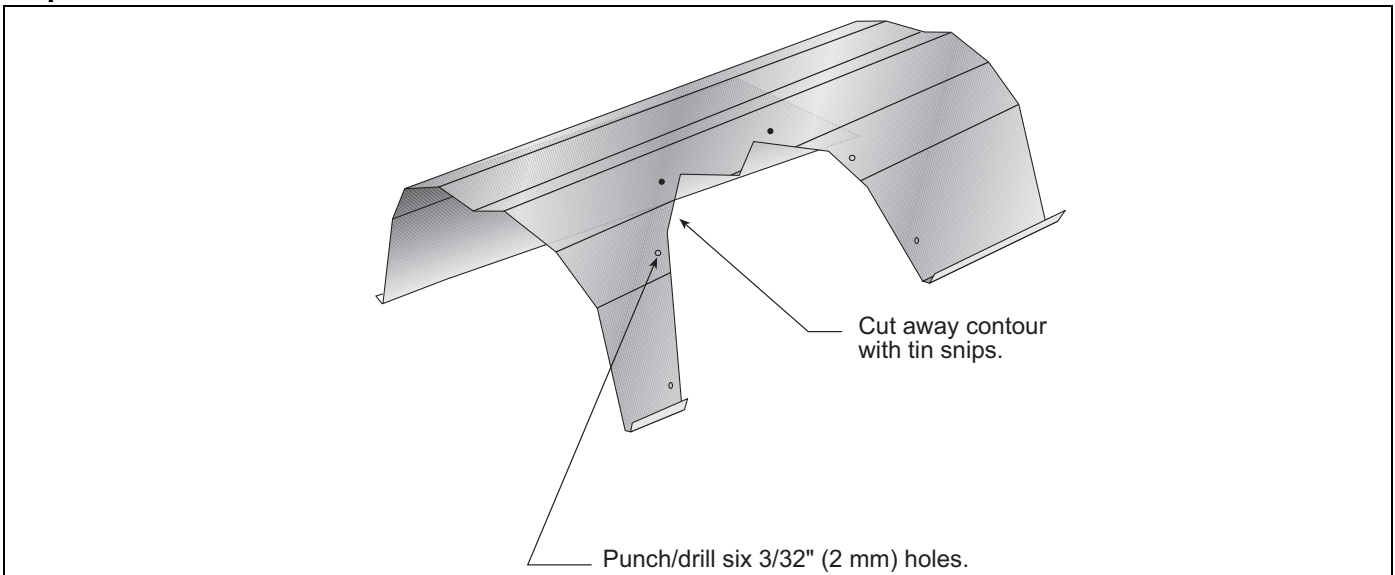
### Step 7.2.2 Elbow Installation



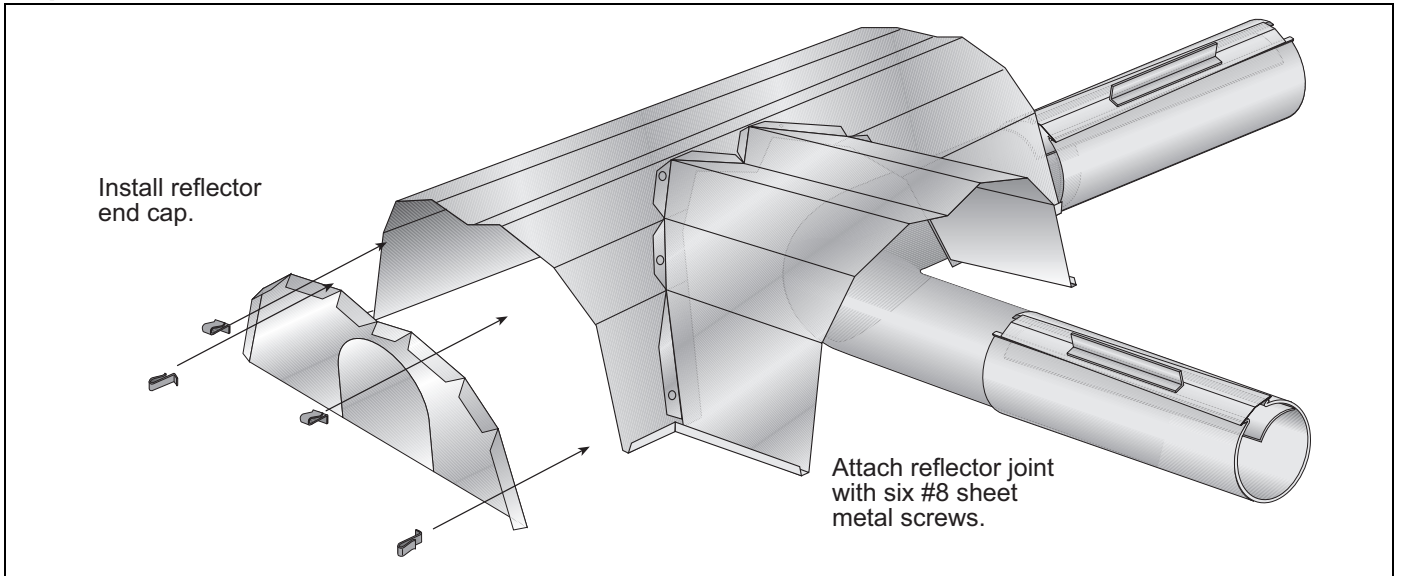
### Step 7.2.3 Reflector Joint Installation



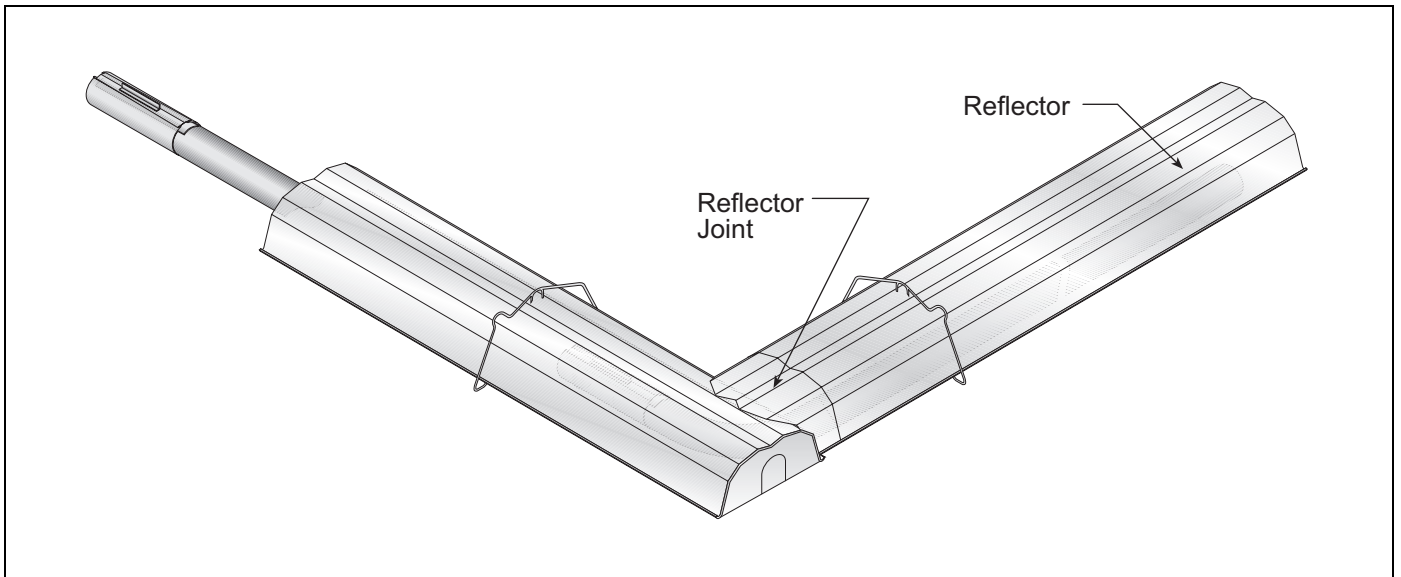
### Step 7.2.4 Reflector Joint Installation



**Step 7.2.5 Reflector Joint Detail**

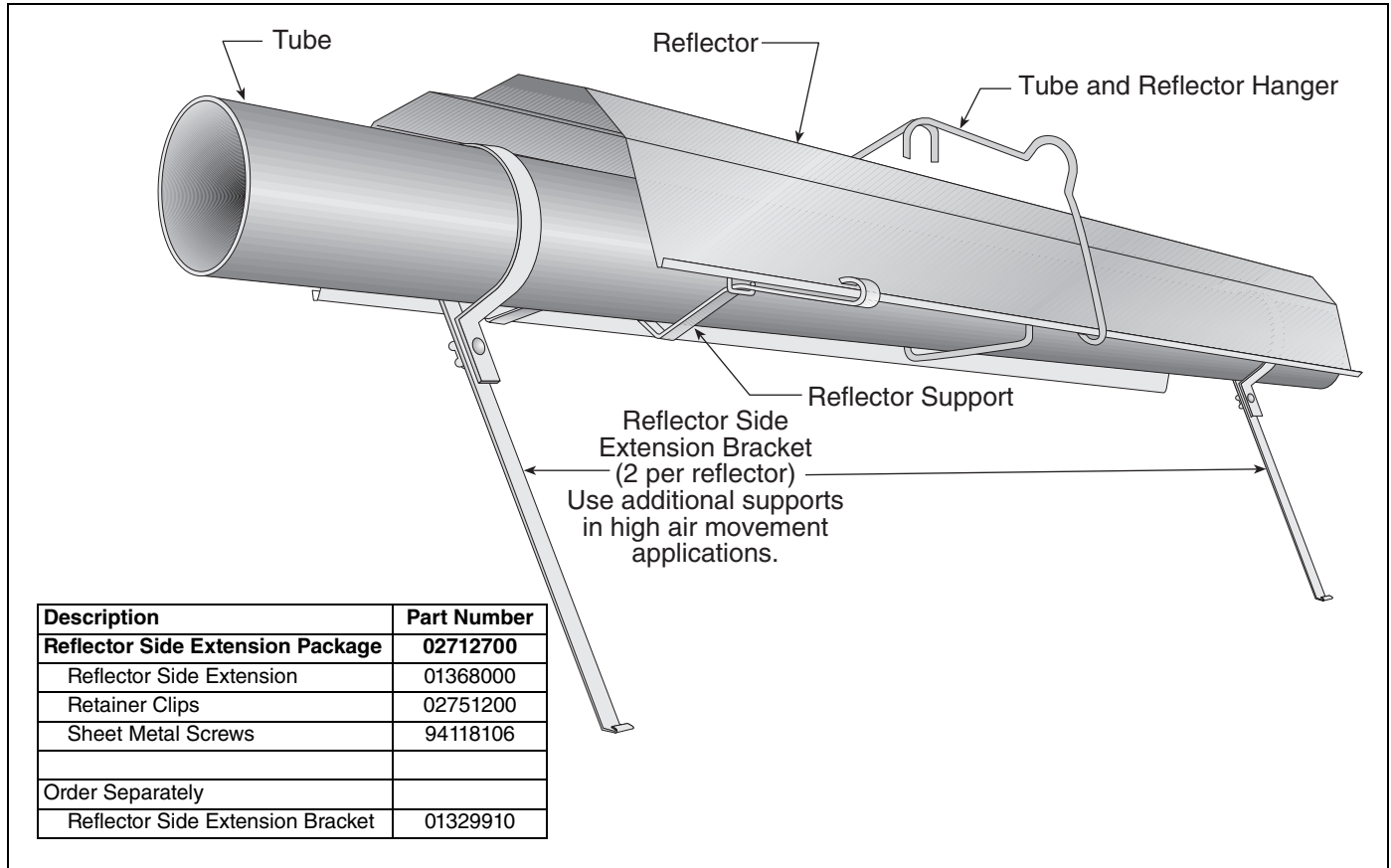


**FIGURE 19: Reflector Joint Detail**

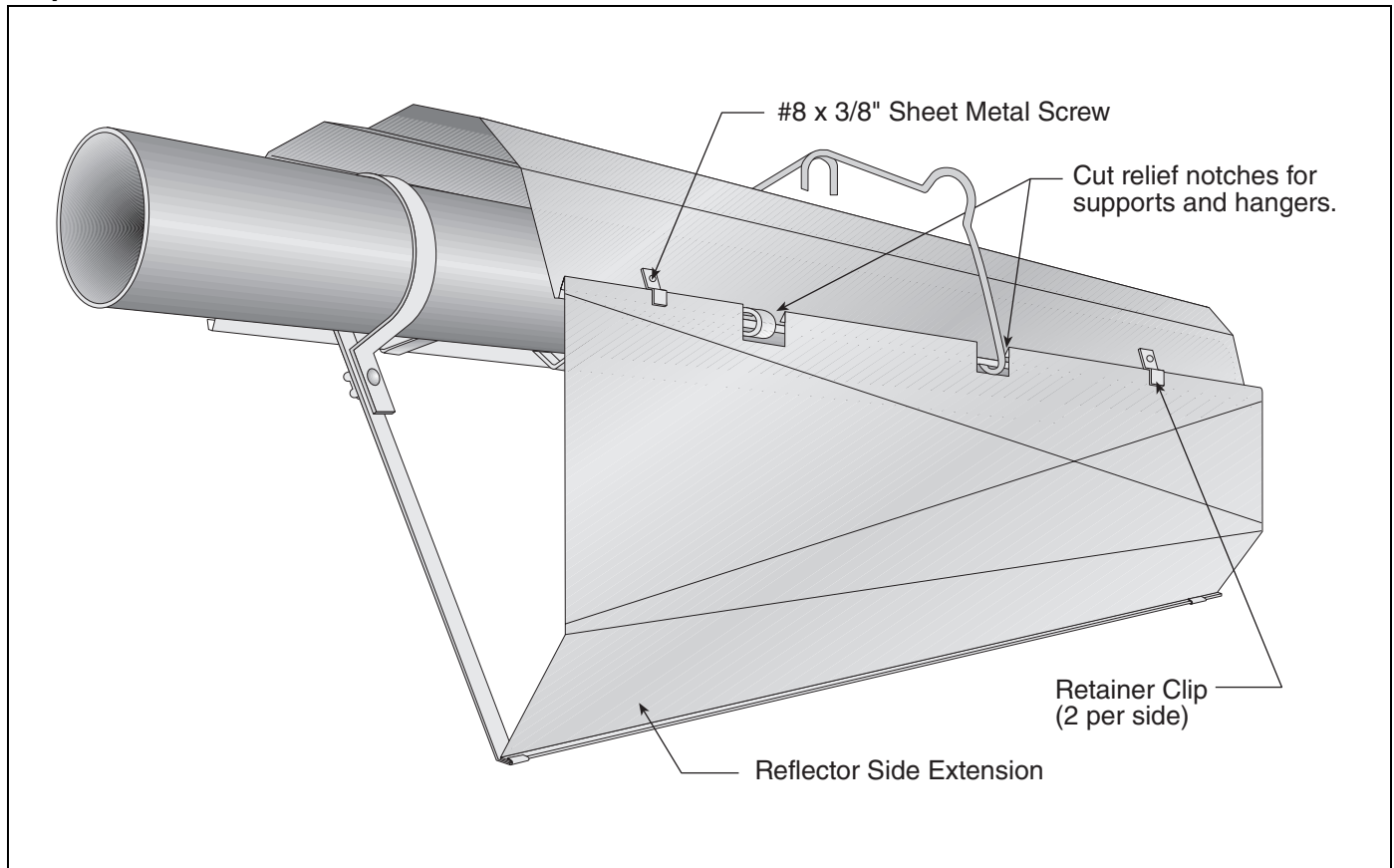


### 7.3 Reflector Side Extension

#### Step 7.3.1 Bracket Installation

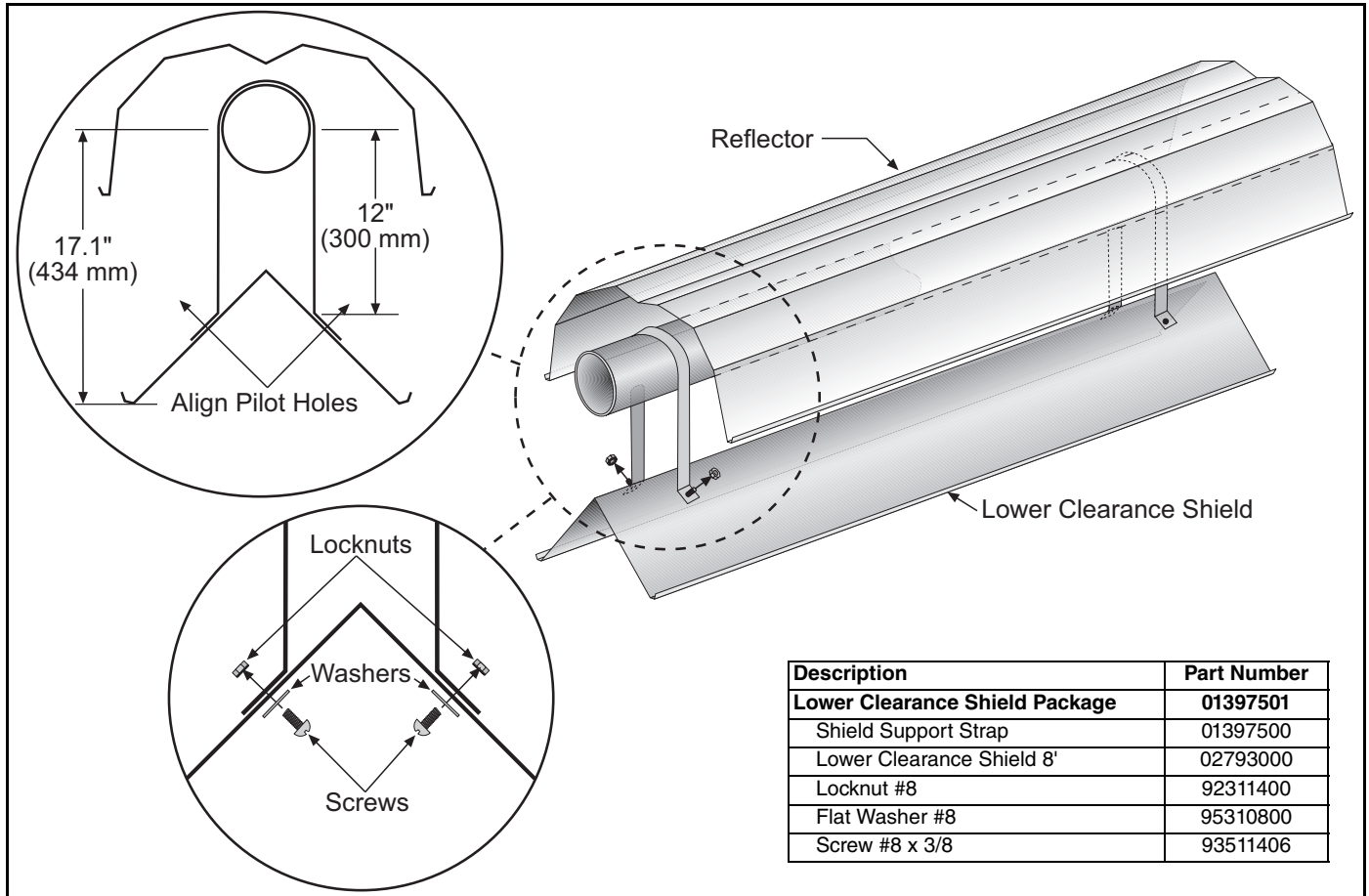


#### Step 7.3.2 Side Reflector Installation



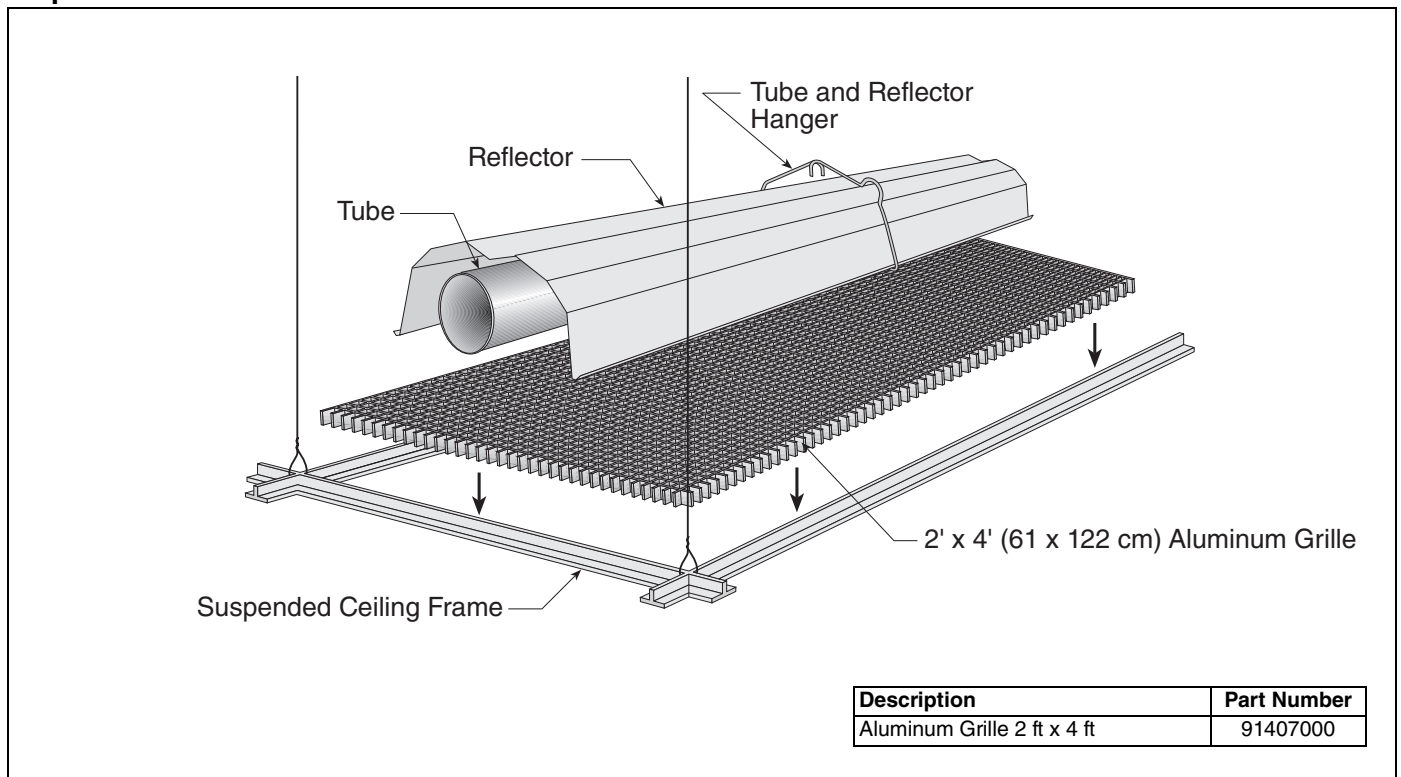
## 7.4 Lower Clearance Shield Installation

### Step 7.4.1 Shield Support Strap Assembly

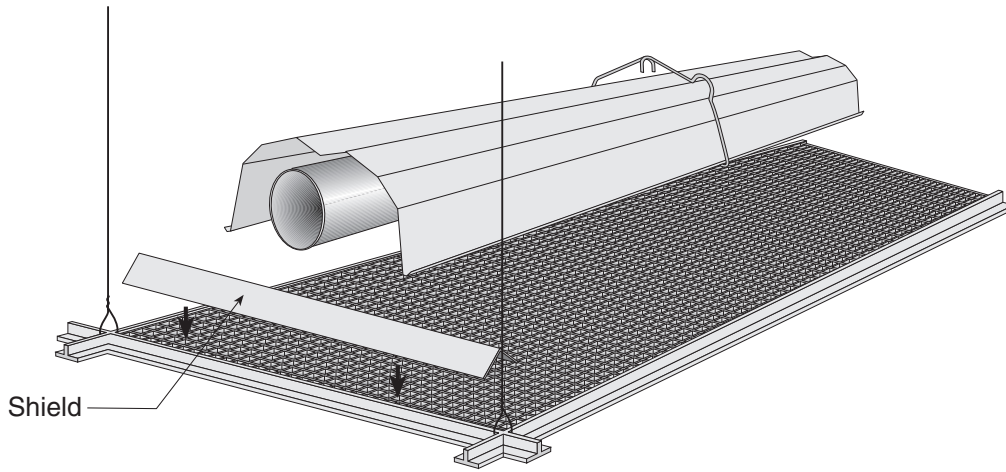


## 7.5 Two-Foot Decorative Grille Installation

### Step 7.5.1 Grille Installation



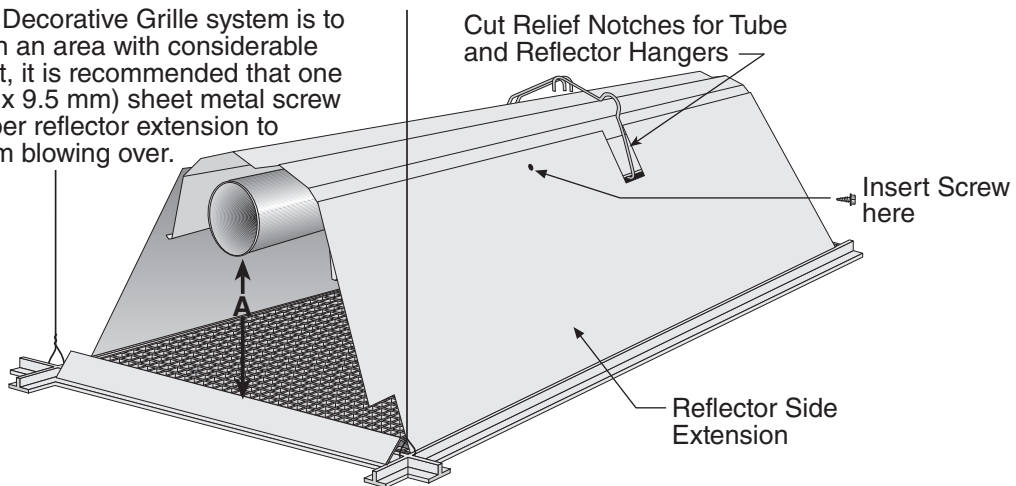
### Step 7.5.2 Frame Shield Installation



Description	Part Number
Deco Grille Shield	01365900

### Step 7.5.3 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 (3.9 x 9.5 mm) sheet metal screw be installed per reflector extension to prevent it from blowing over.



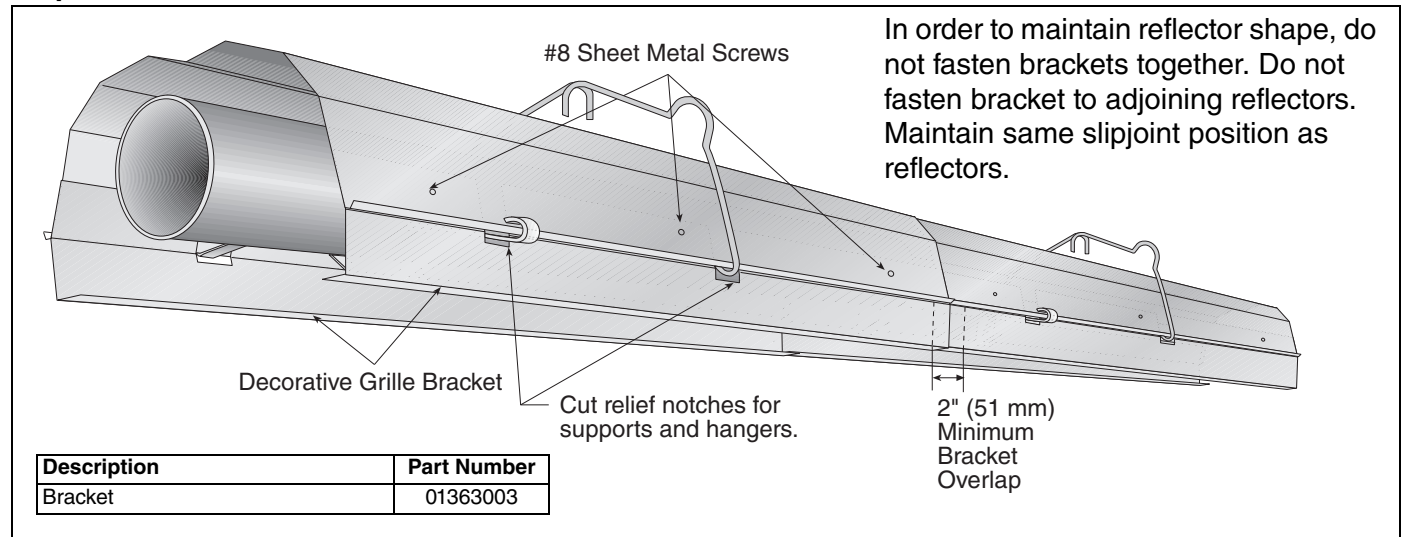
Distance "A"		Extension	
Minimum	Maximum	Part No.	Width
2" (4 cm)	6" (15 cm)	01370408	8" (20 cm)
6" (15 cm)	10" (26 cm)	01370412	12" (30 cm)
10" (26 cm)	14" (37 cm)	01370416	16" (40 cm)

Description	Part Number
Reflector Side Extension	01370412

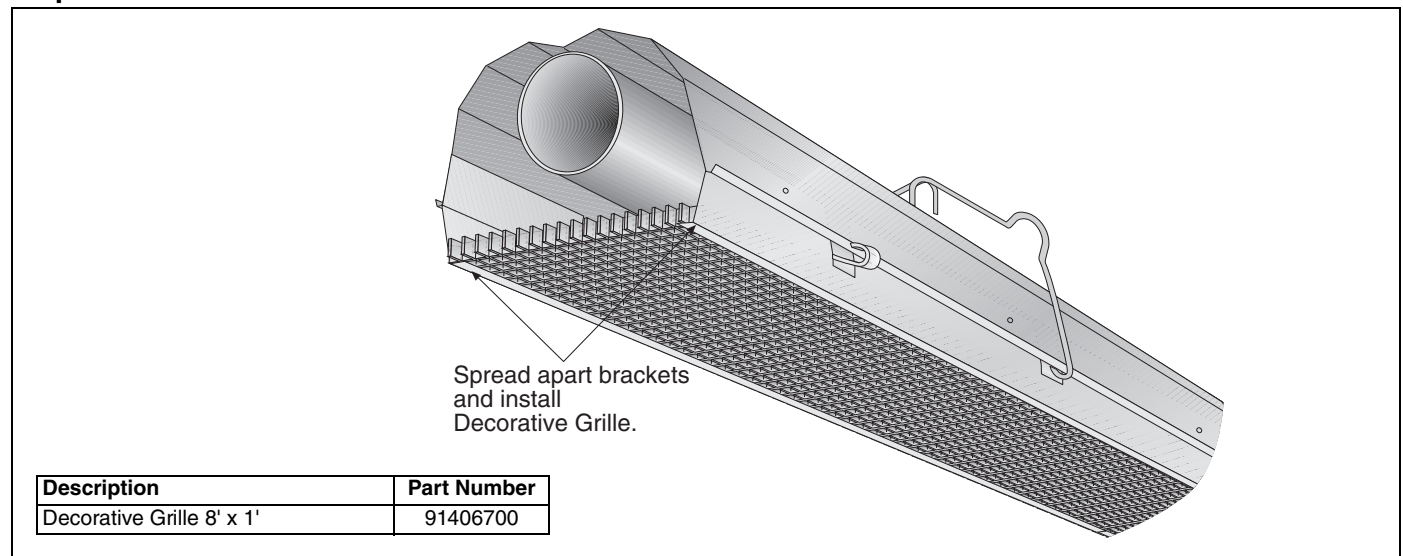


## 7.6 One-Foot Decorative Grille Installation

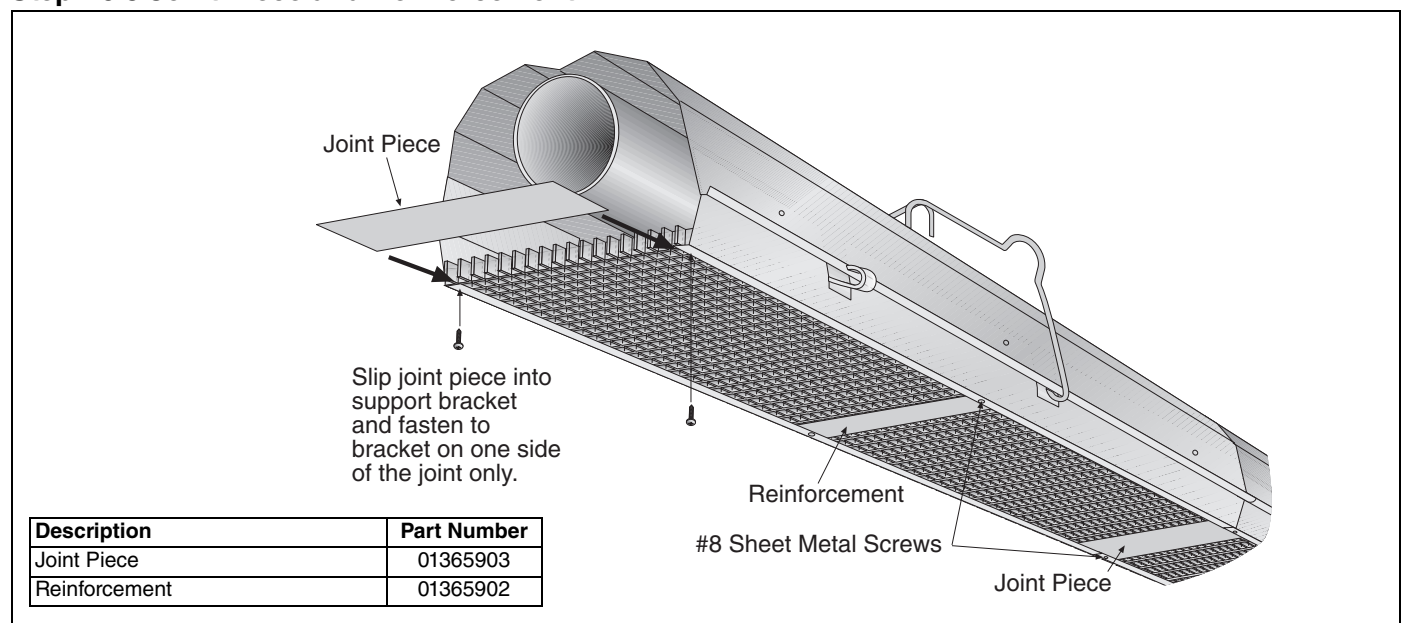
### Step 7.6.1 One-Foot Decorative Grille Bracket



### Step 7.6.2 Decorative Grille



### Step 7.6.3 Joint Piece and Reinforcement



### Step 7.6.4 End Piece and Reflector End Cap

Reflector End Cap

End Piece

Insert end piece between grille and brackets.

Fasten end piece to brackets using two #8 sheet metal screws and replace reflector end cap.

Description	Part Number
End Piece	01365901

### Step 7.6.5 90° Elbow

Inside Corner

Grille Brackets

Joint Piece

Insert End Piece between grille and brackets.

Decorative Grille Brackets

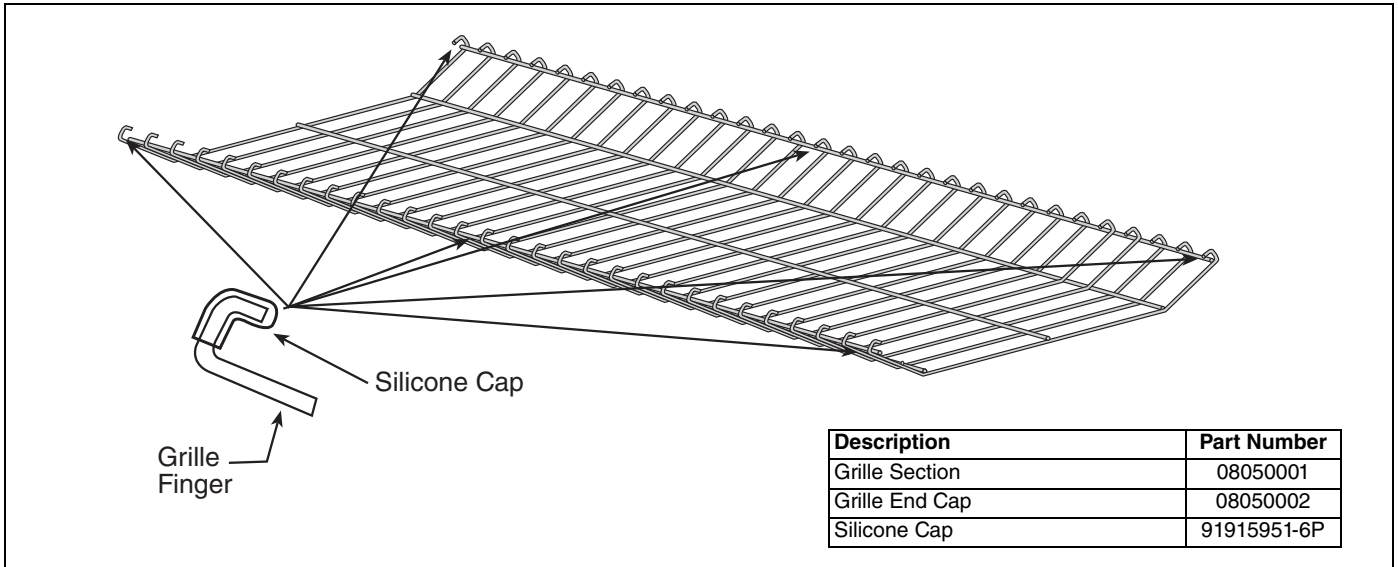
Cut grille bracket at reflector joint piece.

Joint Piece

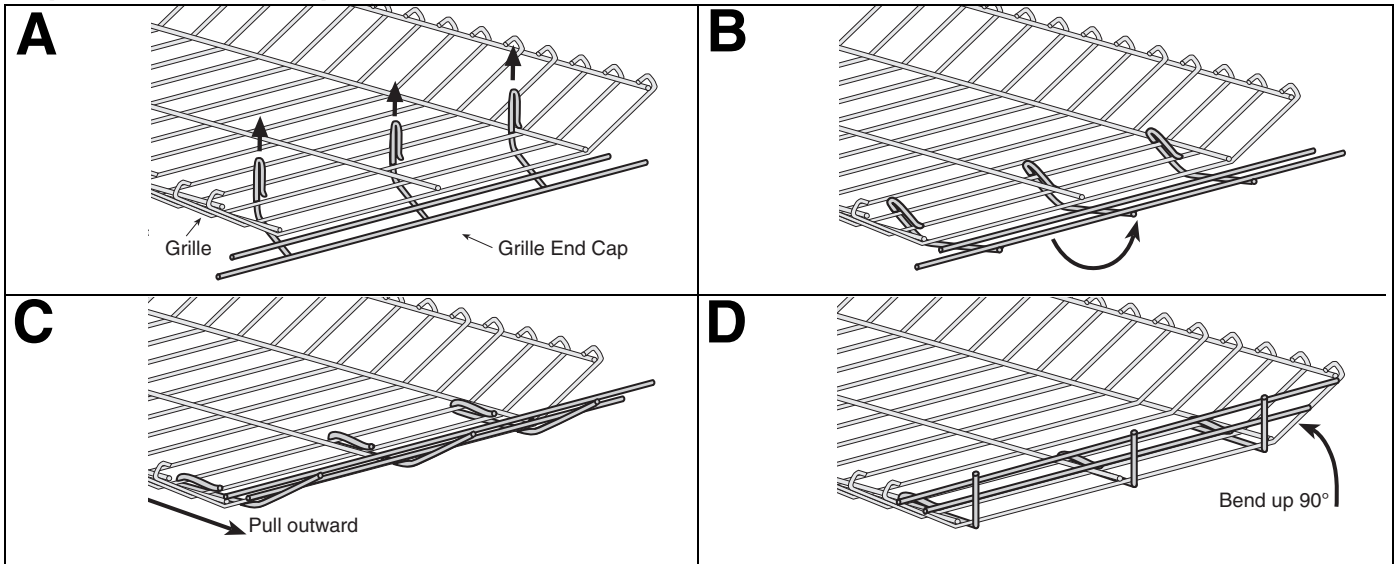


## 7.7 Protective Grille Installation

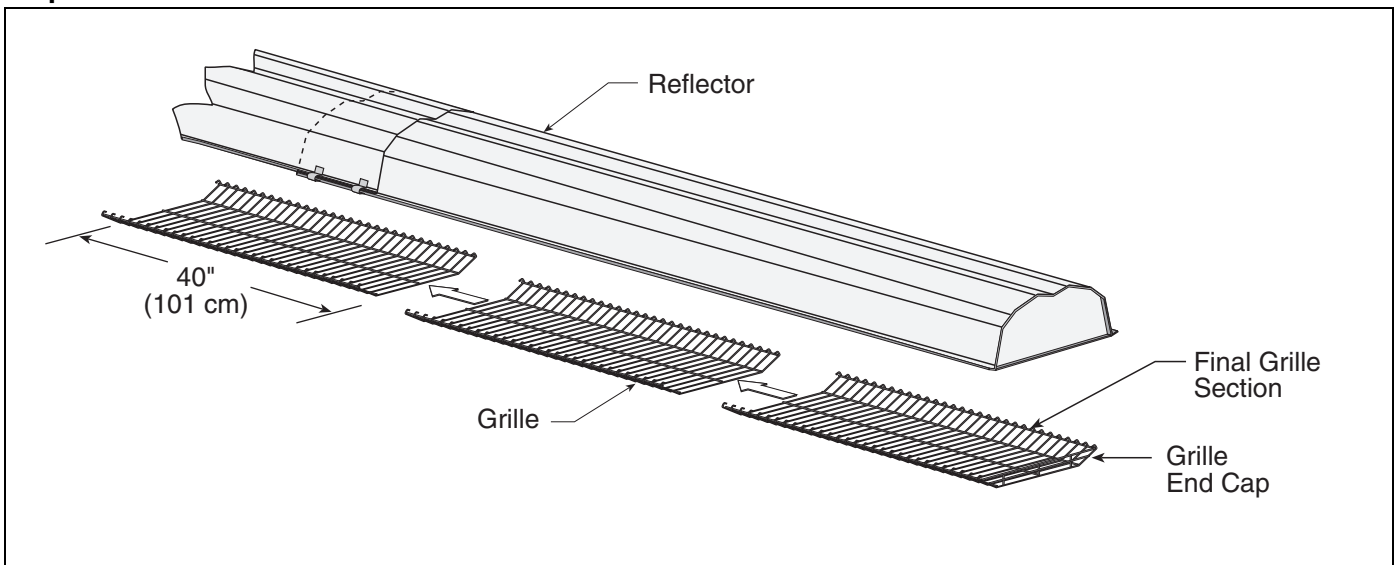
### Step 7.7.1 Silicone Cap Installation




### Step 7.7.2 Grille End Cap Installation



### Step 7.7.3 Grille Installation



**SECTION 8: VENTING**

<b>⚠ WARNING</b>	
	<b>Carbon Monoxide Hazard</b>
	<b>Heaters installed unvented must be interlocked with sufficient building exhaust.</b>
	<b>Heaters must be installed according to the installation manual.</b>
<b>Failure to follow these instructions can result in death or injury.</b>	

**8.1 Venting**

This heater must be vented in accordance with the rules contained in this manual and with the following national codes and any state, provincial or local codes which may apply: **United States:** Refer to ANSI Z223.1 (NFPA 54) - latest revision; **Canada:** Refer to CAN/CGA-B149.1 and B149.2 - latest revision.

Exhaust end of heater will accept a 4" (10 cm) vent pipe using the vent adapter (P/N 90502700). To prevent leakage of condensation, install the vent adapter with the seam on top and seal the joint using a high temperature silicone sealant.

Any portion of vent pipe passing through a combustible wall must have an approved thimble (P/N 90505600) to conform with the above listed codes.

Vent pipe must be sloped downward away from the burner 1/2" (1 cm) for every 20' (6 m).

The heater may be individually vented or common vented. When venting horizontally, a maximum of two heaters can be commonly vented. See Page 35, Section 8.9. When venting vertically, a maximum of four heaters can be commonly vented. See Page 36, Section 8.10.

The heater may also be installed unvented in certain circumstances according to building ventilation codes. Refer to the above codes and Page 32, Section 8.2 for further information. Unvented operation also requires compliance with the clearances to combustibles given on Page 7, Figure 10.

The bottom of the vent or air intake terminal shall not be located less than 1' (.3 m) above grade level.

The vent shall not terminate less than 7' (2.1 m) above grade where located adjacent to public walkways.

Vent terminal must be installed at a height sufficient to prevent blockage by snow, and building materials protected from degradation by flue gasses.

Secure all joints with #8 x 3/8 sheet metal screws. Seal all joints with high temperature silicone sealant.

Vent terminal must be beyond any combustible overhang.

**8.1.1 United States Requirements**

Vent must terminate at least 3' (.9 m) above any forced air inlet located within 10' (3.1 m).

Vent must terminate at least 4' (1.2 m) below, 4' (1.2 m) horizontally from, or 1' (.3 m) above any door, operable window, or gravity air inlet into any building.

**8.1.2 Canadian Requirements**

The vent shall not terminate within 6' (1.8 m) of a mechanical air supply inlet to any building.

The vent shall not terminate within 3' (.9 m) of a window or door that can be opened in any building, any non-mechanical air supply inlet to any building, or of the combustion air inlet of any other appliance.

**8.2 Unvented Operation**

Sufficient ventilation must be provided in the amount of 4 cfm per 1000 Btu/h firing rate (United States); 3 cfm per 1000 Btu/h firing rate (Canada).

Use of optional outside combustion air is not recommended with unvented heaters.

If exhaust fans are used to supply ventilation air, an interlock switch must be used to prevent the heater from coming on when the fans are off. This may be done using a pressure switch.

**8.3 Horizontal Venting**

In noncombustible walls only, vent terminal (P/N 02537801-1P) may be used.

For 4" (10 cm) vents in either combustible or noncombustible walls, use P/N 90502100 (Tjernlund VH1-4) or equivalent, insulated vent terminal. Follow the manufacturer's instructions for proper installation.

For 6" (15 cm) common vents in either combustible or noncombustible walls, use P/N 90502101 (Tjernlund VH1-6) or equivalent, insulated vent terminal. Follow the manufacturer's instructions for proper installation.

### 8.4 Vertical Venting

For 4" (10 cm) common vent, an approved vent cap (P/N 90502300) must be used.

For 6" (15 cm) common vent, an approved vent cap (P/N 90502302) must be used.

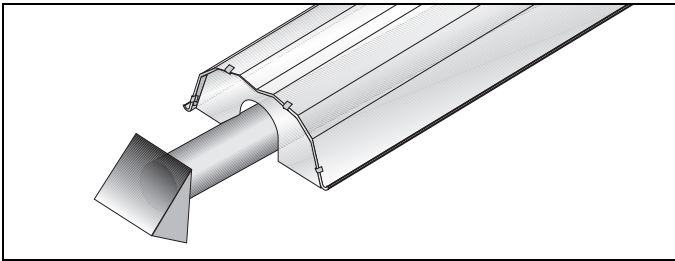
For common vertical venting of more than two heaters, *See Page 36, Section 8.10.*

A vent shall not extend less than 2' (.6m) above the highest point where it passes through a flat roof of a building.

### 8.5 Unvented Operation Tube Termination

Turndown type vent terminal with a screen must be installed at the exhaust end of the tube. Vent terminal design shall not incorporate backdraft flap.

**FIGURE 20: Tube Termination**



### 8.6 Length Requirements

The maximum vent length allowed is 45' (13.7 m).

The maximum outside air supply duct length allowed is 45' (13.7 m).

The total vent length, plus outside air duct length, plus any extensions to minimum heat exchanger lengths, cannot exceed 65' (19.8 m).

Vent length should be limited to less than 20' (6 m). If using vent lengths greater than 20' (6 m), condensation will form in the vent pipe. Insulation and additional sealing measures (high temperature silicone at all seams) are required. Optional heat exchanger beyond minimum lengths is considered as vent length for length determination.

Subtract 15' (4.6 m) of maximum allowed vent or duct length per vent elbow if more than two are used.

### 8.7 Horizontal Ventilation 4 in (10 cm) Pipe

**Combustible or Non-Combustible Wall**

Vent Adapter

4" Single Wall Pipe

Vent Terminal

**Non-Combustible Wall Only**

Vent Adapter

18" Min.

4" Single Wall Pipe

Vent Terminal

Description	Part Number
Vent Terminal (Comb. Wall)	90502100
Vent Terminal	02537801-XX
Wall Thimble	90505600

### 8.8 Vertical Ventilation 4 in (10 cm) Pipe

**SIDE VIEW**

4" (10 cm) Type "B" vent cap

4" (10 cm) Type "B" vent pipe

18" (46 cm) Min.

Roof Flashing

Roof

Approved Thimble (If Applicable)

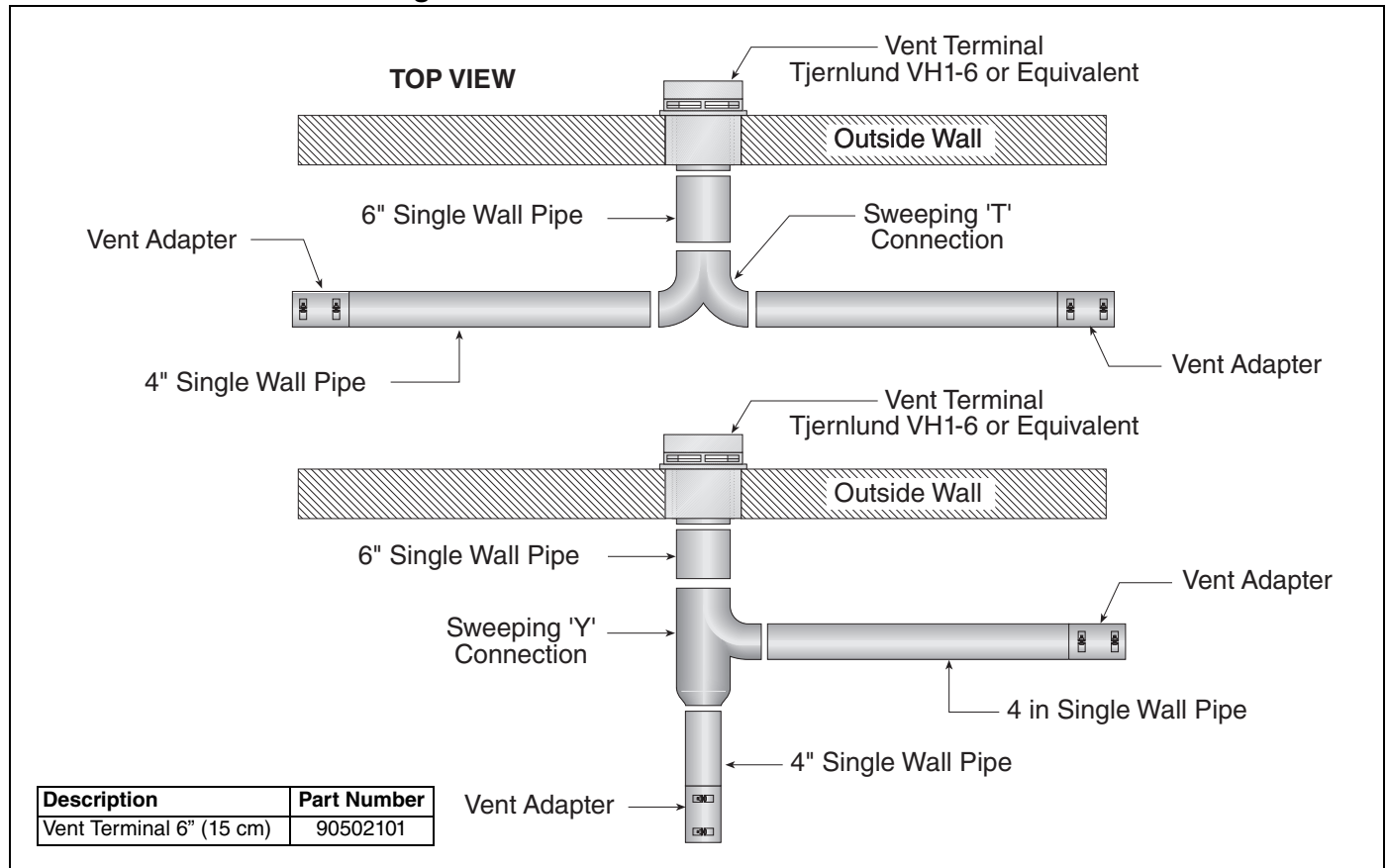
Vent Adapter

4" (10 cm) Single Wall Pipe

The last section of vent pipe passing through the roof or wall may be Type "B" vent pipe. All other vent materials in the building must be single wall vent pipe.

Description	Part Number
Vent Cap 4" (10 cm)	90502300

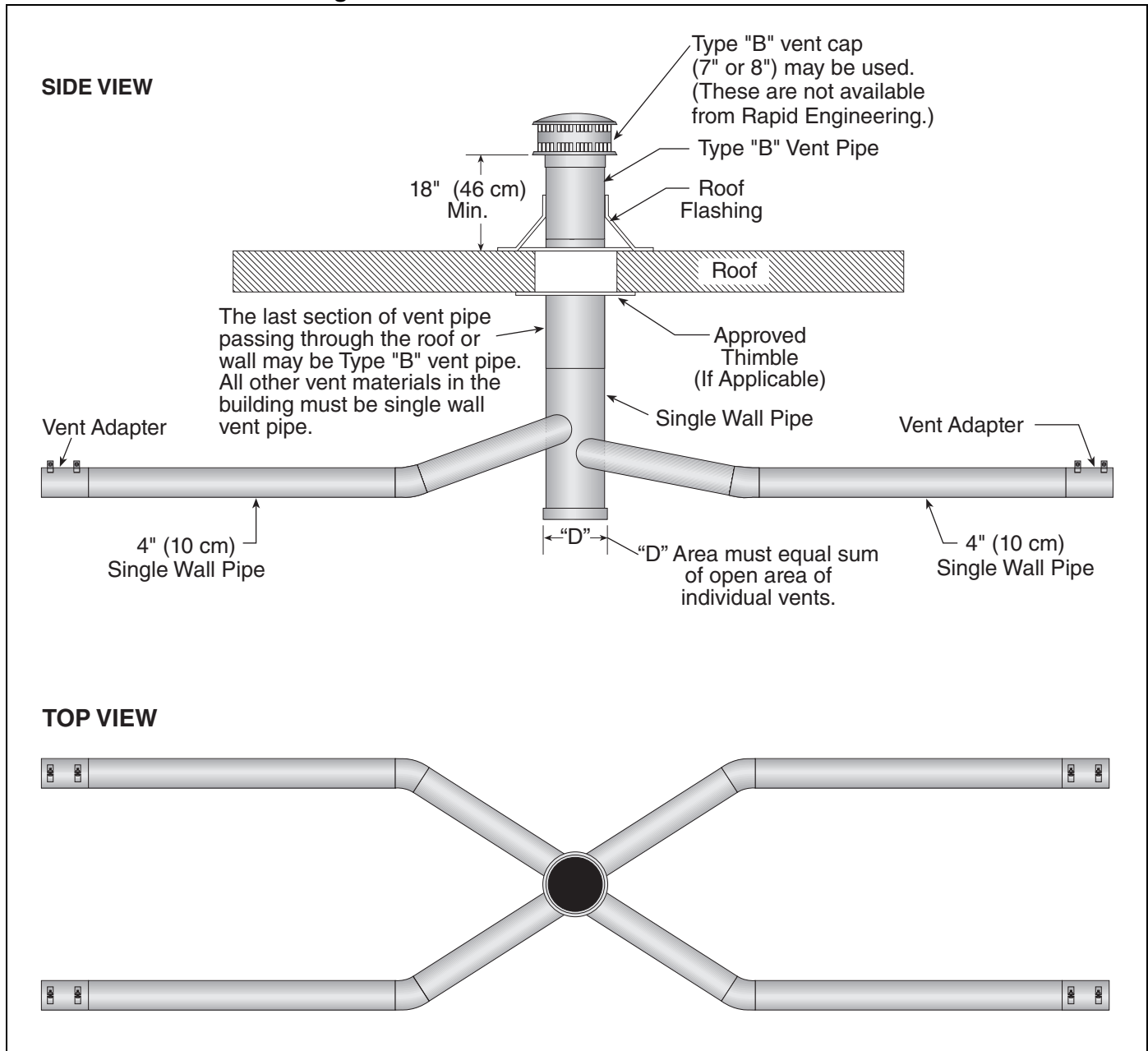
## 8.9 Common Side Wall Venting



### Requirements:

- Maximum of 2 heaters can be commonly vented through a side wall.
- Heaters must be of the same BTU output.
- Heaters must be controlled by a common thermostat.

## 8.10 Common Vertical Venting



**Requirements:**

- Heaters must be controlled by a common thermostat.
- Connections to a common stack must be positioned to avoid direct opposition between streams of combustion gases.

### 8.11 Outside Combustion Air Supply

**IMPORTANT:** If the building has a slight negative pressure or corrosive contaminants, such as halogenated hydrocarbons, are present in the air, an outside combustion air supply to the heater is required. Seal all combustion air pipe joints.

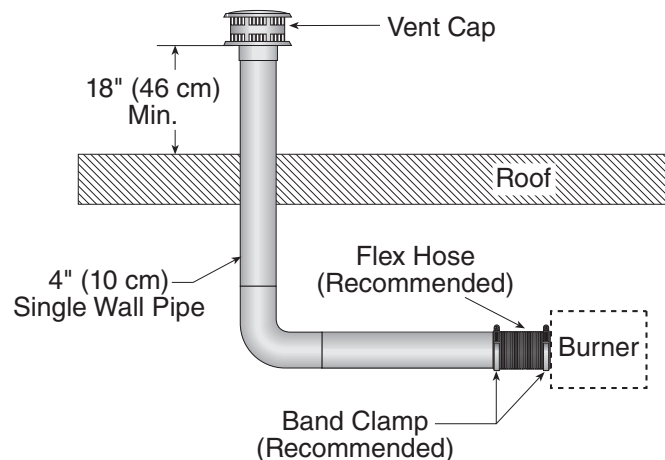
Use of optional outside combustion air is not recommended with unvented heaters.

The air supply duct may have to be insulated to prevent condensation on the outer surface. The outside air terminal must not be more than 1' (31 cm) above the vent terminal.

#### 8.11.1 Length Requirements

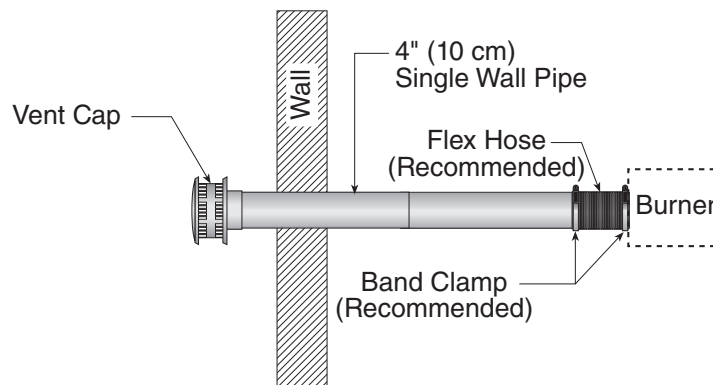
Follow the constraints listed on *Page 33, Section 8.6.*

#### 8.11.2 Vertical Outside Air Supply for Single Heater Installation



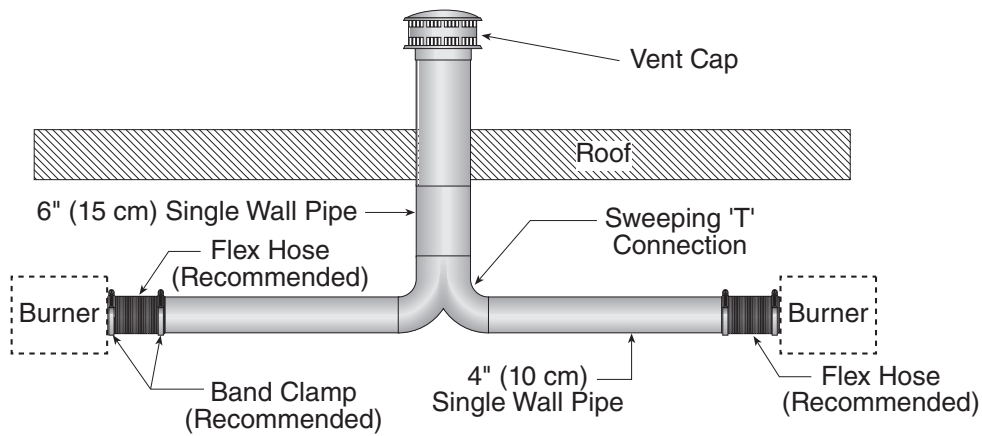
Description	Part Number
Vent Cap 4" (10 cm)	90502300

#### 8.11.3 Horizontal Outside Air Supply for Single Heater Installation



Description	Part Number
Vent Cap 4" (10 cm)	90502300

### 8.11.4 Vertical Outside Air Supply for Double Heater Installation

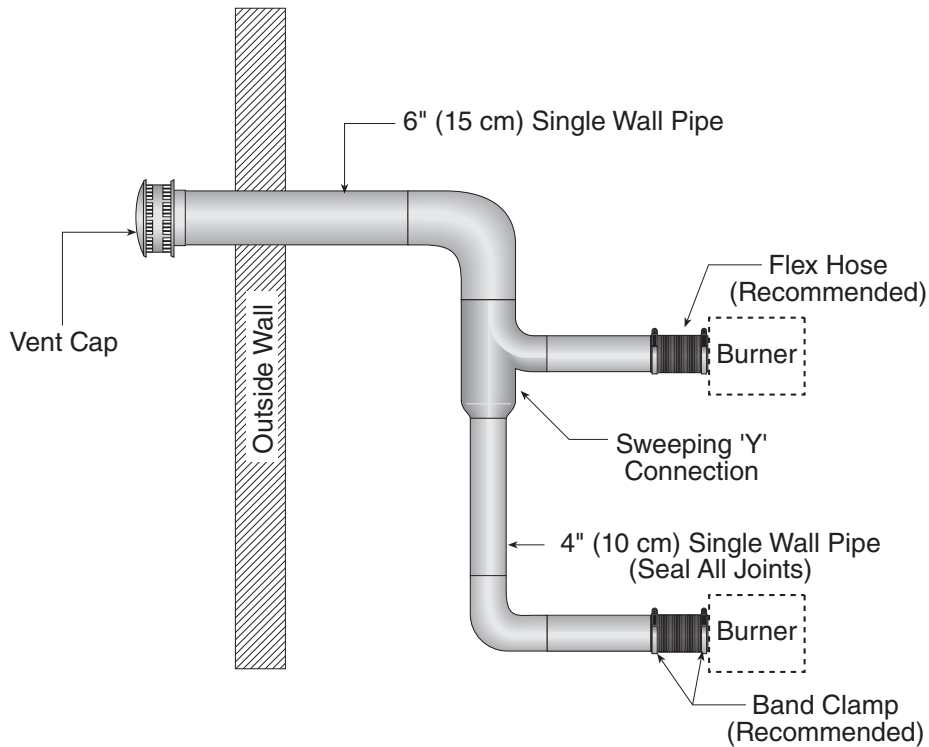


Description	Part Number
Vent Cap 6" (15 cm)	90502302

**Requirements:**

- Heaters must be controlled by a common thermostat.

### 8.11.5 Horizontal Outside Air Supply for Double Heater Installation



Description	Part Number
Vent Cap 6" (15 cm)	90502302


**Requirements:**

- Heaters must be controlled by a common thermostat.



## SECTION 9: GAS PIPING

**⚠ WARNING**



**Fire Hazard**

**Tighten gas hose fittings to connect gas supply according to *Figure 20*.**

**Gas hose can crack when twisted.**

**Gas hose moves during normal operation.**

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

Install the gas hose as shown in *Figure 21*. 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

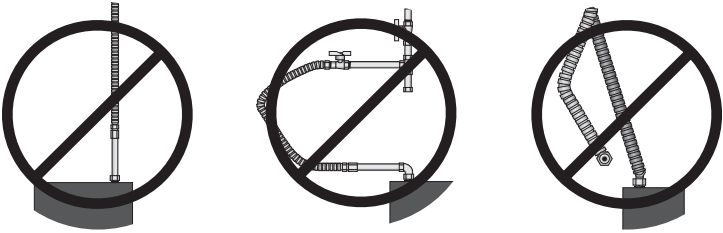
system, verify that all high pressure testing of the gas piping has been completed.

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 strictly in accordance with *Figure 21*.

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 1/2" w.c. When gas piping is not included in the layout drawing, the local gas supplier will usually help in planning the gas piping.

- **Do not high pressure test the gas piping with the burner connected. Failure to follow these instructions can result in property damage.**
- **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.**

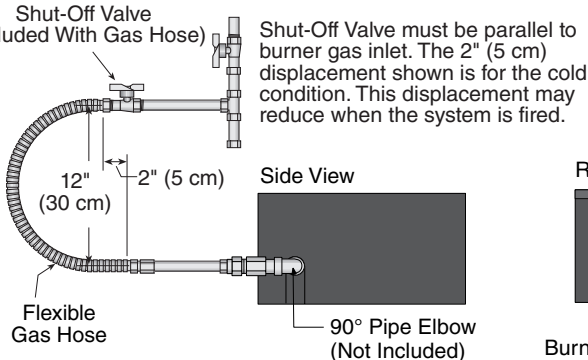
**FIGURE 21: Gas Connection with Flexible Gas Hose**



Hold gas nipple securely with pipe wrench when attaching the gas hose.

Failure to follow these instructions can result in product damage.

Shut-Off Valve (Included With Gas Hose)



Shut-Off Valve must be parallel to burner gas inlet. The 2" (5 cm) displacement shown is for the cold condition. This displacement may reduce when the system is fired.

12" (30 cm)

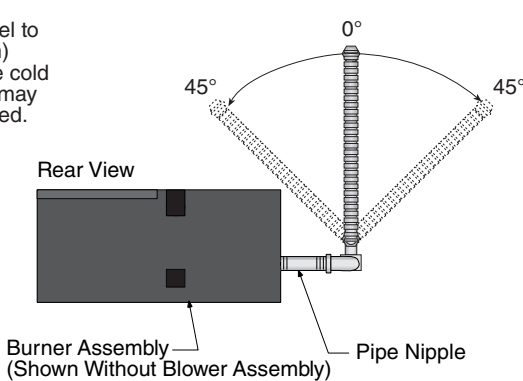
2" (5 cm)

Flexible Gas Hose

90° Pipe Elbow (Not Included)

Side View

Rear View



0°

45°

45°

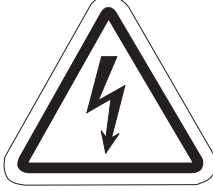
Burner Assembly (Shown Without Blower Assembly)

Pipe Nipple

Description	Part Number
1/2" Flexible Stainless Steel Gas Hose (US Models)	91412200
3/4" Flexible Stainless Steel Gas Hose (US Models)	91412203
1/2" Rubber (Type 1) Gas Hose (Canadian Models)	91412206
3/4" Rubber (Type 1) Gas Hose (Canadian Models)	91412207

**SECTION 10: WIRING**

**⚠ WARNING**



**Electrical Shock Hazard**

Disconnect electrical power and gas supply before servicing.

This appliance must be connected to a properly grounded electrical source.

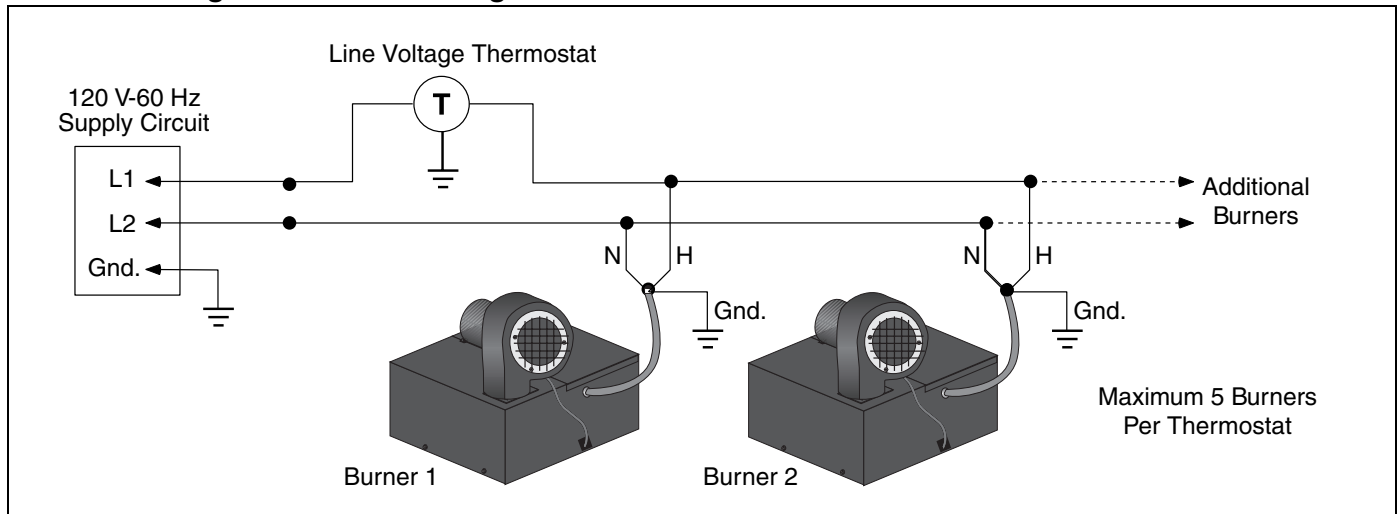
Failure to follow these instructions can result in death or electrical shock.

Heaters can be controlled using several methods. Normally thermostats are used to control the heaters but they can also be controlled by an Energy Management System. *Section 10.1* illustrates the connection for heaters controlled by a line voltage thermostat.

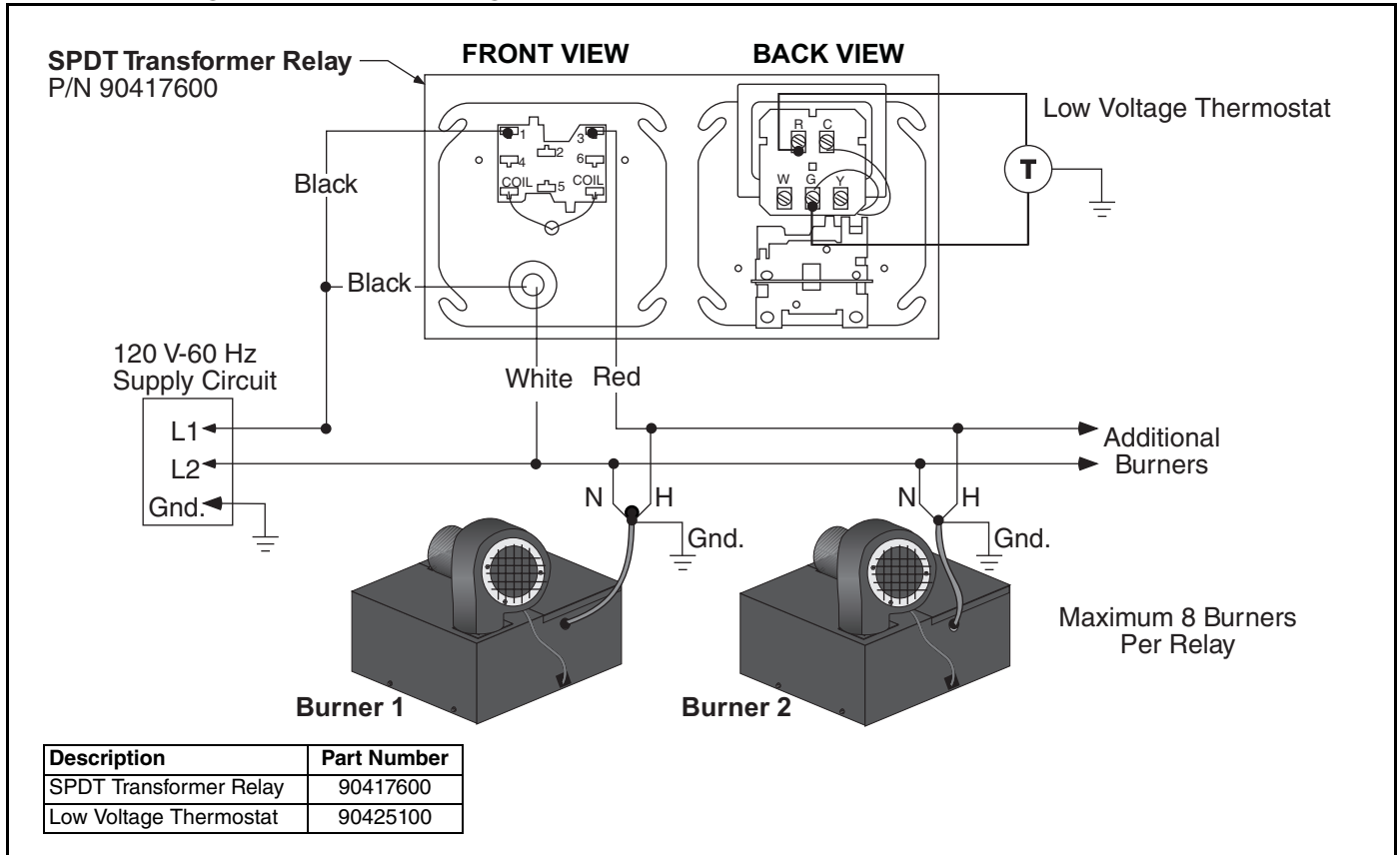
For heaters on a low voltage thermostat, See *Page 41, Section 10.2*. Heaters must be grounded in accordance with applicable codes: United States: refer to National Electrical Code® ANSI/NFPA 70 - latest revision; Canada: refer to Canadian Electrical Code CSA C22.1 Part I - latest revision.

If any of the original internal wiring must be replaced, it must be replaced with wiring materials having a temperature rating of at least 105°C and 600 volts.

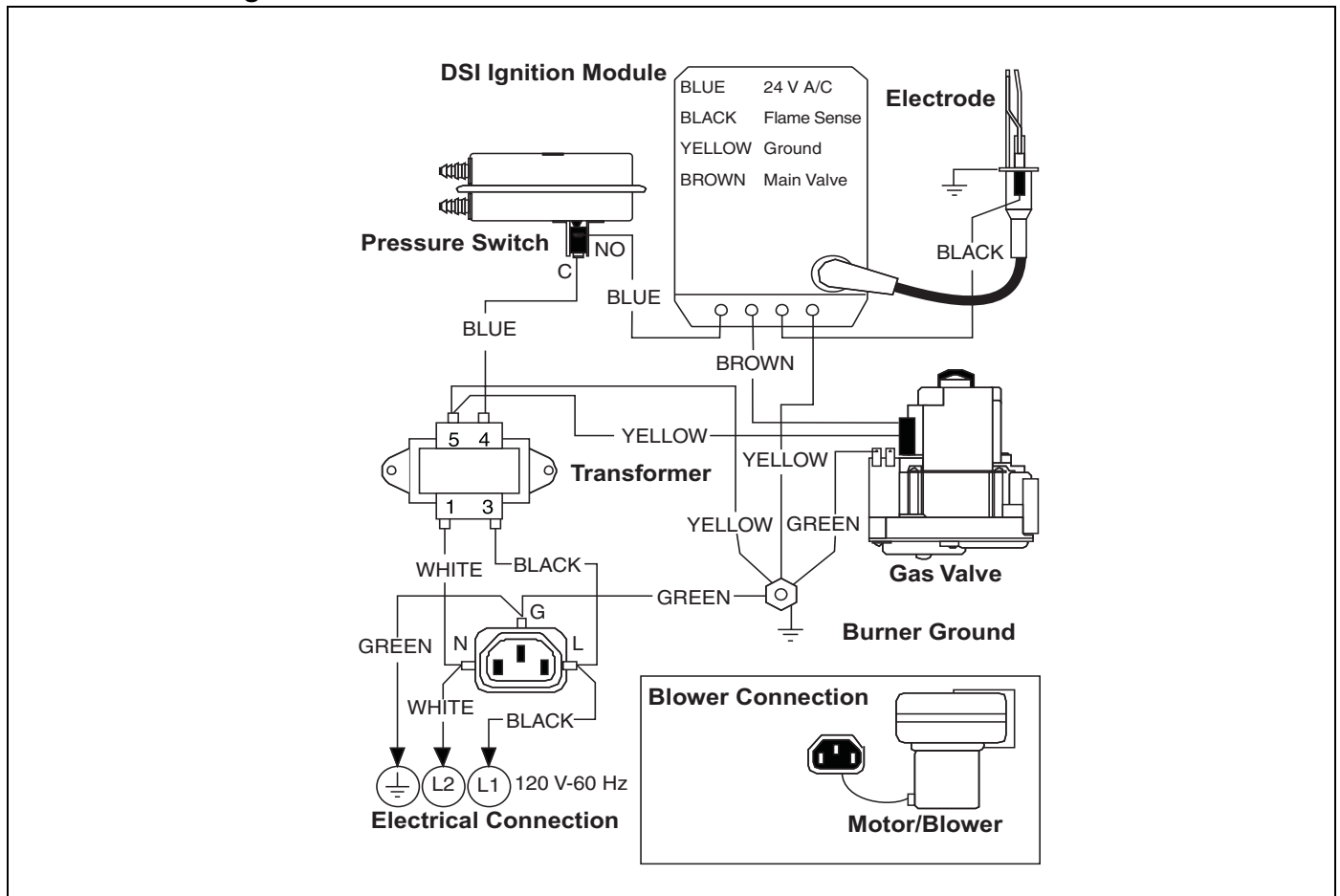
**10.1 Line Voltage Thermostat Wiring**



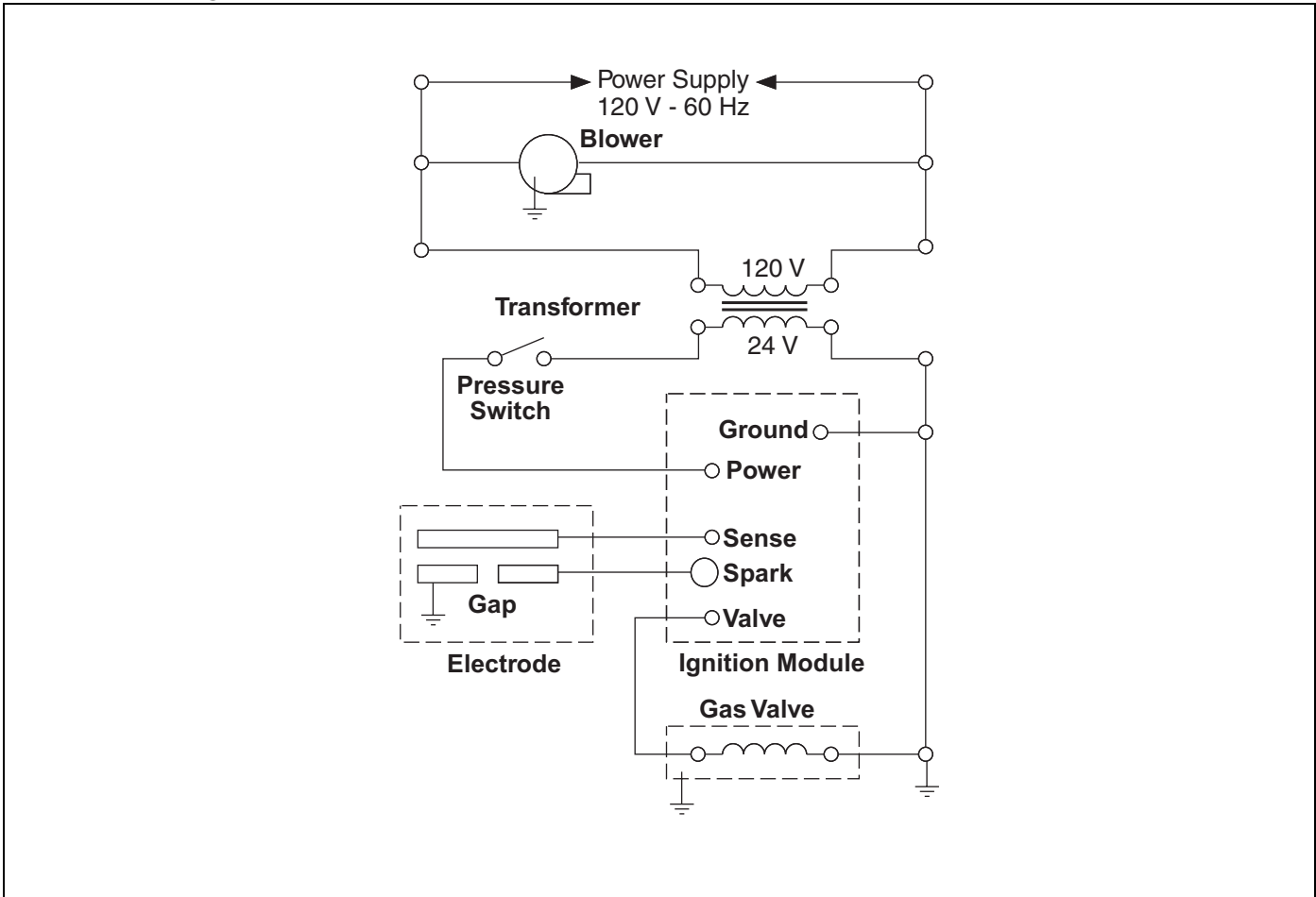
### 10.2 Low Voltage Thermostat Wiring



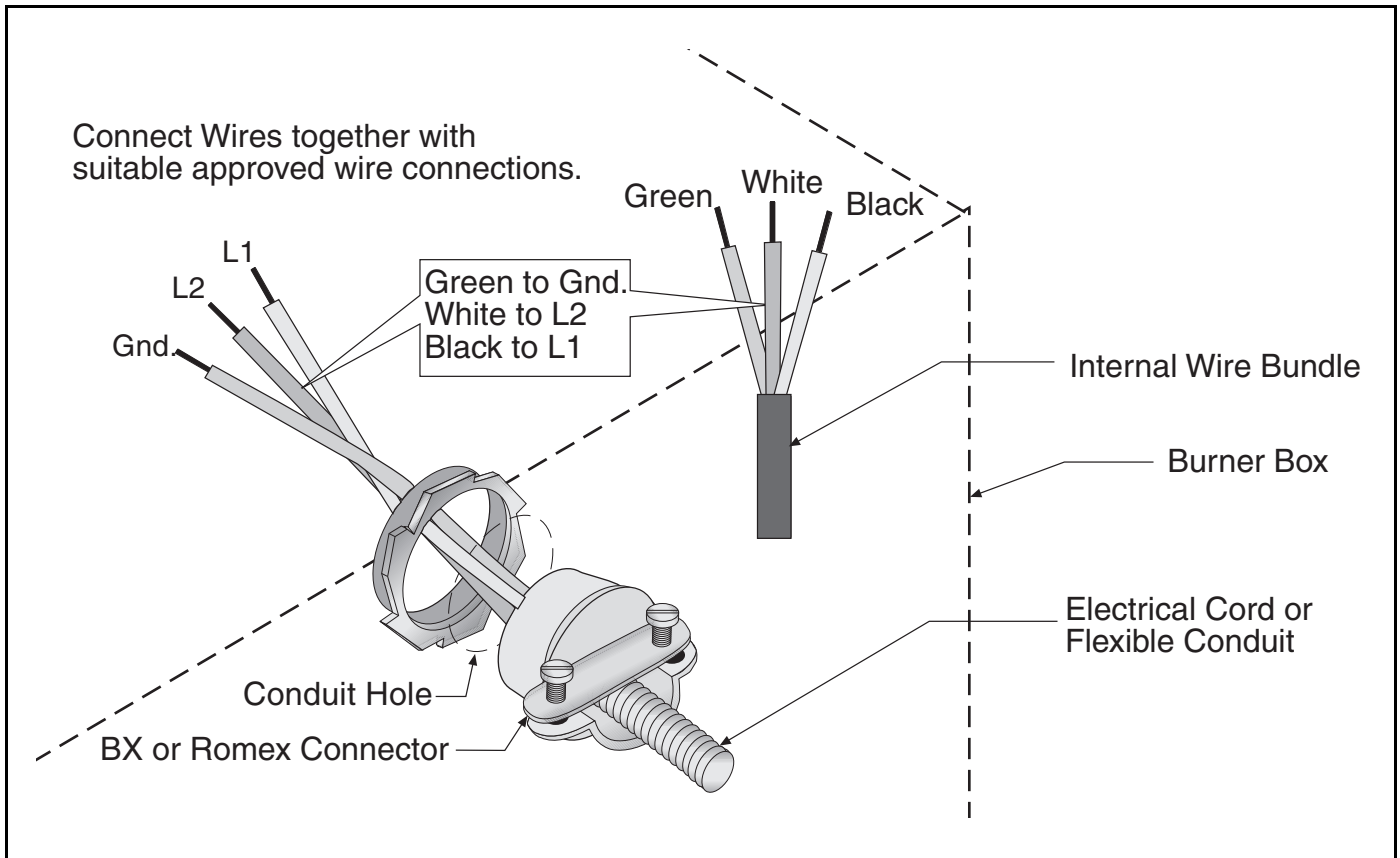
### 10.3 Internal Wiring



### 10.4 Ladder Diagram



### 10.5 Electrical Connection to the Burner



## SECTION 11: OPERATION AND MAINTENANCE

This heater is equipped with a direct spark ignition system.

### 11.1 Sequence of Operation

1. Turn the thermostat up. When the thermostat calls for heat, the blower motor will energize.
2. When the motor approaches nominal running RPM, the pressure switch closes and activates the ignition module.
3. After a 45 second prepurge, the ignition module then opens the gas valve and energizes the spark igniter.
4. When the flame is established, the sparking sequence ceases.
5. If the flame is not established during the ignition sequence, the ignition module closes the gas valve and purge begins. Module will try 2 additional times for ignition (with purges in between trials). If ignition is not established, the module will lockout.
6. If the flame extinguishes during operation, the ignition module will attempt the multiple trial sequence described in step 5. If ignition is not re-established, the module will lockout for one hour or until reset.
7. After lockout, the control can be reset by turning down thermostat for five seconds, and then raising it again to desired temperature, or by disconnecting power and then reconnecting.
8. When thermostat is satisfied, all power to the unit is shut off.

### 11.2 To Shut Off Heater

Set thermostat to lowest setting.  
Turn OFF electric power to heater.  
Turn OFF manual gas valve in the heater supply line.

### 11.3 To Start Heater

Turn gas valve and electric power OFF and wait five minutes for unburned gases to vent from heater.  
Turn ON main gas valve.  
Turn ON electric power.  
Set thermostat to desired temperature.  
Burner should light automatically.

## 11.4 Pre-Season Maintenance and Annual Inspection

### WARNING

Turn off gas and electrical supplies before performing service or maintenance.

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

To ensure your safety and years of trouble-free operation of the heating system, service and annual inspections must be done by a contractor qualified in the installation and service of gas-fired heating equipment.

Turn off gas and electric supplies before performing service or maintenance. Allow heater to cool before servicing.

Before every heating season, a contractor qualified in the installation and service of gas-fired heating equipment must perform a thorough safety inspection of the heater.

For best performance, the gas, electrical, thermostat connections, tubing, venting, suspensions and overall heater condition should be inspected thoroughly.

**NOTE:** Gas flow and burner ignition are among the first things that should be inspected.

Please see *Page 45, Section 11.5* for suggested items to inspect.

## 11.5 Maintenance Checklist

### **⚠ WARNING**

Turn off gas and electrical supplies before performing service or maintenance.

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

**Installation Code and Annual Inspections:** All installations and service of RAPID™ products must be performed by a contractor qualified in the installation and service of gas-fired heating equipment and conform to all requirements set forth in the RAPID™ manuals and all applicable governmental authorities pertaining to the installation, service and operation of the equipment.

To help facilitate optimum performance and safety, Rapid Engineering recommends that a qualified contractor annually inspect your RAPID™ products and perform service where necessary, using only RAPID™ replacement parts.

<b>The Vicinity of the Heater</b>	<p>Do not store or use flammable objects, liquids or vapors near the heater. Immediately remove these items if they are present.</p> <p><i>See Page 3, Section 3.</i></p>
<b>Vehicles and Other Objects</b>	<p>Maintain the clearances to combustibles.</p> <p>Do not hang anything from, or place anything on, the heater.</p> <p>Make sure nothing is lodged underneath the reflector, in between the tubes or in the decorative or protective grilles (included with select models).</p> <p>Immediately remove objects in violation of the clearances to combustibles.</p> <p><i>See Page 3, Section 3.</i></p>
<b>Reflector</b>	<p>Make sure there is no dirt, sagging, cracking or distortion.</p> <p>Do not operate if there is sagging, cracking or distortion.</p> <p>Make sure reflectors are correctly overlapped. <i>See Page 19, Section 6.5.1.</i></p> <p>Clean outside surface with a damp cloth.</p>
<b>Vent Pipe</b>	<p>Venting must be intact. Using a flashlight, look for obstructions, cracks on the pipe, gaps in the sealed areas or corrosion.</p> <p>The area must be free of dirt and dust.</p> <p>Remove any carbon deposits or scale using a wire brush.</p> <p><i>See Page 32, Section 8.</i></p>
<b>Outside Air Inlet</b>	<p>Inlet must be intact. Look for obstructions, cracks on the pipe, gaps in the sealed areas or corrosion.</p> <p>The area must be free of dirt and dust. Clean and reinstall as required.</p>

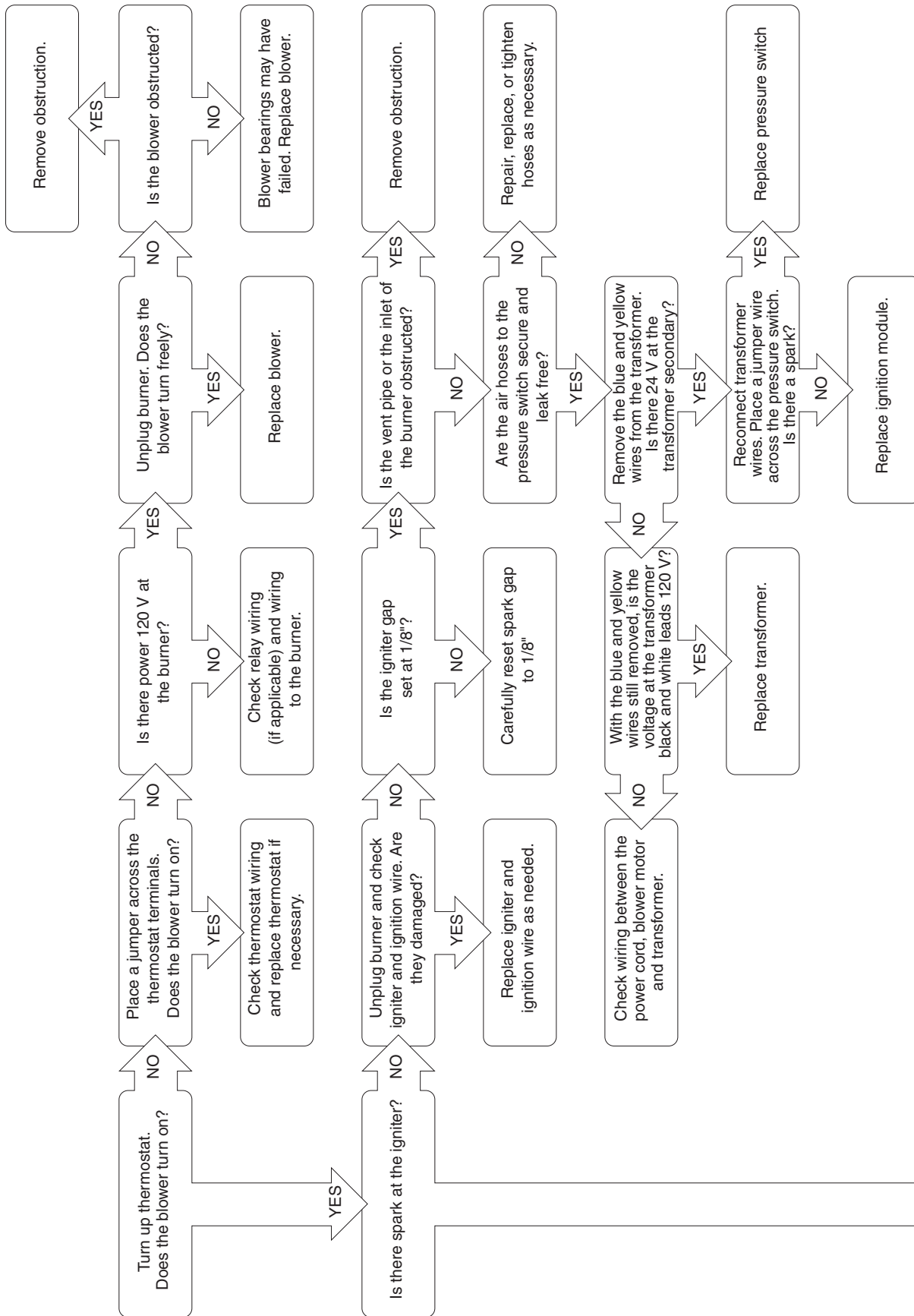
<b>Tubes</b>	<p>Make sure there are no cracks.</p> <p>Make sure tubes are connected and suspended securely.</p> <p><i>See Page 12, Section 6.</i></p> <p>Make sure there is no sagging, bending or distortion.</p> <p>Clean or replace as required.</p>
<b>Gas Line</b>	<p>Check for gas leaks. <i>See Page 39, Section 9.</i></p>
<b>Burner Observation Window</b>	<p>Make sure it is clean and free of cracks or holes.</p> <p>Clean and replace as required.</p>
<b>Blower Scroll, Wheel and Motor</b>	<p>Compressed air or a vacuum cleaner may be used to clean dust and dirt.</p>
<b>Burner Cup and Orifice</b>	<p>Clear of obstructions (even spider webs will cause problems).</p> <p>Carefully remove any dust and debris from the burner.</p>
<b>Electrode</b>	<p>Replace if there are cracked ceramics, excessive carbon residue, or erosion of the electrode.</p> <p>The electrode gap should be 1/8" (3.2 mm).</p>
<b>Thermostat</b>	<p>There should be no exposed wire or damage to the thermostat.</p> <p><i>See Page 40, Section 10.</i></p>
<b>Suspension Points</b>	<p>Make sure the heater is hanging securely. Look for signs of wear on the chain or ceiling.</p> <p><i>See Page 12, Figure 12.</i></p>
<b>Decorative and Protective Grille (optional)</b>	<p>The grille must be securely attached.</p> <p>Check that the side reflector extensions are installed correctly and secured in place if necessary. (Decorative grille only.)</p> <p><i>See Page 27, Section 7.5 and Page 31, Section 7.7</i></p> <p>Make sure shield is installed correctly and secured in place if necessary. (Decorative grille only.) <i>See Page 28, Section 7.5.2.</i></p>
<b>Lower Clearance Shield (optional)</b>	<p>The lower shield must be securely attached. Inspect shield support straps and lower clearance shield anchor points.</p> <p><i>See Page 27, Section 7.4.</i></p> <p>Make sure shield is installed correctly and secured in place if necessary.</p> <p><i>See Page 27, Section 7.4.</i></p>

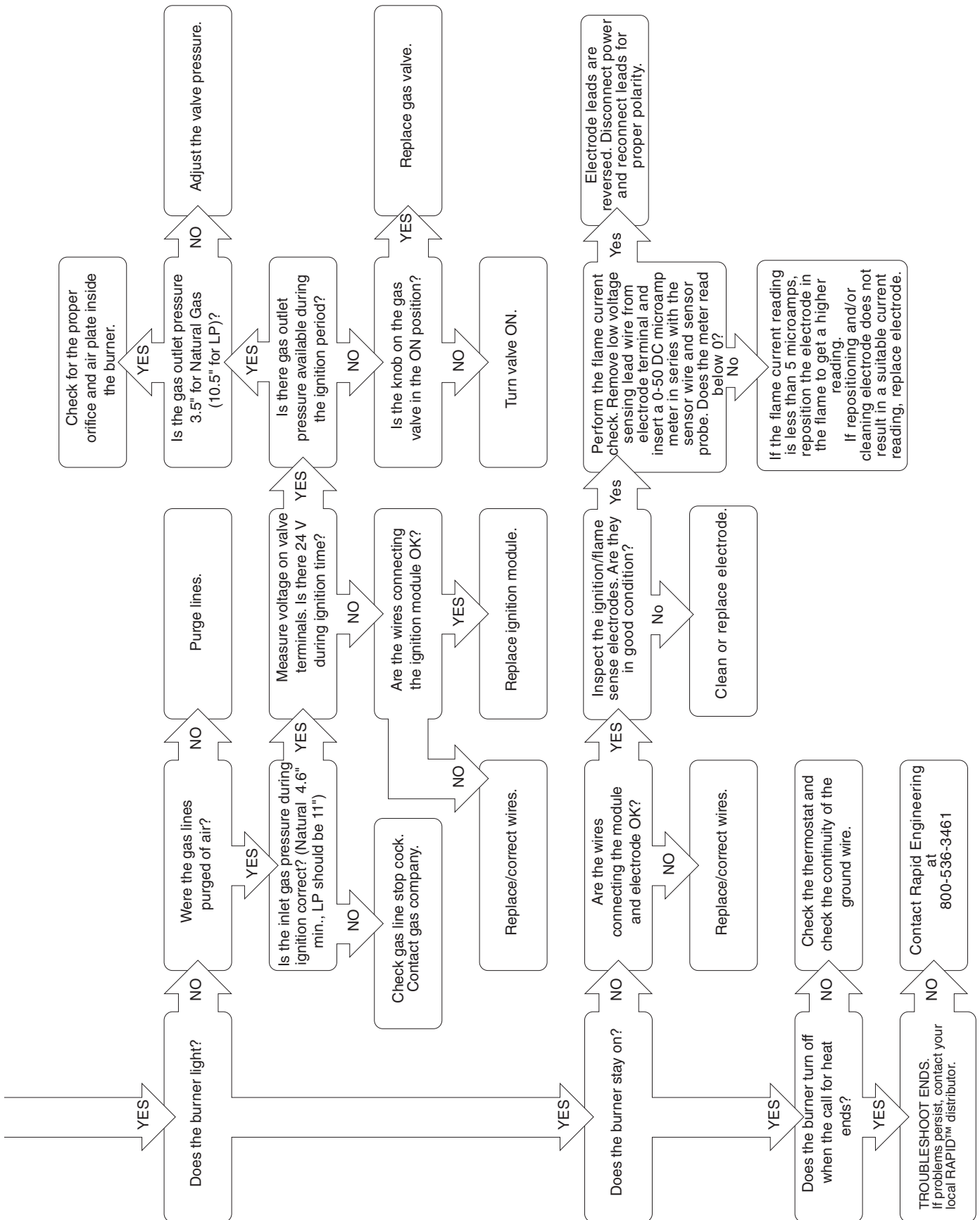
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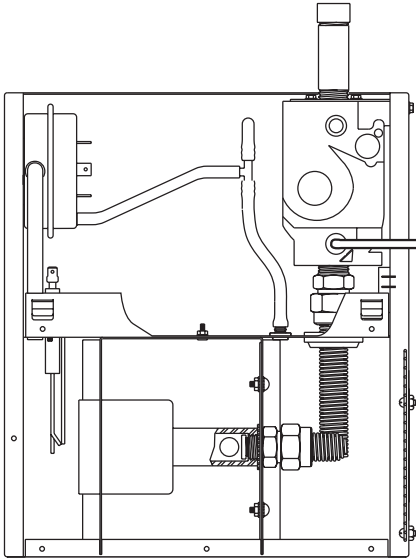
SECTION 12: TROUBLESHOOTING

12.1 Troubleshooting Flow Chart



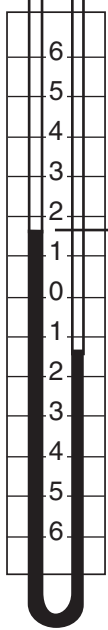


### 12.2 Manifold Gas Pressure Setting

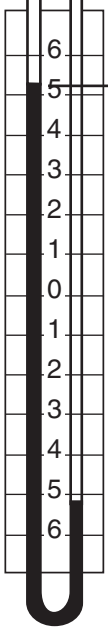


Top View of Heater

Manometer



Natural



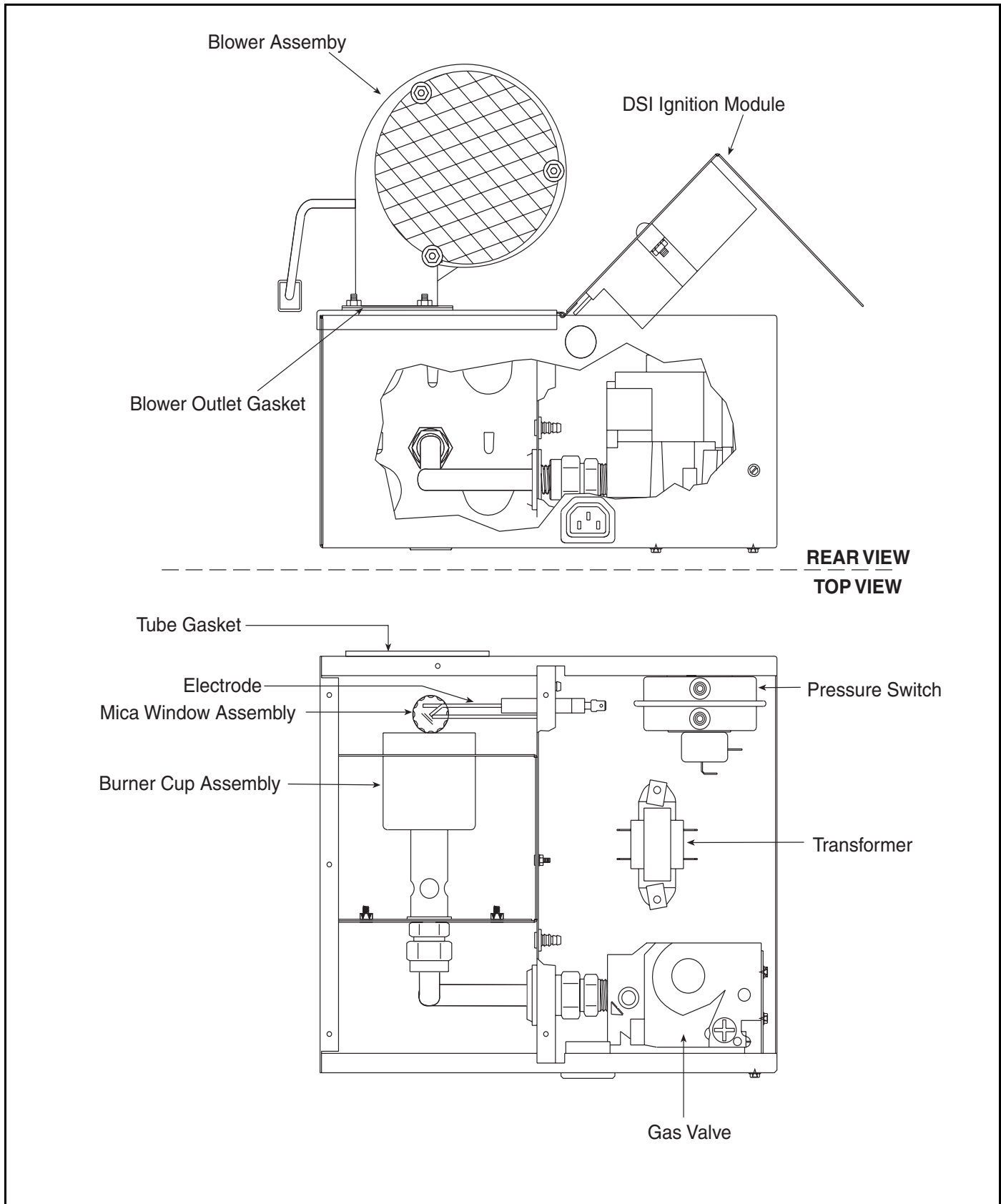
Propane

### SECTION 13: REPLACEMENT PARTS

Use only genuine RAPID™ replacement parts.

Use of parts not specified by Rapid Engineering voids warranty.

Failure to follow these instructions can result in property damage.



<b>Description</b>	<b>Part Number</b>
Mica Window Assembly	02553203
Electrode Gasket	02558501
Tube Gasket	02568200
Burner Cup Assembly	03020100
Gas Valve (Natural)	90032500
Gas Valve (LP)	90032502
Electrode	90427400
DSI Ignition Module	90439500
Transformer	90436900K
Pressure Switch	
(200)	90439801K
(115, 140, 175)	90439802K
(150)	90439803K
(60, 80, 100, 125)	90439805K
(40)	90439808K
Motor/Blower Assembly	90709700
Blower Outlet Gasket	90709801

**SECTION 14: GENERAL SPECIFICATIONS**

**14.1 Material Specification**

**14.1.1 Reflectors**

.024 Aluminum  
(Optional .024 Stainless Steel Type 304)

**14.2 Heater Specifications**

**14.2.1 Ignition**

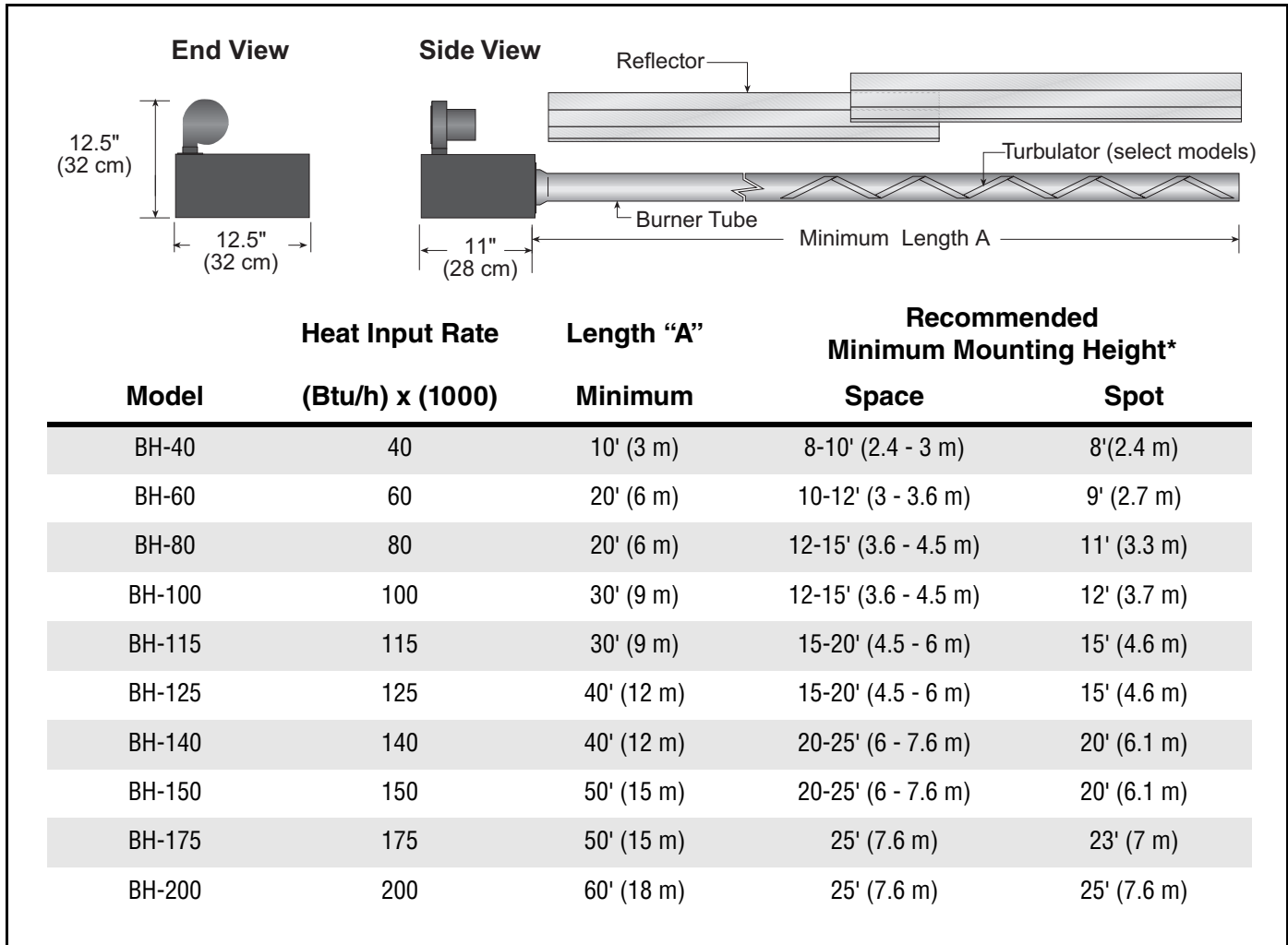
Fully automatic spark ignition with safety shut-off.  
General Specifications for BH-Series heaters are as follows:

**14.3 Suspension Specifications**

Hang heater with materials with a minimum working load of 75 lbs (33 kg). See Page 12, Figure 12.

**14.4 Controls Specifications**

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



\*See Page 3, Section 3 for clearances to combustibles.

**GAS PRESSURE AT MANIFOLD:**

Natural Gas: 3.5" wc  
LP Gas: 10.5" wc

**PIPE CONNECTION:**

1/2" NPT (for BH-40, 60, 80, 100, 115 & 125)  
3/4" NPT (for BH- 140, 150,175 & 200)

**DIMENSIONS:**

Vent Connection Size: 4" (10 cm)  
Outside Air Connection Size: 4" (10 cm)  
Refer to figure above for dimensional information.

**GAS INLET PRESSURE:**

**Natural Gas:**  
for BH-40, 60, 80, 100,  
115, 125, 140, 150 4.6" wc Minimum  
for BH-175, 200 5.0" wc Minimum  
14.0" wc Maximum  
**LP Gas:** 11.0" wc Minimum  
14.0" wc Maximum

**ELECTRICAL RATING (ALL MODELS):**

120 V - 60 Hz, 1 A

**SECTION 15: THE RAPID™ BH WARRANTY****RAPID ENGINEERING WILL PAY FOR:**

Within 42 months from date of shipment from Rapid Engineering, replacement parts will be provided free of charge for any part of the product which fails due to a manufacturing or material defect.

Rapid Engineering will require the part in question to be returned to the factory. Rapid Engineering will, at its sole discretion, repair or replace after determining the nature of the defect and disposition of part in question.

RAPID™ Replacement Parts are warranted for a period of 18 months from date of shipment from Rapid Engineering or the remaining RAPID™ BH warranty.

**RAPID ENGINEERING WILL NOT PAY FOR:**

Service trips, service calls and labor charges.

Shipment of replacement parts.

Claims where the total price of the goods have not been paid.

Damage due to:

- Improper installation, operation or maintenance.
- Misuse, abuse, neglect, or modification of the RAPID™ BH in any way.
- Use of the RAPID™ BH for other than its intended purpose.
- Incorrect gas or electrical supply, accident, fire, floods, acts of God, war, terrorism, or other casualty.
- Improper service, use of replacement parts or accessories not specified by Rapid Engineering.
- Failure to install or maintain the RAPID™ BH as directed in the Installation, Operation and Service manual.
- Relocation of the RAPID™ BH after initial installation
- Use of the RAPID™ BH in a corrosive atmosphere containing contaminants.
- Use of the RAPID™ BH in the vicinity of a combustible or explosive material.
- Any defect in the RAPID™ BH arising from a drawing, design, or specification supplied by or on behalf of the consumer.
- Damage incurred during shipment. Claim must be filed with carrier.

**WARRANTY IS VOID IF:**

The RAPID™ BH is not installed by an electrician qualified in the installation and service of control systems for heating equipment.

You cannot prove original purchase date and required annual maintenance history.

The data plate and/or serial number are removed, defaced, modified or altered in any way.

The ownership of the RAPID™ BH is moved or transferred. This warranty is nontransferable.

Rapid Engineering is not permitted to inspect the damaged controller and/or component parts.

**READ YOUR INSTALLATION, OPERATION AND SERVICE MANUAL.**

If you have questions about your controller, contact your installing professional. Should you need Replacement Parts or have additional questions, call or write Rapid Engineering:

**Rapid Engineering**

1100 Seven Mile Road, NW  
Comstock Park, MI 49321  
616.784.0500

**On the web at:** [www.rapidengineering.com](http://www.rapidengineering.com)

**Rapid Engineering's liability, and your exclusive remedy, under this warranty or any implied warranty (including the implied warranties of merchantability and fitness for a particular purpose) is limited to providing replacement parts during the term of this warranty.** Some jurisdictions do not allow limitations on how long an implied warranty lasts, so this limitation may not apply to you. There are no rights, warranties or conditions, expressed or implied, statutory or otherwise, other than those contained in this warranty.

**Rapid Engineering shall in no event be responsible for incidental or consequential damages or incur liability for damages in excess of the amount paid by you for the RAPID™ BH.** Some jurisdictions do not allow the exclusion or limitation of incidental or consequential damages, so this limitation or exclusion may not apply to you. This warranty gives you specific legal rights, and you may also have other rights which vary from jurisdiction to jurisdiction.

Rapid Engineering shall not be responsible for failure to perform under the terms of this warranty if caused by circumstances out of its control, including but not limited to war, fire, flood, strike, government or court orders, acts of God, terrorism, unavailability of supplies, parts or power. No person is authorized to assume for Rapid Engineering any other warranty, obligation or liability.

**LIMITATIONS ON AUTHORITY OF REPRESENTATIVES:**

No representative of Rapid Engineering, other than an Executive Officer, has authority to change or extend these provisions. Changes or extensions shall be binding only if confirmed in writing by Rapid Engineering's duly authorized Executive Officer.







Attach this information to a wall near the RAPID™ heater.



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

Know your model number and installed configuration.

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

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

**OPERATING INSTRUCTIONS**

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

**TO TURN OFF THE HEATER**

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

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

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

**⚠ WARNING**



**Fire Hazard**

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

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

**Rapid Engineering**  
1100 Seven Mile Road, NW  
Comstock Park, MI 49321  
Telephone: 616.784.0500  
Fax: 616.784.1910  
Toll Free: 800.536.3461

**Installation Code and Annual Inspections:** All installations and service of RAPID™ products must be performed by a contractor qualified in the installation and service of gas-fired heating equipment and conform to all requirements set forth in the RAPID™ manuals and all applicable governmental authorities pertaining to the installation, service and operation of the equipment.

To help facilitate optimum performance and safety, Rapid Engineering recommends that a qualified contractor annually inspect your RAPID™ products and perform service where necessary, using only RAPID™ replacement parts.

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