

## 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.

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

 **ROBERTS GORDON**

# CoRayVac®

## Custom-Engineered, Low-Intensity Infrared Heating Systems

## Installation, Operation & Service Manual

CRV-B-2

CRV-B-4

CRV-B-6

CRV-B-8

CRV-B-9

CRV-B-10

CRV-B-12

CRV-B-12A

## ⚠ 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 to provide your serviceman with information should it become necessary.



**Quality in Any Language™**

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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.

## ►SECTION 2: INSTALLER RESPONSIBILITY

The Installer is responsible for the following:

- To ensure the system is designed in accordance with the parameters of the CORAYVAC® design manual (P/N 127500US).
- To install the heating system, as well as the gas and electrical supplies, in accordance with applicable specifications and codes. Roberts-Gordon 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 heating system 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 ladder or other access equipment and never hang or suspend anything from the heater.

## 2.1 Halogenated Hydrocarbons

### 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.**

Roberts-Gordon 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 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.*

## ► SECTION 3: CRITICAL CONSIDERATIONS

### 3.1 Minimum Required Clearances to Combustibles

Clearances are the required distances that combustible objects must be away from the tube to prevent serious fire hazards. 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 your safety.**

Clearances for all heater models are located on the burner of the heater and on *Pages 3-5, Section 3, Figures 1-9* 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 heating system 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 doors, overhead cranes, vehicle lifts, partitions, storage racks, hoists, 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 heating system in accordance to the suspension requirements on *Page 15, Section 8, Step 8.1*.
- 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.

## ⚠ WARNING



### Fire Hazard

**Some objects will 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.**

- NOTE:** 1. All dimensions are from the surfaces of all tubes, combustion chambers, couplings, tees, elbows and crosses.
2. Clearances B, C and D can be reduced by 50% after 25' (7.5 m) of tubing downstream from the burner.
3. “-” indicates an unapproved application. Roberts-Gordon does not allow the installation of unapproved applications.

### CLEARANCES TO COMBUSTIBLES

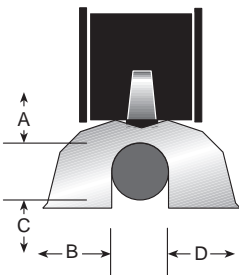
STANDARD REFLECTOR									
	(inches)				(centimeters)				
	A	B	C	D	A	B	C	D	
	Model	A	B	C	D	A	B	C	D
	CRV-B-2	4	20	48	20	10	50	120	50
	CRV-B-4	4	20	48	20	10	50	120	50
	CRV-B-6	4	20	48	20	10	50	120	50
	CRV-B-8	4	20	48	20	10	50	120	50
	CRV-B-9	4	36	60	36	10	90	150	90
	CRV-B-10	4	36	60	36	10	90	150	90
	CRV-B-12	4	36	60	36	10	90	150	90
	CRV-B-12A	4	36	60	36	10	90	150	90

FIGURE 1

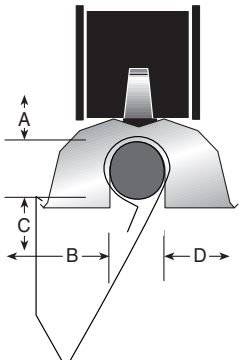
ONE SIDE REFLECTOR									
	(inches)				(centimeters)				
	A	B	C	D	A	B	C	D	
	Model	A	B	C	D	A	B	C	D
	CRV-B-2	4	12	56	20	10	30	140	50
	CRV-B-4	4	12	56	20	10	30	140	50
	CRV-B-6	4	12	56	20	10	30	140	50
	CRV-B-8	4	12	56	20	10	30	140	50
	CRV-B-9	4	12	60	42	10	30	150	105
	CRV-B-10	4	12	60	42	10	30	150	105
	CRV-B-12	4	12	60	42	10	30	150	105
	CRV-B-12A	4	12	60	42	10	30	150	105

FIGURE 2

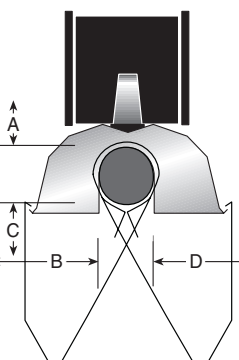
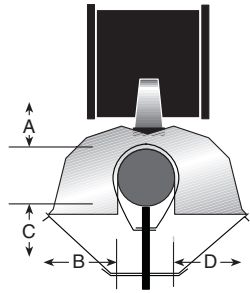
TWO SIDE REFLECTORS									
	(inches)				(centimeters)				
	A	B	C	D	A	B	C	D	
	Model	A	B	C	D	A	B	C	D
	CRV-B-2	4	12	56	12	10	30	140	30
	CRV-B-4	4	12	56	12	10	30	140	30
	CRV-B-6	4	12	56	12	10	30	140	30
	CRV-B-8	4	12	56	12	10	30	140	30
	CRV-B-9	4	12	60	12	10	30	150	30
	CRV-B-10	4	12	60	12	10	30	150	30
	CRV-B-12	4	12	60	12	10	30	150	30
	CRV-B-12A	4	12	60	12	10	30	150	30

FIGURE 3

- NOTE:** 1. All dimensions are from the surfaces of all tubes, combustion chambers, couplings, tees, elbows and crosses.
2. Clearances B, C and D can be reduced by 50% after 25' (7.5 m) of tubing downstream from the burner.
3. “-” indicates an unapproved application. Roberts-Gordon does not allow the installation of unapproved applications.

### CLEARANCES TO COMBUSTIBLES

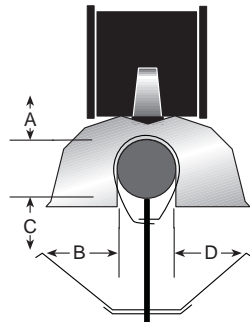
#### UNIVERSAL SHIELD (POSITION 1)



Model	(inches)				(centimeters)			
	A	B	C	D	A	B	C	D
CRV-B-2	4	12	12	12	10	30	30	30
CRV-B-4	4	12	12	12	10	30	30	30
CRV-B-6	4	12	12	12	10	30	30	30
CRV-B-8	4	12	12	12	10	30	30	30
CRV-B-9	8	18	24	18	20	45	60	45
CRV-B-10	8	18	24	18	20	45	60	45
CRV-B-12	8	18	24	18	20	45	60	45
CRV-B-12A	8	18	24	18	20	45	60	45

FIGURE 4

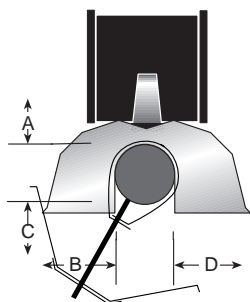
#### UNIVERSAL SHIELD (POSITION 2)



Model	(inches)				(centimeters)			
	A	B	C	D	A	B	C	D
CRV-B-2	4	20	48	20	10	60	120	60
CRV-B-4	4	20	48	20	10	60	120	60
CRV-B-6	4	20	48	20	10	60	120	60
CRV-B-8	4	20	48	20	10	60	120	60
CRV-B-9	4	36	48	36	10	90	120	90
CRV-B-10	4	36	48	36	10	90	120	90
CRV-B-12	4	36	48	36	10	90	120	90
CRV-B-12A	4	36	48	36	10	90	120	90

FIGURE 5

#### UNIVERSAL SHIELD (POSITION 3)



Model	(inches)				(centimeters)			
	A	B	C	D	A	B	C	D
CRV-B-2	4	12	56	30	10	30	140	75
CRV-B-4	4	12	56	30	10	30	140	75
CRV-B-6	4	12	56	30	10	30	140	75
CRV-B-8	4	12	56	30	10	30	140	75
CRV-B-9	8	12	60	42	20	30	150	105
CRV-B-10	8	12	60	42	20	30	150	105
CRV-B-12	8	12	60	42	20	30	150	105
CRV-B-12A	8	12	60	42	20	30	150	105

FIGURE 6

- NOTE:** 1. All dimensions are from the surfaces of all tubes, combustion chambers, couplings, tees, elbows and crosses.
2. Clearances B, C and D can be reduced by 50% after 25' (7.5 m) of tubing downstream from the burner.
3. "-" indicates an unapproved application. Roberts-Gordon does not allow the installation of unapproved applications.

### CLEARANCES TO COMBUSTIBLES

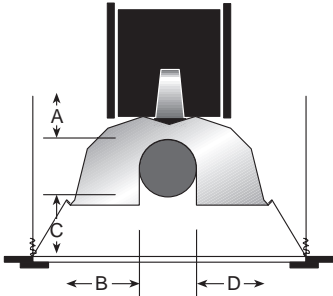
2 FOOT DECO GRILLE									
	Model	(inches)				(centimeters)			
		A	B	C	D	A	B	C	D
	CRV-B-2	4	12	48	12	10	30	120	30
	CRV-B-4	4	12	48	12	10	30	120	30
	CRV-B-6	4	12	48	12	10	30	120	30
	CRV-B-8	4	12	48	12	10	30	120	30
	CRV-B-9	4	18	56	18	10	45	140	45
	CRV-B-10	4	18	56	18	10	45	140	45
	CRV-B-12	4	18	56	18	10	45	140	45
	CRV-B-12A	4	18	56	18	10	45	140	45

FIGURE 7

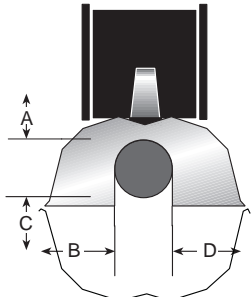
BARRIER SHIELD									
	Model	(inches)				(centimeters)			
		A	B	C	D	A	B	C	D
	CRV-B-2	4	12	12	12	10	30	30	30
	CRV-B-4	4	12	12	12	10	30	30	30
	CRV-B-6	4	12	12	12	10	30	30	30
	CRV-B-8	4	12	12	12	10	30	30	30
	CRV-B-9	-	-	-	-	-	-	-	-
	CRV-B-10	-	-	-	-	-	-	-	-
	CRV-B-12	-	-	-	-	-	-	-	-
	CRV-B-12A	-	-	-	-	-	-	-	-

FIGURE 8

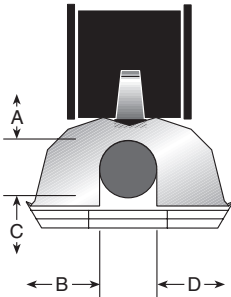
PROTECTIVE GRILLE AND 1 FOOT DECO GRILLE									
	Model	(inches)				(centimeters)			
		A	B	C	D	A	B	C	D
	CRV-B-2	4	20	48	20	10	50	120	50
	CRV-B-4	4	20	48	20	10	50	120	50
	CRV-B-6	4	20	48	20	10	50	120	50
	CRV-B-8	4	20	48	20	10	50	120	50
	CRV-B-9	4	36	60	36	10	90	150	90
	CRV-B-10	4	36	60	36	10	90	150	90
	CRV-B-12	4	36	60	36	10	90	150	90
	CRV-B-12A	4	36	60	36	10	90	150	90

FIGURE 9

## ►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 Bulletin 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 heaters.
- In shops, offices and other sections of aircraft hangars communicating with aircraft storage or servicing areas, heaters shall be installed not less than 8' (2.6 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 Standard for Repair Garages, NFPA 88B - 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' (2.6 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

Entire heating system must be wired and 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.



## ►SECTION 5: STANDARD PARTS LIST

**Table 1.** Contents of CORAYVAC® Carton (CRV-B all models)

Part No.	Description	Quantity
<b>0270XXXX</b>	Burner	1
<b>013676XX</b>	End Vent Plate	1
<b>01397300</b>	Accessory Package	1
01361200	Filter Support Disk	1
01367800	Combustion Chamber Gasket	1
02724901	Door Assembly w/ Hole	1
91115100	Screw #10 - 24x5/8	4
91119500	U Clip	4
91905500	Filter Support	1
92123900	Nut 5/16 - 18	2
92511601	Wing Nut #10 - 24	1
96411600	Lockwasher 5/16"	2
01312401	Filter and Gasket	1

**Table 2.** Common CORAYVAC® System Components

### Tubing and Related Accessories

01312700	4" Plain Coupling
01312706	6" Plain Coupling
0131270I	4" Lined Coupling
01331900	4" Damper Coupling
E0009356	6" Damper Coupling
0133022D	4" Coated Tee
0133025D	6" Coated Tee
01330203	4" Aluminized Tee
01330204	6" Aluminized Tee
0133092D	4" Coated Cross
0133095D	6" Coated Cross
01330903	4" Aluminized Cross
01330904	6" Aluminized Cross
01330800	4" Tube Plug
01335801	4" Aluminized 90° Elbow
T0100320	6" Aluminized 90° Elbow
0133580D	4" Coated 90° Elbow
0133660D	6" Coated 90° Elbow
01336101	4" Aluminized 45° Elbow
0133610D	4" Coated 45° Elbow
91409300	16 Ga. Hot Rolled Steel 4" dia. 10' Tube
91409403	16 Ga. Non-heat treated Aluminized 4" dia. 10' Tube
91409408	16 Ga. Heat Treated Aluminized 4" dia. 10' Tube
91409420	16 Ga. Non-heat treated Aluminized 6" dia. 10' Tube

9141030D	16 Ga. Coated 4" dia. 10' Tube
9141060D	16 Ga. Coated 6" dia. 10' Tube
E0009105	16 Ga. Heat Treated Aluminized 6" dia. 10' Tube
91418200	Aluminized Tube Adapter 6" dia. x 4" dia.
02722100	4" Cast Iron Adapter
91240010	6" Tube Hanger
91308001	High Temperature Pipe Compound, 1lb. can.

### Venting Accessories

01316000	Outside Air Supply Blower Mounting Kit
01324401	4" Outside Air Supply Takeoff
01326801	Outside Air Filter Housing
90707500	Air Supply Blower/Power Venter
91409601	4" Outside Air Flex Duct (Box of 8 - 8' sections)
90434501	Outside Air Pressure Switch

### Reflectors and Related Accessories

01329910	Reflector Side Extension Support
03050010	Reflector Support Package (Tubing)
02712700	Reflector Side Extension, 2 Clips ,2 Screws
02716400	Reflector Support Package (Sch 40 Pipe)
02750303	Aluminum Reflector
027503SS	Stainless Steel Reflector
02750304	Aluminum Reflector with Hole
027503SH	Stainless Steel Reflector with Hole
02750800	Aluminum Reflector End Cap
027508SS	Stainless Steel Reflector End Cap
027508SH	Stainless Steel Reflector End Cap with Hole
02750900	Reflector Joint
027509SS	Stainless Steel Reflector Joint
03090100	Tube and Reflector Hanger
02790300	Tube and Reflector Hanger (Cast Iron)
91907302	"S" Hook
91903201	Turnbuckle
02712100	Universal Shield Support
02751800	Universal Shield with Holes
02751801	Universal Shield

### Controls and Thermostats

BZC100	ROBERTS GORDON® BZC 100 Controller with Sensor
--------	---

BZC300	ROBERTS GORDON® BZC 300 Controller
BZC700	ROBERTS GORDON® BZC 700 Controller
10001500	Internal Sensor
02770002	System Control
05023000	Load Relay Package
90417600	Transformer Relay - SPST (12A)
90436300	Transformer Relay - DPDT (12A)
90423000	24V Low Voltage Thermostat (Marked 1-5)
10050002	12V DC Starter for EP-201, 1PH*
10050003	120V AC Starter for EP-201, 1PH*
10050004	12V DC Starter for EP-301, 1PH*
10050005	120V AC Starter for EP-301, 1PH*
10050006	120V AC Contactor for EP-301, 1PH**
10050007	12V DC Contactor for EP-301, 1PH**
90424300	Thermostat Guard

**Deco Grille (1' x 8')**

01363003	Bracket
01365901	End Piece
01365902	Reinforcement
01365903	Joint Piece
91406700	1' x 8' Protective Grille

**Deco Grille (2' x 4')**

01365900	Shield Frame
01370408	Reflector Side Extension 8" x 48"
01370412	Reflector Side Extension 12" x 48"
01370416	Reflector Side Extension 16" x 48"
91407000	Aluminum Grille 2' x 4'

**Protective Grille**

08050001	40" Protective Grille
08050002	Protective Grille End Cap

**Pump Packages and Accessories****02719105 EP-100 Pump Package**

02719100	EP-100 Pump
02724700	Accessory Package

**02716305 EP-201 Pump Package**

01312001	EP-201 Pump
01317805	Accessory Package

**02713014 EP-301 Pump Package 4"**

02719300	EP-301 Pump
02719303	Accessory Package

**02713016 EP-301 Pump Package 6"**

02719300	EP-301 Pump
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02719304	Accessory Package
----------	-------------------

**Accessories**

90430600	Pressure Switch
01327000	Condensate Trap Assembly for EP-201 Pump
02718851	4" Drain Cap
91216001	6" Drain Cap

\* Optional for use with ROBERTS GORDON® BZC Controllers if pump trip indication is desired.

\*\* Required for use with the EP-301.



**►SECTION 6: DESIGN REQUIREMENTS**

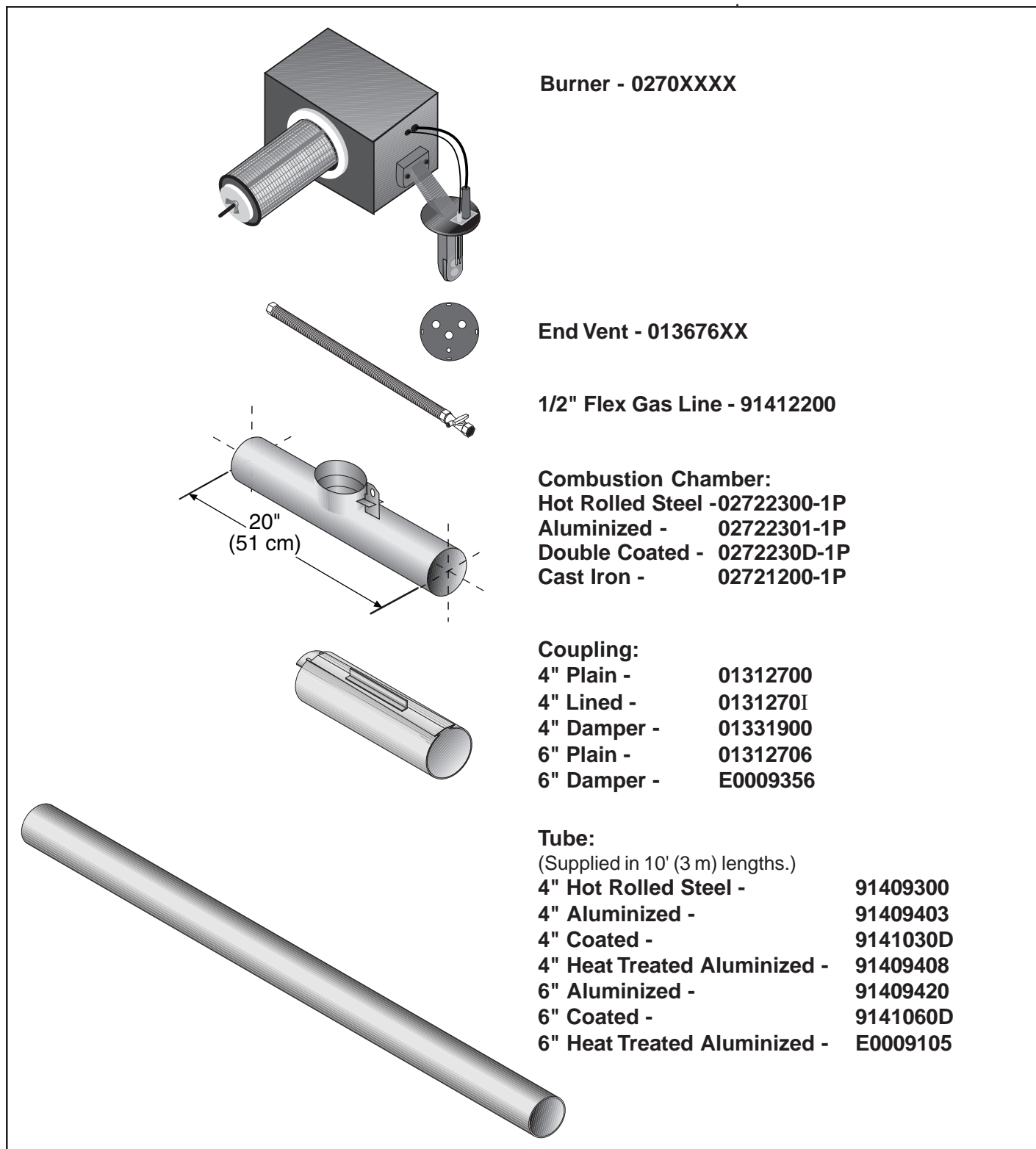
The CORAYVAC® systems design is related to the system operation and performance required by the building being heated. Every effort should be made to follow the dimensions on the layout drawing. If deviations are necessary, either contact the company responsible for the layout design, your ROBERTS GORDON® independent distributor, or consult the CORAYVAC® Design Manual (P/N 127500US).

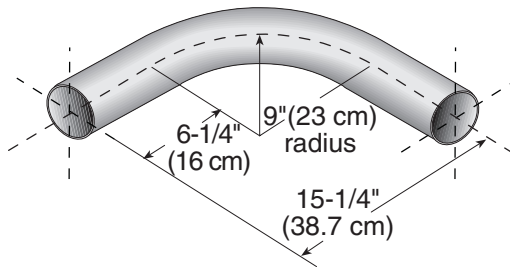
## ► SECTION 7: ASSEMBLY OVERVIEW

The figures in this section provide a general overview of component placement in a CORAYVAC® system. The location of some components such as supports and couplings is crucial for proper installation. Assemble the heater components as shown on *Page 14, Section 7, Figure 11*.

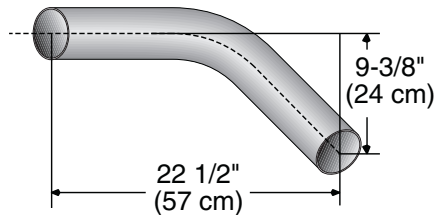
Optional reflector configurations are shown on *Pages 3-5, Section 3, Figures 1-9*. Install appropriate suspension hardware, beam clamps, chain or rod at predetermined locations. Adjustments of chain length will provide uniform pitch.

**FIGURE 10 – Major Components' Descriptions**

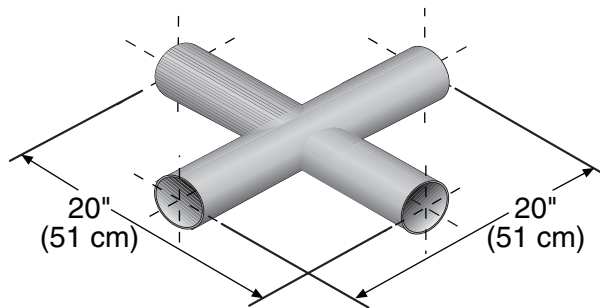


**FIGURE 10 – Major Components' Descriptions**

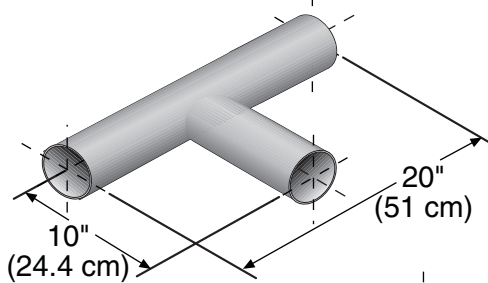
**90° Elbow:**  
 4" Coated - 0133580D  
 4" Aluminized - 01335801  
 6" Coated - 0133660D  
 6" Aluminized - T0100320



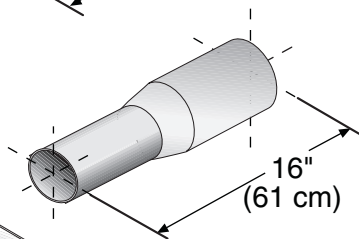
**45° Elbow:**  
 4" Coated - 0133610D  
 4" Aluminized - 01336101



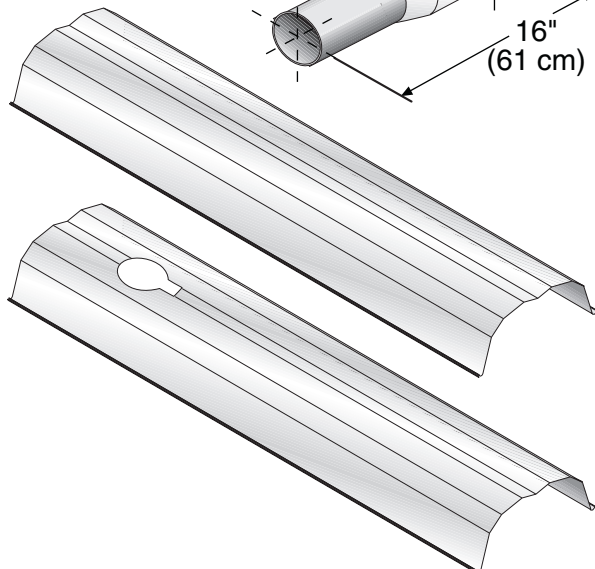
**Cross:**  
 4" Coated - 0133092D  
 4" Aluminized - 01330903  
 6" Coated - 0133095D  
 6" Aluminized - 01330904



**Tee:**  
 4" Coated - 0133022D  
 4" Aluminized - 01330203  
 6" Coated - 0133025D  
 6" Aluminized - 01330204



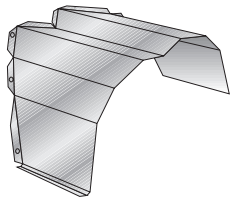
**Tube Adapter:**  
 6" to 4" Aluminized 91418200



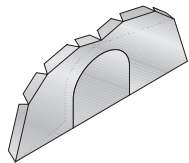
**Aluminum Reflector (8') - 02750303**  
**Stainless Steel Reflector (8') - 027503SS**

**Aluminum Reflector with Hole (8') - 02750304**  
**Stainless Steel Reflector with Hole (8') - 027503SH**

**FIGURE 10 – Major Components' Descriptions**

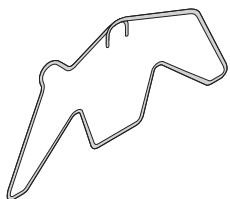


**Reflector Joint - 02750900**

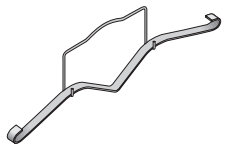


**Reflector End Cap - 02750800**  
**Stainless Steel Reflector End Cap - 027508SS**

Remove center section to accommodate heat exchanger tube when necessary.



**Tube and Reflector Hanger - 03090100**



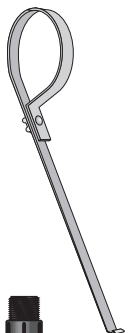
**Reflector Support Package - 03050010**



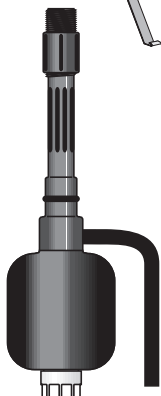
**"S" Hook - 91907302**



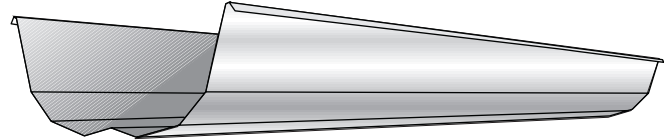
**Turnbuckle - 91903201**



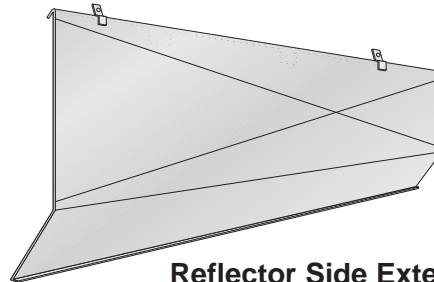
**Reflector Side Extension Bracket - 01329910**



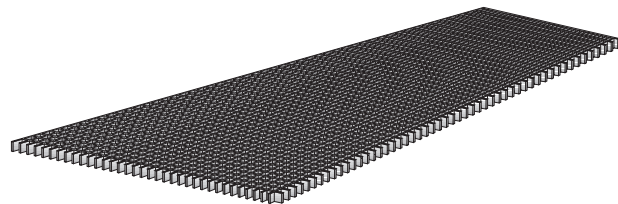
**Condensate Trap Assembly - 01327000**



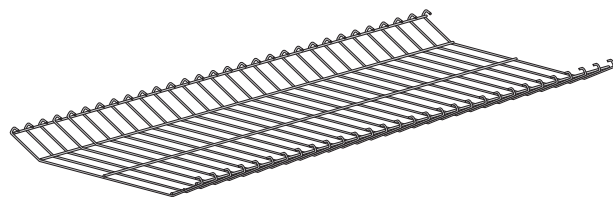
**Barrier Shield - 02750303**



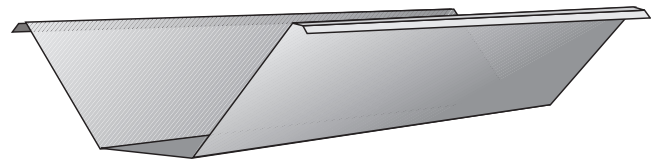
**Reflector Side Extension (8') - 02712700**



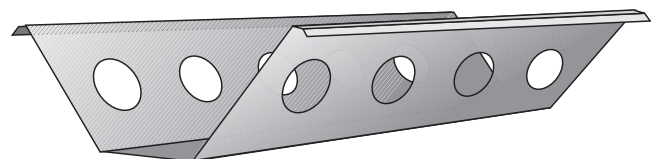
**Deco Grille (2' x 4') - 91407000**  
**(1' x 8') - 91406700**



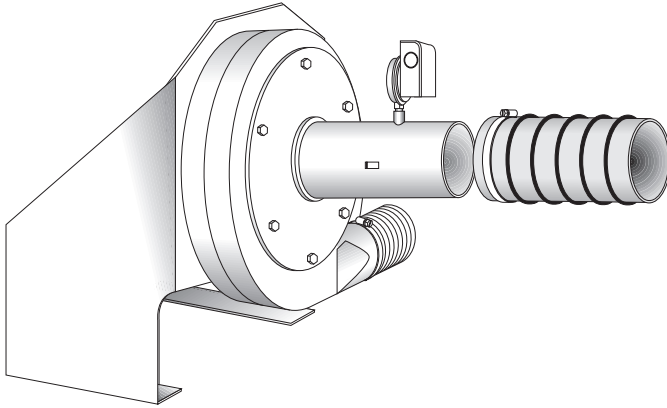
**Protective Grille (40") - 08050001**



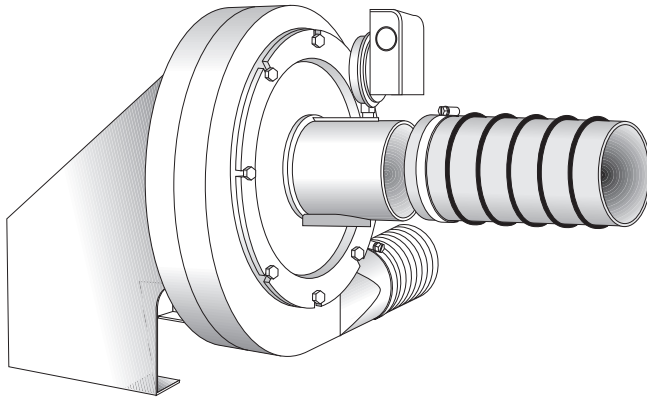
**Universal Shield (8') - 02751801**  
**Stainless Steel Universal Shield (8') - 027518SS**



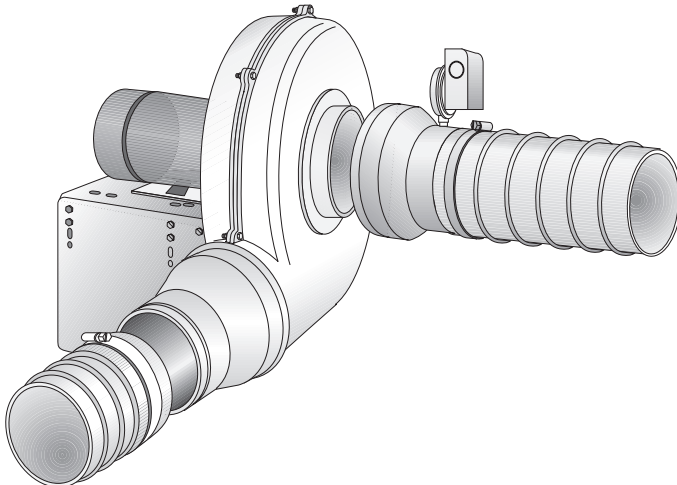
**Universal Shield with Holes - 02751800**

**FIGURE 10 – Major Components' Descriptions**

**EP-101 Pump Package - 4" dia. - 02719105**  
 For more information, refer to the EP-100  
 Installation, Operation and Service Manual  
 P/N 127201NA.



**EP-201 Pump Package - 4" dia. - 02716305**  
 For more information, refer to the EP-201  
 Installation, Operation and Service Manual  
 P/N 127200NA.



**EP-301 Pump Package - 4" dia. - 02713014**  
**EP-301 Pump Package - 6" dia. - 02713016**  
 For more information, refer to the EP-301  
 Installation, Operation and Service Manual  
 P/N 127202NA.



**ROBERTS GORDON® BZC 700**  
**Controller - BZC700**

**ROBERTS GORDON® BZC 300**  
**Controller - BZC300**

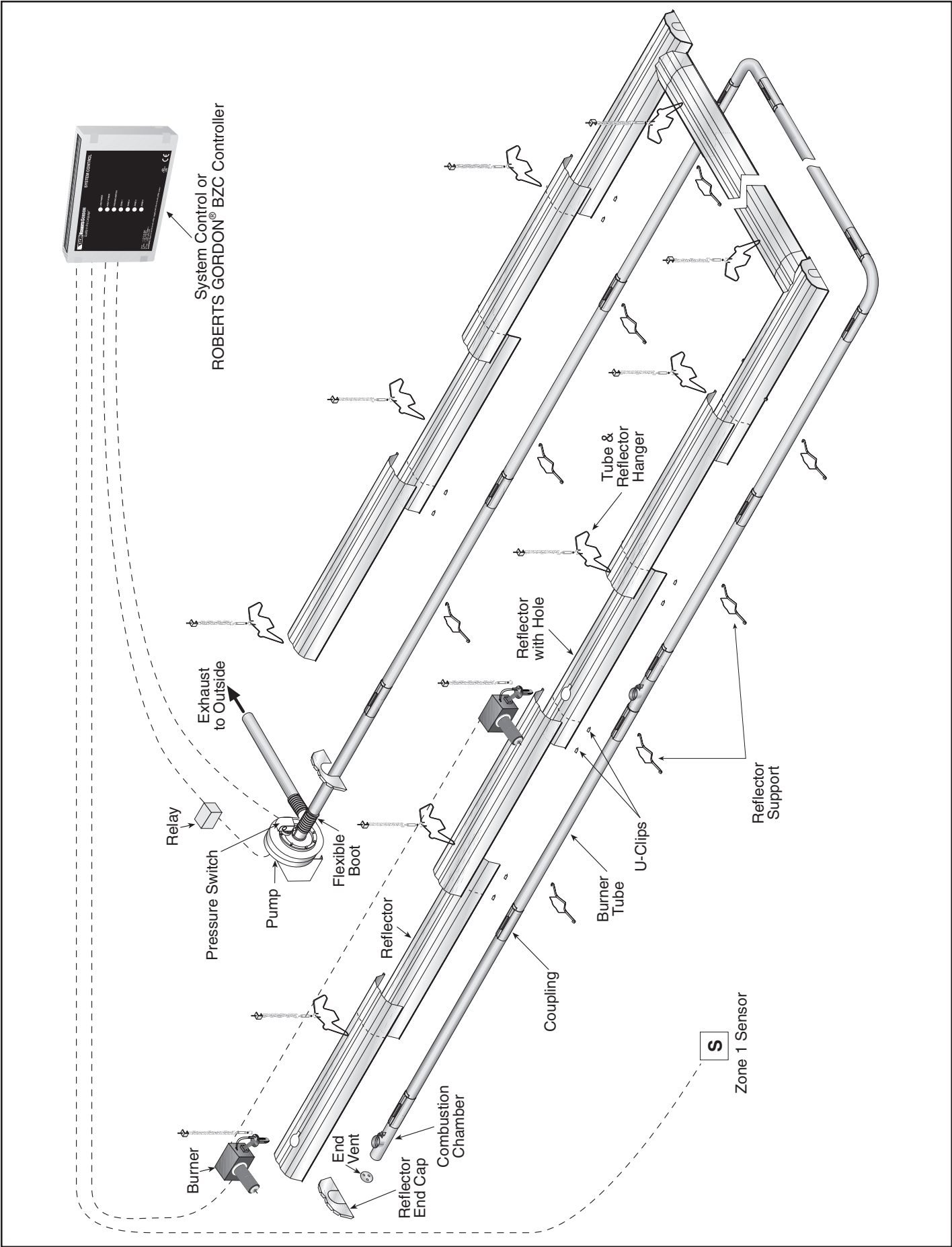
**ROBERTS GORDON® BZC 100**  
**Controller with Sensor - BZC100**

**Sensor - 10001500**



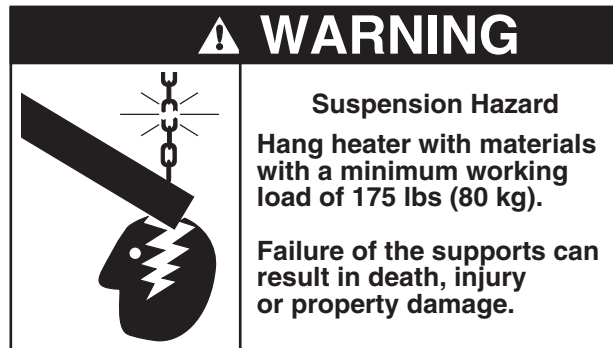
**System Control - 02770002**

FIGURE 11 –CRV Assembly Overview

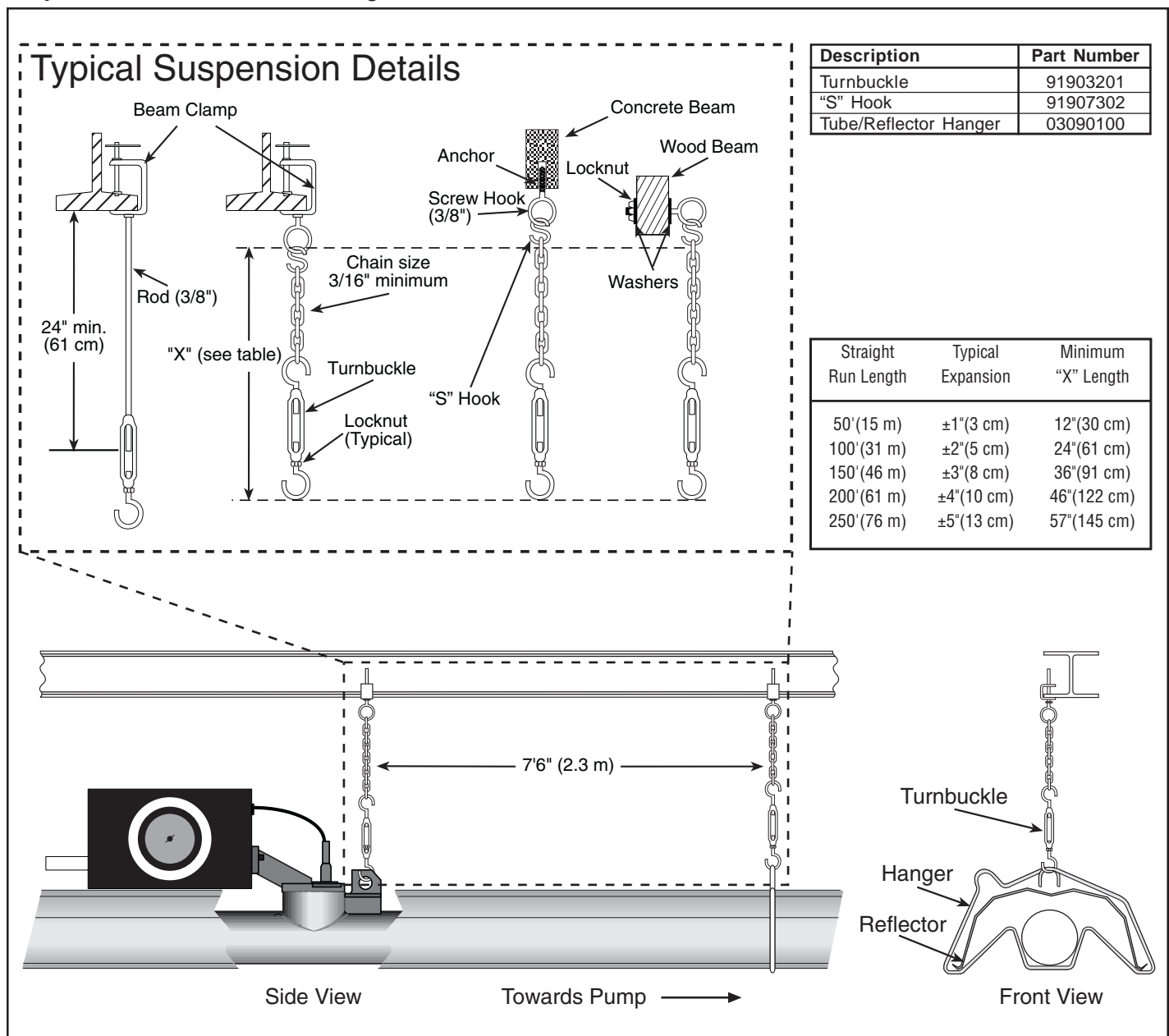




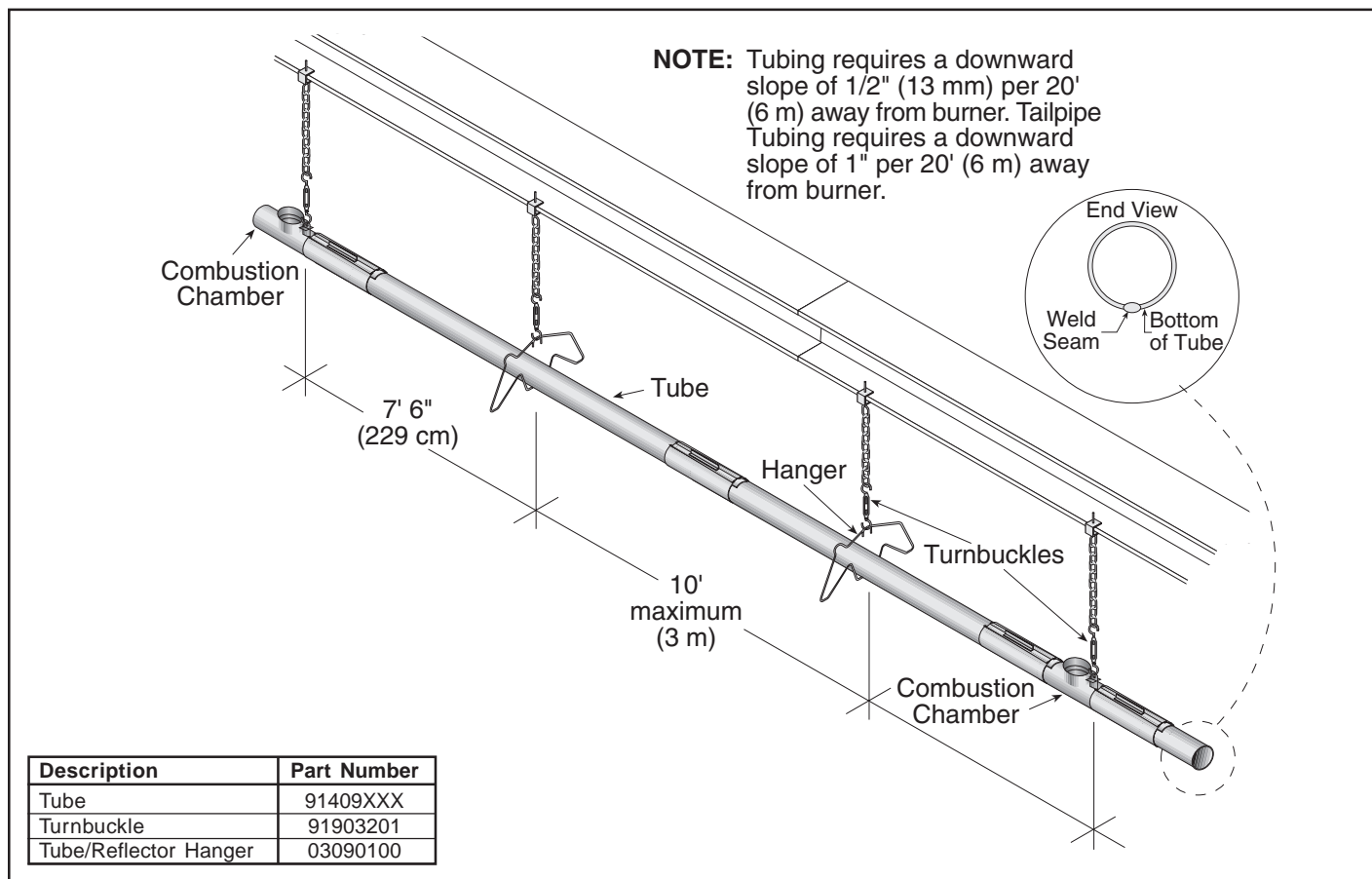
## ►SECTION 8: HEATER INSTALLATION



Sections 8.1 - 8.13 show the logical sequence of heater installation, pictorially. Follow these steps in order and if any questions arise, refer to the assembly overview (*Page 14, Section 7, Figure 11*) for guidance. If any step is unclear, please contact your ROBERTS GORDON® independent distributor or Roberts-Gordon at (716) 852-4400 or (800) 828-7450 in the U.S., (905) 945-5403 or (800) 663-9025 in Canada or at [www.rg-inc.com](http://www.rg-inc.com).

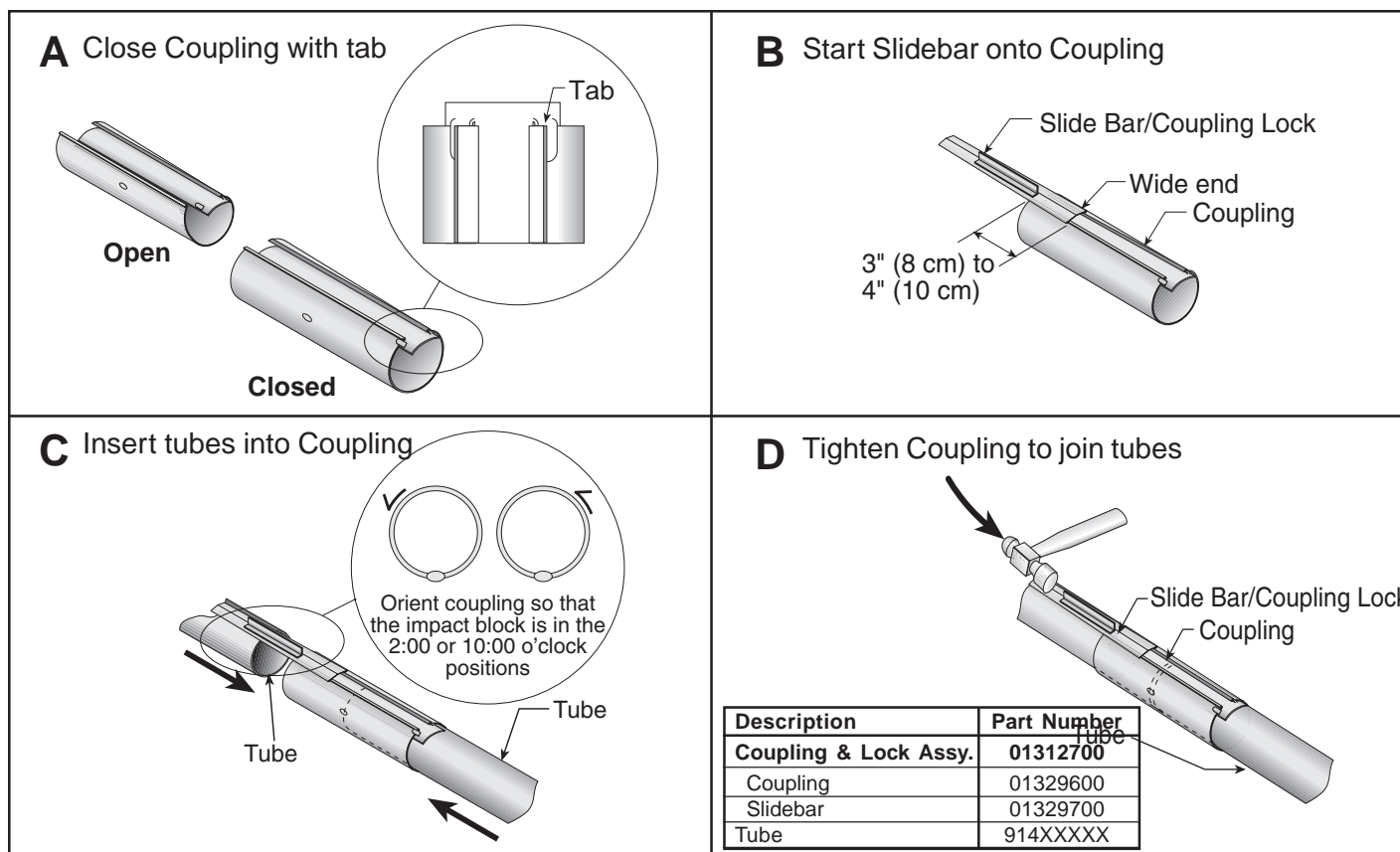
**Step 8.1 – Determine Critical Hanger Placement**

## Step 8.2 – Tube Assembly



## 8.3 Coupling and Tube

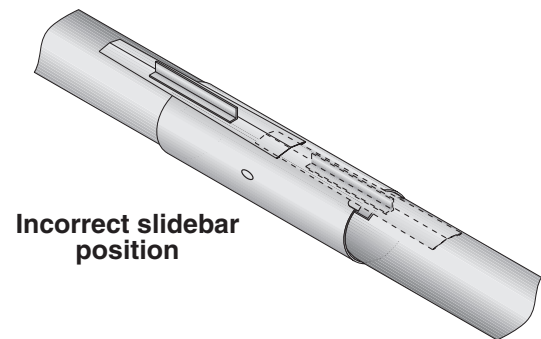
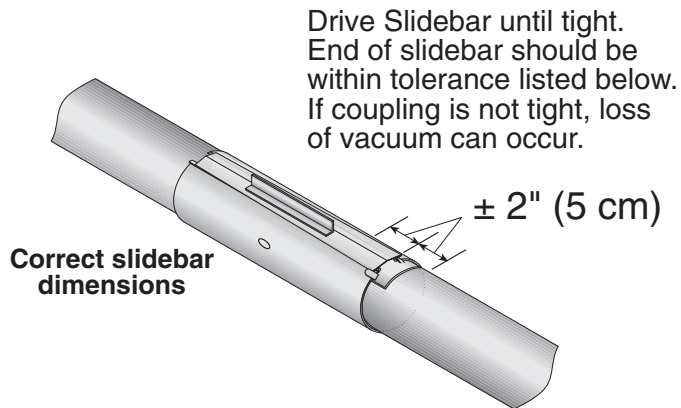
### Step 8.3.1 – Coupling and Tube Assembly



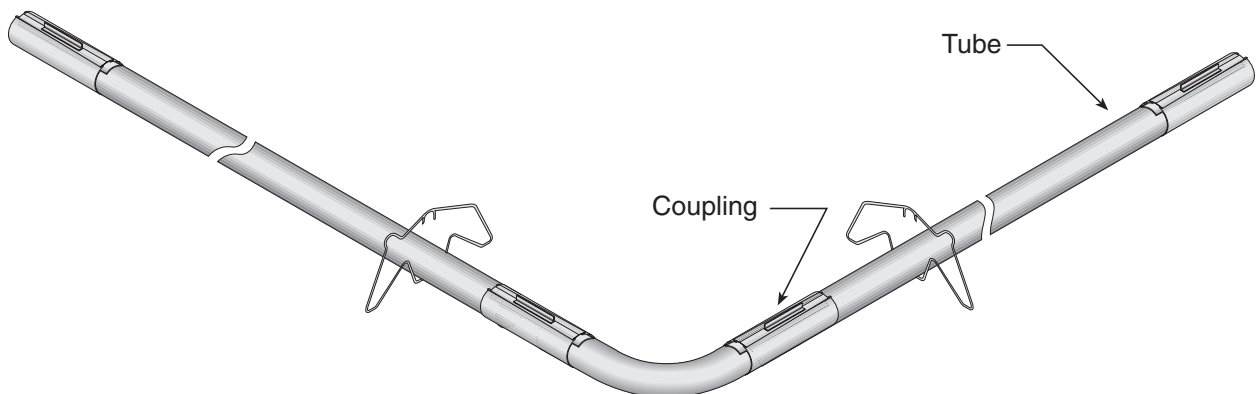


**Step 8.3.2 – Coupling and Tube Assembly (Continued)**

**Tighten slidebar as shown below.**

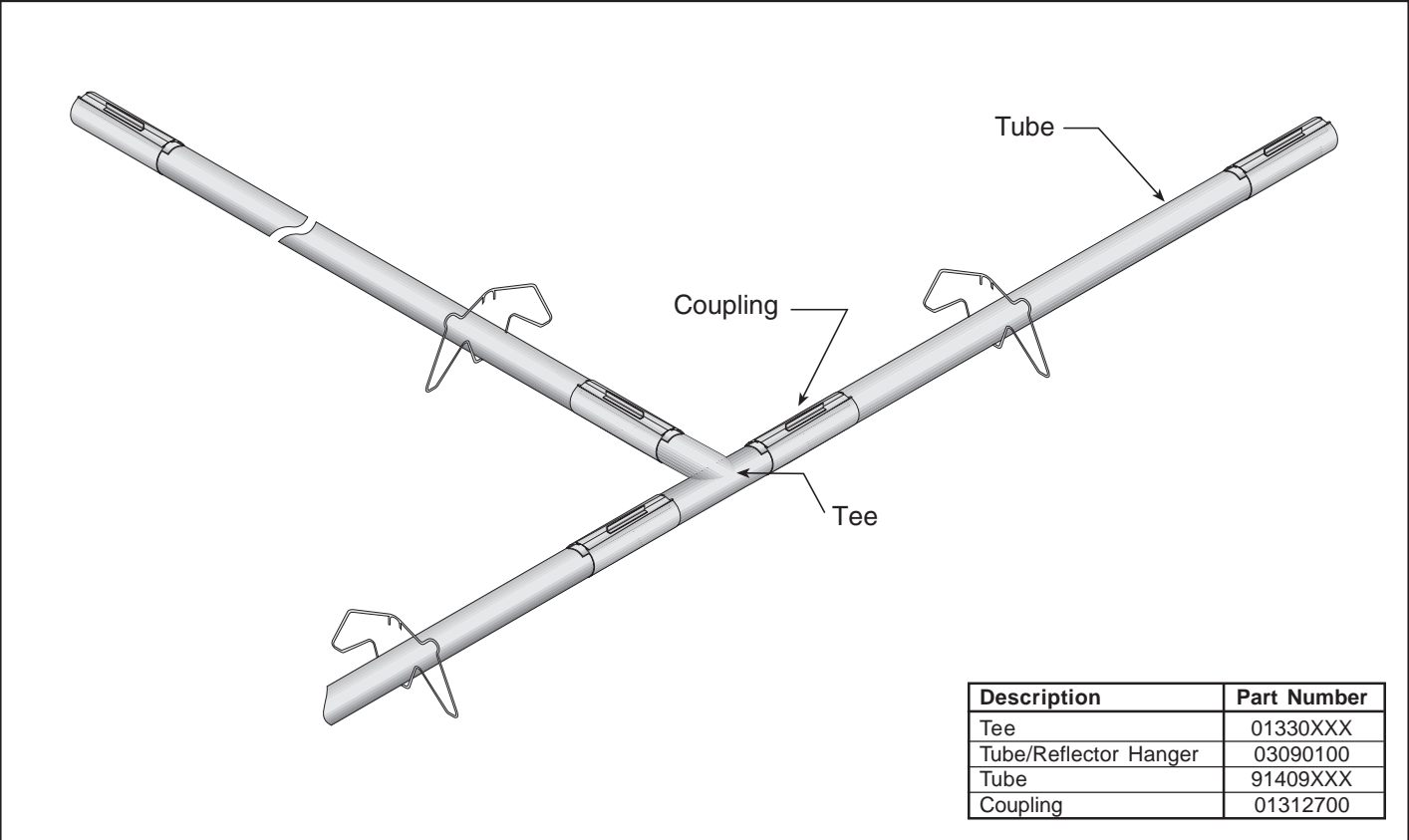


- Repeat steps 8.3.1 A-D until all tubes are assembled.

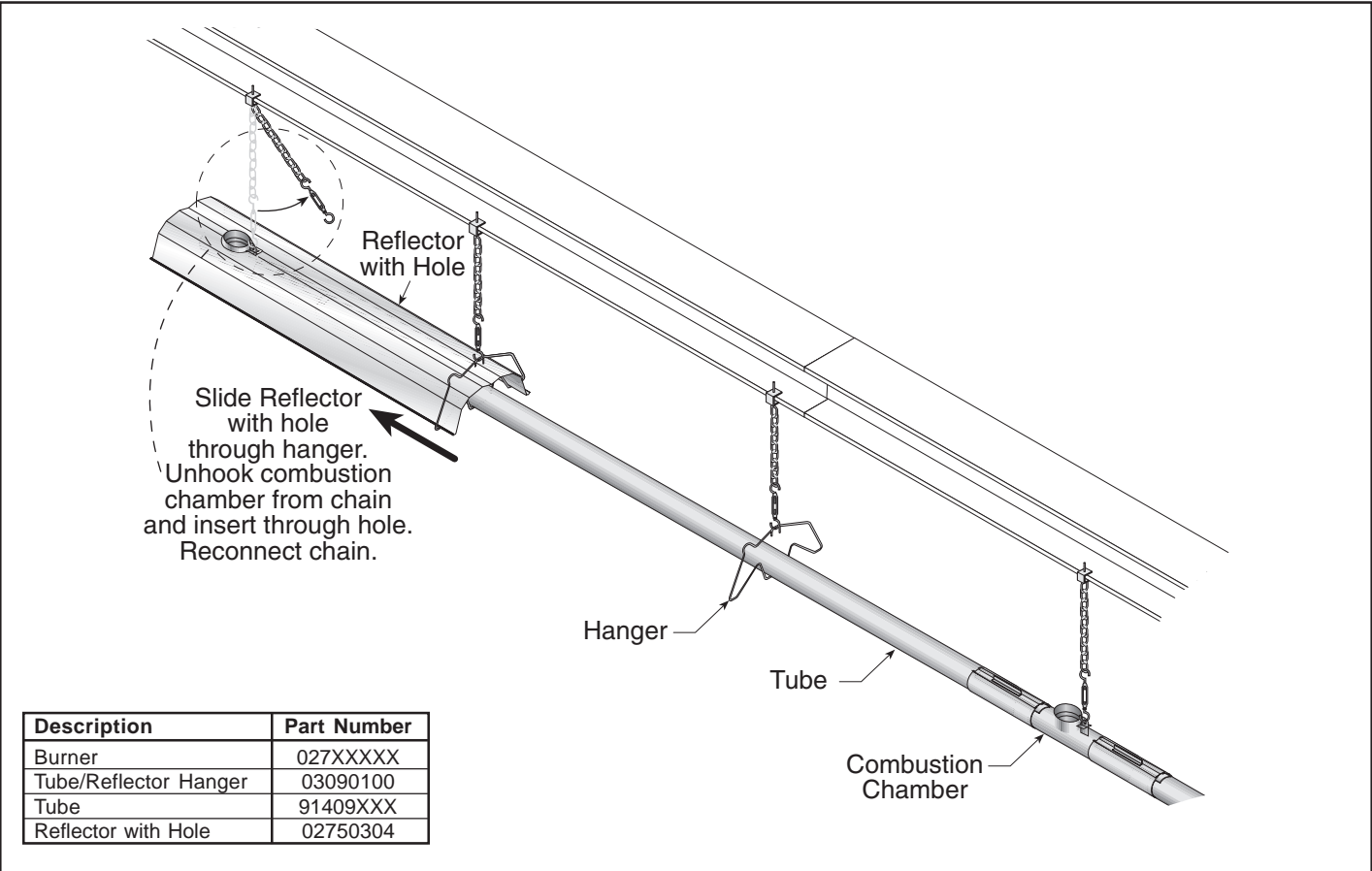
**8.4 Elbow Package Configuration****Step 8.4.1 – Elbow Package**

Description	Part Number
Tube	914XXXXX
<b>Elbow Package</b>	<b>02718702</b>
90° Elbow	01335801
Coupling	01312700

Step 8.4.2 – Tee



8.5 Reflector  
Step 8.5.1 – Reflector with Hole



## Step 8.5.2 – Reflector

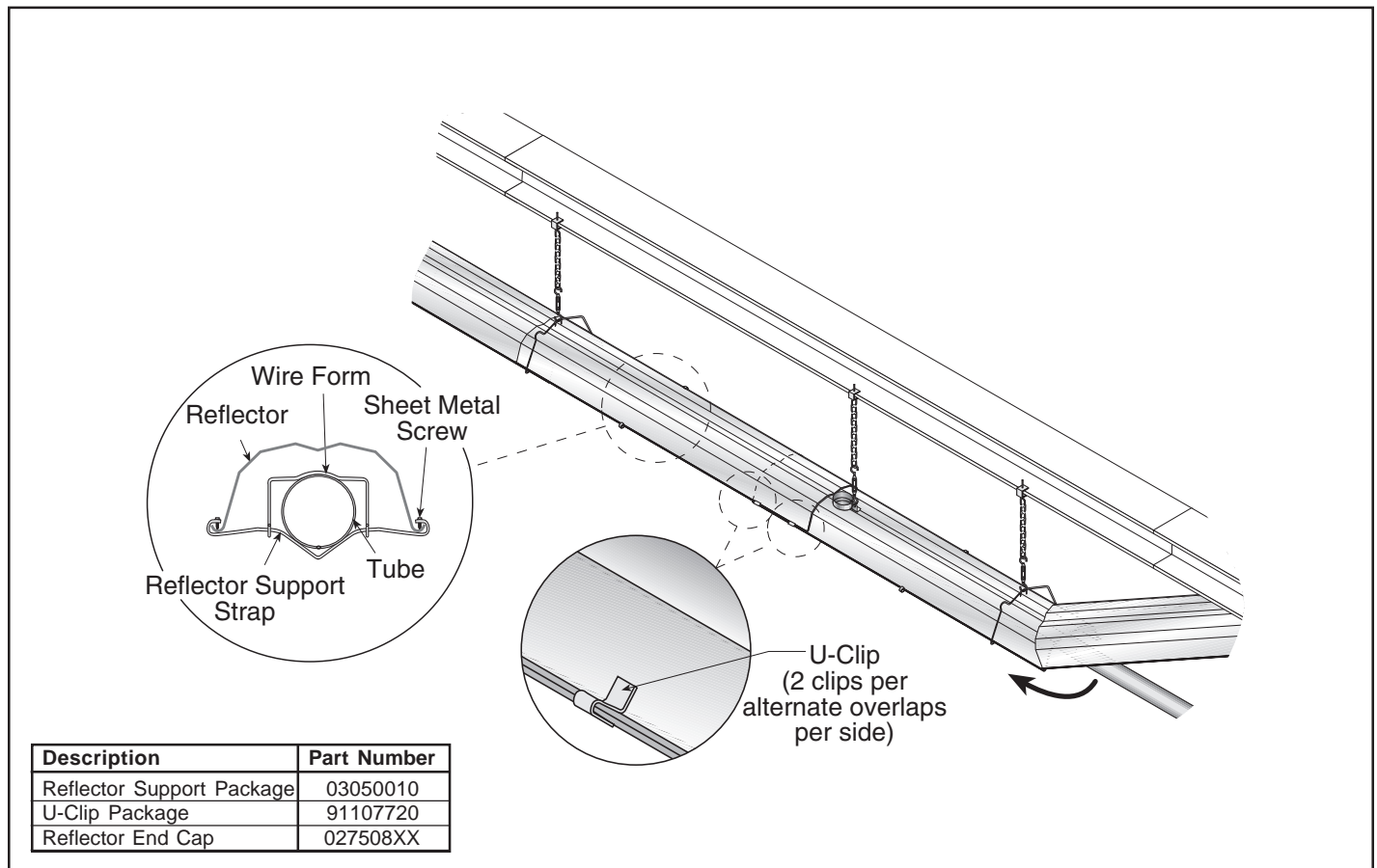
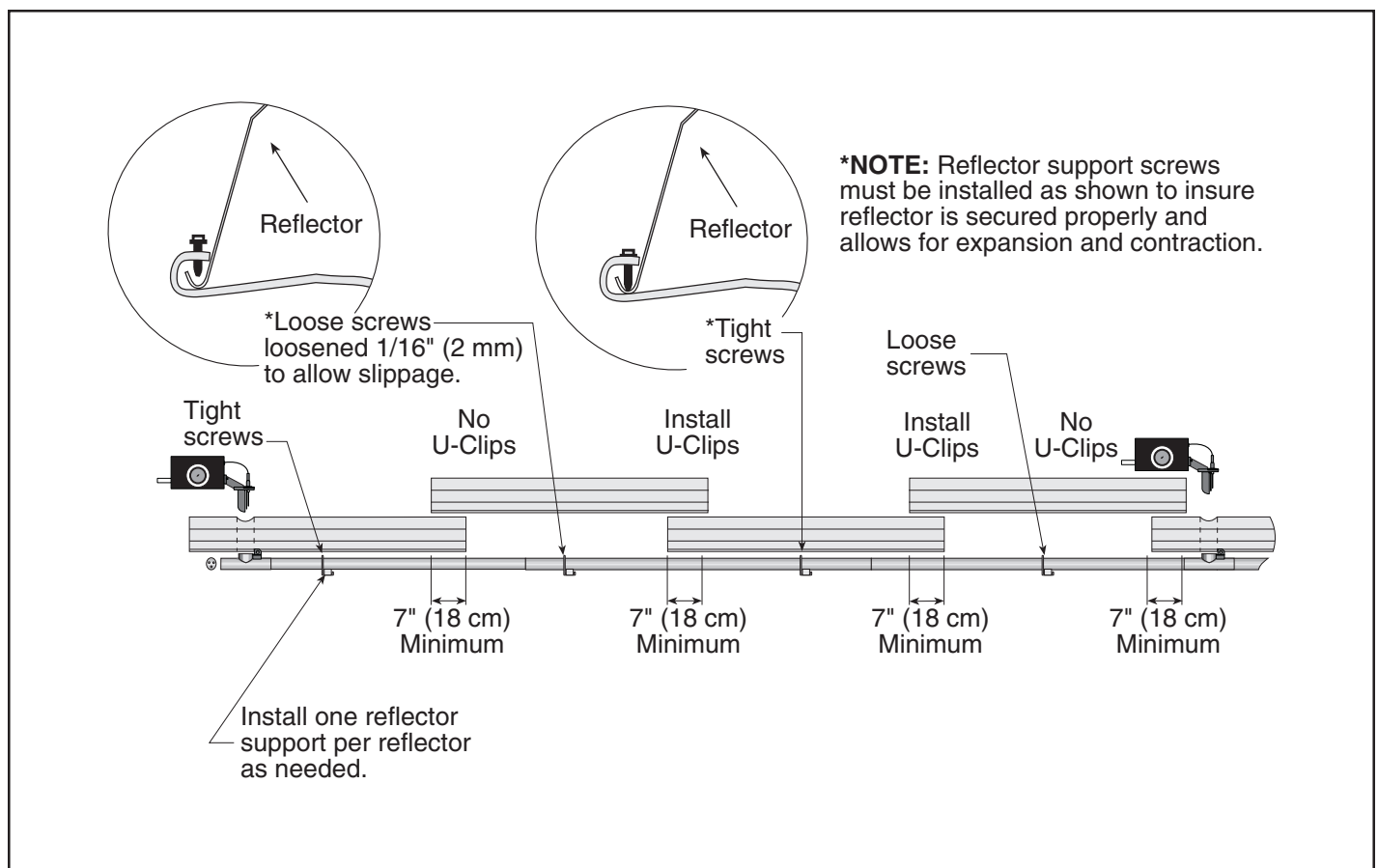
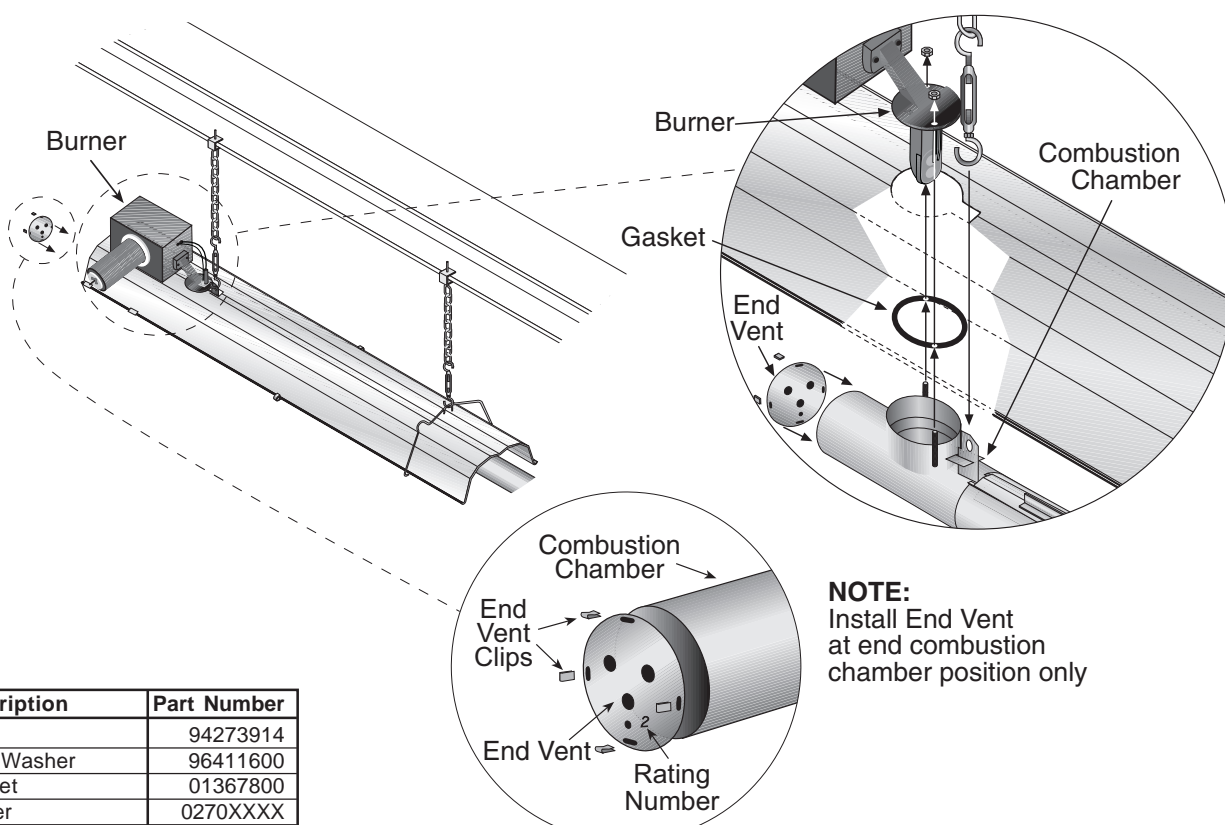


FIGURE 12 – Reflector Overlap Detail



Step 8.6 – Burner



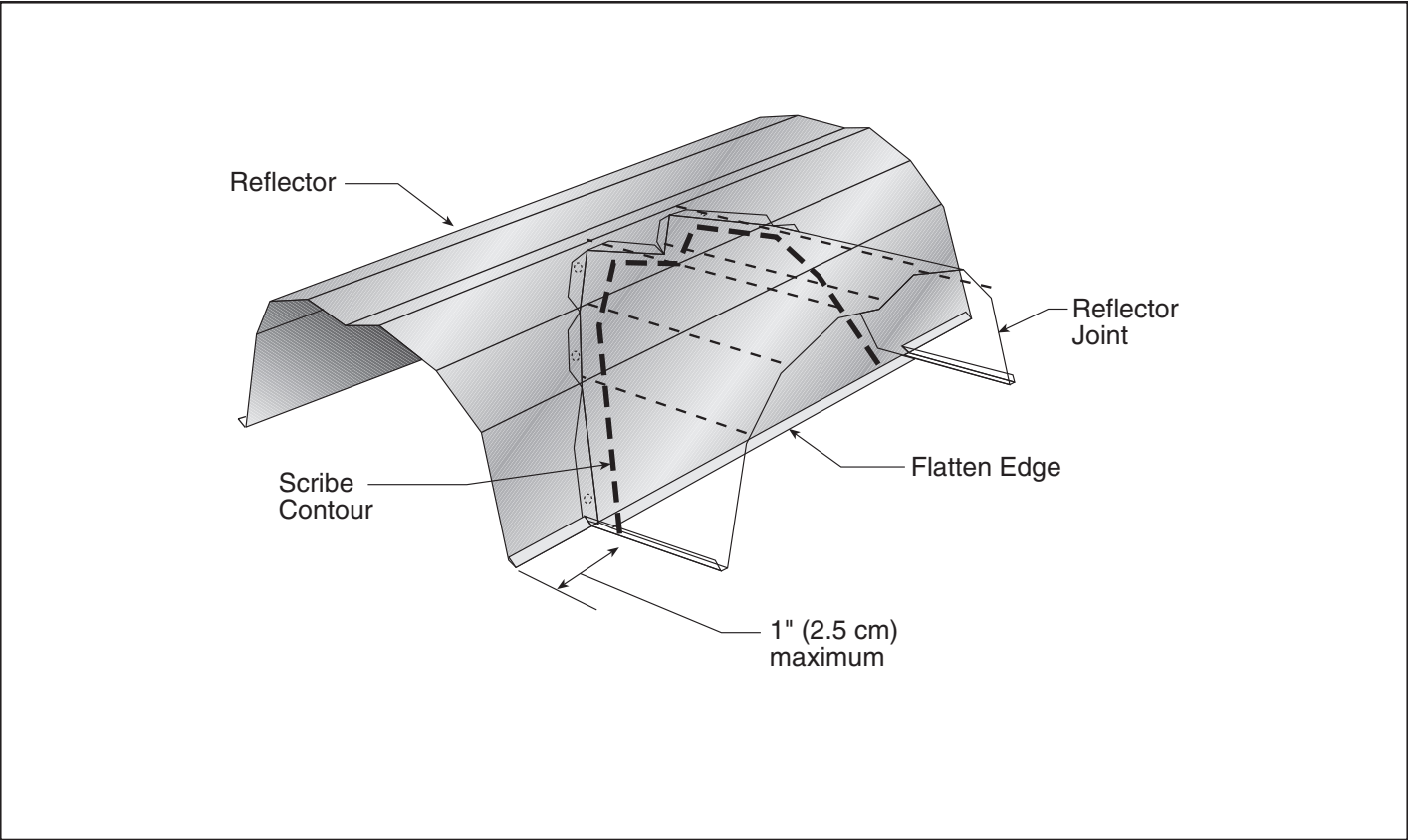
The diagram illustrates the burner assembly. A main view shows the burner mounted on a combustion chamber with a gasket. A circular inset provides a detailed view of the burner's connection to the combustion chamber, highlighting the gasket and the end vent. Another circular inset shows the end vent with its rating number and end vent clips.

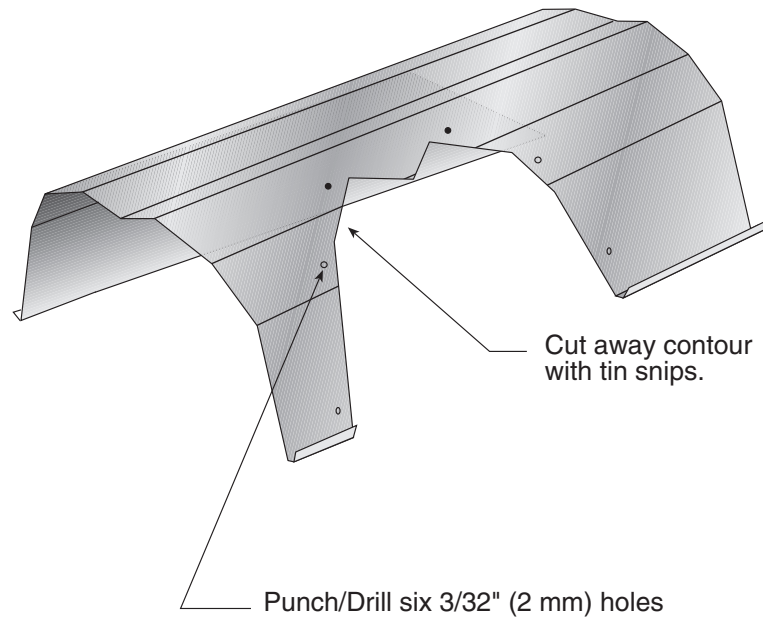
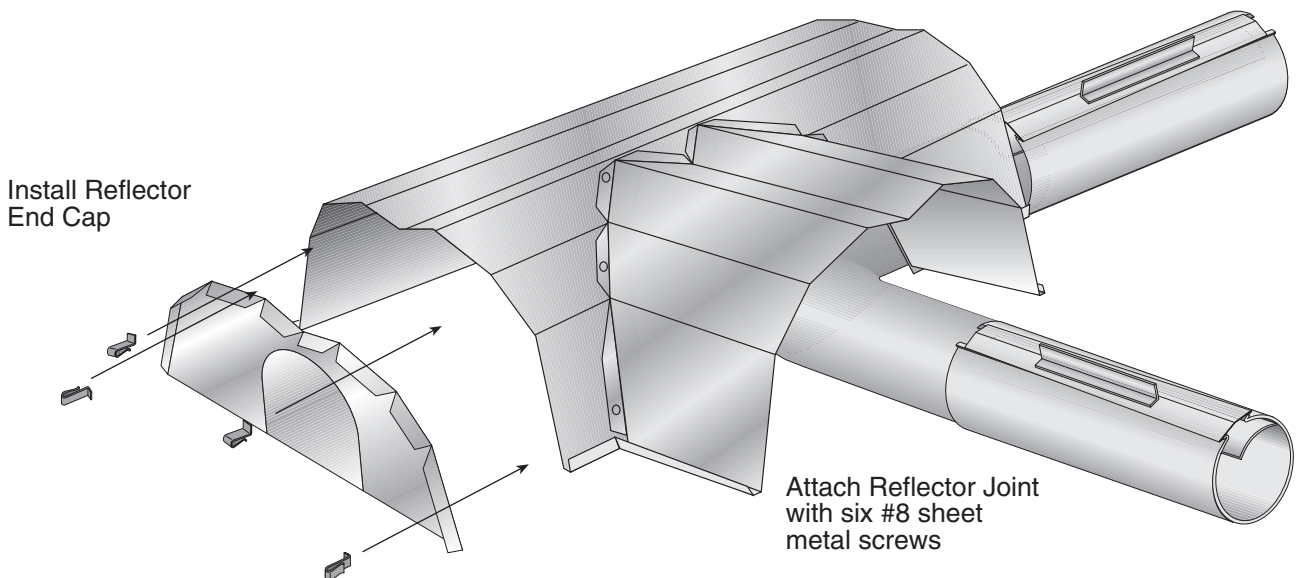
**NOTE:**  
Install End Vent  
at end combustion  
chamber position only

Description	Part Number
Bolt	94273914
Lock Washer	96411600
Gasket	01367800
Burner	0270XXXX
End Vent	013676XX

8.7 Reflector Joint

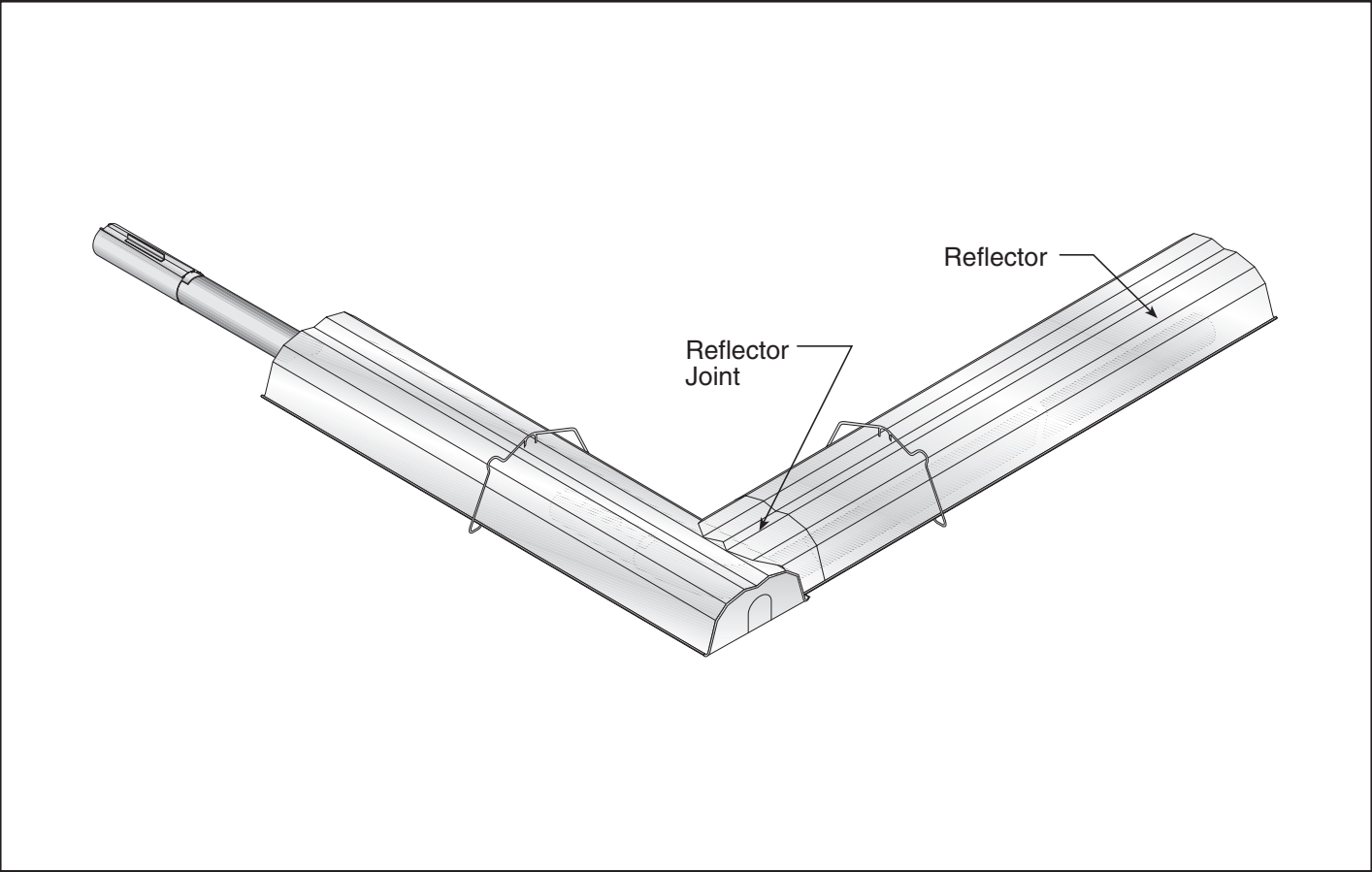
Step 8.7.1 – Reflector Joint



**Step 8.7.2 – Reflector Joint****Step 8.7.3 – Reflector Joint**

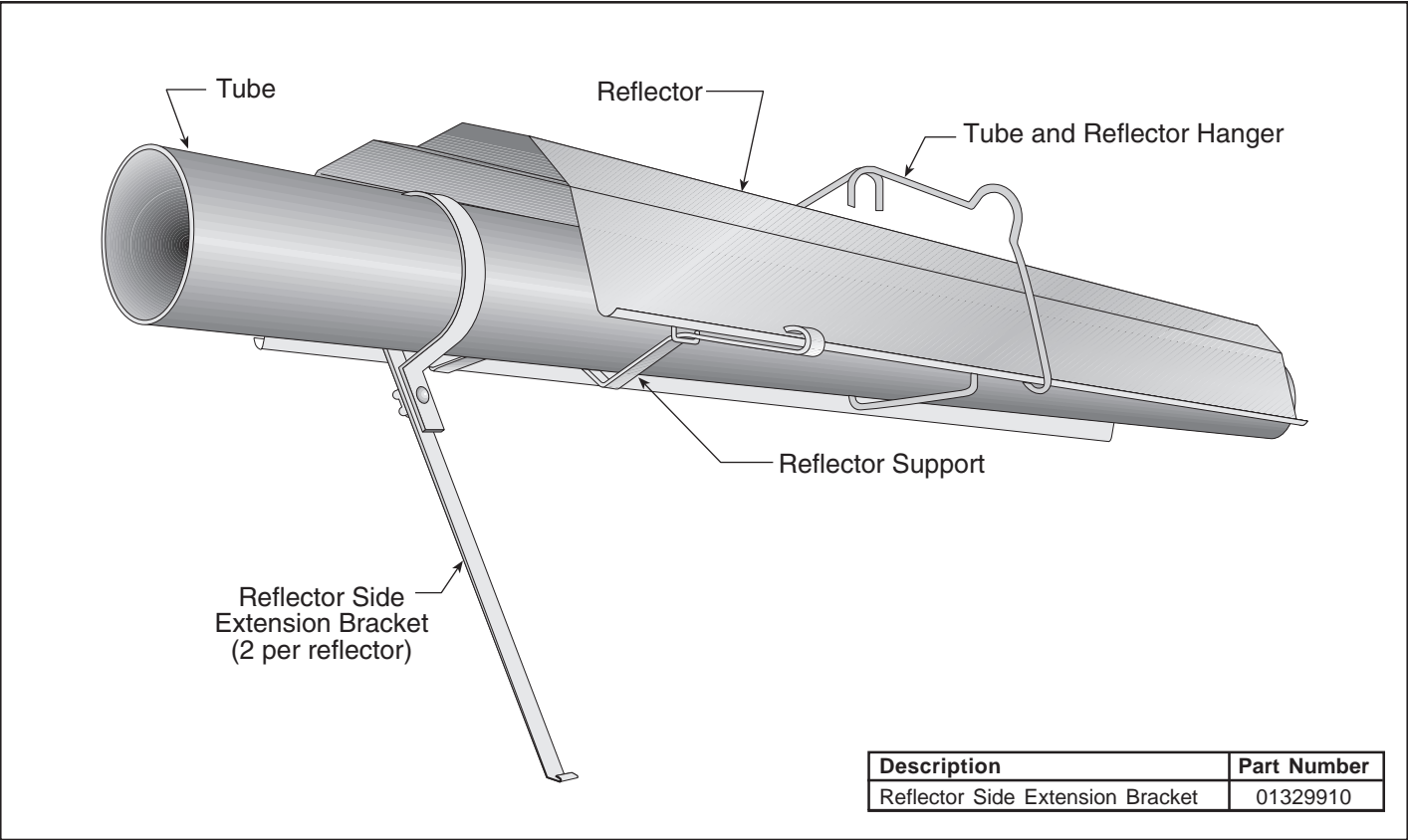
Description	Part Number
<b>90° Elbow Package</b>	<b>02718702</b>
Reflector Joint	02750900
Reflector End Cap	02750800
U-Clip Package	91107720
Sheet Metal Screws (#8 x 3/8)	94118106
90° Elbow	01335801
Coupling	01312700

FIGURE 13 – Reflector Joint Detail



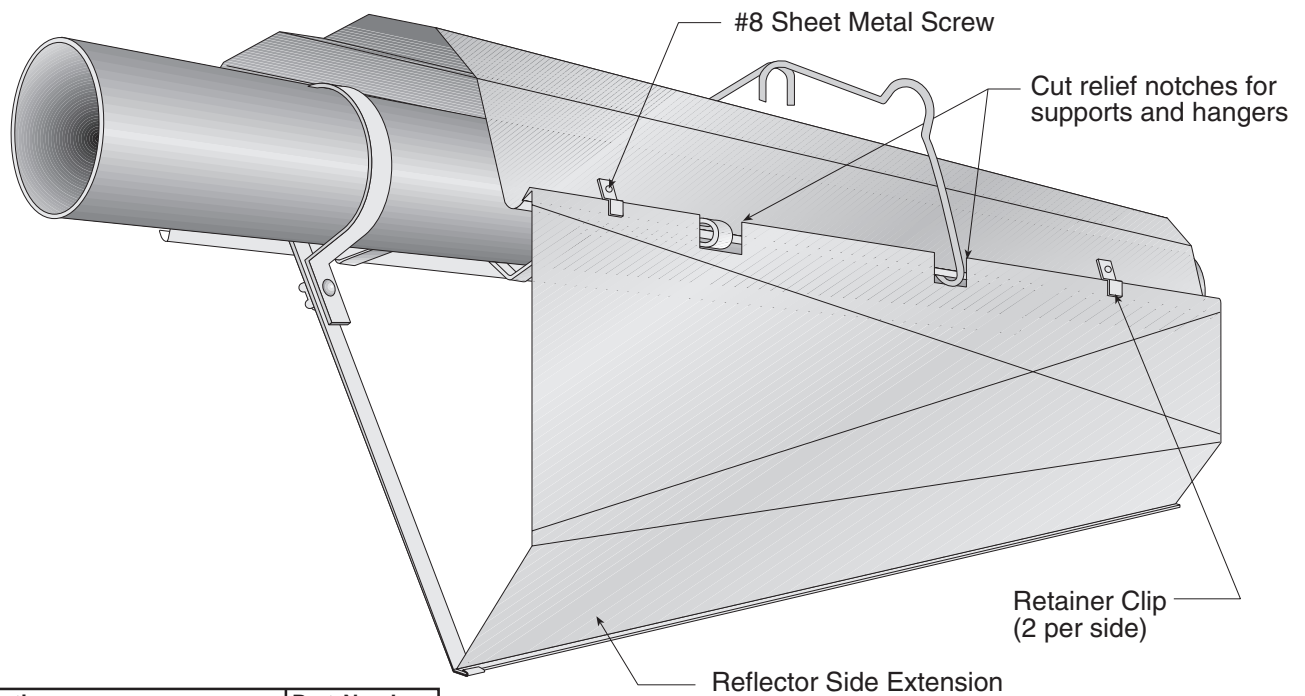
8.8 Reflector Side Extension

Step 8.8.1 – Bracket





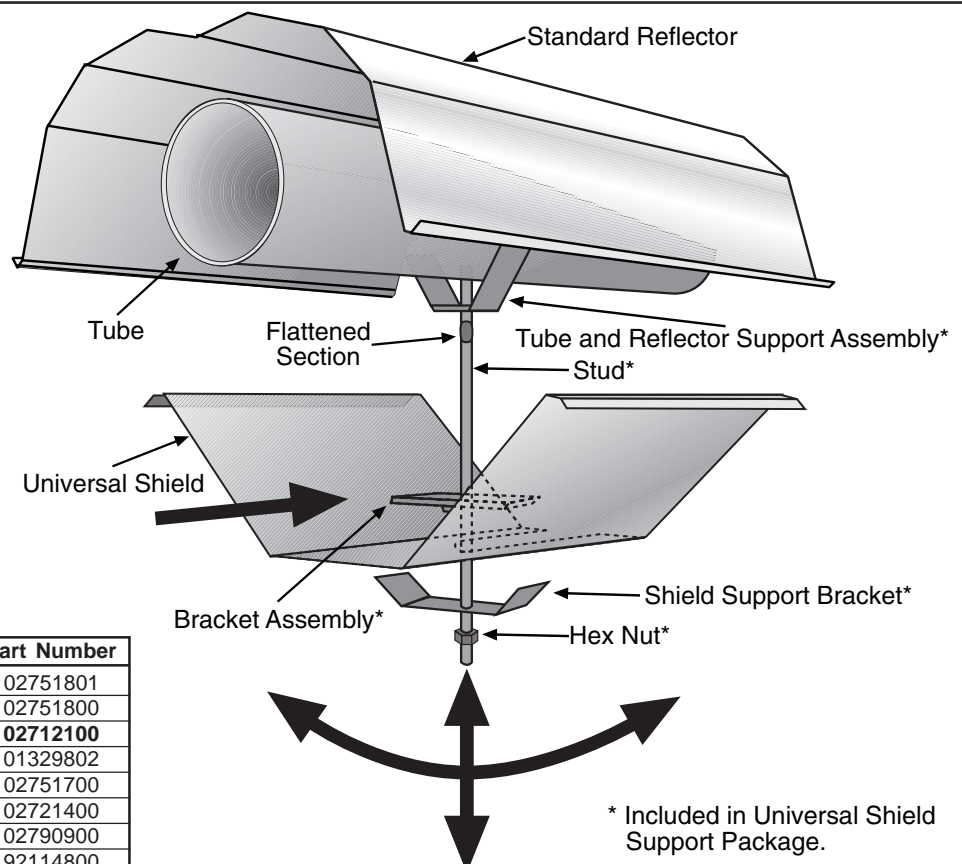
### Step 8.8.2 – Reflector Side



Description	Part Number
<b>Reflector Side Extension Package</b>	<b>02712700</b>
Reflector Side Extension	01368000
Retainer Clips	02751200
Sheet Metal Screws	94118106

### 8.9 Universal Shield

Universal shields are adjustable aluminum reflectors that can be angled and height adjusted to direct heat to or away from a desired area. See *Page 4, Section 3, Figures 4-6* for positions.



Description	Part Number
Universal Shield	02751801
Universal Shield with Holes	02751800
<b>Universal Shield Support Package</b>	<b>02712100</b>
Tube and Reflector Support Assembly	01329802
Universal Shield Support	02751700
Shield Bracket Assembly	02721400
Stud	02790900
Hex Nut	92114800

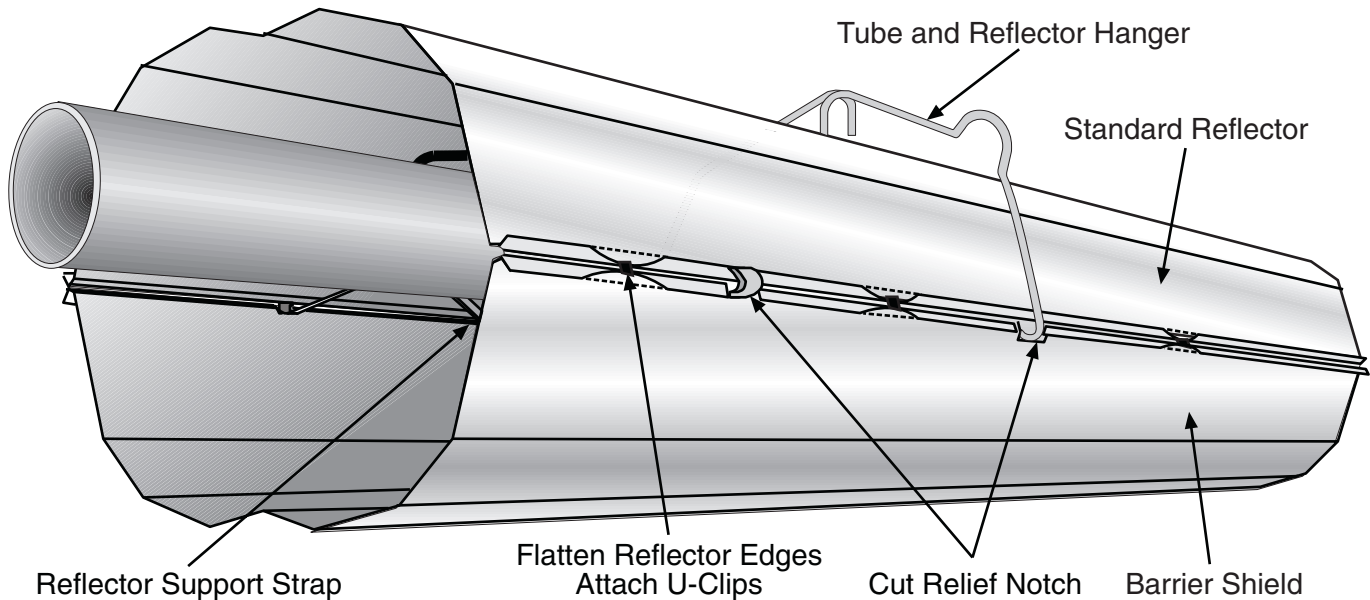
8.10 Barrier Shield

Step 8.10.1 – Barrier Shield

Do not install barrier shield less than 20' (6 m) downstream of any burner.

Do not attach end caps to the ends of the barrier shields. For lengths greater than 8' (2.6 m), use universal shields.

Do not use barrier shields for burner sizes larger than 80,000 btu/Hr.

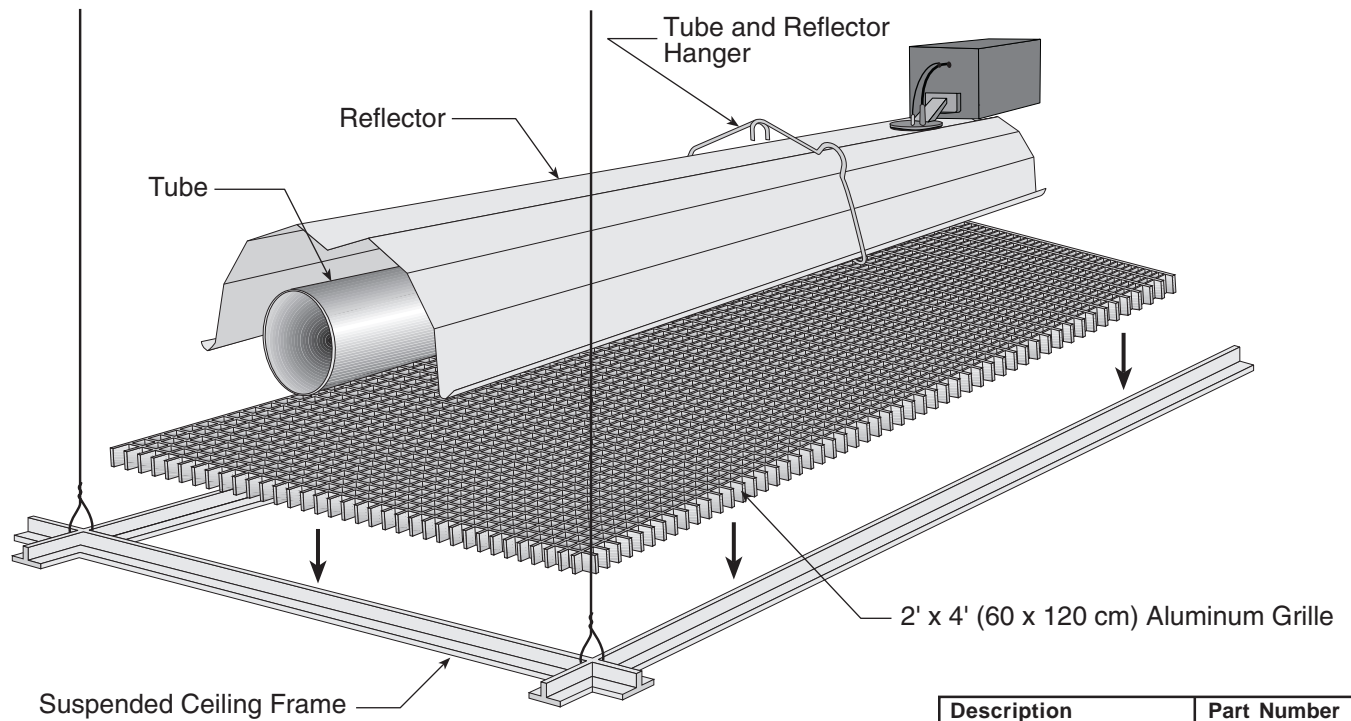


Description	Part Number
Barrier Shield	02750303
U-Clip Package	91107720

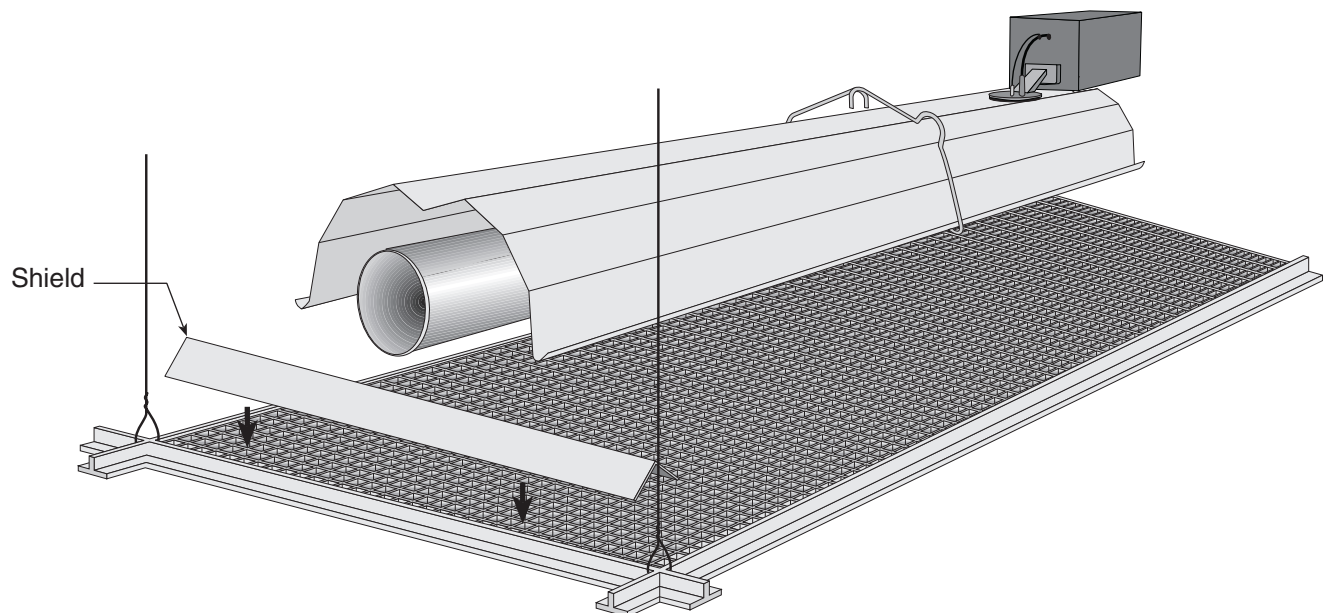


## 8.11 Decorative Grille

### Step 8.11.1 – Grille



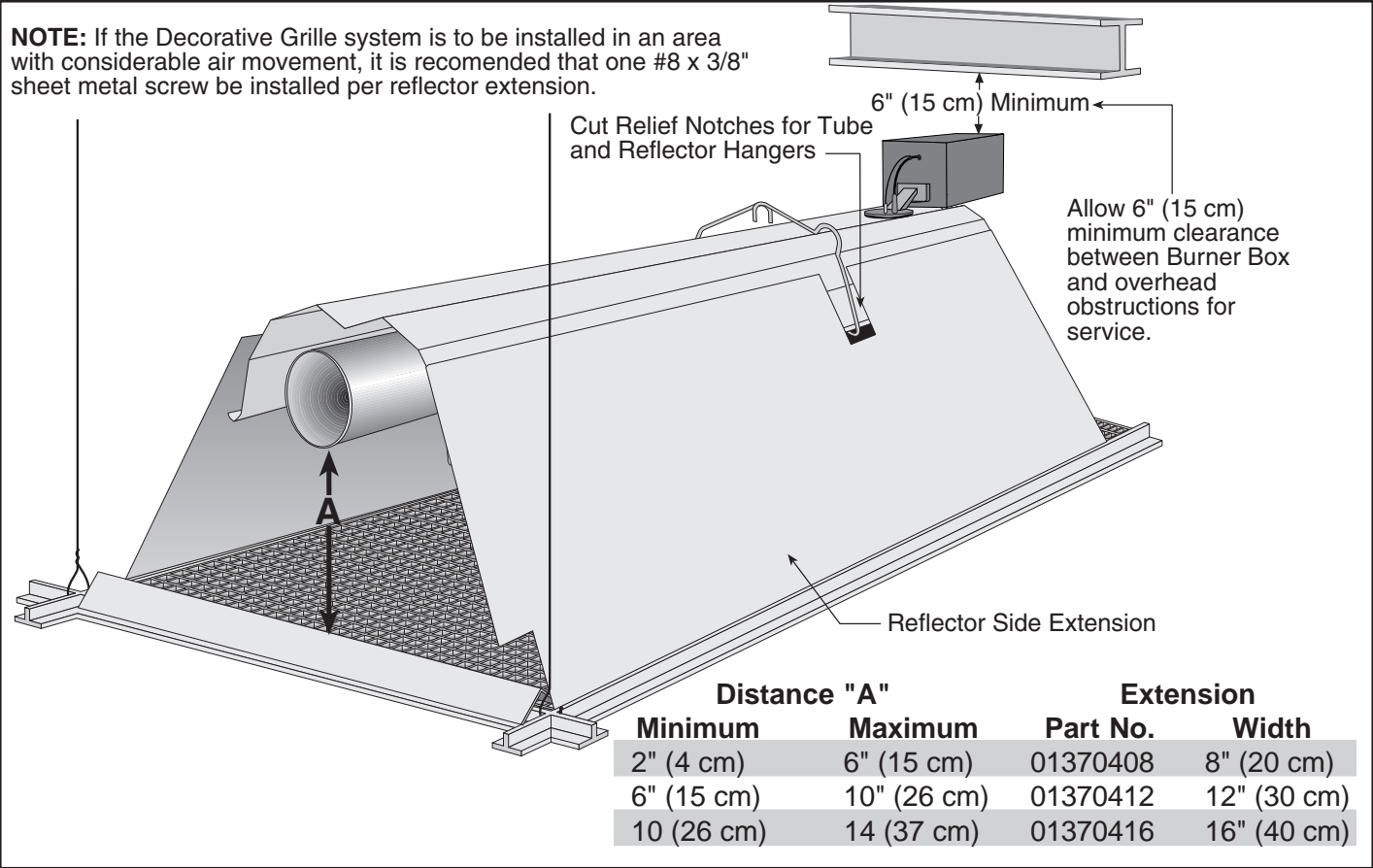
### Step 8.11.2 – Frame Shield



Description	Part Number
Shield	01365900

Step 8.11.3 – Reflector Extension

**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.



6" (15 cm) Minimum

Allow 6" (15 cm) minimum clearance between Burner Box and overhead obstructions for service.

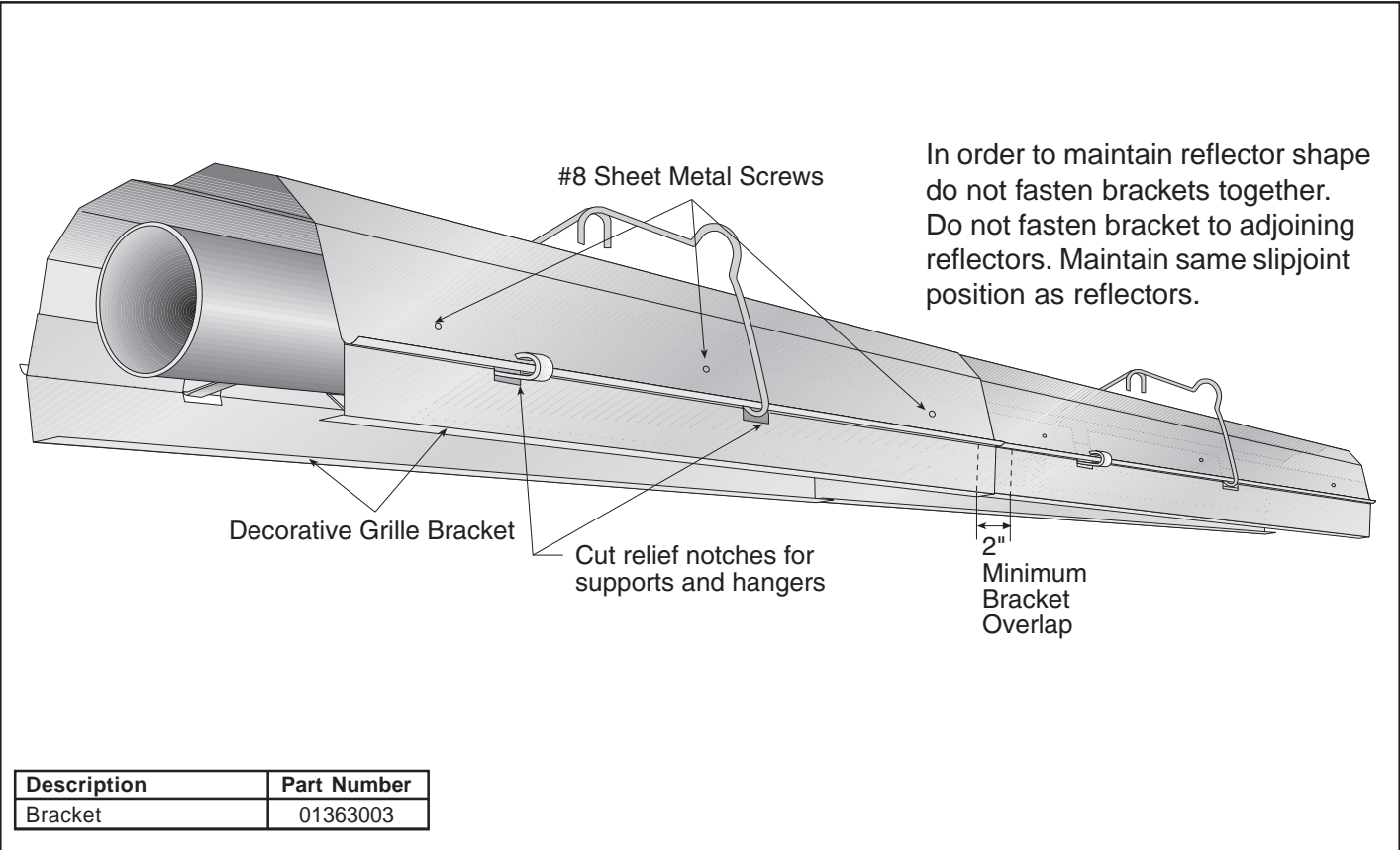
Cut Relief Notches for Tube and Reflector Hangers

Reflector Side Extension

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)

8.12 One Foot Decorative Grille

Step 8.12.1 – One Foot Decorative Grille Bracket



#8 Sheet Metal Screws

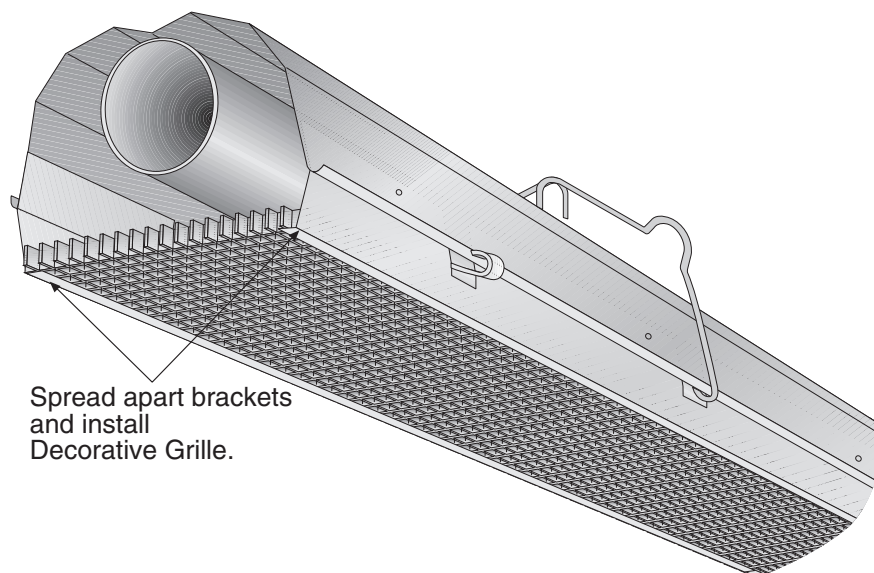
In order to maintain reflector shape do not fasten brackets together. Do not fasten bracket to adjoining reflectors. Maintain same slipjoint position as reflectors.

Decorative Grille Bracket

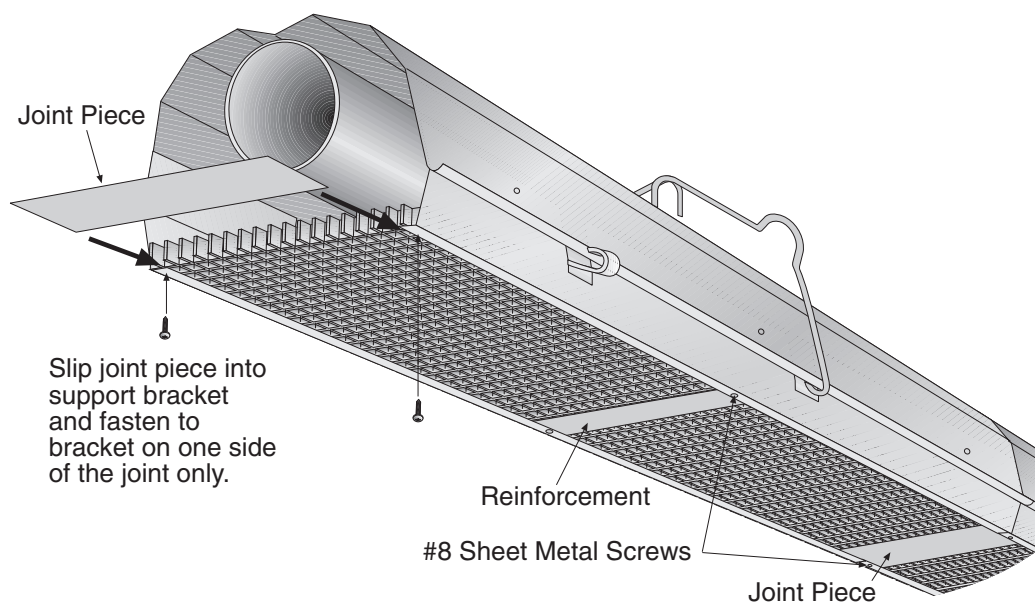
Cut relief notches for supports and hangers

2" Minimum Bracket Overlap

Description	Part Number
Bracket	01363003

**Step 8.12.2 – Decorative Grille**

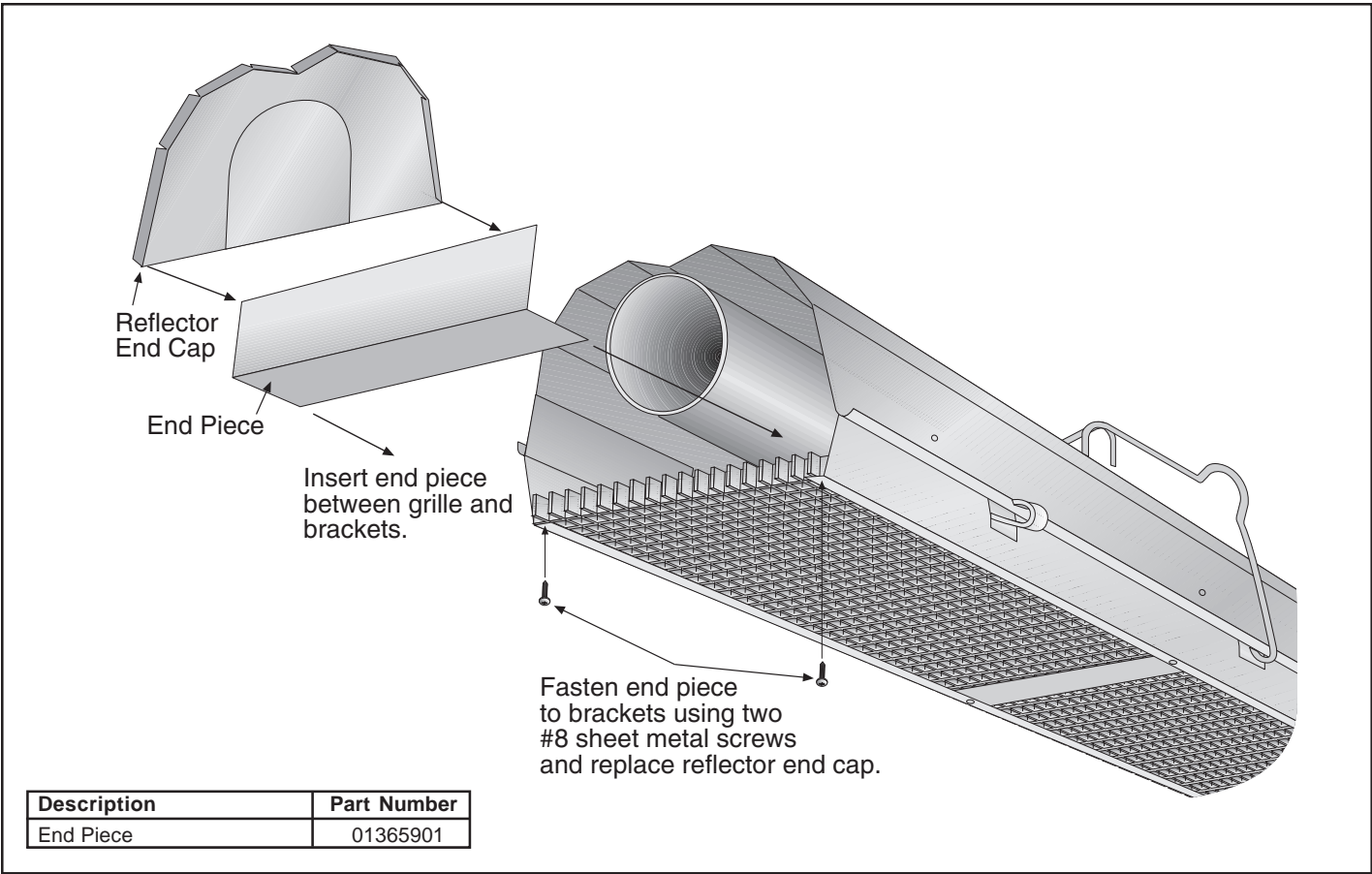
Description	Part Number
Decorative Grille 8' x 1'	91406700

**Step 8.12.3 – Joint Piece and Reinforcement**

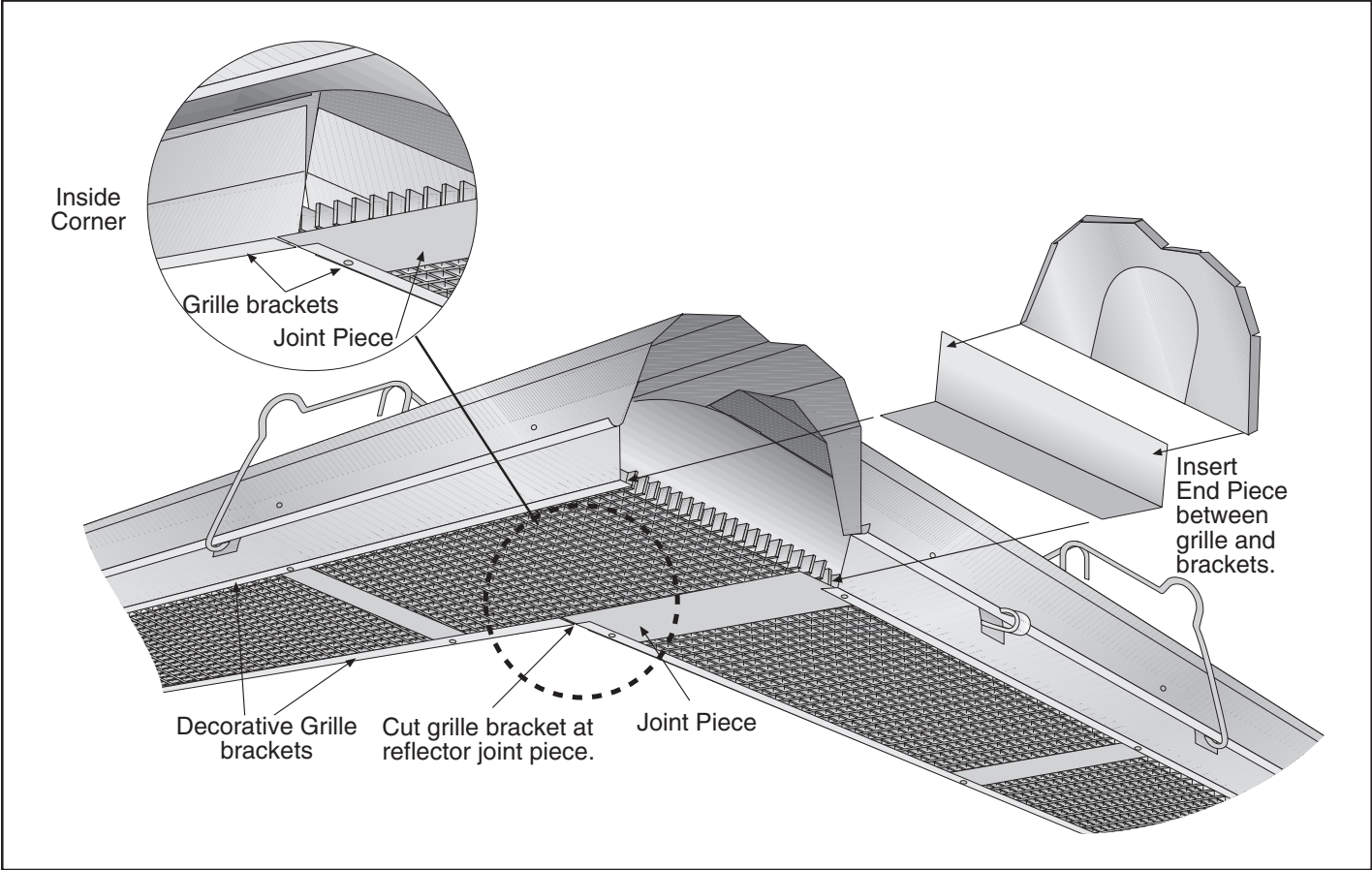
Description	Part Number
Joint Piece	01365903
Reinforcement	01365902



Step 8.12.4 – End Piece and Reflector End Cap

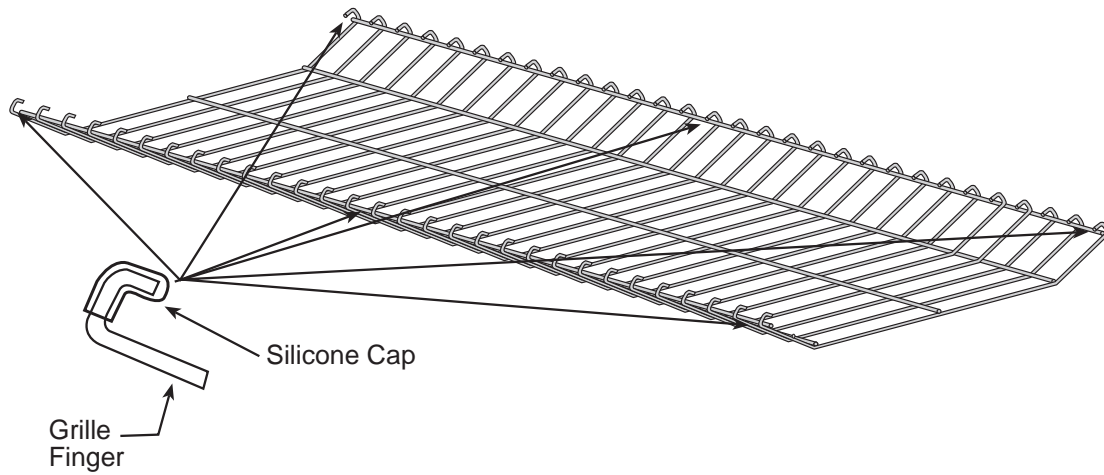


Step 8.12.5 – 90° Elbow



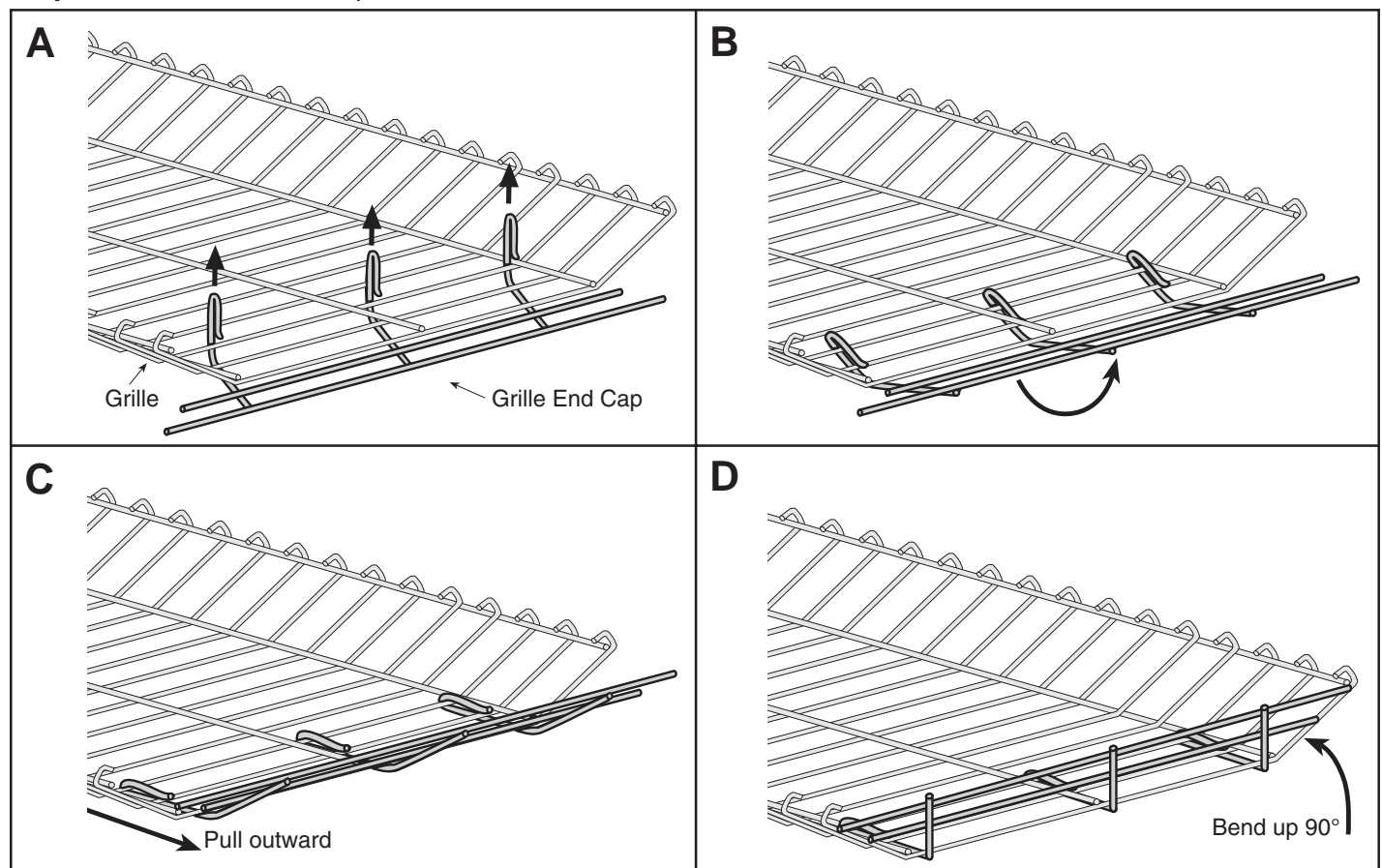
## 8.13 Protective Grille

### Step 8.13.1 – Silicone Cap

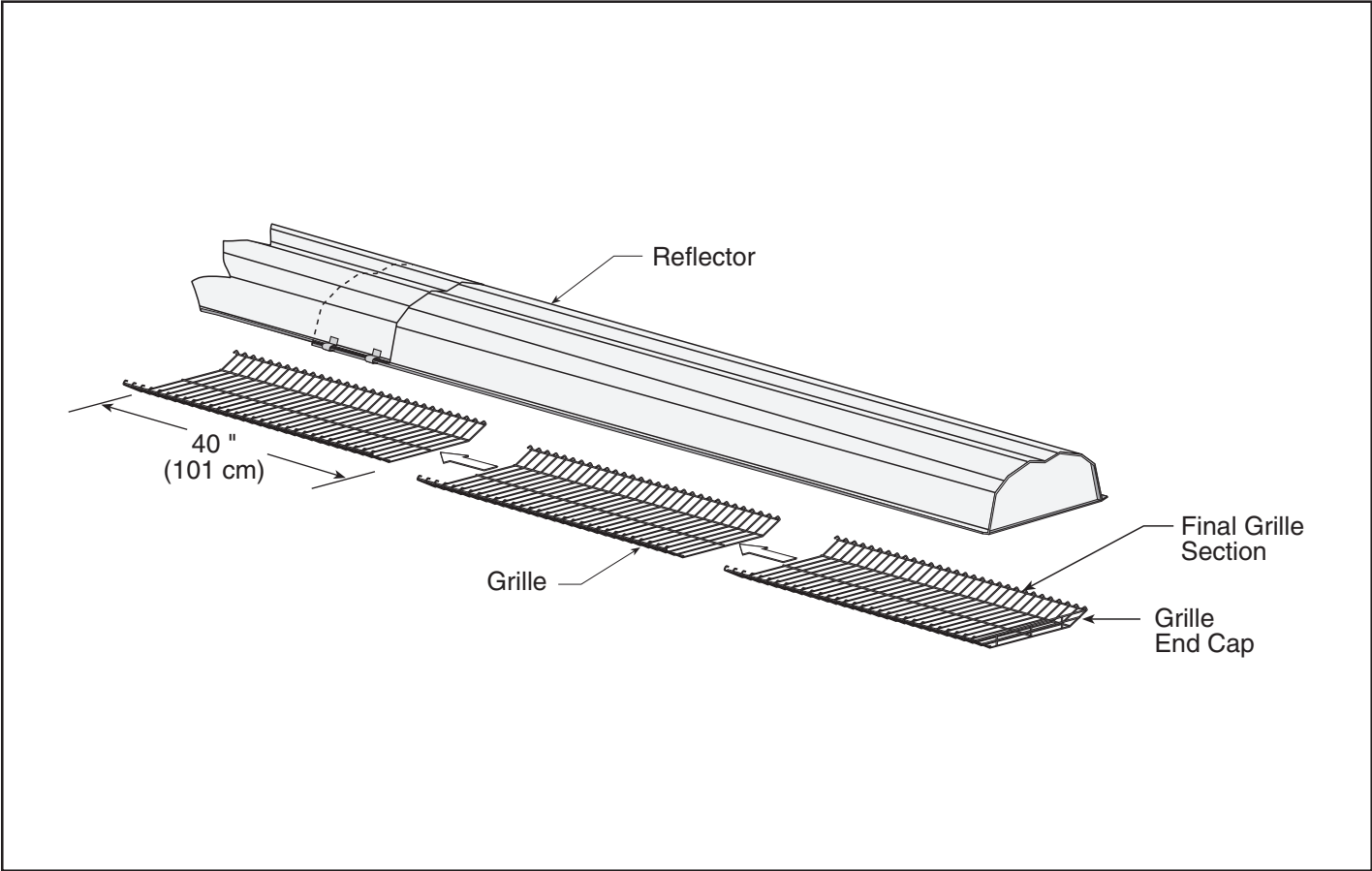


Description	Part Number
Grille Section	08050001
Grille End Cap	08050002
Silicone Cap (6 pieces)	91915951-6P

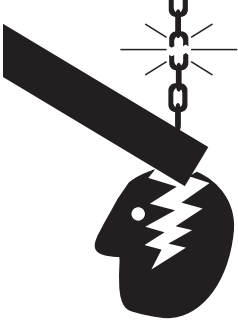
### Step 8.13.2 – Grille End Cap



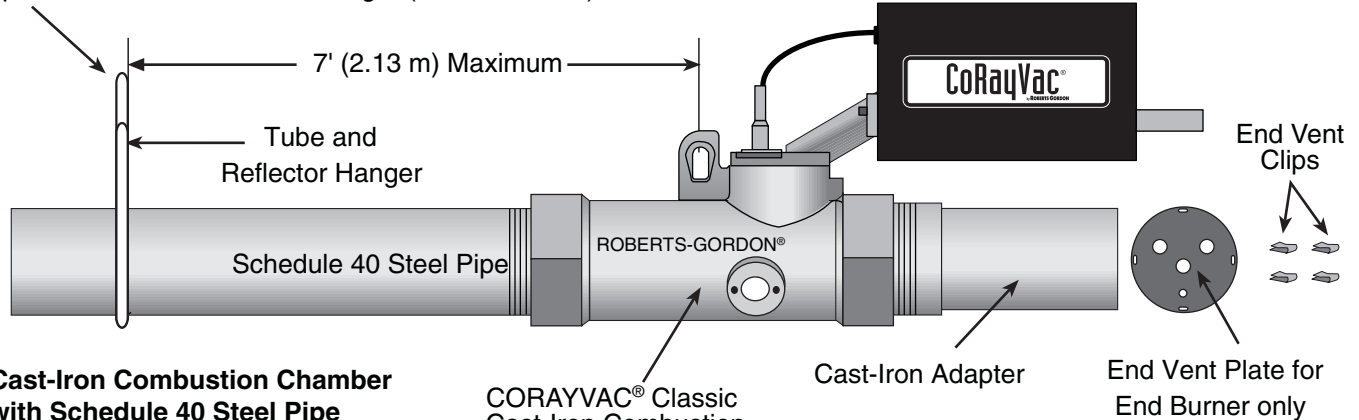
Step 8.13.3 – Grille



## 8.14 CORAYVAC® Classic Cast-Iron Components

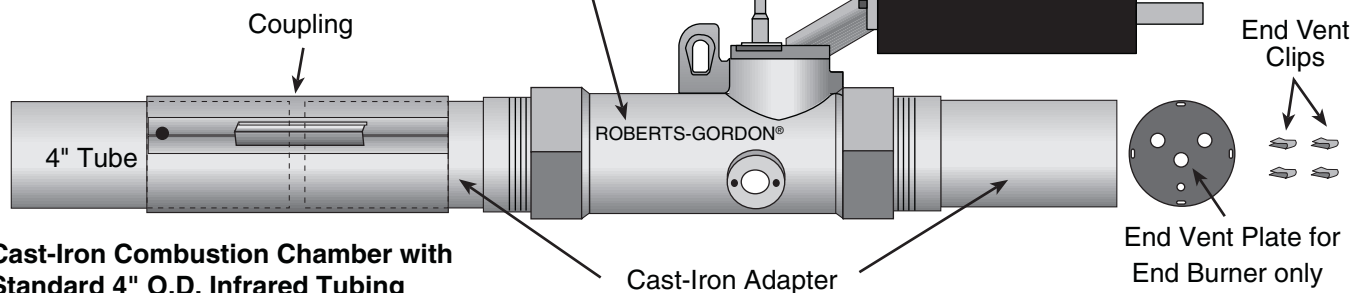
⚠ WARNING	
	<b>Suspension Hazard</b>
	Use special tube and reflector hangers when suspending the schedule 40 steel pipe system.
	Schedule 40 steel pipe is heavy and will fall if not supported properly.
	Distance between supports must be 7' (2.13 m) or less.
Failure to follow these instructions can result in death, injury or property damage.	

Special Tube and Reflector Hanger (P/N 02790300)



### Cast-Iron Combustion Chamber with Schedule 40 Steel Pipe

The total weight of each burner and combustion chamber is 40.25 lbs (18 kg).  
4" Schedule 40 pipe weighs 10.9 lbs. (5 kg) per foot.



### Cast-Iron Combustion Chamber with Standard 4" O.D. Infrared Tubing

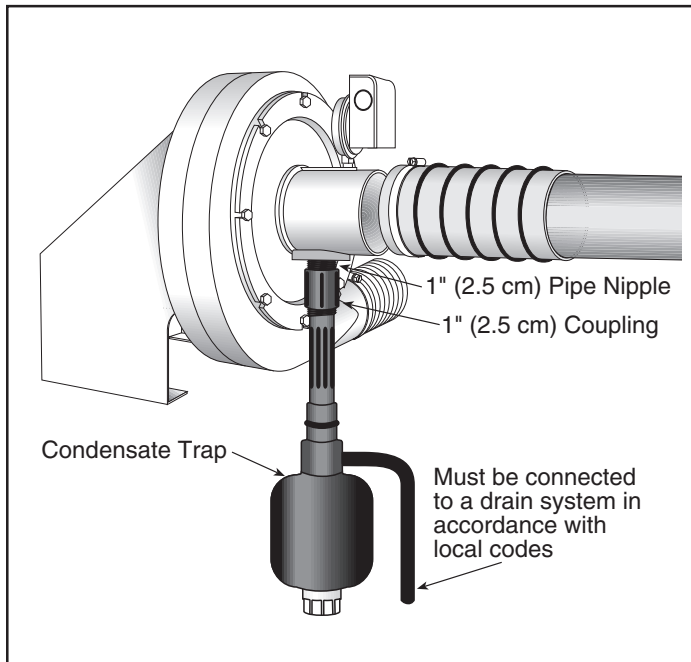
The total weight of each burner and combustion chamber is 40.25 lbs (18 kg).  
4" O.D. 16 Ga. tubing weighs 2.8 lbs. (1.3 kg) per foot.



## ►SECTION 9: PUMP INSTALLATION AND VENTING

For complete pump installation, please refer to the EP-100, EP-201 or EP-301 installation, operation and service manuals.

**FIGURE 14 – EP-201-Condensate Trap Installation**



### 9.1 General Venting Requirements Model EP-100, EP-201 and EP-301

This system must be vented in accordance with the following national codes and any local codes which may apply:

**United States:** Refer to ANSI Z223.1 - latest revision

**Canada:** Refer to CAN/CGA-B149.2 and B149.2

In brooder installations, affix Brooder Ventilation Wall Tag (P/N 91039300) adjacent to the heater thermostat. In the absence of a thermostat, the wall tag must be posted in a conspicuous location.

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

Vent pipe must be sloped downward away from the pump, 1/2" (1 cm) in 20' (6 m).

Vent must be at least 6' (2 m) from the combustion air opening of this unit, or any other appliance.

Secure all joints with #8 x 3/8 sheet metal screws.

Seal all joints with high temperature silicone sealant.

### Vertical Venting

Refer to *Page 33, Section 9.2*, for recommended vertical venting options.

### Horizontal Venting

Refer to *Pages 34 - 36, Section 9.3, Figures 15 - 17*, for recommended horizontal venting options.

### United States Requirements

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

Vent must exit a building not less than 7' (2 m) above grade when located adjacent to public walkways.

Vent must terminate at least 3' (1 m) above any forced air inlet located within 3' (1 m).

Vent must terminate at least 4' (1.3 m) below, 4' (1.3 m) horizontally from, or 1' (.3 m) above any door, window, or gravity inlet into any building.

Vent terminal shall be located at least 1' (.3 m) from any opening through which vent gasses could enter a building.

### Canadian Requirements

Vent terminal must not be installed less than 3' (1 m) from any building opening.

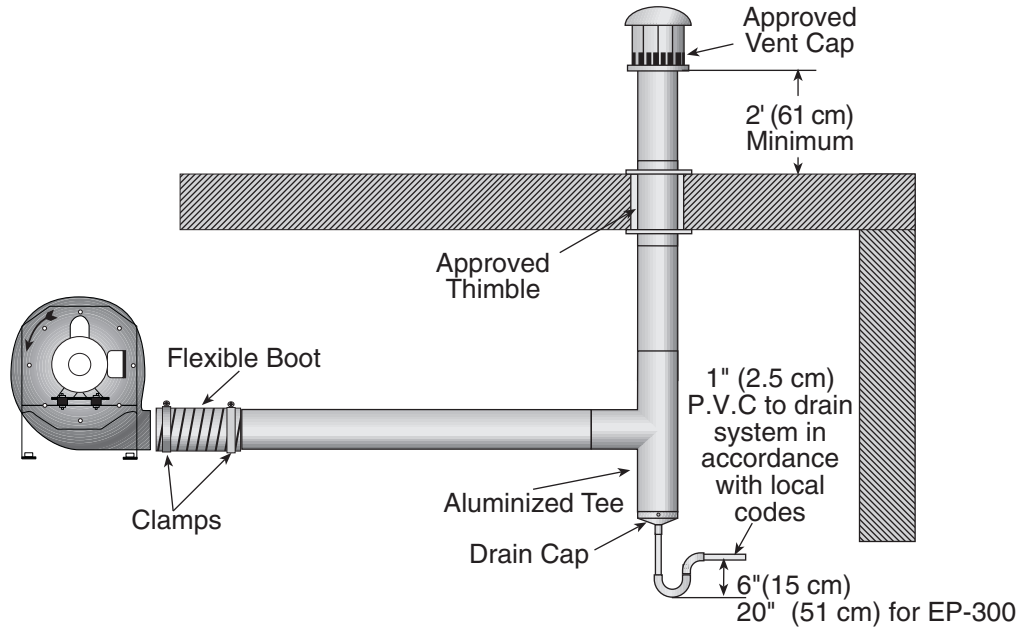
Vent terminal must be installed at least 3' (1 m) above grade.

### Length Requirements

Refer to *Pages 33 - 36, Section 9.2 - 9.3*, for recommended vent lengths and sizes.

Seal all pipe joints with high temperature silicone sealant

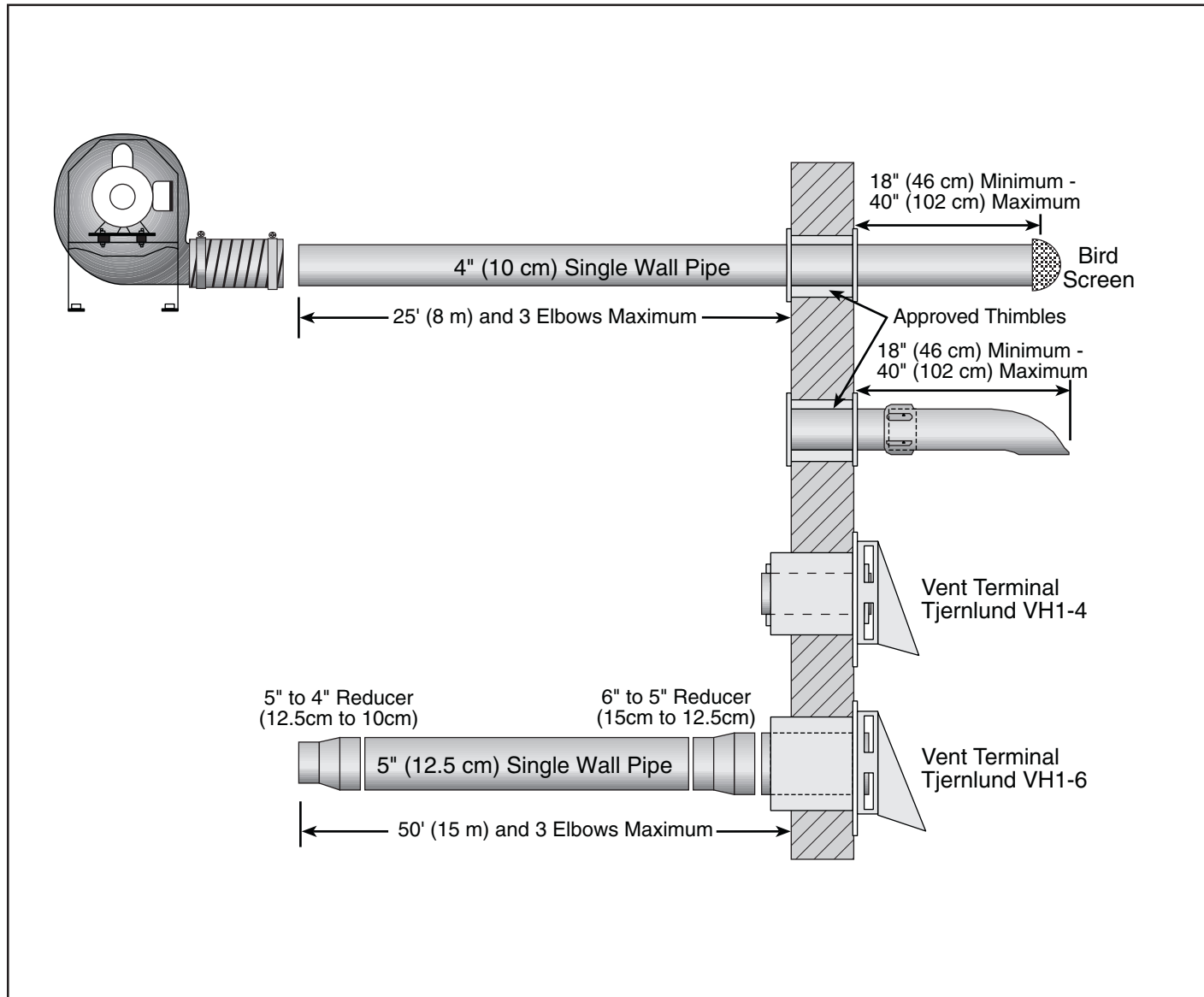
## 9.2 Vertical Venting Configuration



Part No.	Description
91412800	4" Flexible Boot
91412801	4 - 1/2" Flexible Boot
91412802	6" Flexible Boot
91901300	4" Boot Clamp
91913703	6" Boot Clamp
90505600	4" Wall Thimble
01331900	4" Damper Coupling
E0009356	6" Damper Coupling
01330203	4" Aluminized Tee
01330204	6" Aluminized Tee
01335801	4" Aluminized 90° Elbow
T0100320	6" Aluminized 90° Elbow
91409403	16 Ga. Aluminized 4" dia. 10' Tube
91409420	16 Ga. Aluminized 6" dia. 10' Tube
90502300	4" Metalbestos Vent Cap
90502302	6" Metalbestos Vent Cap
02718851	4" Drain Cap
02718852	6" Drain Cap Assembly
91418200	6" dia. x 4" dia. Aluminized Tube Adapter

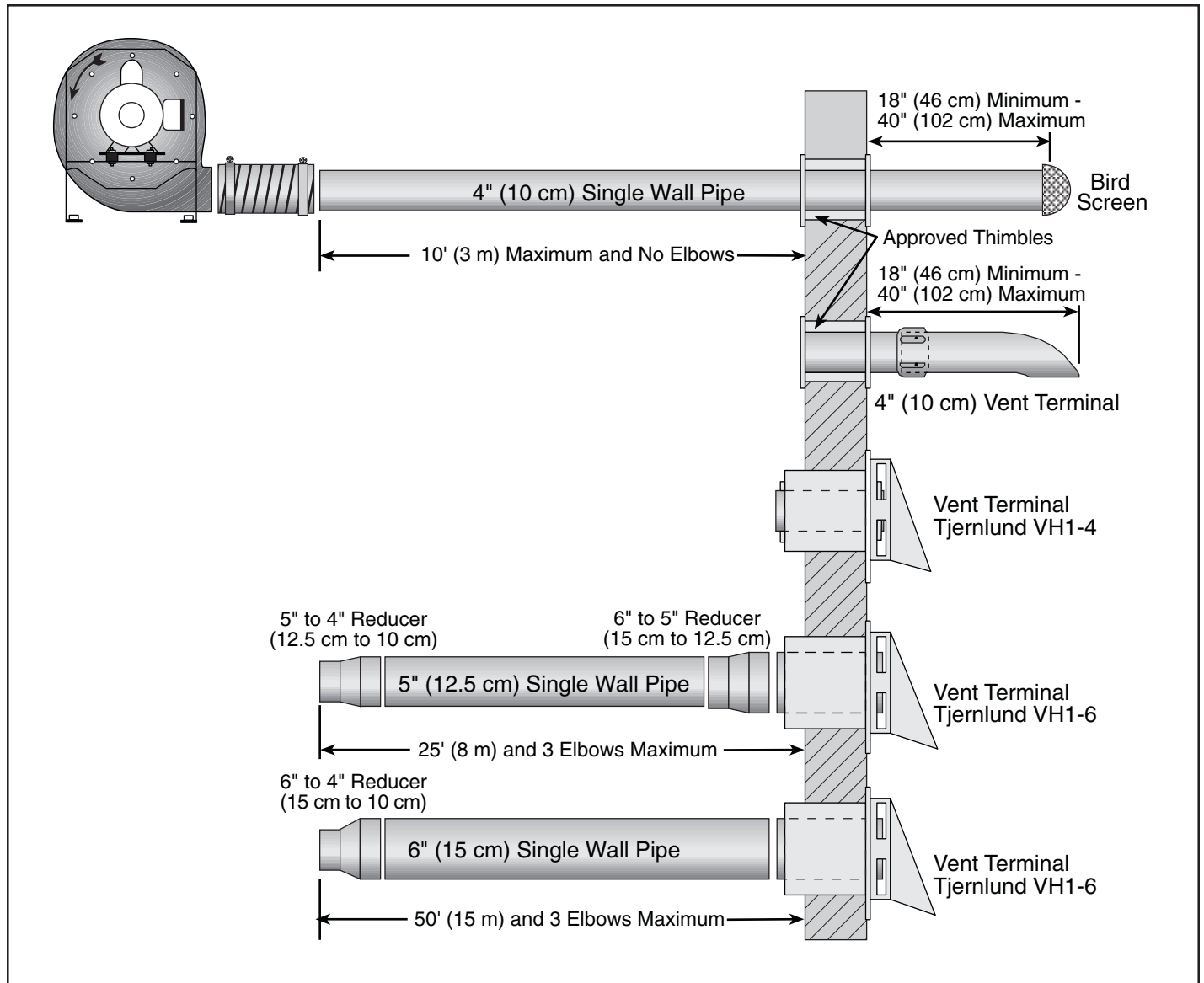
### 9.3 Horizontal Venting Configurations

**FIGURE 15 – EP-100 Horizontal Venting Configurations**



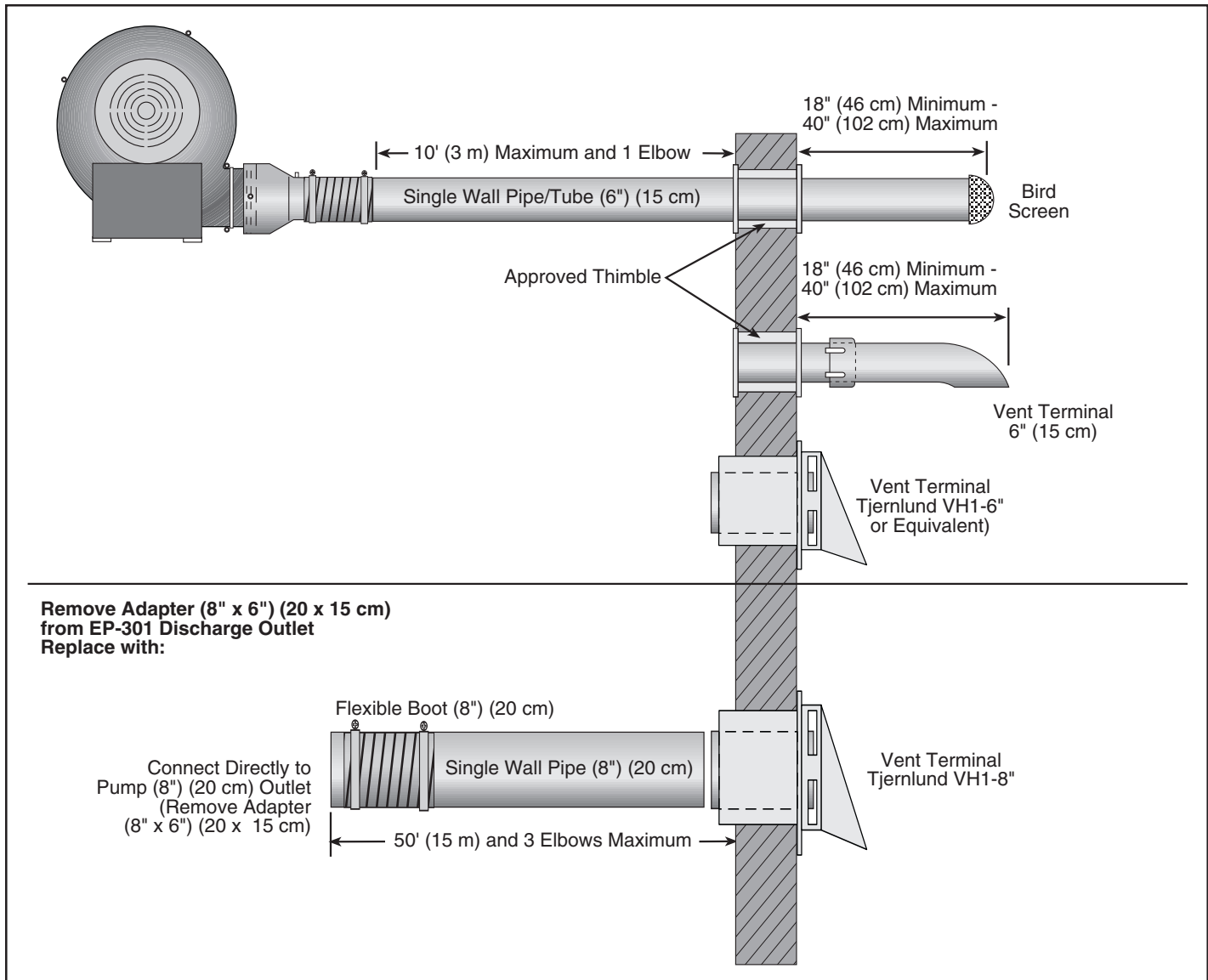
Part No.	Description
91412800	4" Flexible Boot
91901300	4" Boot Clamp
90502101	6" Vent Terminal (Combustible Wall)
90502100	4" Vent Terminal (Combustible Wall)
02537801-1P	Vent Terminal (Non-Combustible Wall)
90505600	4" Wall Thimble
01331900	4" Damper Coupling
01330203	4" Aluminized Tee
01335801	4" Aluminized 90° Elbow
91409403	16 Ga. Aluminized 4" dia. 10' Tube
02718851	4" Drain Cap
01365400	4" Bird Screen

Part No.	Description
Not Supplied	16 Ga. Aluminized 5" dia. 10' Tube
Not Supplied	5" dia. x 4" dia. Tube Adapter
Not Supplied	6" dia. x 5" dia. Tube Adapter

**FIGURE 16 – EP-201/203 Horizontal Venting Configurations**

Part No.	Description
91412801	4-1/2" Flexible Boot
91906900	Silicone Ring
91901300	4" Boot Clamp
90502100	4" Vent Terminal (Combustible Wall)
90502101	6" Vent Terminal (Combustible Wall)
02537801-1P	Vent Terminal (Non-Combustible Wall)
90505600	Wall Thimble
01365400	4" Bird Screen
01331900	4" Damper Coupling
01330203	4" Aluminized Tee
01335801	4" Aluminized 90° Elbow
91409403	16 Ga. Aluminized 4" dia. 10' Tube
91409420	16 Ga. Aluminized 6" dia. 10' Tube
02718851	4" Drain Cap
91418200	6" dia. x 4" dia. Aluminized Tube Adapter

Part No.	Description
Not Supplied	16 Ga. Aluminized 5" dia. 10' Tube
Not Supplied	5" dia. x 4" dia. Tube Adapter
Not Supplied	6" dia. x 5" dia. Tube Adapter

**FIGURE 17 – EP-301/303 Horizontal Venting Configurations**

Part No.	Description
91412800	4" Flexible Boot
91412802	6" Flexible Boot
91901300	4" Boot Clamp
91913703	6" Boot Clamp
90502100	4" Vent Terminal (Combustible Wall)
90502101	6" Vent Terminal (Combustible Wall)
02537801-1P	Vent Terminal (Non-Combustible Wall)
90505600	4" Wall Thimble
01331900	4" Damper Coupling
E0009356	6" Damper Coupling
01330203	4" Aluminized Tee
01330204	6" Aluminized Tee
01335801	4" Aluminized 90° Elbow
T0100320	6" Aluminized 90° Elbow
91409403	16 Ga. Aluminized 4" dia. 10' Tube
91409420	16 Ga. Aluminized 6" dia. 10' Tube

Part No.	Description
02718851	4" Drain Cap
02718852	6" Drain Cap
01397400	6" Bird Screen
91418200	6" dia. x 4" dia. Aluminized Tube Adapter
Not Supplied	16 Ga. Aluminized 5" dia. 10' Tube
Not Supplied	16 Ga. Aluminized 8" dia. 10' Tube
Not Supplied	8" dia. x 6" dia. Tube Adapter
Not Supplied	8" Flexible Boot
Not Supplied	8" Vent Terminal (Combustible Wall)

## ►SECTION 10: OUTSIDE AIR SUPPLY

The CORAYVAC® system is approved for use with an outside air system. Halogenated hydrocarbons or other corrosive chemicals in the air can be drawn into the equipment and seriously damage the system components. Avoid the use of such chemical compounds near the air inlet to the heaters.

**IMPORTANT:** If the building has a slight negative pressure or contaminants are present in the air, an outside combustion air supply to the heaters is strongly recommended.

All joints and seams in the air supply system must be airtight. The filter housing attaches to the burner assembly by using the wing nut provided.

### Pressurized

See *Page 39, Figure 21*, for a typical layout of a pressurized air supply system.

For pressurized outside air supplies, the outside air blower motor has a pressure switch interlock that must be used. Wire this switch in series with the pump pressure switch. When using an outside air blower either with a ROBERTS GORDON® BZC or System Control panel or relay transformer, a separate load relay package is required. Wire the control for the relay in parallel with the pump. The outside air blower must have a separate 20A, 120V power supply.

### Non-Pressurized

For a non-pressurized outside air supply, a 4" O.D. single wall pipe duct may be attached to the burner and end vent. For length and duct sizing requirements see duct design rules below in Figure 18. To prevent condensation, insulate the outside air duct.

**FIGURE 18 – Duct Sizing**

#### Outside Air System Design Requirements: Blower Performance (90707500): 112 Flow Units

One outside air blower is required per each EP-100 or EP-200 series pump and two outside air blowers may be required for each EP-300 series pump. Outside air blowers cannot be shared between two separate CORAYVAC® systems.

#### Duct Design Rules:

- System should be designed so that the blower is positioned closest to the highest flow requirements (end vents).
- When a duct is carrying more than 40 flow units, it must be at least 6" (150 mm) diameter.

#### Pressurized Systems

- 6" diameter duct must not exceed 120' (36 m) total per system.
- 4" diameter duct must not exceed 120' (36 m) per radiant branch.

#### Non Pressurized

- 6" diameter duct must not exceed 90' (27 m) maximum 100 flow units
- 4" diameter duct must not exceed 90' (27 m)
- Elbows are equivalent to 10' (3 m) of duct length.

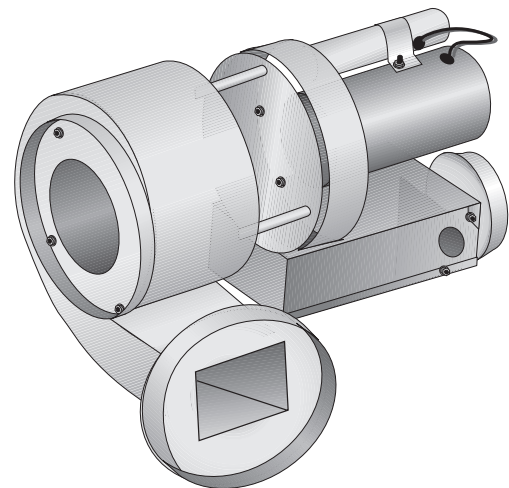




Figure 19 – Filter Housing Assembly

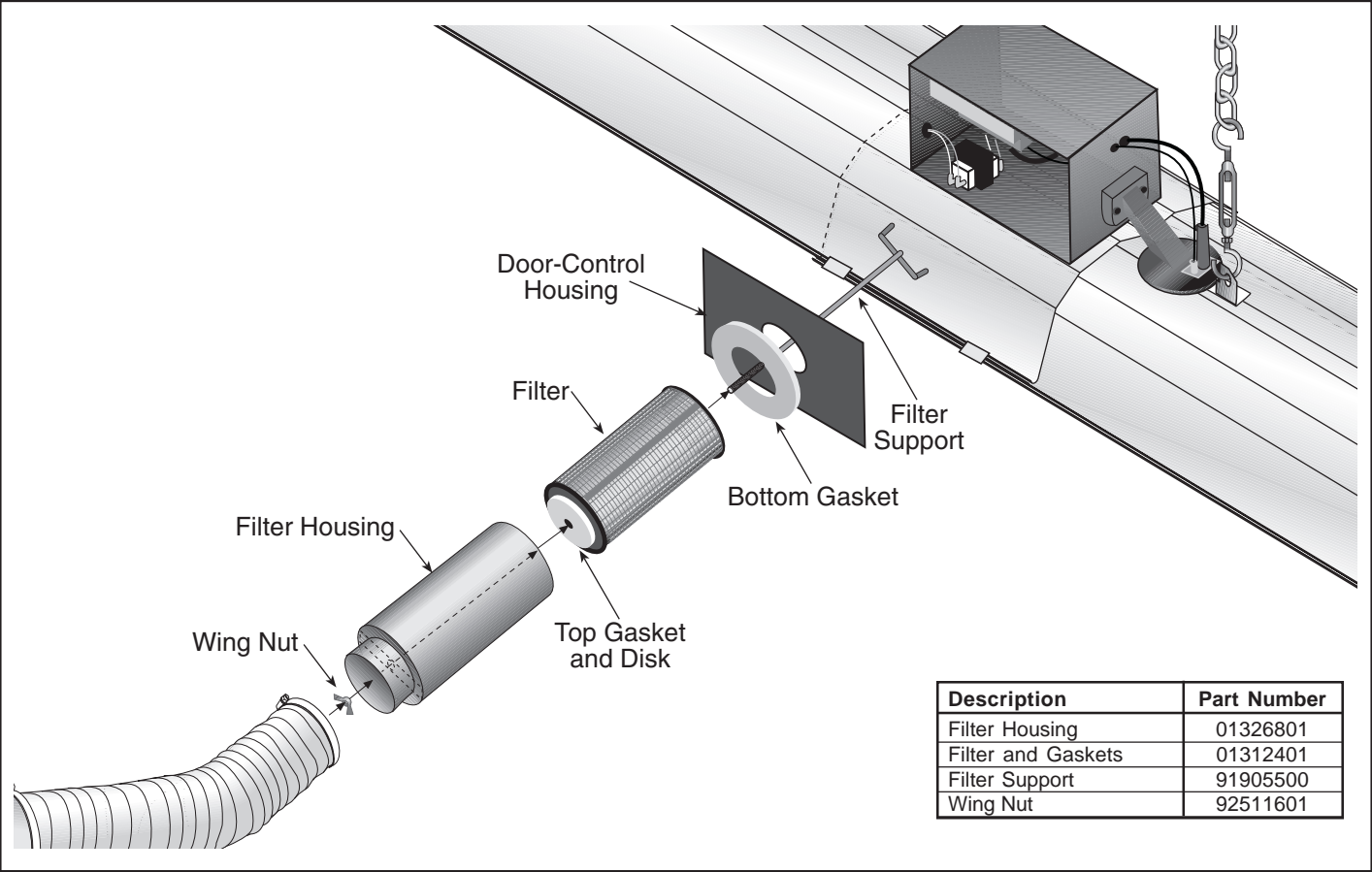
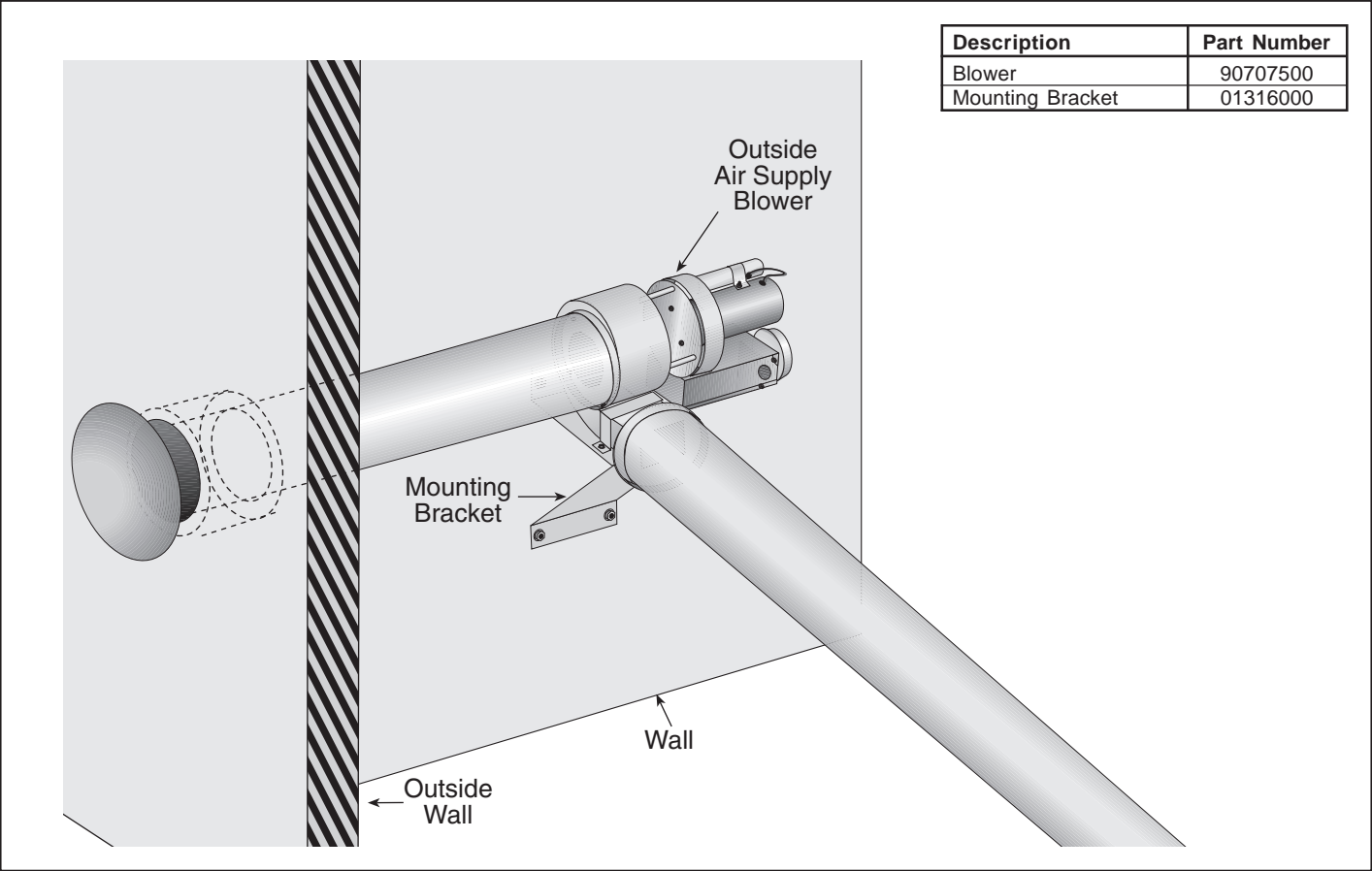
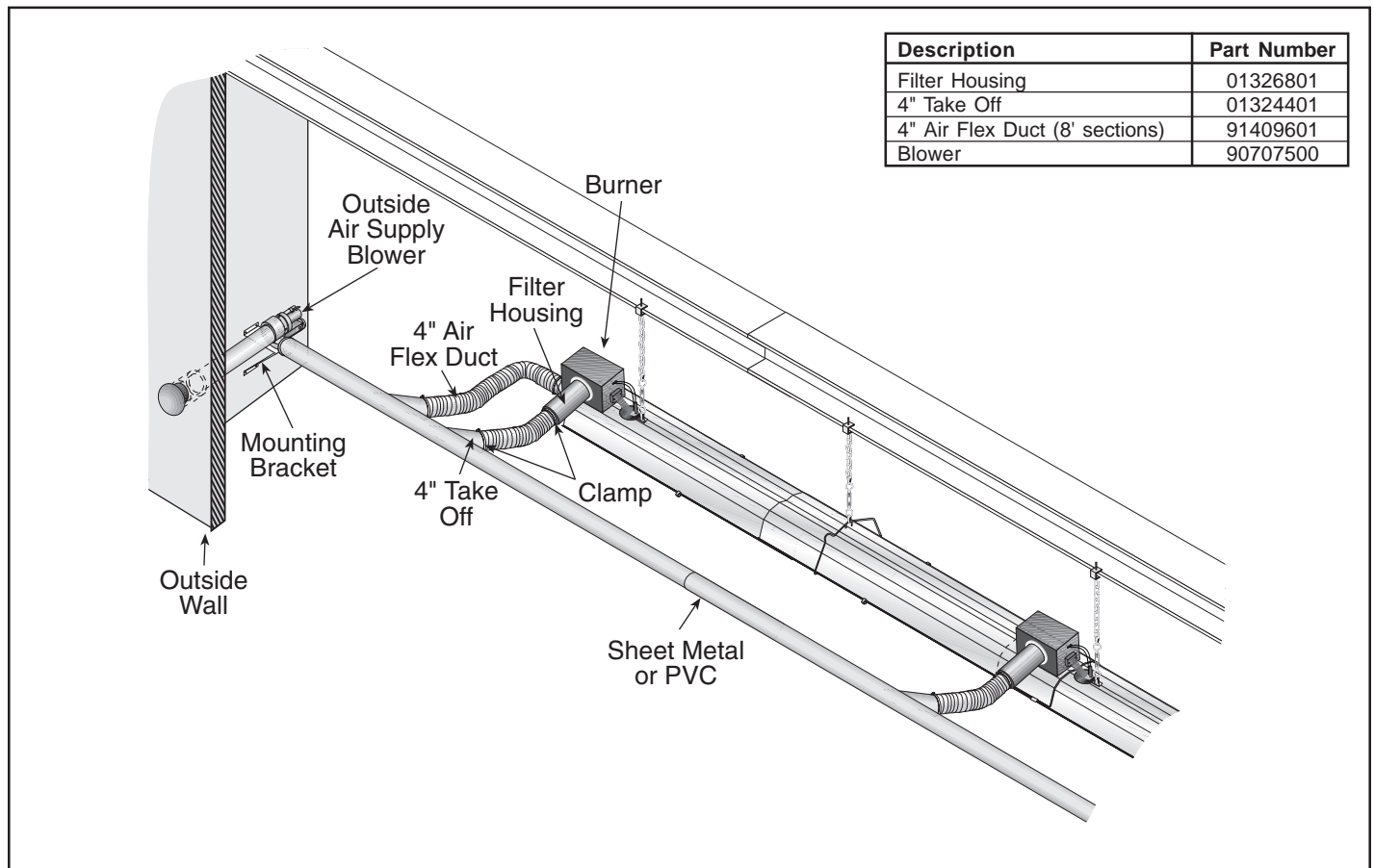
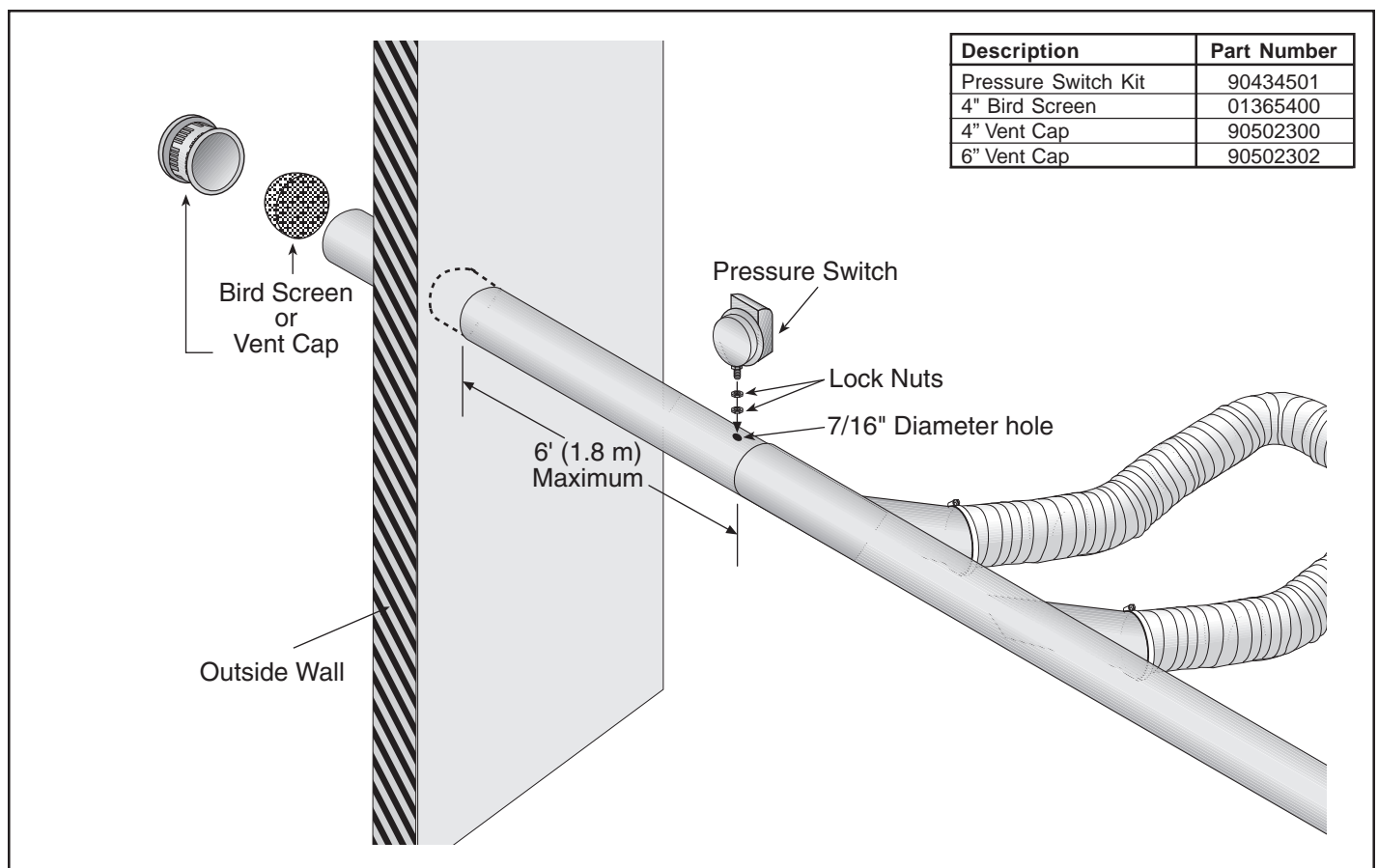



Figure 20 – Air Supply Blower Support






**Figure 21 – Outside Air Supply - Pressurized****Figure 22 – Outside Air Supply - Non-Pressurized**

►SECTION 11: GAS PIPING

**WARNING**



**Fire Hazard**

**Tighten gas line fittings to connect gas supply according to *Figure 23*.**

**Flex gas line can crack when twisted.**

**Gas line moves during normal operation.**

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

Install the flex gas connector as shown in Figure 23. The flex gas connector 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 heat exchanger tube with each firing cycle, this will cause the burner to move with respect to the gas line. This can cause a gas leak resulting in an unsafe condition if the gas connection is not made strictly in accordance with *Figure 23* below.

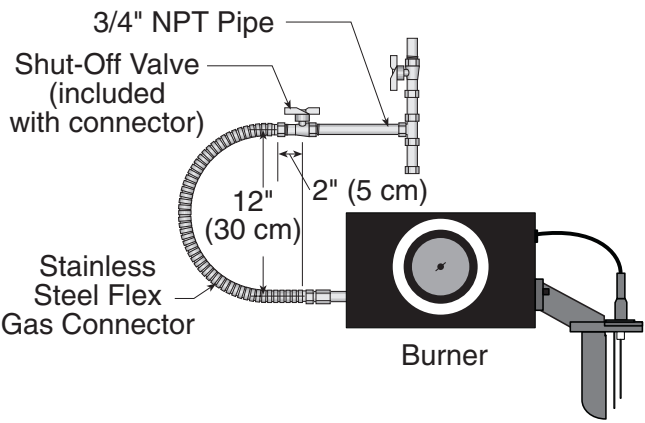
Meter and service must be large enough to handle all the burners being installed plus any other connected load. The gas line which feeds the system must be large enough to supply the required gas with a maximum pressure drop of 1/2" w.c. When gas piping is not included in the layout drawing, the local 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 23 – Gas Connection with Stainless Steel Flex Gas Connector**

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.

Description	Part Number
1/2" Flex Gas Line	91412200
3/4" Flex Gas Line	91412203



3/4" NPT Pipe

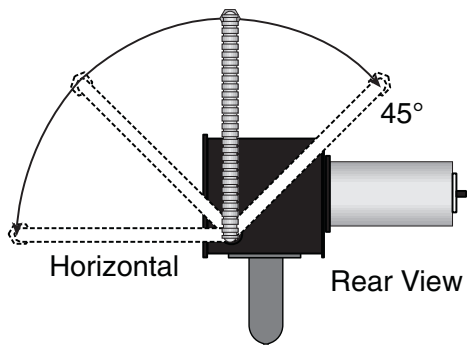
Shut-Off Valve (included with connector)

12" (30 cm)

2" (5 cm)

Stainless Steel Flex Gas Connector

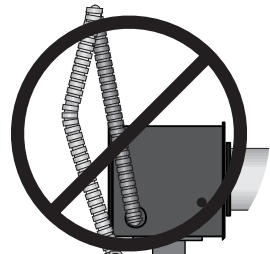
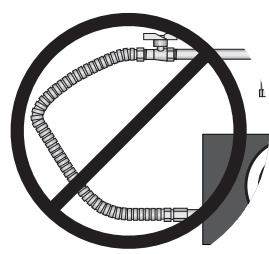
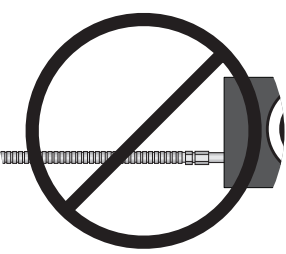
Burner



Horizontal

Rear View


45°



Hold gas nipple securely with pipe wrench when attaching the flex gas connector.

Failure to follow these instructions can result in product damage.

## ►SECTION 12: Control Methods


<b>Electrical Shock Hazard</b> <b>Disconnect electrical power before servicing.</b>  <b>This appliance must be connected to a properly grounded electrical source.</b>  <b>Failure to follow these instructions can result in death or electrical shock.</b>

There are several methods of controlling CORAYVAC® systems. The options are as follows:

### 1. ROBERTS GORDON® System Control P/N 02770002

The System Control is an electronic control panel designed to control CORAYVAC® heating systems. The System Control wiring is shown on *Pages 45-46, Figures 26-29* and in the System Control installation manual P/N 10091601NA. The System Control can be used to control an EP-100 or EP-201 pumps from the control panel. Other pumps such as the EP-301 and 3 phase models may be controlled by a relay or motor starter. The System Control can control up to four zones of burners.

The electrical circuit is a 120V AC (20A) supply.

The output for the thermostat is 12V DC. Do not use thermostats that draw power from the low voltage supply.

A System Control operated system has two minutes post purge pump operation to completely exhaust products of combustion from the system and provides indication of power to the pump, zones and indicates the status of the vacuum proving switch with lights.

The System Control is UL listed in accordance with UL873 – Temperature measurement and indicating equipment.

### 2. ROBERTS GORDON® BZC control panels

The ROBERTS GORDON® BZC controls are microprocessor based controls pre-programmed to be used in conjunction with the full range of ROBERTS GORDON® infrared heating equipment.

There are three ROBERTS GORDON® BZC control panels. The number of CORAYVAC® systems they can operate are as follows:

#### ROBERTS GORDON® BZC100

The ROBERTS GORDON® BZC100 wiring is shown in the ROBERTS GORDON® BZC100 Installation manual P/N 10011601NA. The ROBERTS GORDON® BZC100 can be used to control a CORAYVAC® system consisting of one zone of burners and one vacuum pump.

#### ROBERTS GORDON® BZC300

The ROBERTS GORDON® BZC300 wiring is shown in the ROBERTS GORDON® BZC300 Installation manual P/N 10031601NA. The ROBERTS GORDON® BZC300 can be used to control multiple CORAYVAC® systems consisting of three zones of burners and two pumps.

#### ROBERTS GORDON® BZC700

The ROBERTS GORDON® BZC700 wiring is shown in the ROBERTS GORDON® BZC700 Installation manual P/N 10071601NA. The ROBERTS GORDON® BZC700 can be used to control multiple CORAYVAC® systems consisting of five zones of burners and four pumps.

The electrical circuit is a 120V AC (20A) supply. Every control requires a ROBERTS GORDON® BZC internal temperature sensor (P/N 10001500). The sensors must be connected using a shielded cable (Belden 8451 or equivalent).

The pumps cannot be connected directly to the ROBERTS GORDON® BZC controls, suitable load relays, contactors or starters are required. Consult the ROBERTS GORDON® BZC Installation manual for more details.

The ROBERTS GORDON® BZC operated systems have two minutes post purge pump operation to completely exhaust products of combustion from the system. The controls offer full energy management features such as day and night temperature set points, optimized start up and security coding. For full details of the ROBERTS GORDON® BZC features and benefits contact your ROBERTS GORDON® independent distributor or Roberts-Gordon at (716) 852-4400 or (800) 828-7450 in the U.S., (905) 945-5403 or (800) 663-9025 in Canada or at [www.rg-inc.com](http://www.rg-inc.com).

The ROBERTS GORDON® BZC Controls are UL listed in accordance with UL873 – Temperature measurement and indicating equipment.

A pressure switch is required to confirm pump operation on all pumps.

A pressure switch (outside air) is also required on the inlet duct of a non-pressurized air supply. For pressurized outside air supplies, the outside air blower motor has a motor interlock that should be used. These controls should be wired in series with the pump's pressure switch.

When using an outside air blower either with control panel or relay transformer, a separate load relay package is required. Wire the control for the relay in parallel with the pump. The outside air blower must have a separate 20A, 120V power supply.

### **3. SPST Transformer Relay P/N 90417600**

The transformer relay wiring diagram is shown on *Page 43, Figure 24*. The transformer relay can be used to control an EP-100 or EP-201 pump CORAYVAC® system. The single pole relay can only be used to control one zone of burners.

The electrical circuit is a 120V AC (20A) supply.

The transformer 24V AC output for the thermostat is rated at 40VA. Thermostats used with the transformer must not exceed this power requirement.

A transformer relay operated system will not give any post purge pump operation to completely exhaust products of combustion from the system or provide indication of operating conditions.

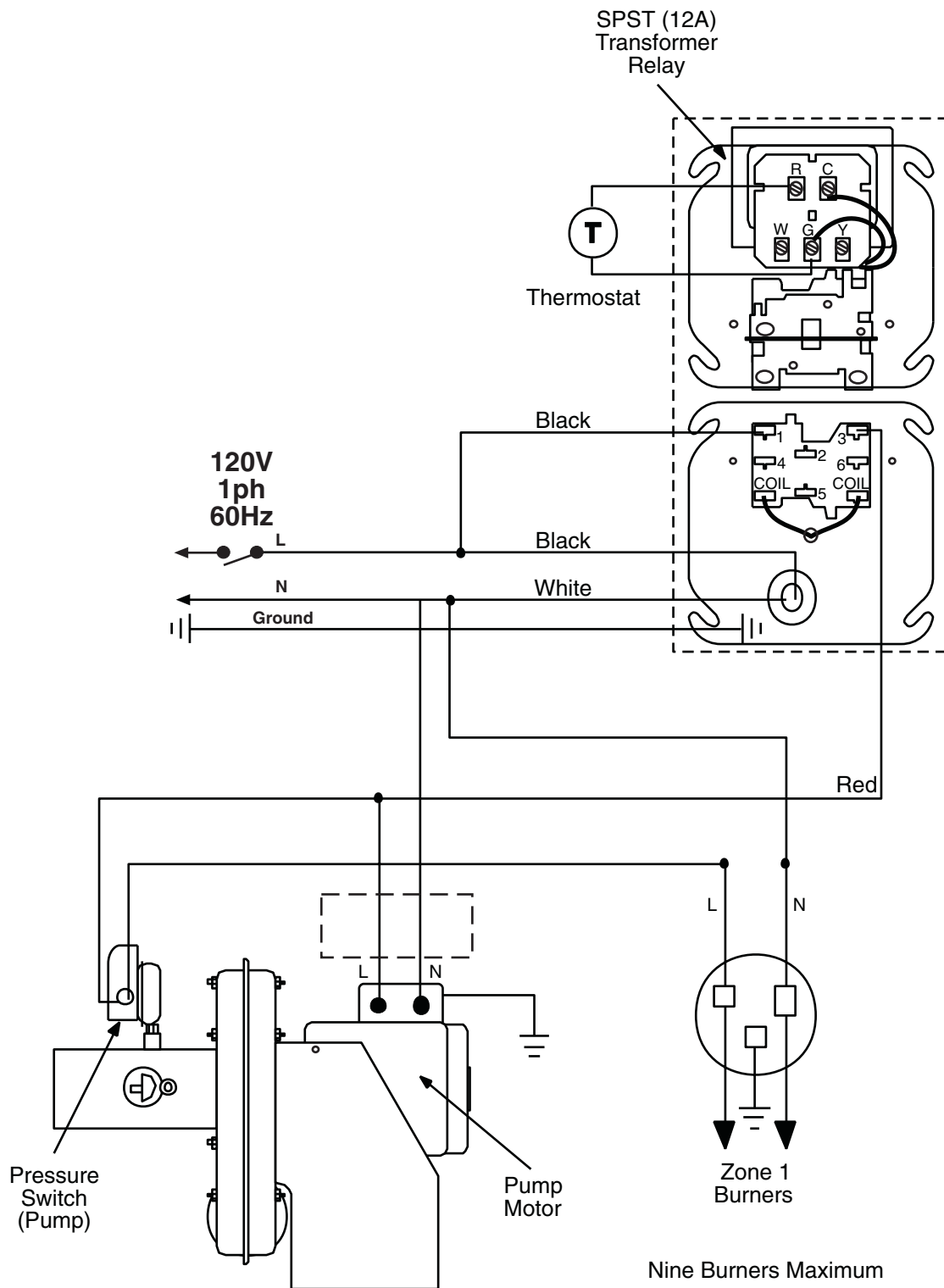
### **4. DPDT Transformer Relay P/N 90436300**

The transformer relay wiring diagram is shown on *Page 44, Figure 25*. The transformer relay can be used to control an EP-100 or EP-201 pump CORAYVAC® system. The double pole relay can only be used to control two zones of burners.

The electrical circuit is a 120V AC (20A) supply.

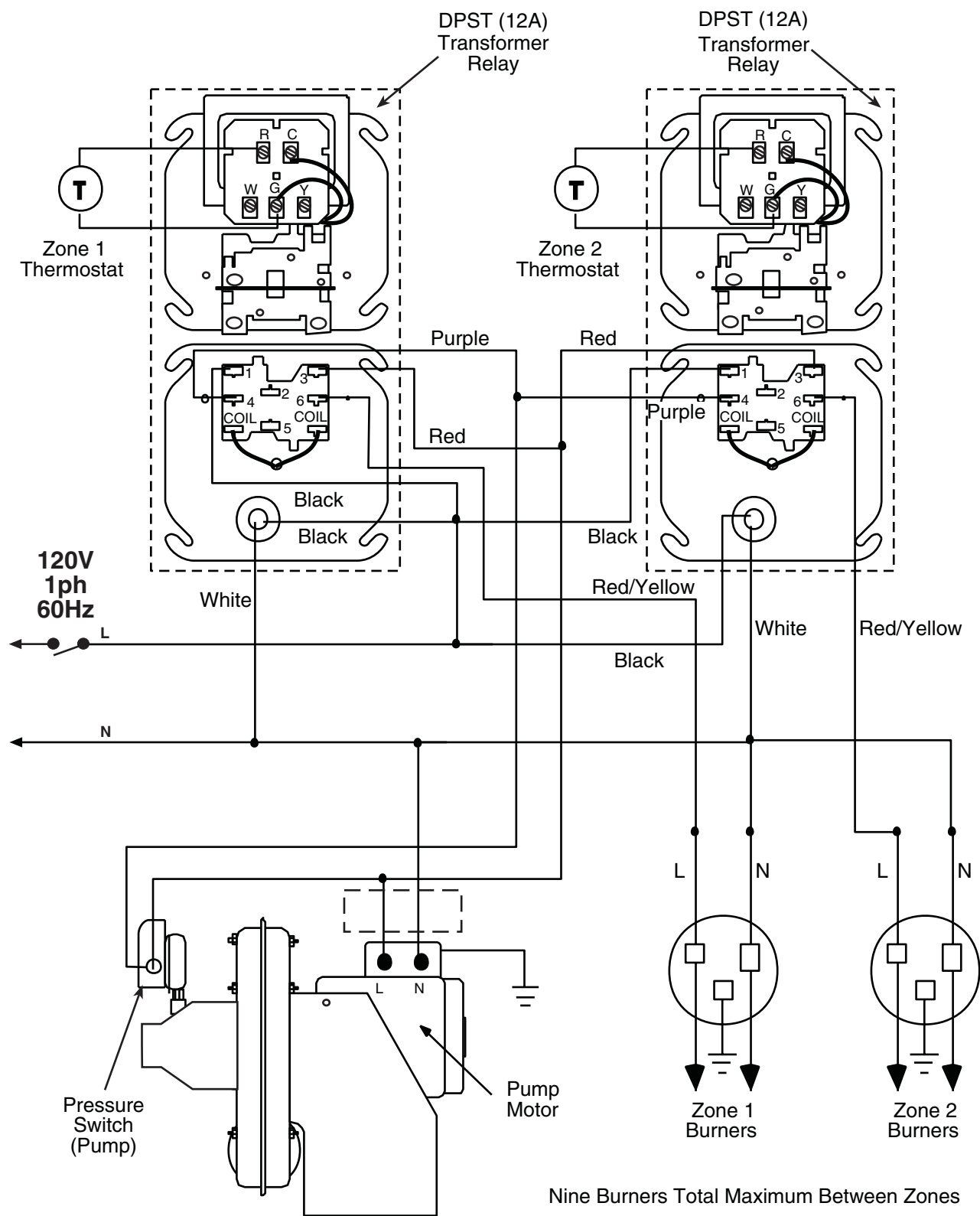
The transformer 24V AC output for the thermostat is rated at 40VA. Thermostats used with the transformer must not exceed this power requirement.

A transformer relay operated system will not give any post purge pump operation to completely exhaust products of combustion from the system or provide indication of operating conditions.

**FIGURE 24** – One Zone Operation without Control Panel

Description	Part Number
SPST Transformer Relay	90417600

**FIGURE 25 – Two Zone Operation without Control Panel**



Description	Part Number
DPST Transformer Relay	90436300

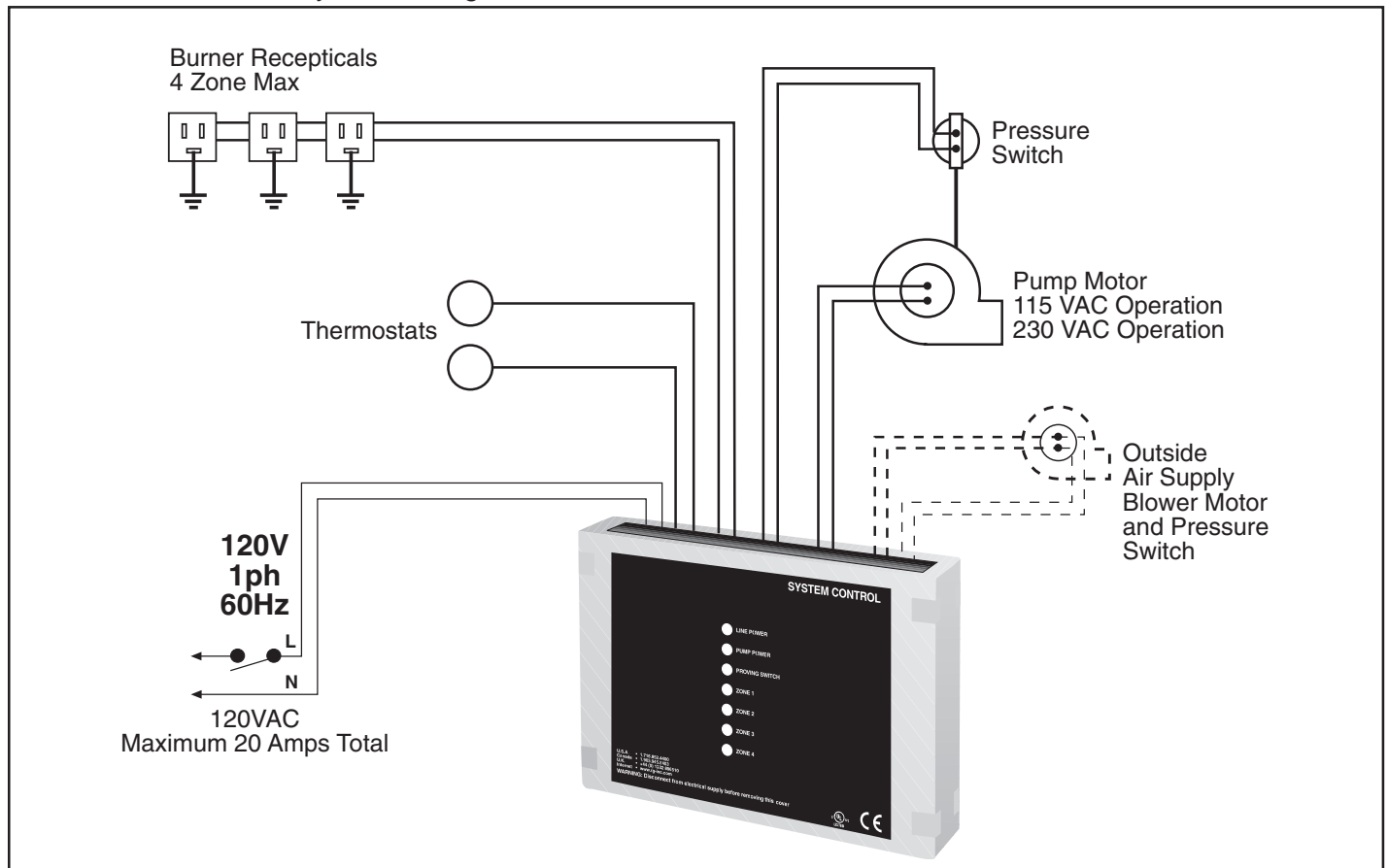
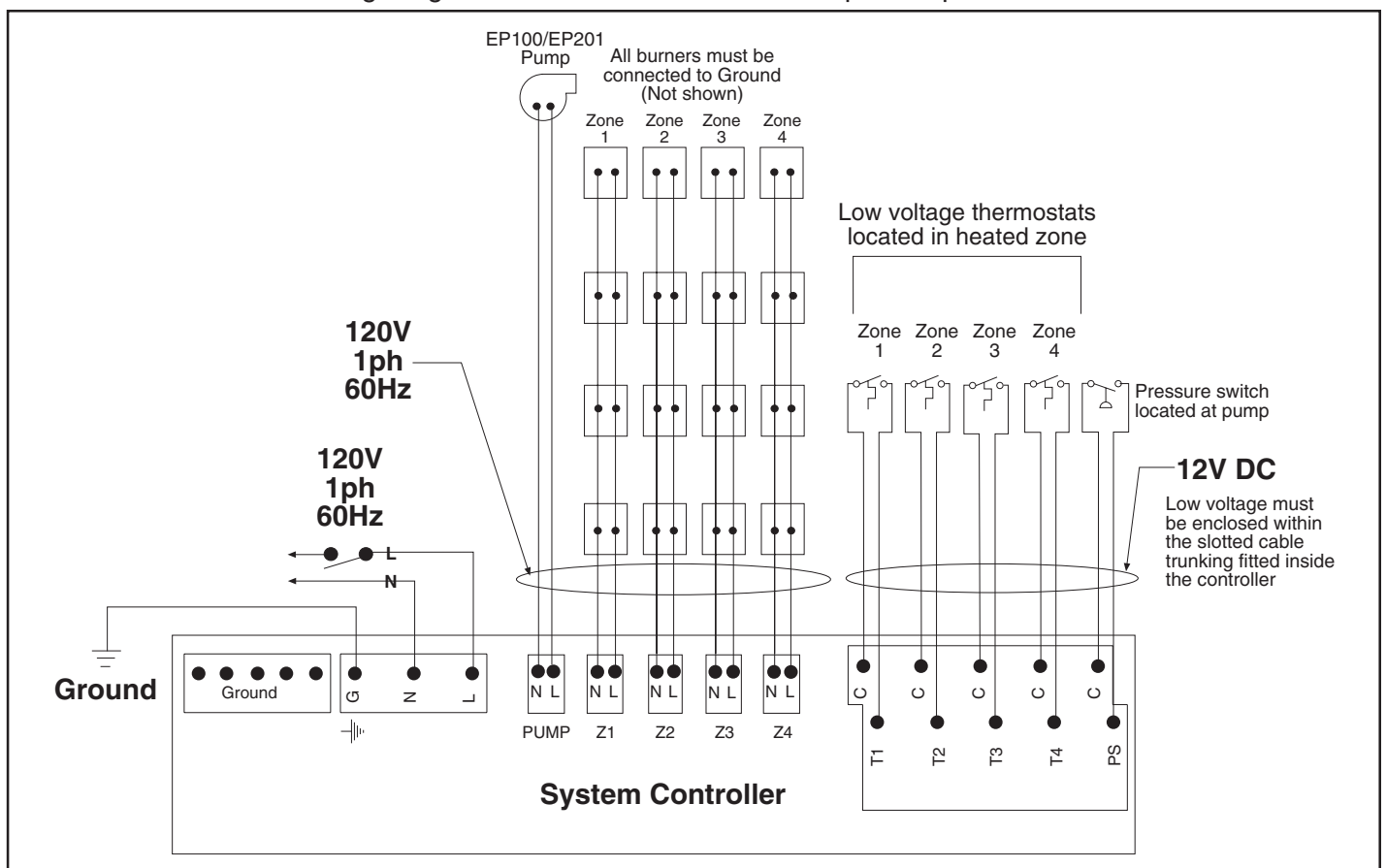
**FIGURE 26 – General System Wiring****FIGURE 27 – External Wiring Diagram EP 100 and EP 201 120V 1ph Pump**



FIGURE 28 – External Wiring Diagram EP 301 120V 1ph Pump

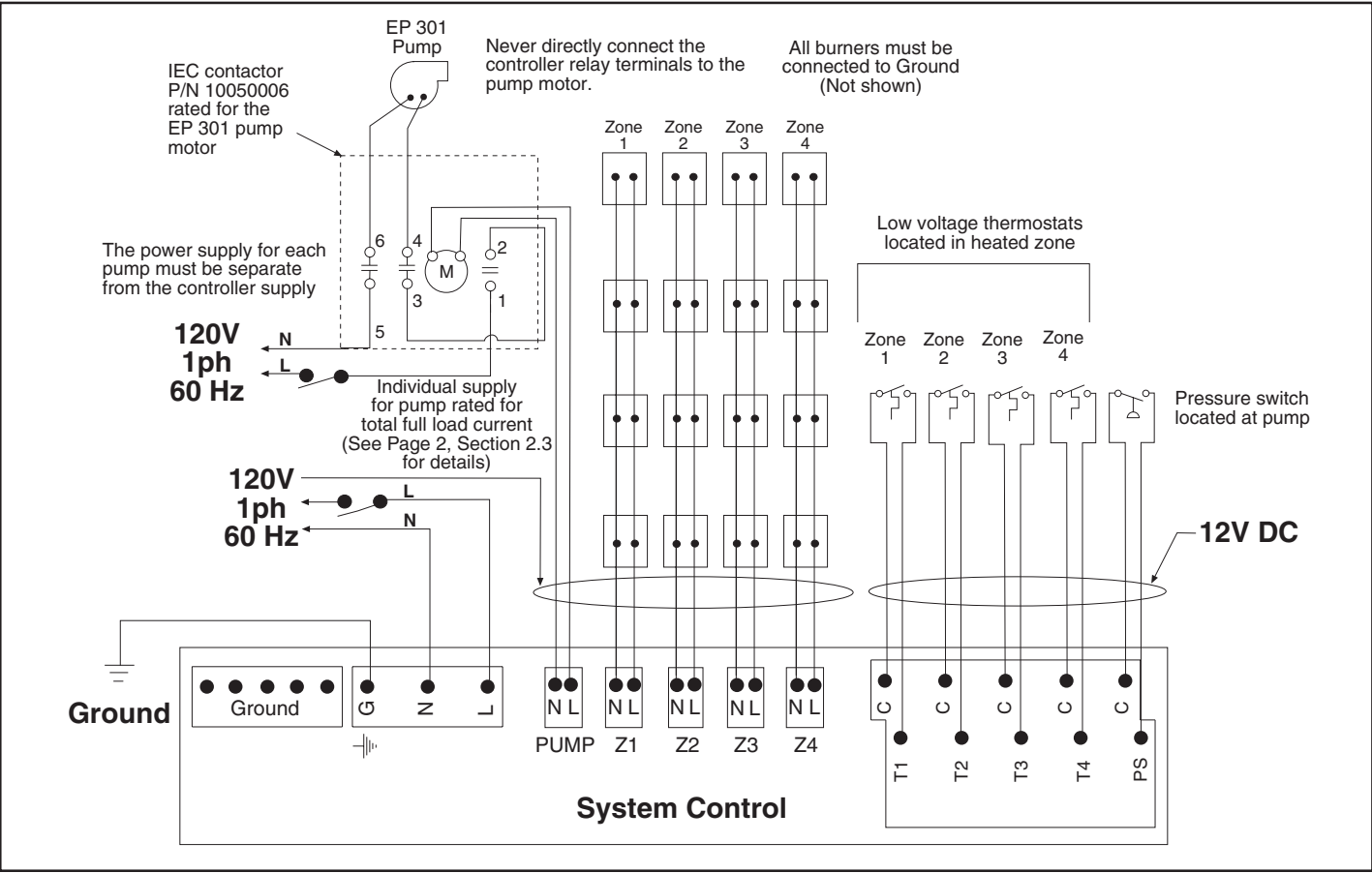
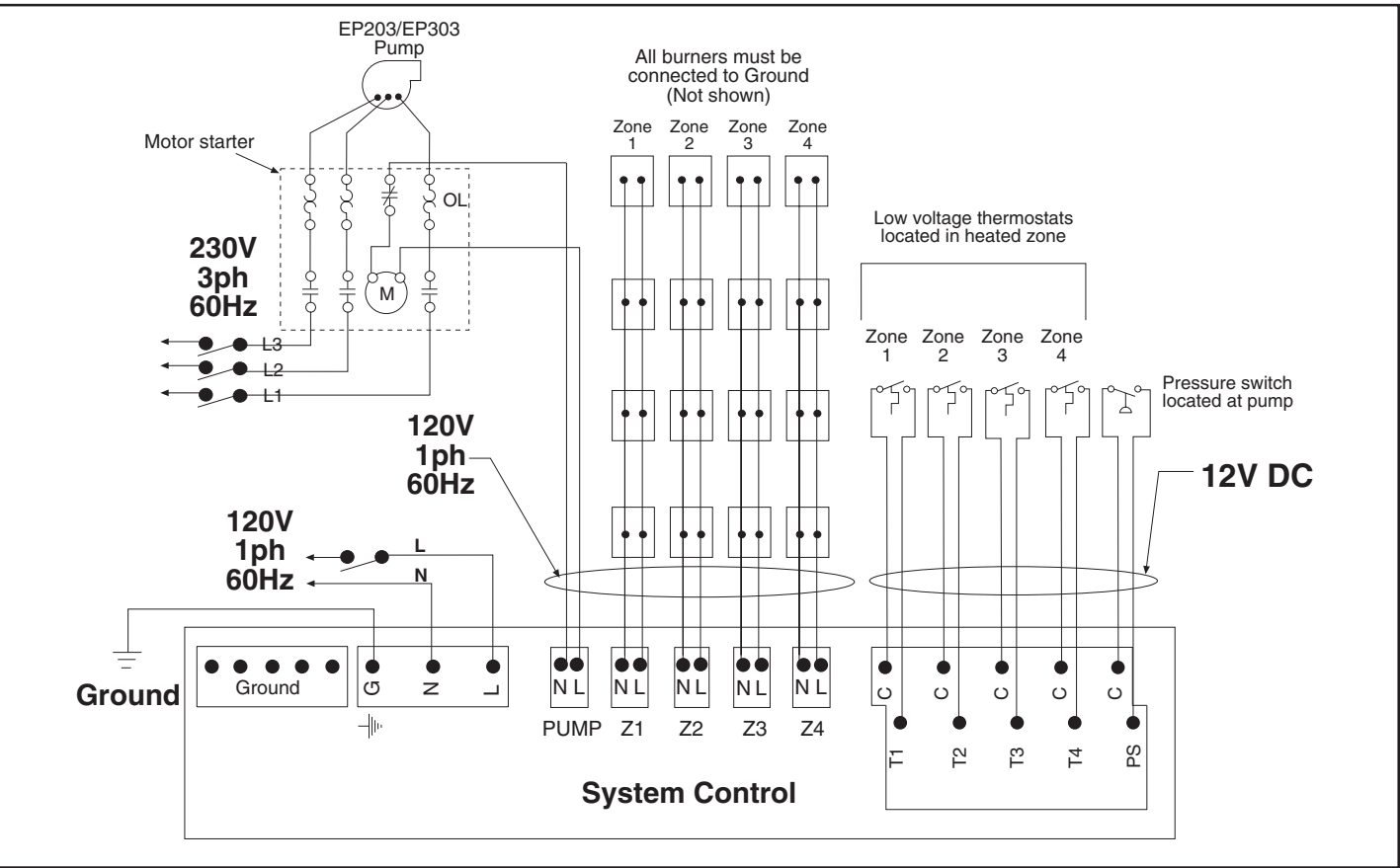
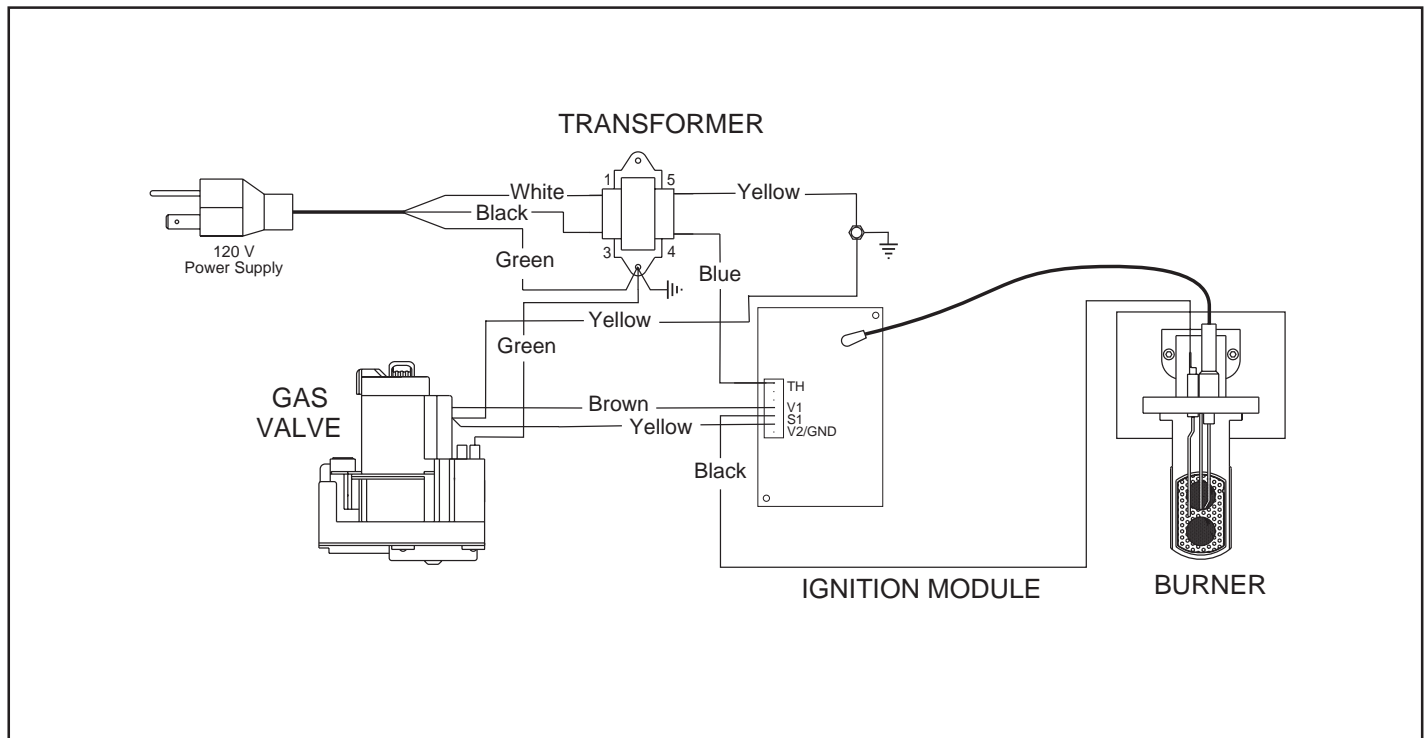


FIGURE 29 – External Wiring Diagram EP 203 and EP 303 230V 3ph Pump



**FIGURE 30 – CRV Burner Internal Wiring**

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 volts.

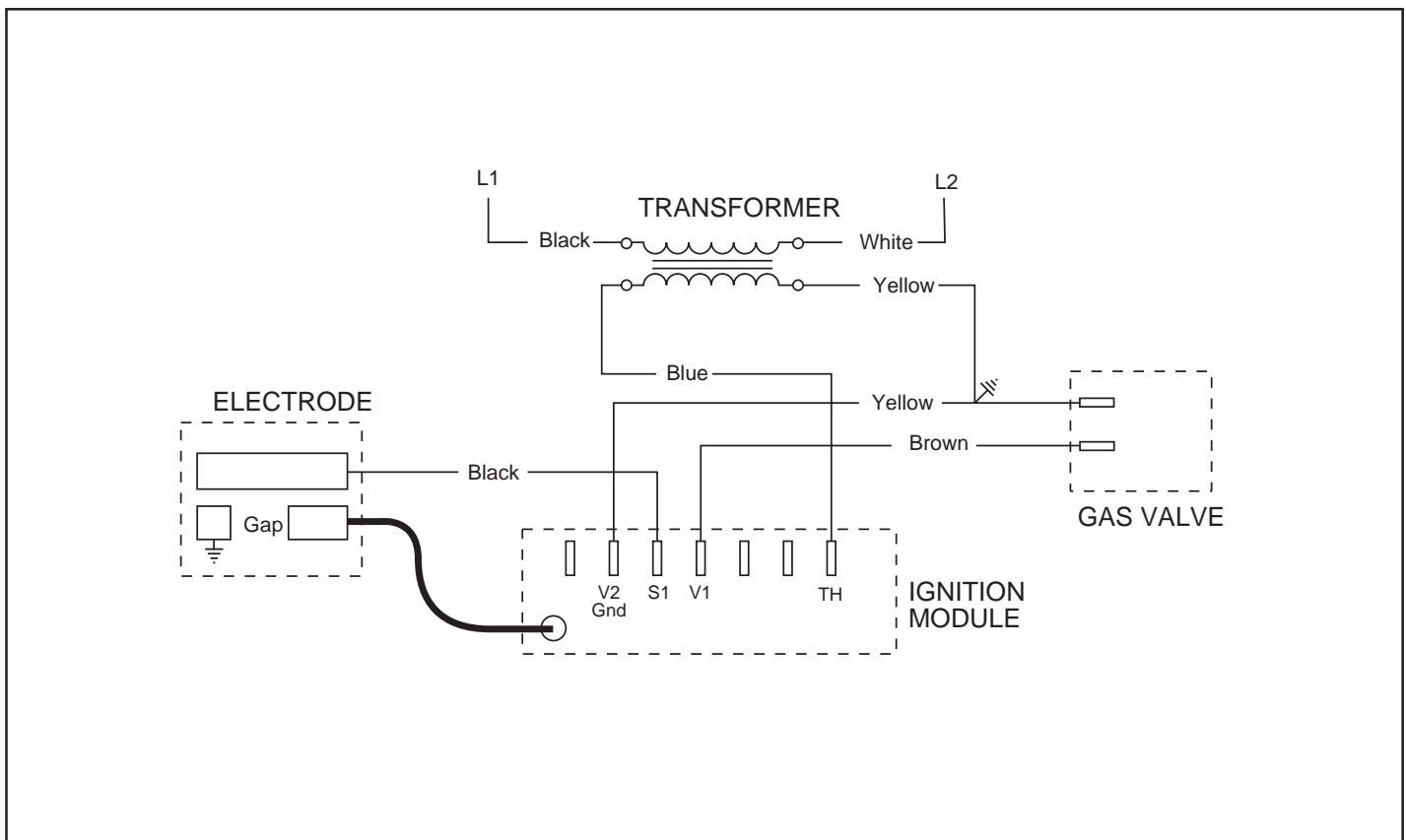
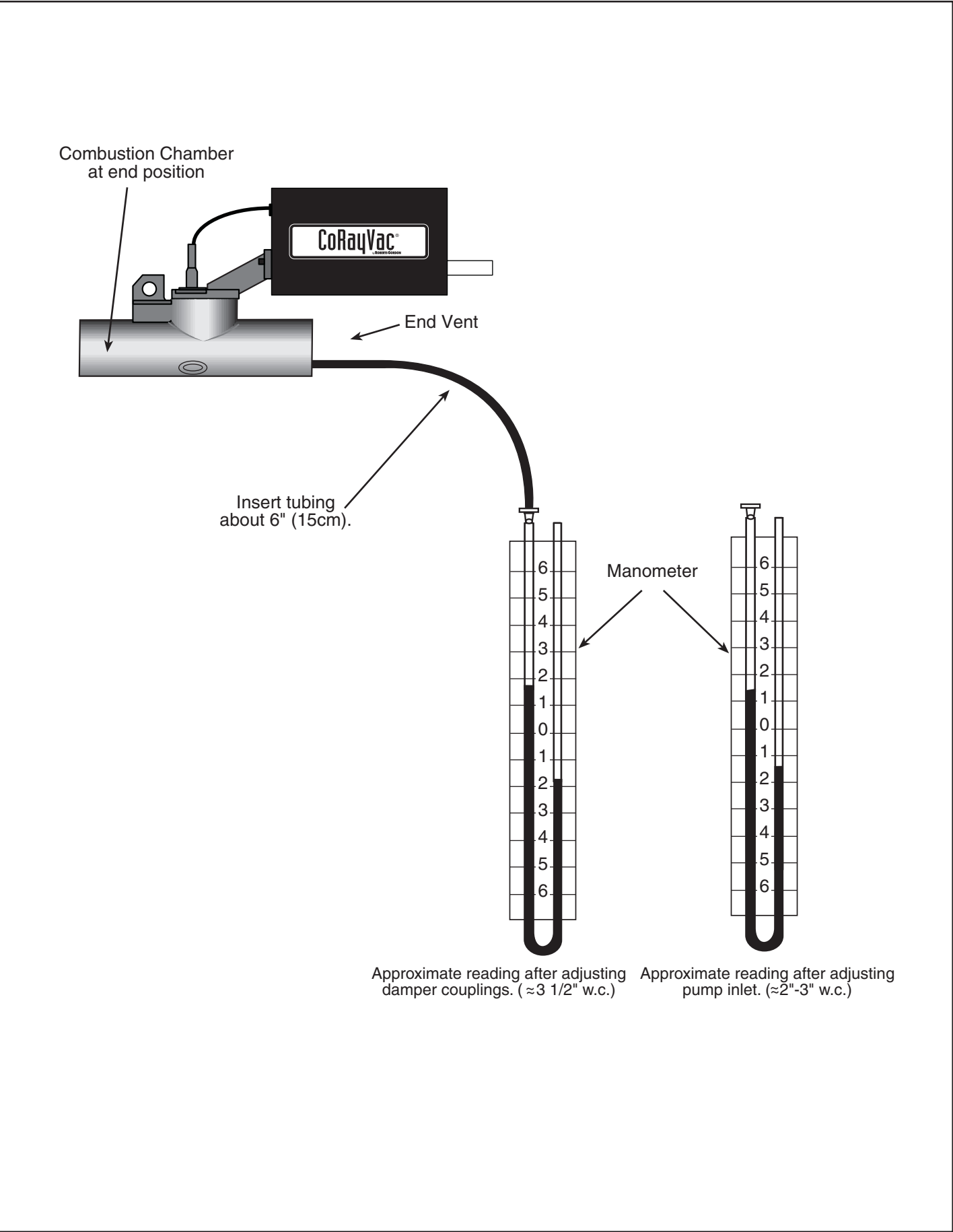
**FIGURE 31 – CRV Burner Internal Ladder Diagram**

FIGURE 32 – Vacuum Reading



## ►SECTION 13: OPERATION AND MAINTENANCE

### 13.1 Sequence of Operation

Turn the thermostat up. When the thermostat calls for heat, the pump will start immediately. After a small delay, the burners will begin their ignition sequence, 45 seconds later, sparking will begin at the electrode. Upon sparking of the electrodes, the gas valve is energized. The flame will be sensed by the flame sensing rod and the electrode is de-energized.

If a flame is detected, the gas valve remains open. When the call for heat is satisfied, the burner shuts off. On CORAYVAC® systems equipped with the optional ROBERTS GORDON® BZC Controllers or System Control, the pump will continue operation for a post-purge period of two minutes.

If no flame is detected on the module, the gas valve is closed, and a purge period begins. After the purge, the module resets, and there is a second trial for ignition. If flame is still not established, a third purge, and trial cycle begins. After 3 trials, the module will lockout until reset. Reset is accomplished by removing power from the module for at least 5 seconds (thermostat cycle required) or automatically after one hour.

### 13.2 Start Up Procedure

#### Pre-Season Maintenance and Annual Inspection

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.

Disconnect gas and electric supplies before performing service or maintenance.

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 heating system.

For safety and best performance, the gas, electrical, thermostat connections, tubing, venting, suspensions and overall heating system condition are some of the areas requiring inspection.

NOTE: Gas flow, burner ignition and pump operation are among the first things that should be inspected. Please see the chart on *Pages 50 and 51*, for suggested items to inspect.

**REMEMBER TO CHECK:**

**Installation, Service and Annual Inspection of the 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.**

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<b>The Vicinity of the Heater</b>	Do not store or use flammable objects, liquids or vapors near the heating system. Immediately remove these items if they are present. <i>See Page 2, Section 3.</i>
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<b>Vehicles and Other Objects</b>	Maintain the clearances to combustibles. Do not hang anything from, or place anything on, the heating system. 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. <i>See Page 2, Section 3.</i>
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<b>Reflector</b>	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. <i>See Page 19, Figure 12.</i> Clean outside surface with a damp cloth.
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<b>Vent Pipe</b>	Venting must be intact. Using a flashlight, look for obstructions, cracks in the pipe, gaps in the sealed areas or corrosion. Do not operate if there are obstructions, cracks, gaps or corrosion. The area must be free of dirt and dust. Remove any carbon deposits or scale using a wire brush.
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<b>Outside Air Terminal</b>	Terminal must be intact. Look for obstructions, cracks in the pipe, gaps in the sealed areas or corrosion. Do not operate if there are obstructions, cracks, gaps or corrosion. The area must be free of dirt and dust. Clean and reinstall as required.
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<b>Tubes</b>	Make sure there are no cracks. Make sure tubes are connected and suspended securely. <i>See Pages 15-17, Sections 8.1-8.3.</i> Make sure there is no sagging, bending or distortion. Do not operate if there is sagging, cracking or distortion.
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<b>Gas Line</b>	Check for gas leaks according to <i>Page 40, Section 11.</i>
<b>Combustion Chamber Window</b>	Do not operate if there is a gas leak. Make sure it is free of cracks or holes. Clean and replace as required.

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<b>Burner Head and Orifice</b>	Clear of obstructions (even spider webs will cause problems). Carefully remove any dust and debris from the burner.
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<b>Electrodes</b>	Replace if there are cracked ceramics, excessive carbon residue, or erosion of the electrodes. The electrode gap should be .1/8" (3.2 mm).
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<b>Thermostat or Internal Sensor</b>	There should be no exposed wire or damage to the thermostat or sensor.
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<b>Suspension Points</b>	<p>Make sure the heater is hanging securely. Look for signs of wear on the chain or ceiling.</p> <p>Contact a contractor qualified in the installation and service of gas-fired heating equipment for repair.</p> <p>Do not operate if the system is hanging insecurely</p> <p><i>See Pages 15-16, Section 8 and Page 19, Section 8, Figure 12.</i></p>
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<b>Decorative and Protective Grille (optional)</b>	<p>The grille must be securely attached. If the grille is loose or off, contact a contractor qualified in the installation and service of gas-fired heating equipment for repair.</p> <p>Check that reflector extensions are installed correctly and secured in place if necessary (decorative grille only).</p> <p><i>See Pages 25-30, Sections 8.11, 8.12 and 8.13.</i></p> <p>Make sure shield is installed correctly and secured in place if necessary. (Decorative grille only.) <i>See Page 25, Section 8, Step 8.11.2</i></p>
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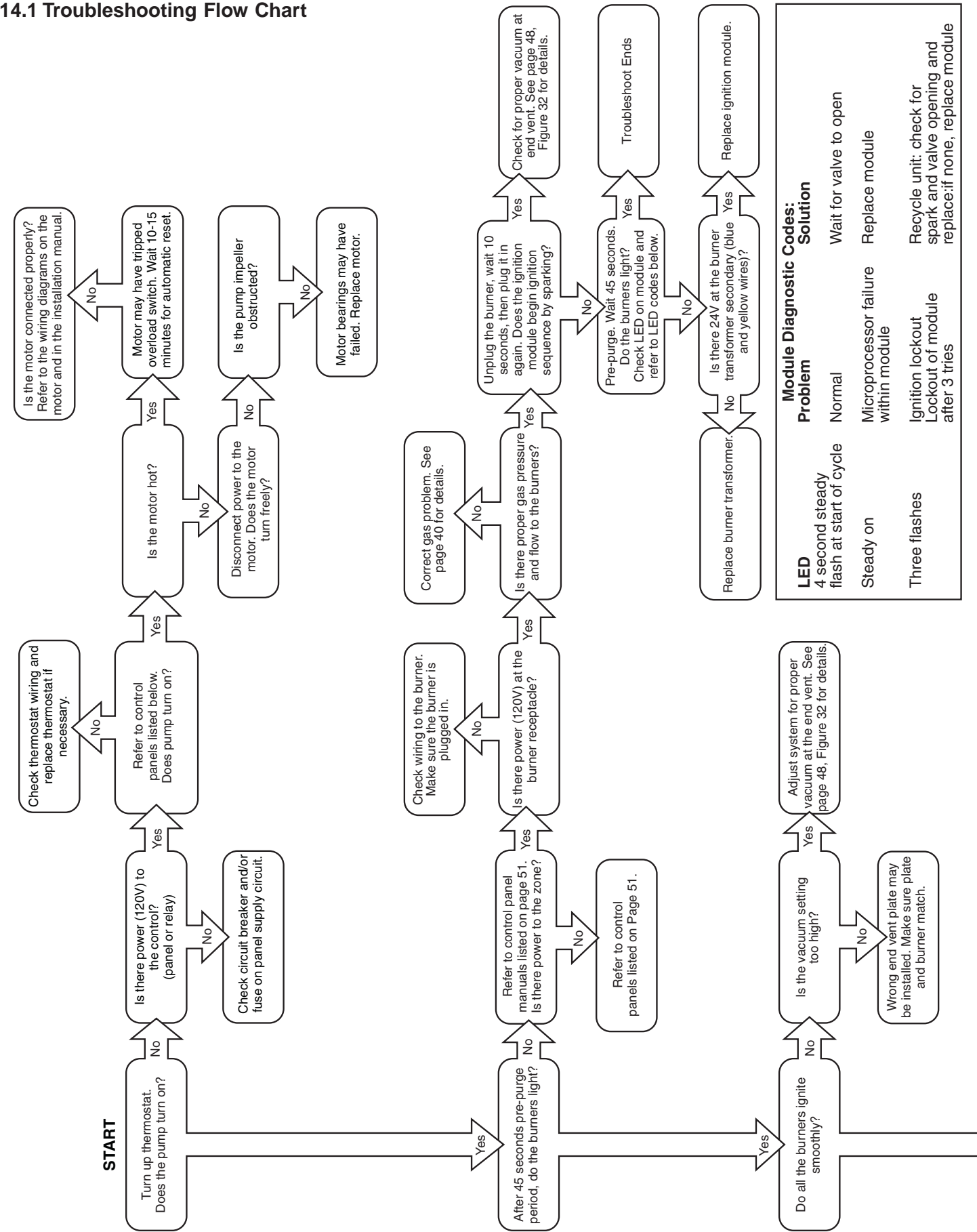
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<b>Pump</b>	<p>With pump operating, check for excessive vibration or noise. Vibration is usually a sign that the impeller is out of balance. Turn off the system, insure power is shut off and remove the inlet plate. Check the shaft seal and replace it if worn or missing.</p> <p><b>With the Power off:</b></p> <p>Check the inlet and outlet of the pump for blockage or excessive soot and clean as necessary.</p> <p>Check boots for cracking or deterioration and replace if necessary.</p> <p>If a condensate trap is installed, check the condition of the trap and the drain line attached. Note: the condensate trap should be filled with water at the beginning of each heating season.</p> <p>Check the condition of the motor mounts. Lift the motor from the rear; look for breaks in the rubber and replace if necessary.</p> <p>Check the condition and operation of the pressure switch.</p>
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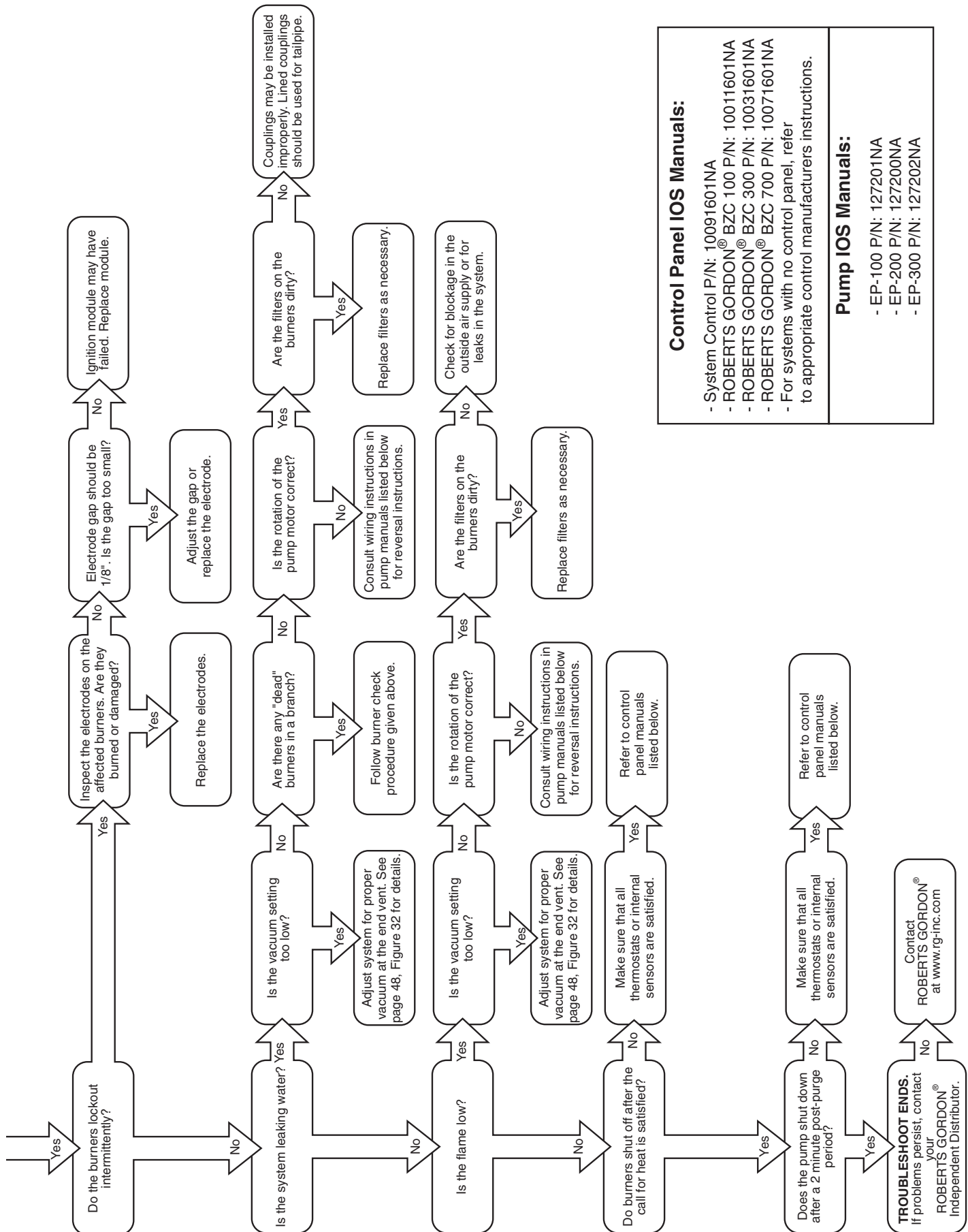
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►SECTION 14: TROUBLESHOOTING

14.1 Troubleshooting Flow Chart

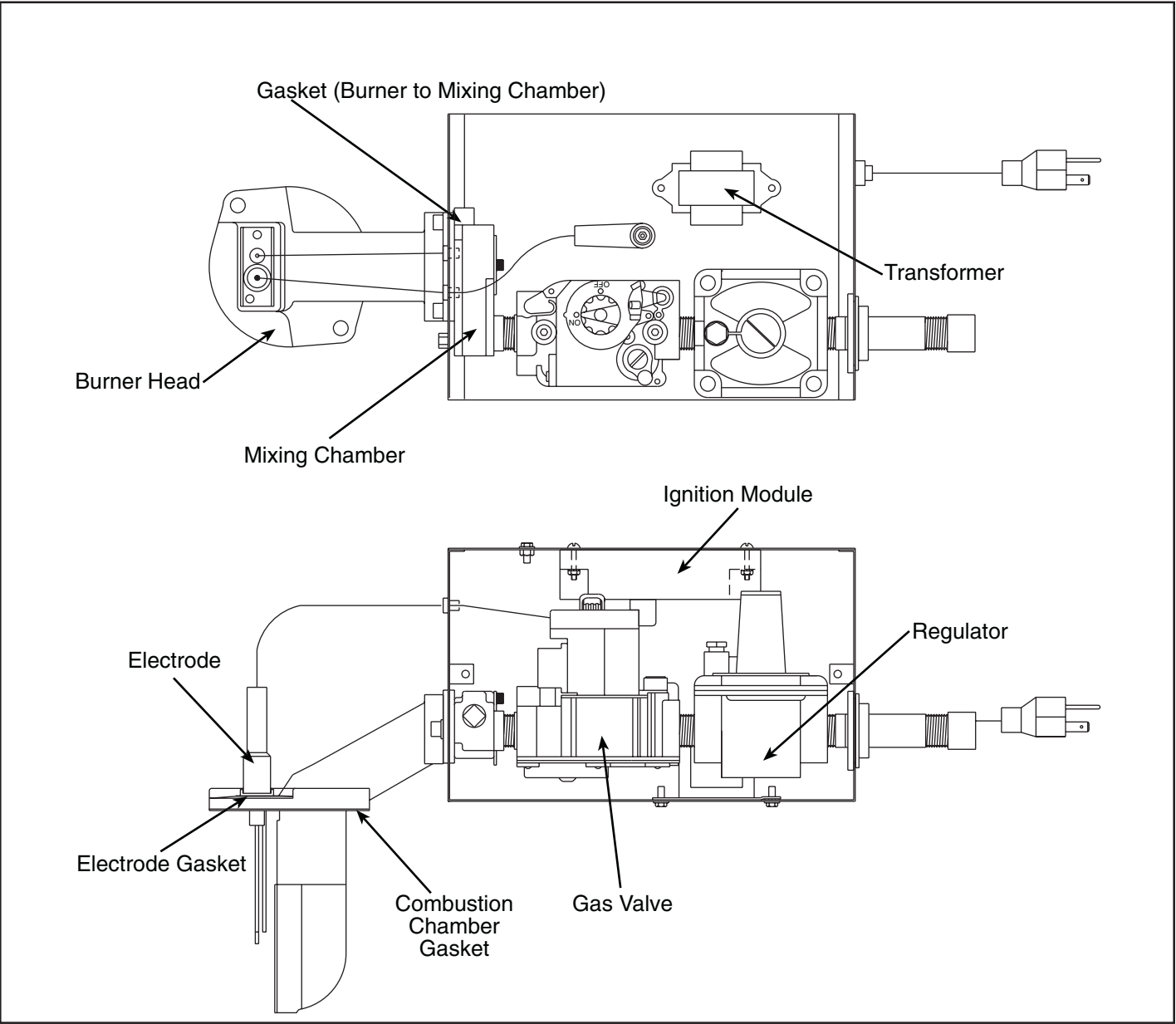






►SECTION 15: REPLACEMENT PARTS

Use only genuine ROBERTS GORDON® replacement parts.  
Use of parts not specified by Roberts-Gordon voids warranty.  
Failure to follow these instructions can result in property damage.

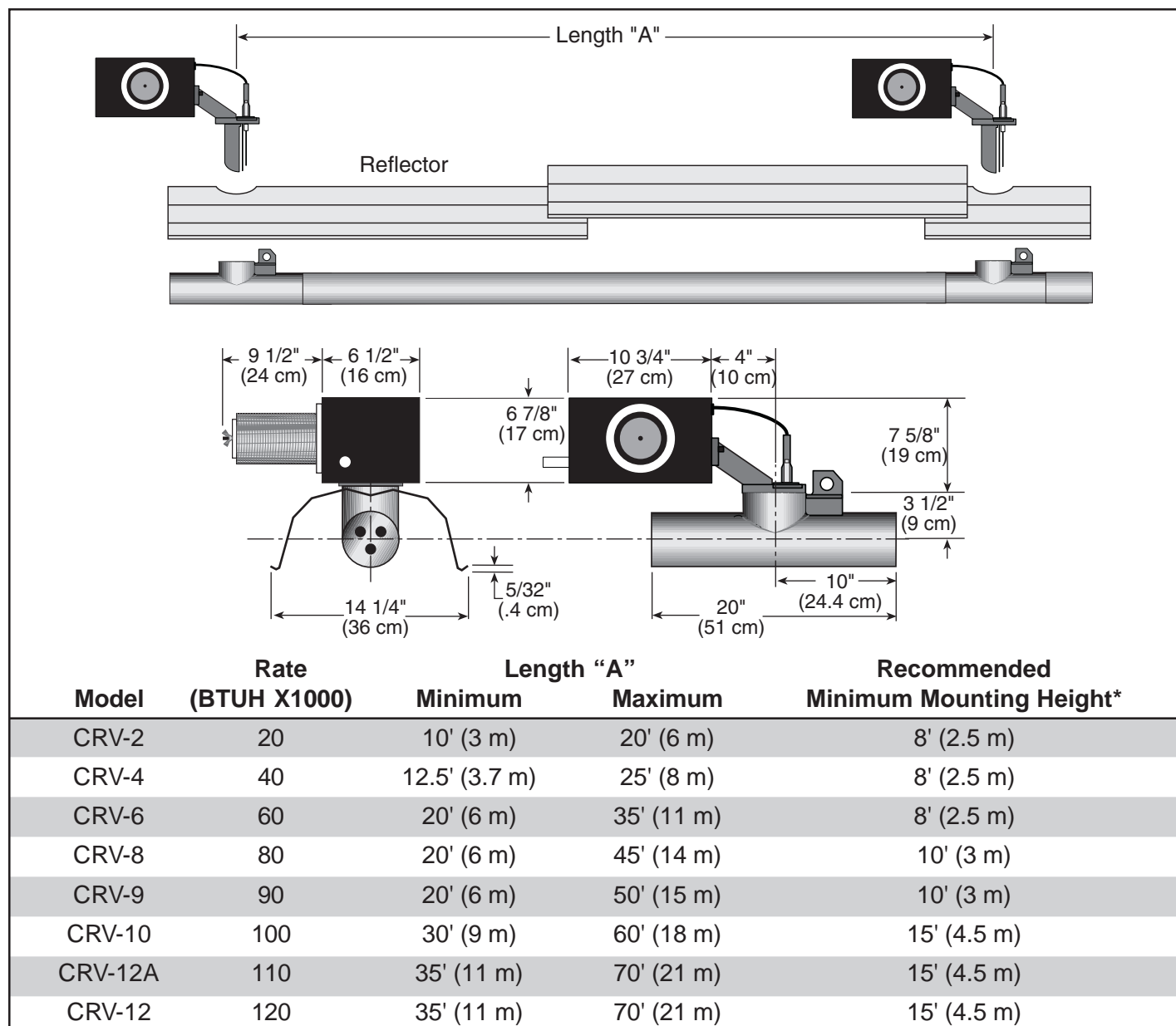


Description	Part Number
Gas Valve (All Burners)	90032502
Gasket (Burner to Mixing Chamber)	01351100
Burner Head Assembly	02721701
Mixing Chamber	02790400
Transformer	90436900K

Description	Part Number
Regulator	90207100
Gasket (Combustion Chamber)	01367800
Electrode	90430700
Electrode Gasket	02558501
Ignition Module	90439500

## ►SECTION 16: GENERAL SPECIFICATIONS

General Specifications for CORAYVAC® heaters are as follows



\* See Pages 3-5, Section 3 for clearances to combustibles.

### GASES:

Natural, L.P.

### GAS CONNECTION:

1/2" NPT

### BURNER WEIGHT:

20 lbs.

### DIMENSIONS:

Vent Connection Size: 4" or 8" (10 or 15 cm)  
Outside Air Connection Size: 4" (10 cm)  
Refer to figure above for dimensional information.

### GAS INLET PRESSURE:

Natural Gas: 4.5" w.c. Minimum 14.0" w.c. Maximum  
LP Gas: 10.5" w.c. Minimum 14.0" w.c. Maximum

### ELECTRICAL RATING:

120V - 60 Hz., 0.3 Amp

### IGNITION SYSTEM:

Fully Automatic, Three Try Direct Spark Electronic  
Microprocessor based Ignition Control, 100% Shut-Off

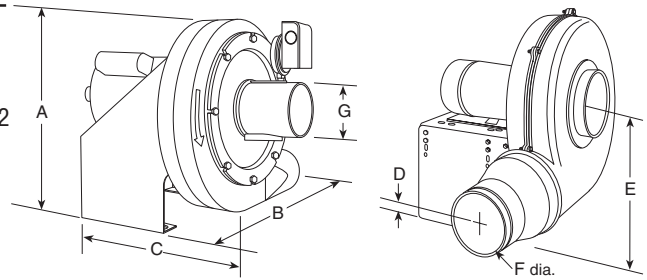
General Specifications for CORAYVAC® pumps are as follows:

### Pump Dimensional Data (in.)

Model	A	B	C	D	E	F	G
EP 100	17	14-1/2	21	3-3/4	10	4	4
EP 201/203	17-3/4	17	18-3/4	3-1/4	10	4-1/2	4-1/2
EP 301/303	25-1/2	21-3/4	27-1/2*	7-1/8	15	6**	6*

\* with 8"x6" inlet adapter installed

\*\* with 8"x6" outlet adapter installed



### Pump Specifications

Model	EP 100	EP 201	EP 203	EP 301	EP 303
Horsepower (Hp)	1/3	3/4	3/4	1-1/2	1-1/2
Phase	1	1	3	1	3
Hertz (Hz)	60	60	60	60	60
Voltage (V)	115/230	115/230	230	115/230	230
Full Load Amp (Amps)	4.8/2.4	6.6/3.3	3.0	16.0/8.0	4.2
R.P.M.	3450	3450	3450	3450	3450
Motor Frame	56	56	56	56	56
Motor Enclosure	TENV	TENV	TEFC	TEFC	TEFC
Noise Level @ 5' (DBA)	-	70	70	74	74
Inlet/Outlet (In.)	4/4	4/4	4/4	6/6	6/6
Weight (lbs.)	62	112	112	108	108

### Air Supply Blower Specifications

Capacity	210 CFM @ 0.75" w.c.
Power (W)	173
Phase	1
Hertz (Hz)	60
Voltage (V)	115
Full Load Amp (Amps)	1.5
R.P.M.	3300
Motor Enclosure	OPEN FC
Noise Level @ 5' (DBA)	-
Inlet/Outlet (In.)	6/6
Weight (lbs.)	10

## ► SECTION 17: THE ROBERTS GORDON® CORAYVAC® WARRANTY.

### ROBERTS-GORDON WILL PAY FOR:

ROBERTS GORDON® warrants to the original owner-user that this ROBERTS GORDON® product will be free from defects in material and workmanship. This warranty is limited to thirty-six (36) months from the date of purchase by the original consumer, or forty-two (42) months from date of shipment by Roberts-Gordon, whichever occurs first.

Roberts-Gordon warrants the cast iron combustion chamber of the CORAYVAC® Classic System will be free from defects in material and workmanship. This warranty is limited to twenty-five (25) years from the date of shipment by Roberts-Gordon. All other components of the CORAYVAC® Classic System adhere to the standard warranty listed in the paragraph above.

ROBERTS GORDON® replacement parts are warranted for the period of the original ROBERTS GORDON® CORAYVAC® Warranty.

### ROBERTS-GORDON WILL NOT PAY FOR:

Service trips, service calls and labor charges.

Shipment of replacement parts.

Damage due to:

Failure to install, operate or maintain the ROBERTS GORDON® CORAYVAC® as directed in Installation, Operation and Service Manual. You must follow requirements printed in this manual.

Misuse, abuse, neglect or modification of the ROBERTS GORDON® CORAYVAC® in any way.

Improper service, use of replacement parts or accessories that are not specified by Roberts-Gordon.

Improper installation, or any relocation of the ROBERTS GORDON® CORAYVAC® after initial installation.

Incorrect supply, accident, fire, flood, acts of God or other casualty.

Use of the ROBERTS GORDON® CORAYVAC® for other than its intended purpose.

Use of the ROBERTS GORDON® CORAYVAC® in a corrosive atmosphere or any atmosphere containing contaminants.

Shipping. Claim must be filed with carrier.

Use of the ROBERTS GORDON® CORAYVAC® in the vicinity of combustible or explosive materials.

Any defect in the ROBERTS GORDON® CORAYVAC® arising from a drawing, design or specification supplied by or on behalf of the consumer.

Failure of parts not manufactured by Roberts-Gordon in respect of any claim where the total price of the goods has not been paid.

### WARRANTY IS VOID IF:

The ROBERTS GORDON® CORAYVAC® is not installed by a contractor qualified in the installation and service of gas-fired 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 ROBERTS GORDON® CORAYVAC® is transferred. This warranty is nontransferable.

Roberts-Gordon is not permitted to inspect the damaged burner and/or component parts.

### READ YOUR INSTALLATION AND USE AND CARE MANUAL

If you have questions about your heater, contact your installing professional. Should you need Replacement Parts or have additional questions, call or write Roberts-Gordon:

#### Canada

241 South Service Road, West  
Grimsby, Ontario L3M 1Y7  
905.945.5403

#### U.S.A.

1250 William Street  
P.O. Box 44  
Buffalo, New York 14240-0044  
716.852.4400

On the web at: [www.rg-inc.com](http://www.rg-inc.com)

**Roberts-Gordon'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.

**Roberts-Gordon 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 ROBERTS GORDON® CORAYVAC®.** 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.

Roberts-Gordon 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 fire, flood, strike, government or court orders, unavailability of supplies, parts or power. No person is authorized to assume for Roberts-Gordon any other warranty, obligation or liability.

### LIMITATIONS ON AUTHORITY OF REPRESENTATIVES:

No representative of Roberts-Gordon, 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 Roberts-Gordon's duly authorized Executive Officer.