FOR YOUR SAFETY
If you smell gas:

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

⚠ WARNING

Fire Hazard

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

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

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

ROBERTS GORDON®

Vantage® TF

Twin Fire Unitary Infrared Heater

Installation, Operation & Service Manual

TF-120
TF-160
TF-200
TF-250
TF-300
TF-350
TF-380

⚠ 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 service technician 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. This heater is not certified to meet the requirements of NFPA30A-2012 Section 7.6.6. (maximum tube temperature of 750 °F (399 °C)). Do not install this heater in facilities where compressed natural gas (CNG) or liquid natural gas (LNG) are present. These instructions, the layout drawing, local codes and ordinances, and applicable standards that apply to gas piping, electrical wiring, venting, etc. must be thoroughly understood before proceeding with the installation.

Protective gear is to be worn during installation, operation and service in accordance to the Occupational Safety and Hazard Administration (OSHA). Gear must be in accordance to NFPA 70E, latest revision when working with electrical components. Thin sheet metal parts 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.

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

This appliance is not intended for use by persons (including children) with reduced physical, sensory or mental capabilities, or lack of experience and knowledge, unless they have been given supervision or instruction concerning use of the appliance by a person responsible for their safety. Children should be supervised to ensure that they do no play with the appliance.

For additional copies of the Installation, Operation and Service Manual, please contact Roberts-Gordon LLC.

1.1 Manpower Requirements

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

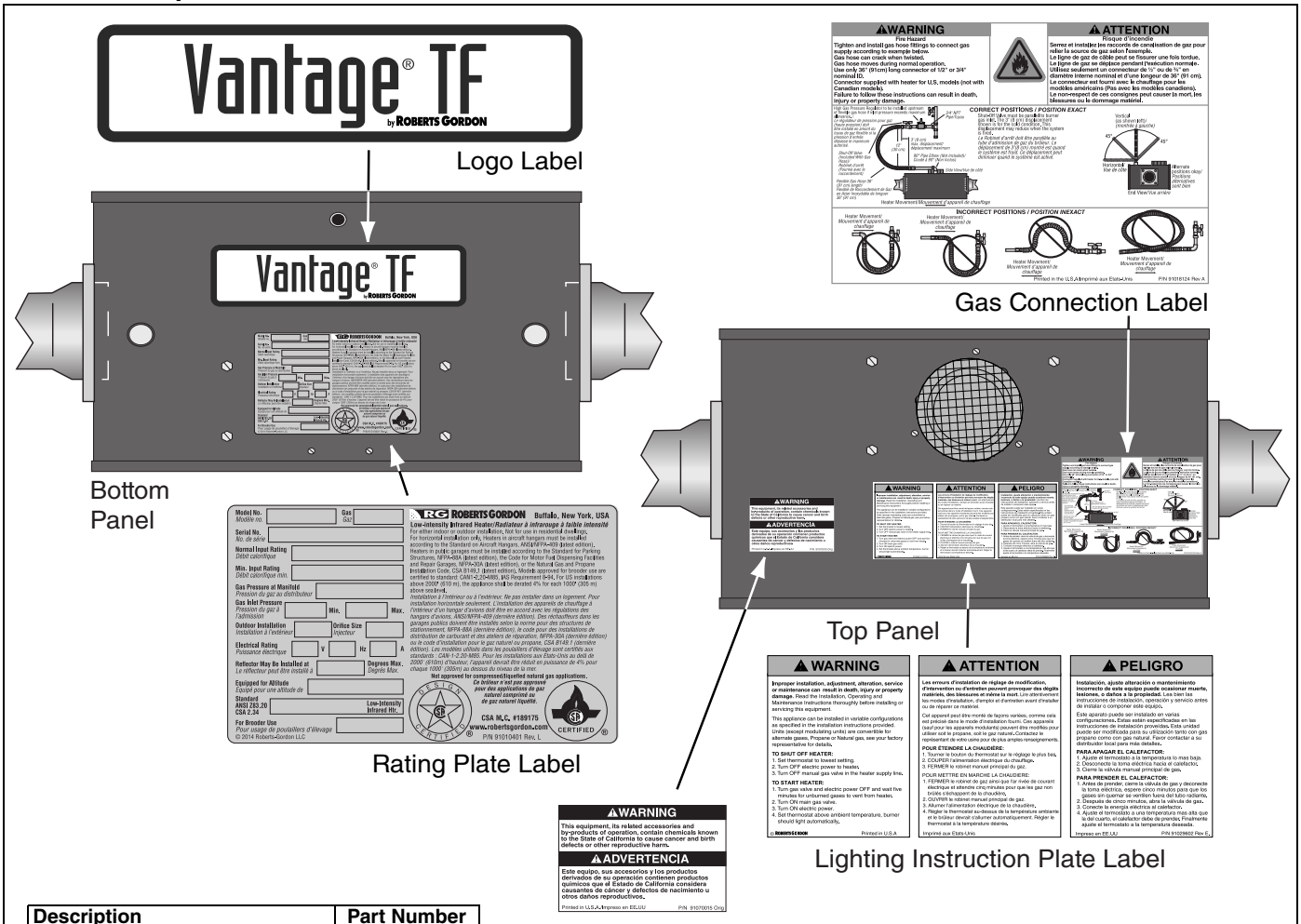
1.2 Safety Labels and Their Placement

Product safety signs or labels should be replaced by the product user when they are no longer legible. Please contact Roberts-Gordon LLC or your ROBERTS GORDON® independent distributor to obtain replacement signs or labels. *See Page 2, Figure 1 through Page 3, Figure 2*.

1.3 California Proposition 65

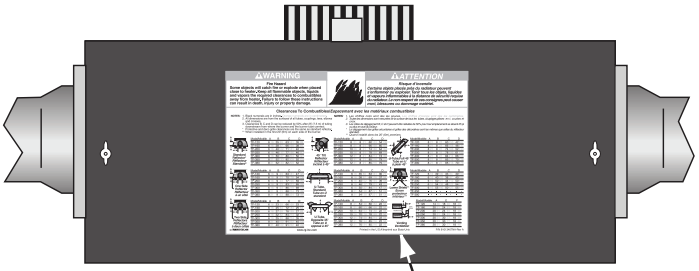
In accordance with California Proposition 65 requirements, a warning label must be placed in a highly visible location on the outside of the equipment (i.e., near equipment's serial plate). See label placement drawing *on Page 2, Figure 1* for label location. Avoid placing label on areas with extreme heat, cold, corrosive chemicals or other elements. To order additional labels, please contact Roberts-Gordon LLC or your ROBERTS GORDON® independent distributor.

FIGURE 1: Top and Bottom Panel Label Placement

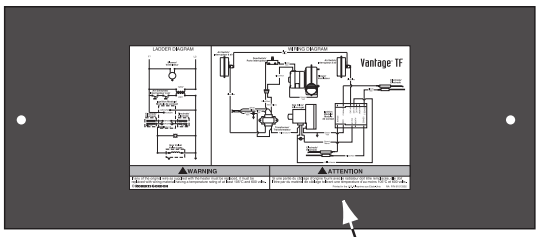


Description	Part Number
Logo Label	91013202
Rating Plate Label	91010401
Gas Connection Label	91018124
Lighting Instruction Plate Label	91029602
Proposition 65 Label	91070016

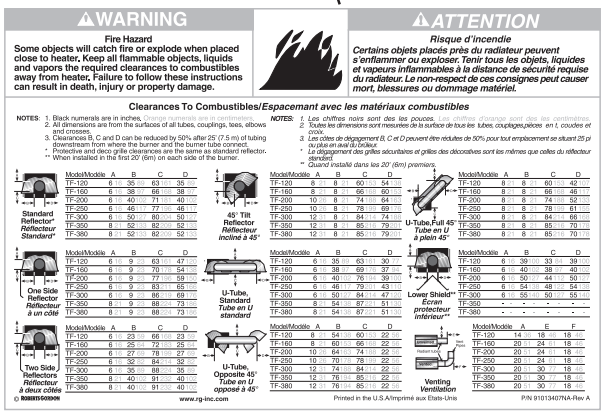
FIGURE 2: Side Panel Label Placement



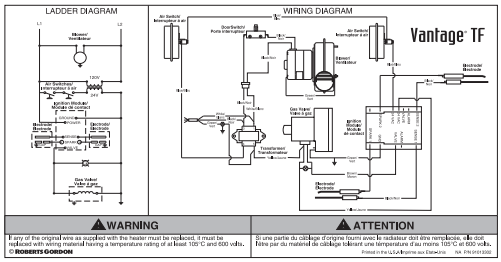
Control Side Panel



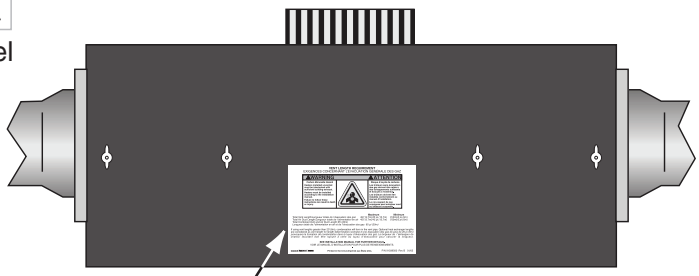
Control Side Panel (Inside)



Clearances to Combustibles Label



Wiring Label



Side Panel

Vent Length Label

Description	Part Number
Clearances to Combustibles Label	91013407
Wiring Label	91013302
Vent Length Label	91039500

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. 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 heater in accordance with the clearances to combustibles.
- To furnish all needed materials not furnished as standard equipment.
- To plan location of supports.
- To provide access to burners for servicing on all sides for burner removal.
- To provide the owner with a copy of this installation, operation and service manual.
- To never use heater as support for a ladder or other access equipment and never hang or suspend anything from heater.
- To ensure there is adequate air circulation around the heater and to supply air for combustion, ventilation and distribution in accordance with local codes.
- To safely and adequately install heater using materials with a minimal working load of 75 lbs (33 kg).
- To ensure the heater is placed in a approved application.

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 Roberts-Gordon or your ROBERTS GORDON® independent distributor to obtain the wall tag. Affix the tag by peeling off the backing of the adhesive strips on the rear surface and position the tag on a wall near the heater (e.g. thermostat or ROBERTS GORDON® Controller).

A copy of the wall tag (P/N 91037912) 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 6, Figure 3 through Page 9, Figure 12*. 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

Product Damage Hazard

Do not use heater in area containing corrosive chemicals.

Refer to appropriate Material Safety Data Sheets (MSDS).

Failure to follow these instructions can result in product damage.

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, 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: CLEARANCES TO COMBUSTIBLES

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 6, Figure 3 through Page 9, Figure 12* 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.
- The stated clearances to combustibles represent a surface temperature of 90° F (50° C) above room temperature. Building materials with a low heat tolerance (such as plastics, vinyl siding, canvas, triply, etc.) may be subject to degradation at lower temperatures. It is the installer's responsibility to assure that adjacent materials are protected from degradation.
- Maintain clearances from heat sensitive equipment and workstations.
- Maintain clearances from vehicles parked below the heater.
- Maintain clearances from swinging and overhead doors, overhead cranes, vehicle lifts, partitions, storage racks, hoists, building construction, etc.
- In locations used for the storage of combustible materials, signs must be posted to specify the maximum permissible stacking height to maintain required clearances from the heater to the combustibles. Signs must be posted adjacent to the heater thermostat. In the absence of a thermostat, signs must be posted in a conspicuous location.
- Consult local 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 17, Figure 14*.

⚠ WARNING

Fire Hazard

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

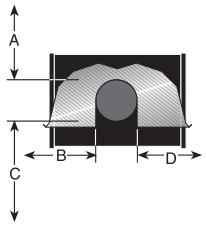
Some objects will catch fire or explode when placed close to heater.

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

- 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.

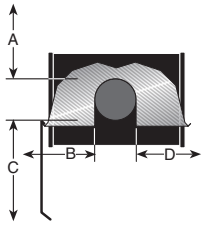
NOTE: 1. All dimensions are from the surfaces of all tubes, couplings and elbows.
2. Clearances B, C and D can be reduced by 50% after 25' (7.5 m) of tubing downstream from where the burner and burner tube connect.

FIGURE 3: STANDARD REFLECTOR



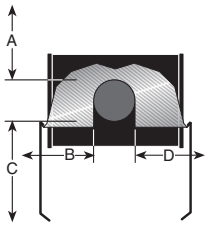
Model	(inches) A	B	C	D	(centimeters) A	B	C	D
TF-120	6	35	63	35	16	89	161	89
TF-160	6	38	66	38	16	97	168	97
TF-200	6	40	71	40	16	102	181	102
TF-250	6	46	77	46	16	117	196	117
TF-300	6	50	80	50	16	127	204	127
TF-350	8	52	82	52	21	133	209	133
TF-380	8	52	82	52	21	133	209	133

FIGURE 4: ONE SIDE REFLECTOR



Model	(inches) A	B	C	D	(centimeters) A	B	C	D
TF-120	6	9	63	47	16	23	161	120
TF-160	6	9	70	54	16	23	178	138
TF-200	6	9	77	59	16	23	196	150
TF-250	6	9	83	65	16	23	211	166
TF-300	6	9	86	69	16	23	219	176
TF-350	8	9	88	73	21	23	224	186
TF-380	8	9	88	73	21	23	224	186

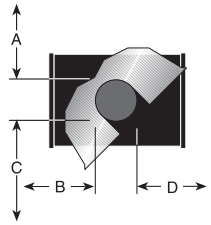
FIGURE 5: TWO SIDE REFLECTORS



Model	(inches) A	B	C	D	(centimeters) A	B	C	D
TF-120	6	23	66	23	16	59	168	59
TF-160	6	25	72	25	16	64	183	64
TF-200	6	27	78	27	16	69	199	69
TF-250	6	32	84	32	16	82	214	82
TF-300	6	35	88	35	16	89	224	89
TF-350	8	40	91	40	21	102	232	102
TF-380	8	40	91	40	21	102	232	102

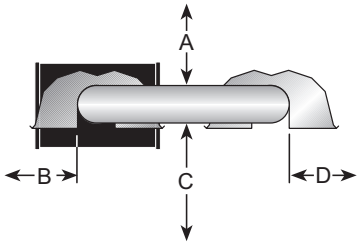
NOTE: 1. All dimensions are from the surfaces of all tubes, couplings and elbows.
2. Clearances B, C and D can be reduced by 50% after 25' (7.5 m) of tubing downstream from where the burner and burner tube connect.

FIGURE 6: 45° TILT REFLECTOR



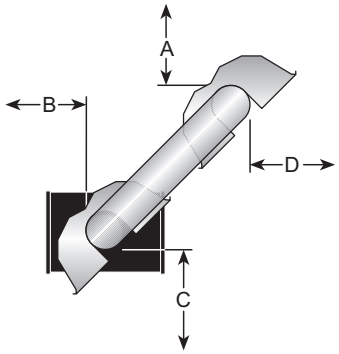
Model	(inches) A	B	C	D	(centimeters) A	B	C	D
TF-120	8	8	60	54	21	21	153	138
TF-160	8	8	66	60	21	21	168	153
TF-200	10	8	74	64	26	21	188	163
TF-250	10	8	78	69	26	21	199	176
TF-300	12	8	84	74	31	21	214	188
TF-350	12	8	85	79	31	21	216	201
TF-380	12	8	85	79	31	21	216	201

FIGURE 7: U-TUBE, STANDARD REFLECTOR



Model	(inches) A	B	C	D	(centimeters) A	B	C	D
TF-120	6	35	63	30	16	89	161	77
TF-160	6	38	69	37	16	97	176	94
TF-200	6	40	76	39	16	102	194	100
TF-250	6	46	79	43	16	117	201	110
TF-300	6	50	84	47	16	127	214	120
TF-350	8	54	87	51	21	138	221	130
TF-380	8	54	87	51	21	138	221	130

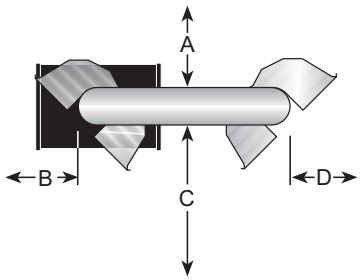
FIGURE 8: U-TUBE, 45°



Model	(inches) A	B	C	D	(centimeters) A	B	C	D
TF-120	8	8	60	42	21	21	153	107
TF-160	8	8	66	46	21	21	168	117
TF-200	8	8	74	52	21	21	188	133
TF-250	8	8	78	61	21	21	199	155
TF-300	8	8	84	66	21	21	214	168
TF-350	8	8	85	70	21	21	216	178
TF-380	8	8	85	70	21	21	216	178

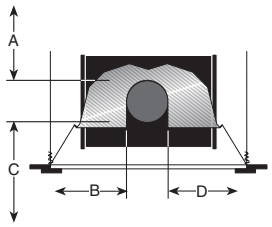
NOTE: 1. All dimensions are from the surfaces of all tubes, couplings and elbows.
2. Clearances B, C and D can be reduced by 50% after 25' (7.5 m) of tubing downstream from where the burner and burner tube connect.

FIGURE 9: U-TUBE, OPPOSITE 45° REFLECTOR



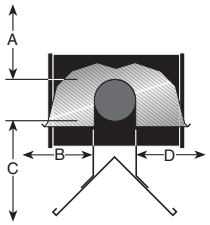
Model	(inches) A	B	C	D	(centimeters) A	B	C	D
TF-120	8	54	60	22	21	138	153	56
TF-160	8	60	66	22	21	153	168	56
TF-200	10	64	74	22	26	163	188	56
TF-250	10	70	78	22	26	178	199	56
TF-300	12	74	84	22	31	188	214	56
TF-350	12	76	85	22	31	194	216	56
TF-380	12	76	85	22	31	194	216	56

FIGURE 10: 2-FOOT DECO GRILLE AND PROTECTIVE GRILLE



Model	(inches) A	B	C	D	(centimeters) A	B	C	D
TF-120	6	35	63	35	16	89	161	89
TF-160	6	38	66	38	16	97	168	97
TF-200	6	40	71	40	16	102	181	102
TF-250	6	46	77	46	16	117	196	117
TF-300	6	50	80	50	16	127	204	127
TF-350	8	52	82	52	21	133	209	133
TF-380	8	52	82	52	21	133	209	133

FIGURE 11: LOWER CLEARANCE SHIELD*

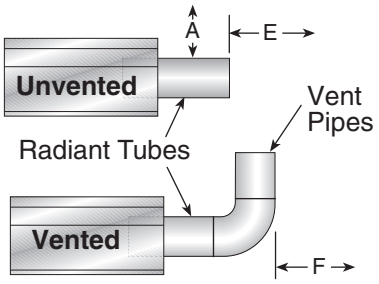


Model	(inches) A	B	C	D	(centimeters) A	B	C	D
TF-120	6	39	33	39	16	100	84	100
TF-160	6	40	38	40	16	102	97	102
TF-200	6	50	44	50	16	127	112	127
TF-250	6	54	48	54	16	138	122	138
TF-300	6	55	50	55	16	140	127	140
TF-350**	**Unapproved**				**Unapproved**			
TF-380**	**Unapproved**				**Unapproved**			

*When installed in the first 10’ (3 m) on each side of the burner.
**Roberts-Gordon prohibits the installation of this heater for all unapproved applications.

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 12: VENTING



Model	(inches) A	E	F	(centimeters) A	E	F
TF-120	14	18	18	36	46	46
TF-160	20	24	18	51	61	46
TF-200	20	24	18	51	61	46
TF-250	20	24	18	51	61	46
TF-300	20	30	18	51	77	46
TF-350	20	30	18	51	77	46
TF-380	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 NFPA 54/ANSI Z223.1 - latest revision.

Canada: Refer to Natural Gas and Propane Installation Code CSA B149.1 - latest revision.

4.2 Aircraft Hangars

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

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

Canada: Refer to Natural Gas and Propane Installation Code CSA B149.1 - latest revision.

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: Refer to 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 Natural Gas and Propane Installation Code CSA B149.1 - latest revision.

• 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®, 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 National Fuel Gas Code NFPA 54/ANSI Z223.1 - latest revision.

Canada: Refer to Natural Gas and Propane Installation Code CSA B149.1 - latest revision.

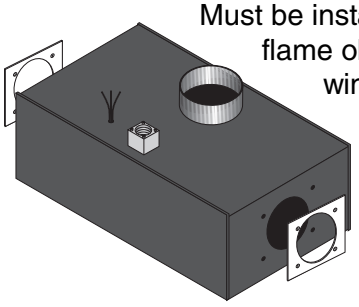
4.6 High Altitude

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

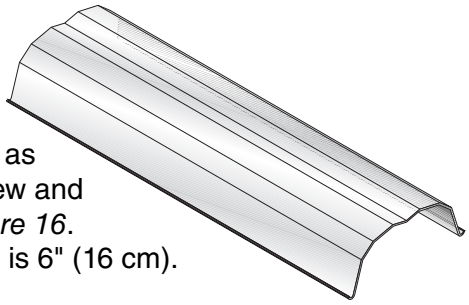
SECTION 5: MAJOR COMPONENTS

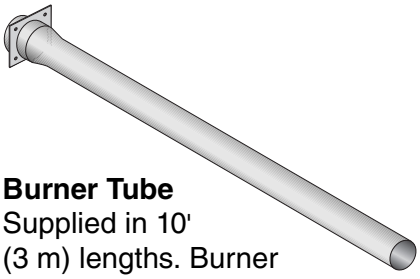
FIGURE 13: Major Component Descriptions

Burner with Tube Gasket
Must be installed with the flame observation window facing down.

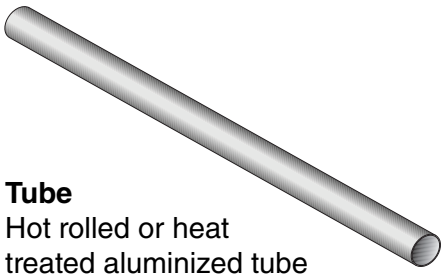


Reflector (Aluminum or Stainless Steel)
Alternate overlap as shown on overview and *on Page 19, Figure 16*.
Minimum overlap is 6" (16 cm).

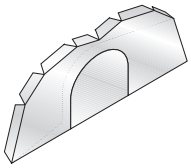




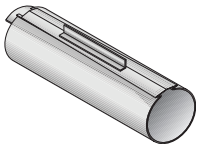
Burner Tube
Supplied in 10' (3 m) lengths. Burner tube is always the first tube after the burner.



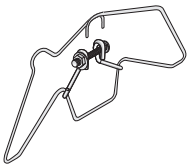
Tube
Hot rolled or heat treated aluminized tube
Supplied in 10' (3 m) lengths.



Reflector End Cap
Punch out center section to accommodate tube.

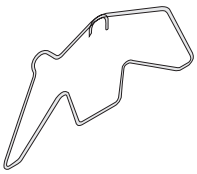


Coupling Assembly with Lock

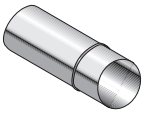


Tube and Reflector Hanger with Clamp Package
Position this hanger no more than 4" (10 cm) away from the burner.

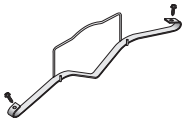
Flexible Boot
Flexible boot is used to connect the last tube to the vent.



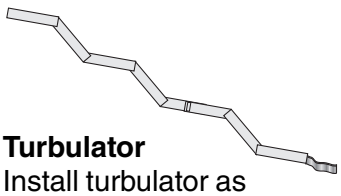
Tube and Reflector Hanger
Suspend system from these hangers.



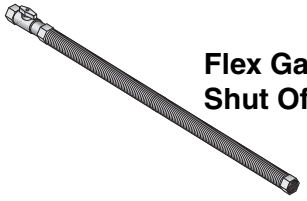
Vent Sleeve
Vent sleeve installed inside flexible boot.



Reflector Support Strap & Wire Form



Turbulator
Install turbulator as specified in the "Turbulator Installation" chart. *See Page 24, Step 7.5*. Turbulator is not required on the TF-250/300/350/380



Flex Gas Line with Shut Off Cock

5.1 Standard Parts List

Table 1: Contents of Burner Carton

Part No.	Description	TF-120	TF-160	TF-200	TF-250	TF-300	TF-350	TF-380
090XXXXX	Burner Assembly (Rate and Fuel Varies)	1	1	1	1	1	1	1
02568200	Gasket (Burner to Burner Tube)	1	1	1	1	1	1	1
190100NA	Installation, Operation and Service Manual	1	1	1	1	1	1	1
94273914	Hex Head Bolts 5/16-18 Rolok	8	8	8	8	8	8	8
96411600	Split Lock washer	8	8	8	8	8	8	8
*91412204	Flexible Stainless Steel Gas Hose - 3/4" NPT (US Models Only)	1	1	1	1	1	1	1
03051503	Turbulator Adapter	2	2	2	-	-	-	-
03051504	Turbulator 2.5' (76 cm) Aluminized Steel	8	8	4	-	-	-	-
91412800	Flexible Boot	2	2	2	2	2	2	2
91901300	Boot Clamp	4	4	4	4	4	4	4
09080000	Vent Sleeve	2	2	2	2	2	2	2

*Canadian Models: Rubber (Type 1) Gas Hoses available as an accessory. *See Page 44, Section 10.*

Table 2: Contents of Core and Extension Packages

		Core Packages									Extension Packages											
		Hot Rolled with Aluminum Reflector			Aluminized with Aluminum Reflector			Aluminized with Stain-less Steel Reflector			Hot Rolled with Aluminum Reflector				Aluminized with Aluminum Reflector				Aluminized with Stainless Steel Reflector			
Part No.	Description	20' (6m)	30' (9m)	40' (12m)	20' (6m)	30' (9m)	40' (12m)	20' (6m)	30' (9m)	40' (12m)	10' (3m)	20' (6m)	30' (9m)	40' (12m	10' (3m)	20' (6m)	30' (9m)	40' (12m	10' (3m)	20' (6m)	30' (9m)	40' (12m
91409300	Tube, Hot Rolled Steel, 10' (3m)	1	2	3	-	-	-	-	-	-	1	2	3	4	-	-	-	-	-	-	-	-
91409408	Tube, HT Aluminized, 10' (3m)	-	-	-	1	2	3	1	2	3	-	-	-	-	1	2	3	4	1	2	3	4
03051101	Burner Tube, ALUMI-THERM® Steel, 10' (3m)	-	1	1	-	1	1	-	1	1	-	-	-	-	-	-	-	-	-	-	-	-
03051601	Burner Tube, HT ALUMI-THERM® Steel, 10' (3m)	1	-	-	1	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
01312700	Coupling Assembly	1	2	3	1	2	3	1	2	3	1	2	3	4	1	2	3	4	1	2	3	4
02750303	Standard Reflector, 8' (3.5m)	3	4	6	3	4	6	-	-	-	2	3	4	6	2	3	4	6	-	-	-	-
02750800	End Cap	2	2	2	2	2	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
027503SS	Stainless Steel Reflector, 8' (3.5m)	-	-	-	-	-	-	3	4	6	-	-	-	-	-	-	-	-	2	3	4	6
027508SS	Stainless Steel End Cap	-	-	-	-	-	-	2	2	2	-	-	-	-	-	-	-	-	-	-	-	-
03090100	Tube and Reflector Hanger	3	4	5	3	4	5	3	4	5	1	2	3	4	1	2	3	4	1	2	3	4
91907302	S-Hook	6	8	10	6	8	10	6	8	10	2	4	6	8	2	4	6	8	2	4	6	8
03050010	Reflector Support Package (Strap, Wire Form, Screws)	2	3	5	2	3	5	4	5	7	2	3	4	6	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	1	1	1	1	1	1
90502700	Vent Adapter (Not required for TF Models)	1	1	1	1	1	1	1	1	1	-	-	-	-	-	-	-	-	-	-	-	-
01318901	Tube Clamp Package	1	1	1	1	1	1	2	2	2	-	-	-	-	-	-	-	-	-	-	-	-
	Part Number	CP20HRS	CP30HRS	CP40HRS	CP20ALUM	CP30ALUM	CP40ALUM	CP20ALUMSS	CP30ALUMSS	CP40ALUMSS	EXP10HRS	EXP20HRS	EXP30HRS	EXP40HRS	EXP10ALUM	EXP20ALUM	EXP30ALUM	EXP40ALUM	EXP10ALUMSS	EXP20ALUMSS	EXP30ALUMSS	EXP40ALUMSS

Table 3: Component Package Guide

	Tubing Length Each Side	Core Packages (2 Required)		
Model	**Minimum**	**Hot Rolled with Aluminum Reflector**	**Aluminized with Aluminum Reflector**	**Aluminized with Stainless Steel Reflector**
TF-120	20' (6 m)	CP20HRS	CP20ALUM	CP20ALUMSS
TF-160	20' (6 m)	CP20HRS	CP20ALUM	CP20ALUMSS
TF-200	30' (9 m)	CP30HRS	CP30ALUM	CP30ALUMSS
TF-250	40' (12 m)	CP40HRS	CP40ALUM	CP40ALUMSS
TF-300	50' (15 m)	CP30HRS + EXP20HRS	CP30ALUM + EXP20ALUM	CP30ALUMSS + EXP20ALUMSS
TF-350	50' (15 m)	CP30HRS + EXP20HRS	CP30ALUM + EXP20ALUM	CP30ALUMSS + EXP20ALUMSS
TF-380	60' (18 m)	CP30HRS + EXP30HRS	CP30ALUM + EXP30ALUM	CP30ALUMSS + EXP30ALUMSS

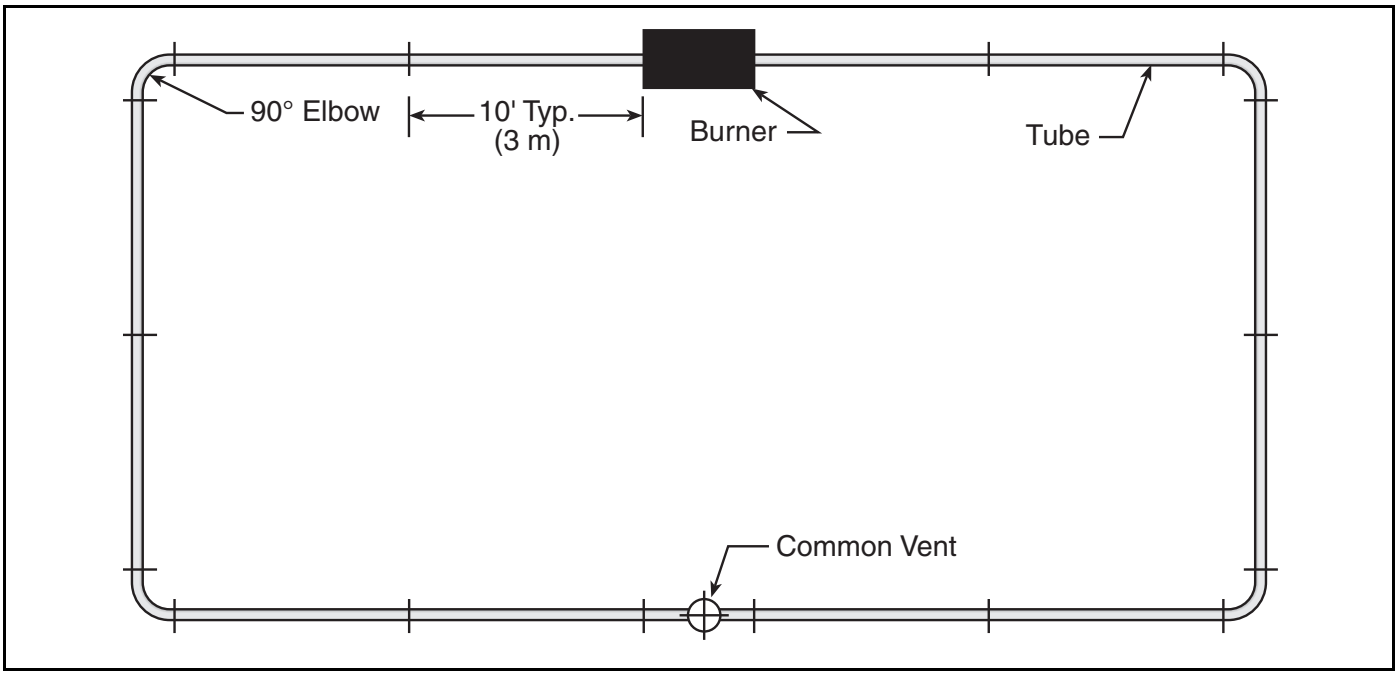
Additional tubing length may be added to heater. Tubing must be heat-treated, aluminized or porcelain coated. Any additional tubing lengths are considered as vent length for length determination. Maximum venting length for minimum heater length is 45' (13.7 m) total, or 22.5' (7 m) on each tube.

SECTION 6: SUGGESTED LAYOUTS

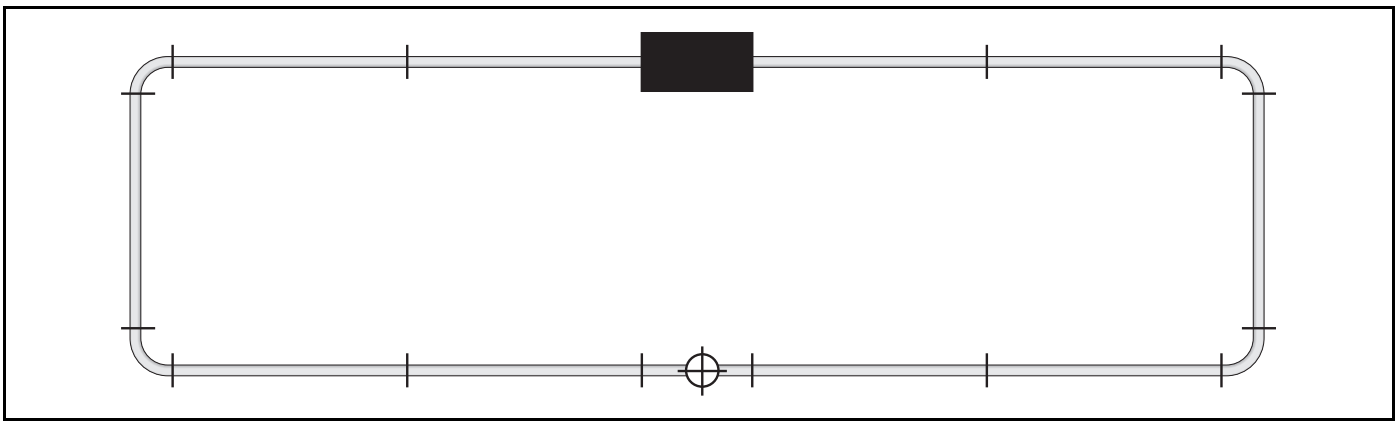
The following are suggested layouts for the heater. These layouts are effective in maximizing the heat pattern and overall performance of the heater. All heaters can be common vented or individually vented (*See Page 37, Section 9*) depending on the building requirements. These are only suggested layouts. The heater can be designed in various configurations provided they are in the guidelines of this manual. When designing a U-Tube or Elbow configuration, the following rules must be adhered to:

- A minimum of 10' (3 m) of tubing on TF-120/160 and/or a minimum of 15' (4.5 m) of tubing on the TF-200/250/300/350/380 is required between the burner and the Elbow or U Tube.
- The design and installation must adhere to the rules and guidelines located in this manual (*See Page 16, Section 7 and Page 37, Section 9*).
- Review venting options before selecting a layout.

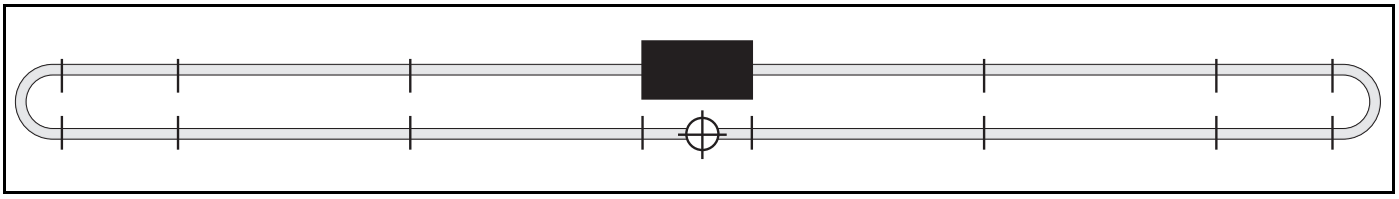
6.1 TF-380 - 4 Elbow Design (Common Vent)



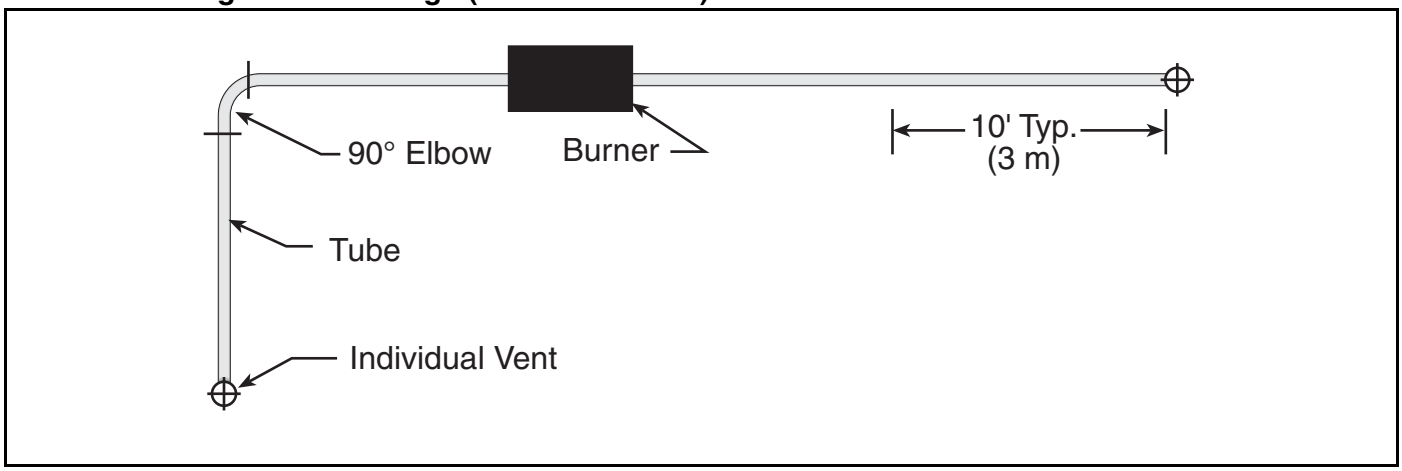
6.2 TF-350 - 4 Elbow Design (Common Vent)



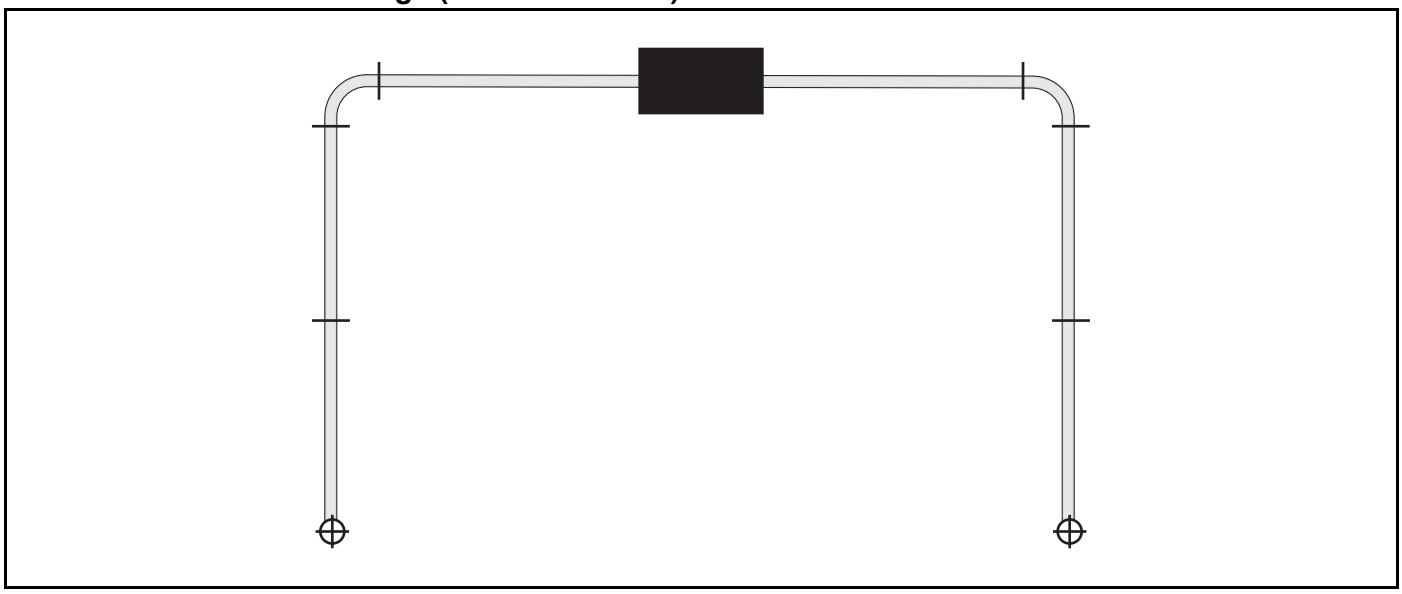
6.3 TF-300 - Double "U" Design (Common Vent)



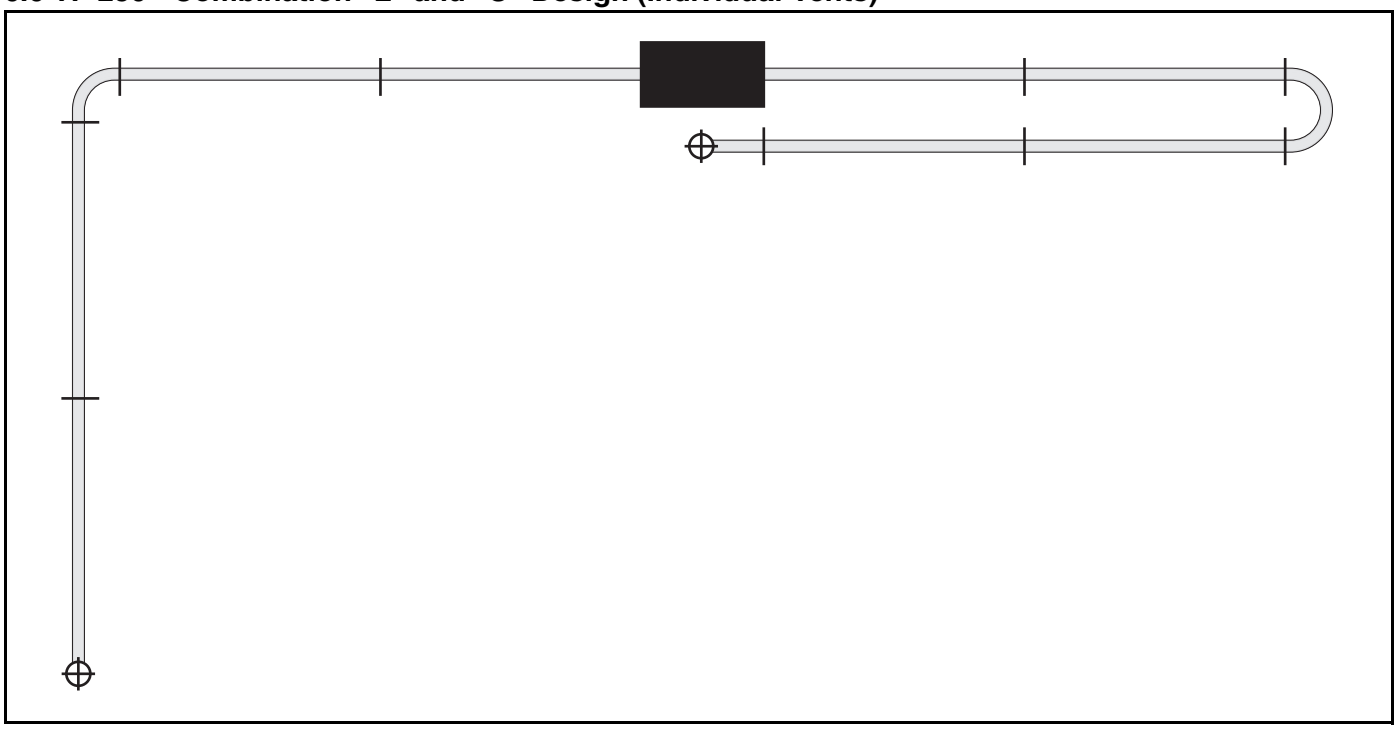
6.4 TF-160 - Single Elbow Design (Individual Vents)



6.5 TF-160 - Double "L" Design (Individual Vents)



6.6 TF-250 - Combination "L" and "U" Design (Individual Vents)



SECTION 7: HEATER INSTALLATION

⚠ WARNING

Severe Injury Hazard

Secure burner to burner tube with bolts and lockwashers.

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

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

⚠ WARNING

Cut/Pinch Hazard

Wear protective gear during installation, operation and service.

Edges are sharp.

Failure to follow these instructions can result in injury.

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

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

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

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

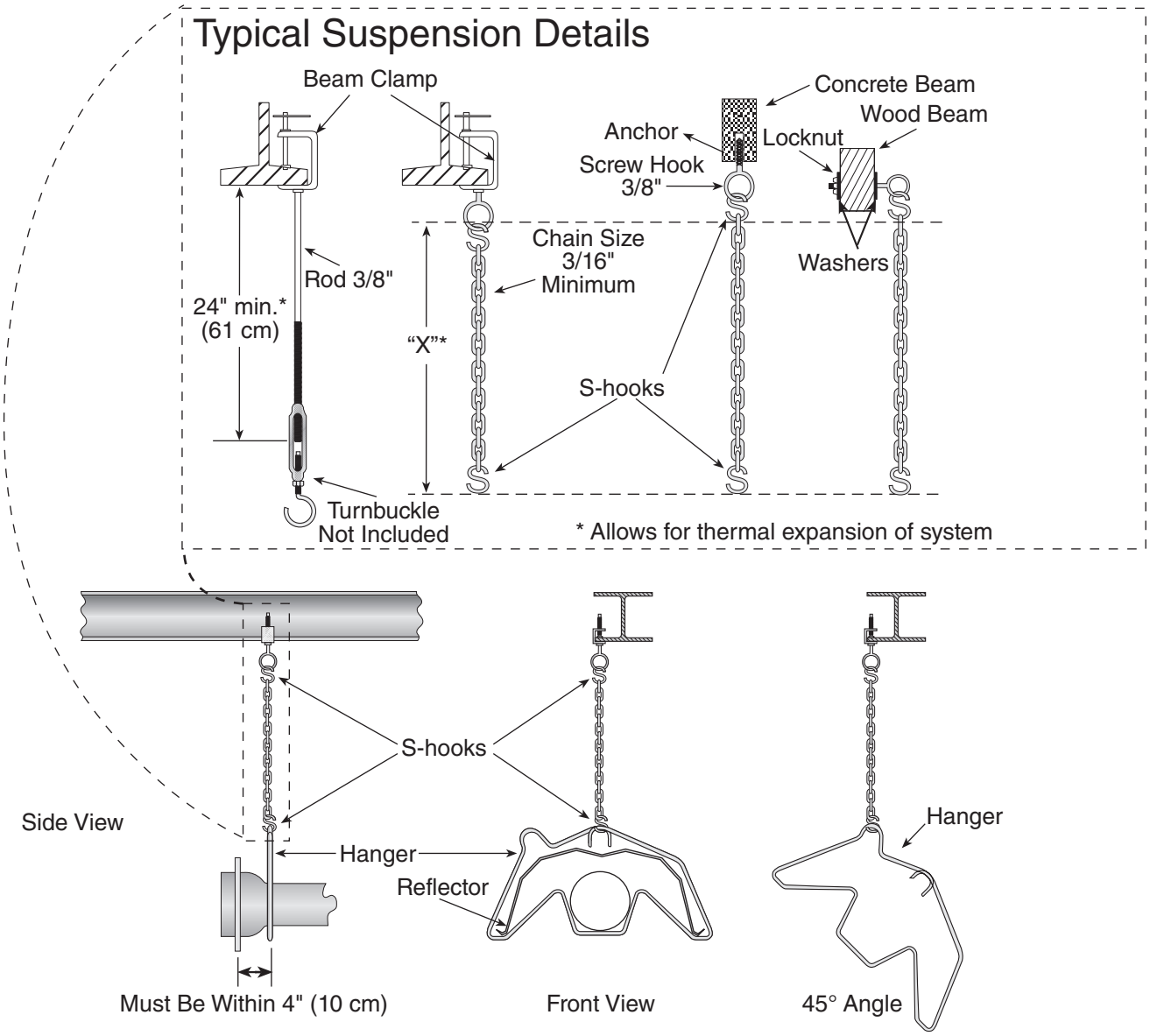
The heaters must be installed in accordance with clearances to combustibles as indicated on the rating plate and in this instruction manual.

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

Typical installation configurations are shown *on Page 17, Figure 14*.

Expansion and contraction of the tube dictates that the minimum suspension lengths must be maintained. *See table on Page 17, Figure 14*.

FIGURE 14: Critical Hanger Placement



Total Straight Length (both sides) or Length from U-Tube to U-Tube in a Double "U" Layout	Typical Expansion Each Side	Minimum "X" Length
0' - 50'	±1" (3 cm)	12" (31 cm)
51' - 60'	±2" (5 cm)	18" (46 cm)
61' - 80'	±3" (8 cm)	24" (61 cm)
81' - 100'	±4" (10 cm)	30" (76 cm)
101' - 120'	±5" (13 cm)	36" (91 cm)
121' - 140'	±6" (15 cm)	42" (107 cm)
141' - 160'	±7" (18 cm)	48" (122 cm)

If the installation requires a shorter suspension length than the minimum listed, the suspension length may be reduced by 6" (16 cm). In this case, tube clamps MUST be used at the two farthest hangers on each side of the burner. *See Page 18, Figure 15*.

Description	Part Number
S-Hook	91907302
Tube/Reflector Hanger	03090100

FIGURE 15: Linear Heater Assembly Overview

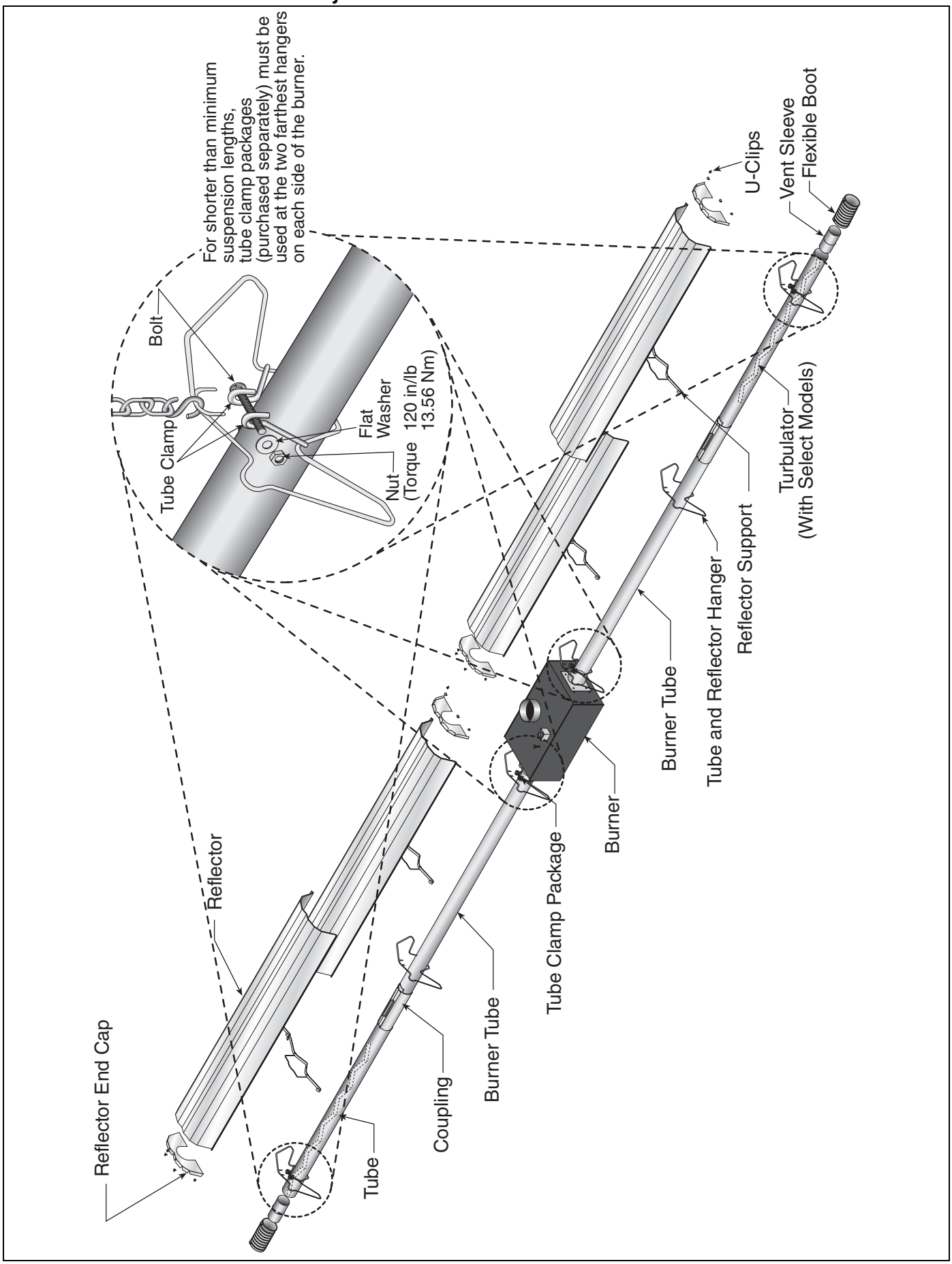


FIGURE 16: Linear Heater Layout Overview

Linear layouts showing one side. Use same measurements for the other side.

LEGEND

- Burner
- Reflector
- Tube
- Tube/Reflector Hanger
- Coupling Assembly

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

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

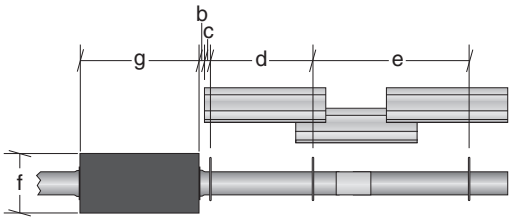
c = 2" (5 cm)
end cap to hanger

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

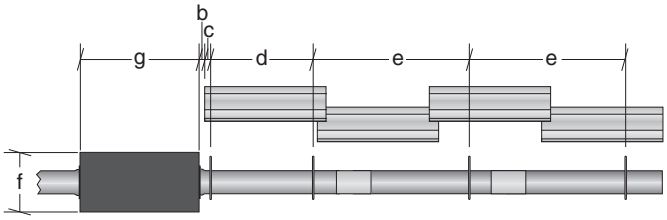
e = 10' (305 cm)
distance between hangers

f = 9.5" (24 cm)
burner height

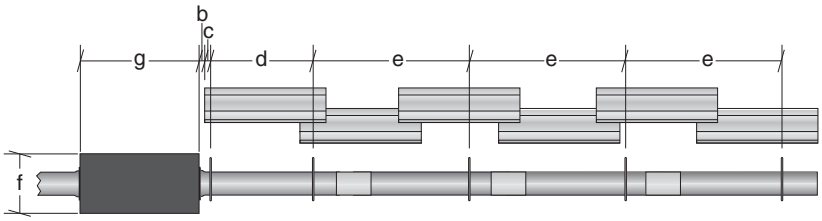
g = 23.5" (60 cm)
burner length



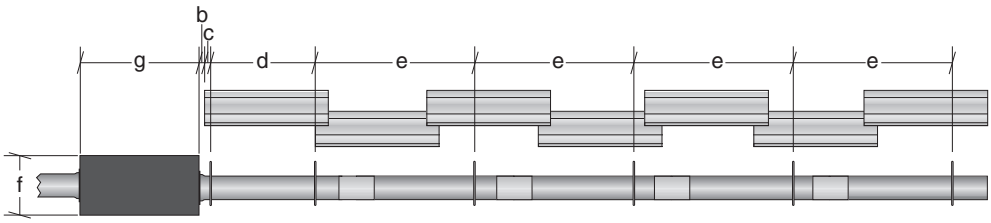
20' (6 m) Tube Length (Each Side)



30' (9 m) Tube Length (Each Side)

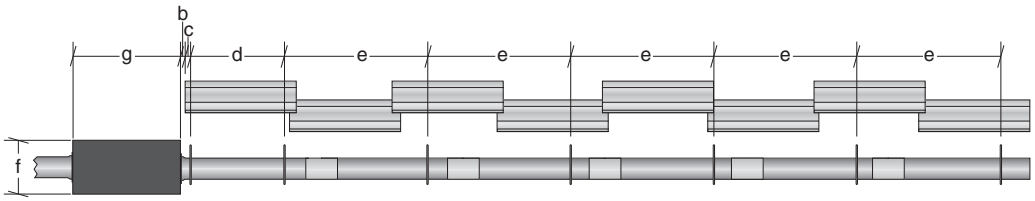


40' (12 m) Tube Length (Each Side)

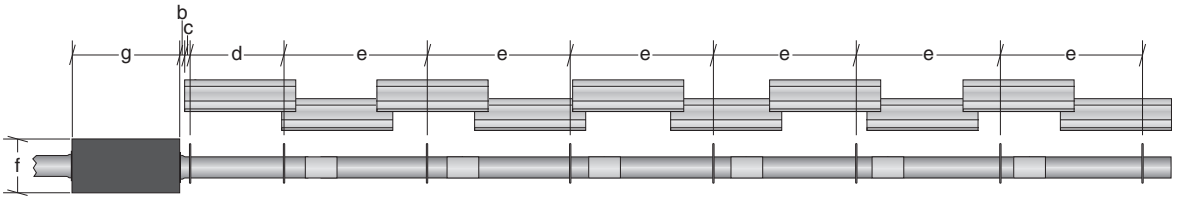


50' (15 m) Tube Length (Each Side)

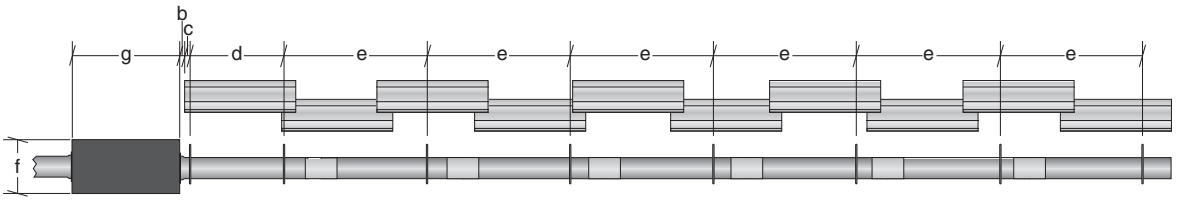
FIGURE 17: Linear Heater Layout Overview (Continued)



60' (18 m) Tube Length (Each Side)

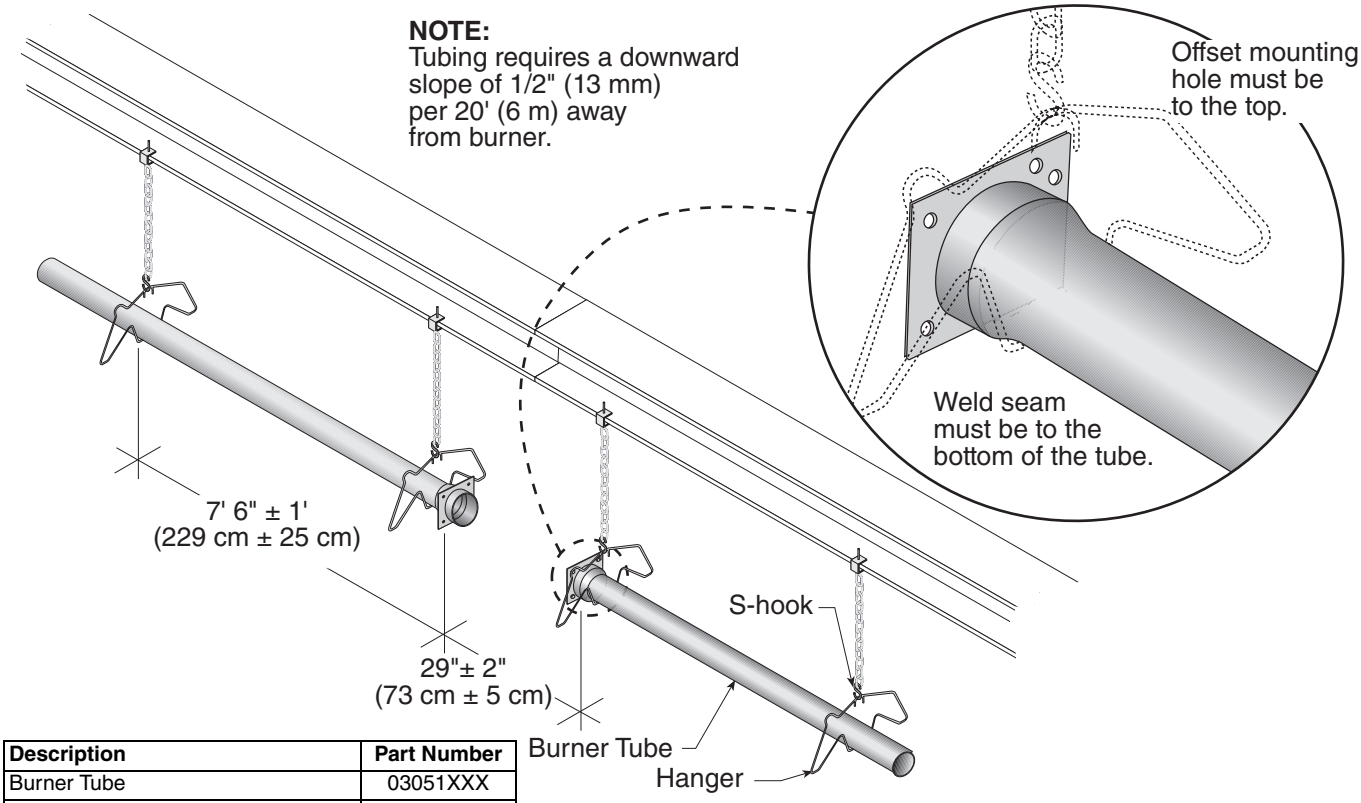


70' (21 m) Tube Length (Each Side)



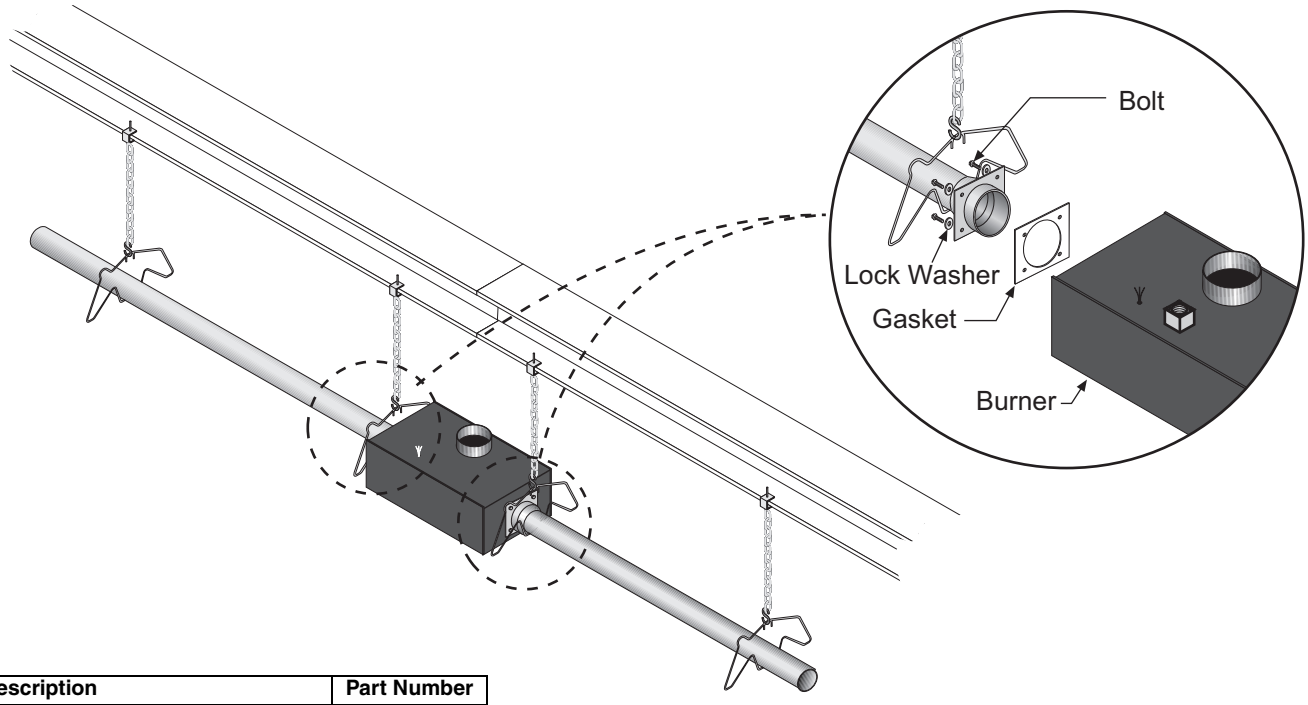
80' (24 m) Tube Length (Each Side)

Step 7.1 Burner Tube Installation



Description	Part Number
Burner Tube	03051XXX
S-Hook	91907302
Tube/Reflector Hanger	03090100

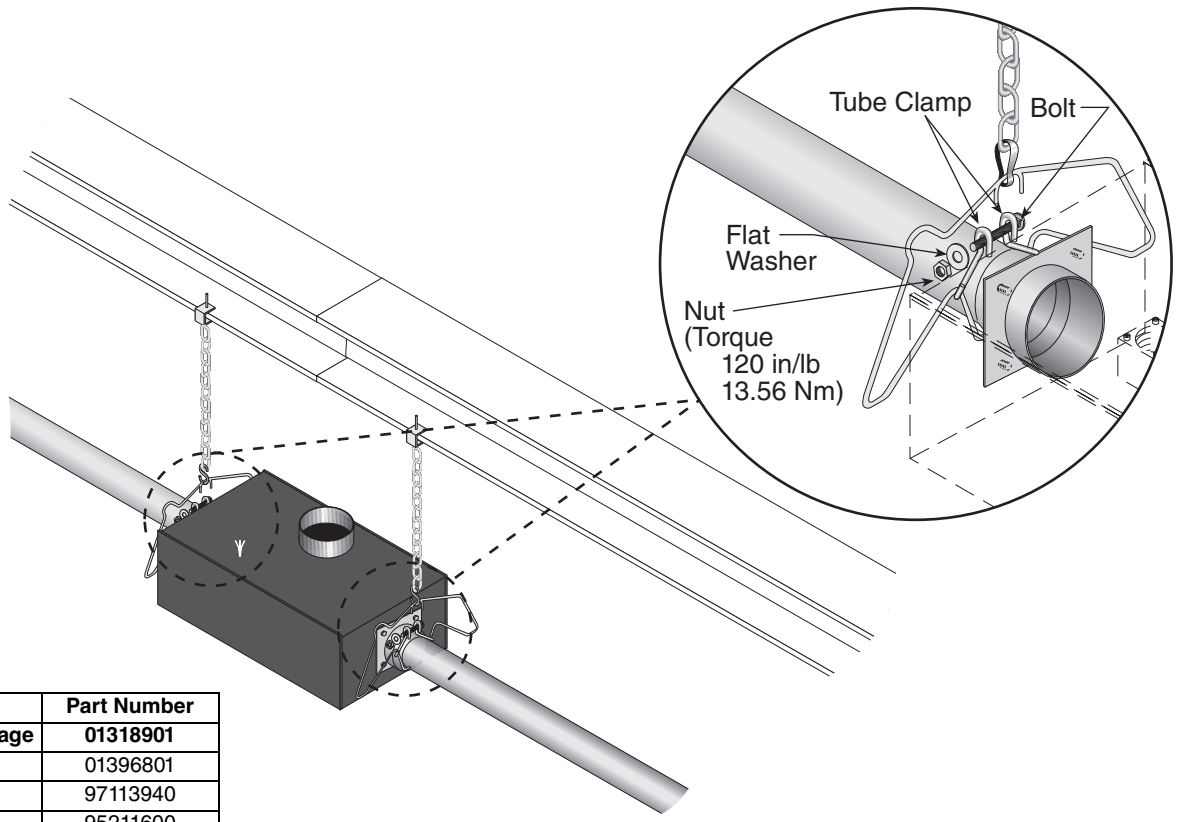
Step 7.2 Burner Installation



Description	Part Number
Bolt	94273914
Lock Washer	96411600
Gasket	02568200
Burner	090XXXXX

NOTE: To ensure proper orientation, attach burner tube with tube weld facing downward.

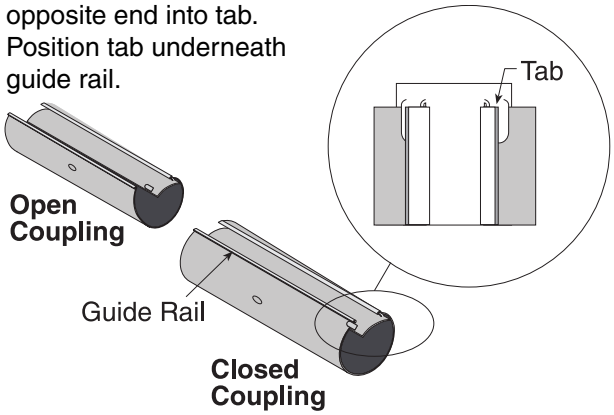
Step 7.3 Tube Clamp Package Installation



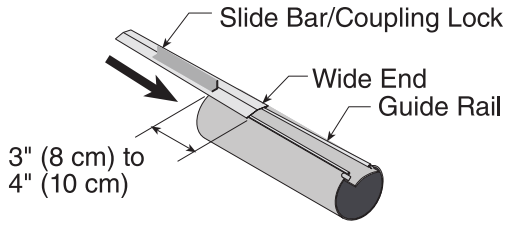
Description	Part Number
Tube Clamp Package	**01318901**
Tube Clamp	01396801
Bolt	97113940
Flat Washer	95211600
Nut	92113900

Step 7.4 Coupling and Tube Assembly

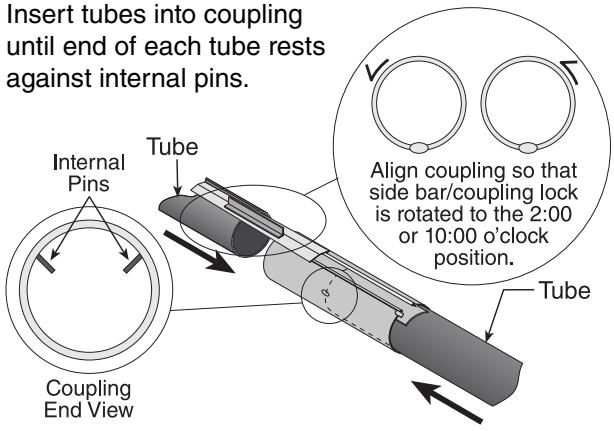
A Close coupling and slide opposite end into tab. Position tab underneath guide rail.



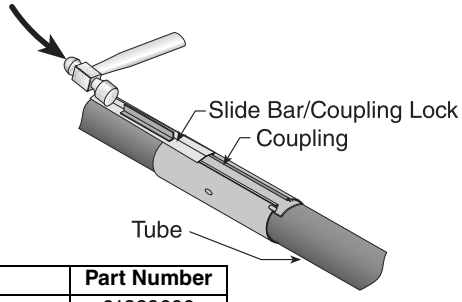
B Insert wide end of slide bar/coupling lock into guide rail on opposite end of tabs. Slide the slide bar/coupling lock up the guide rail until snug (approximately 3" (8 cm) to 4" (10 cm)).



C Insert tubes into coupling until end of each tube rests against internal pins.



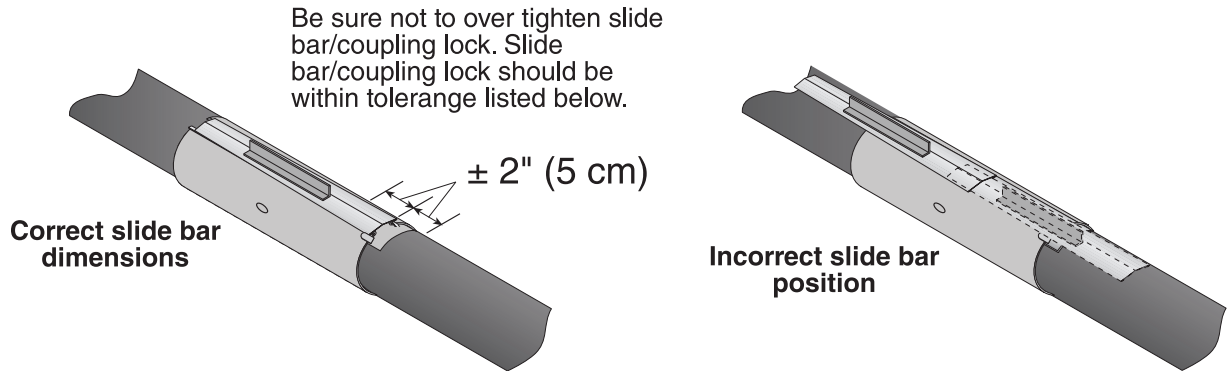
D Strike slide bar/coupling lock with mallet or hammer until tight.



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

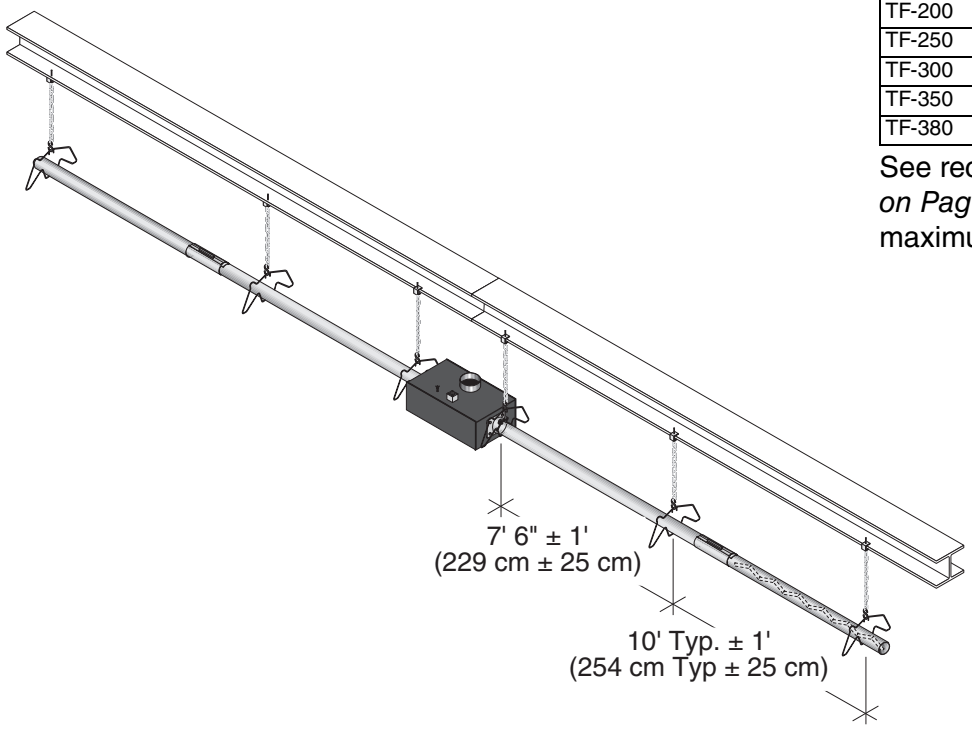
Step 7.4.1 Coupling and Tube Assembly (Continued)

Tighten slide bar as shown below



- **Repeat Step 7.4 A - D until all tubes are assembled.** ***See Page 23, Section 7.4.2*****.**

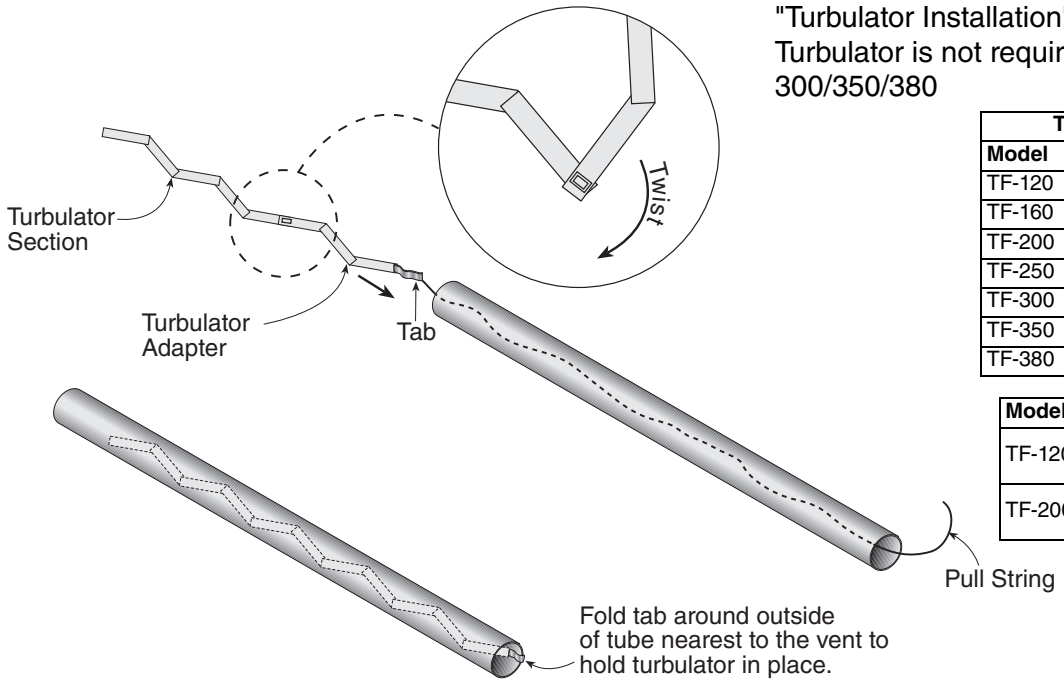
Step 7.4.2 Coupling and Tube Assembly (Continued)



Model	Minimum Tube Length Per Side
TF-120	20’ (6 m)
TF-160	20’ (6 m)
TF-200	30’ (9 m)
TF-250	40’ (12 m)
TF-300	50’ (15 m)
TF-350	50’ (15 m)
TF-380	60’ (18 m)

See recommended venting lengths *on Page 37, Section 9*, when using maximum tube lengths.

Step 7.5 Turbulator Installation



Install turbulator as specified in the "Turbulator Installation" chart below. Turbulator is not required on the TF-250/ 300/350/380

Turbulator Installation	
Model	**Tube Section**
TF-120	2nd 10' Section Each Side
TF-160	2nd 10' Section Each Side
TF-200	3rd 10' Section Each Side
TF-250	N/A
TF-300	N/A
TF-350	N/A
TF-380	N/A

Model	Each Side
TF-120 & TF-160	1 - 03051503 4 - 03051504
TF-200	1 - 03051503 2 - 03051504

Description	Part Number
Turbulator Adapter	03051503
Turbulator Section	03051504
Tube	91409XXX

7.6 Reflector Installation

⚠ WARNING

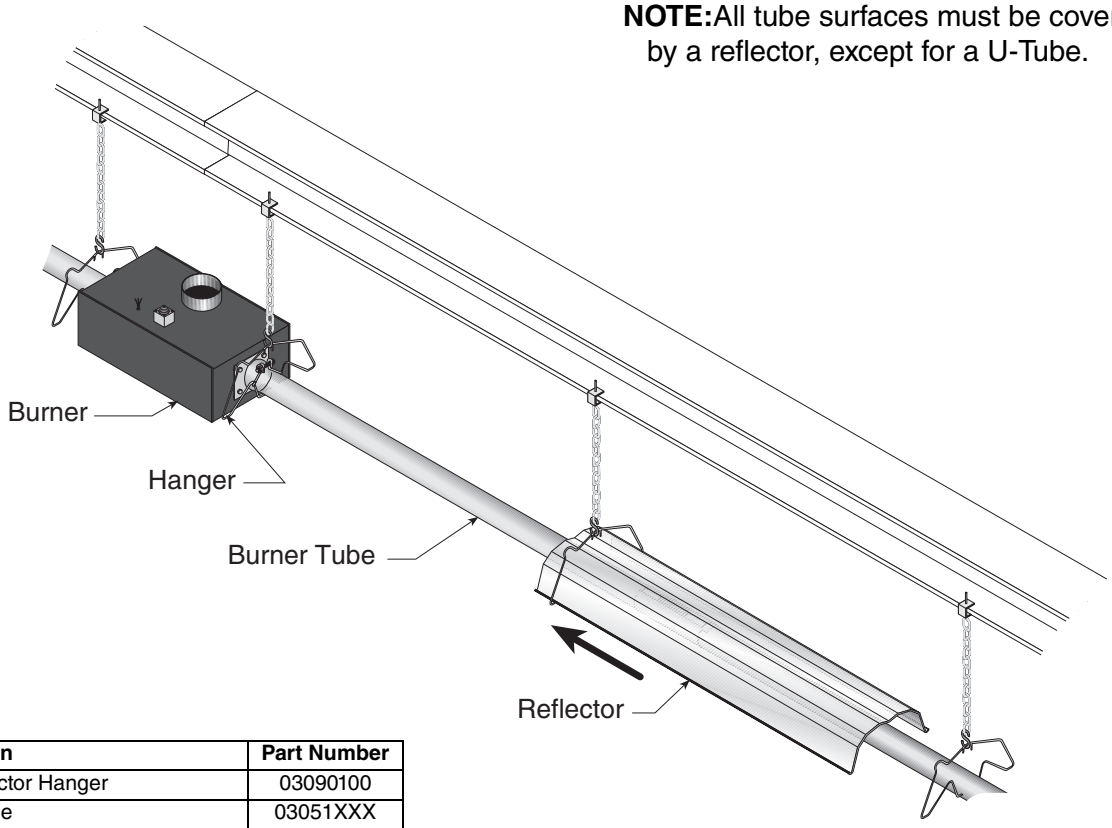
Fire Hazard

Support reflector with reflector hanger and support strap.

Reflector must not touch tube.

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

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



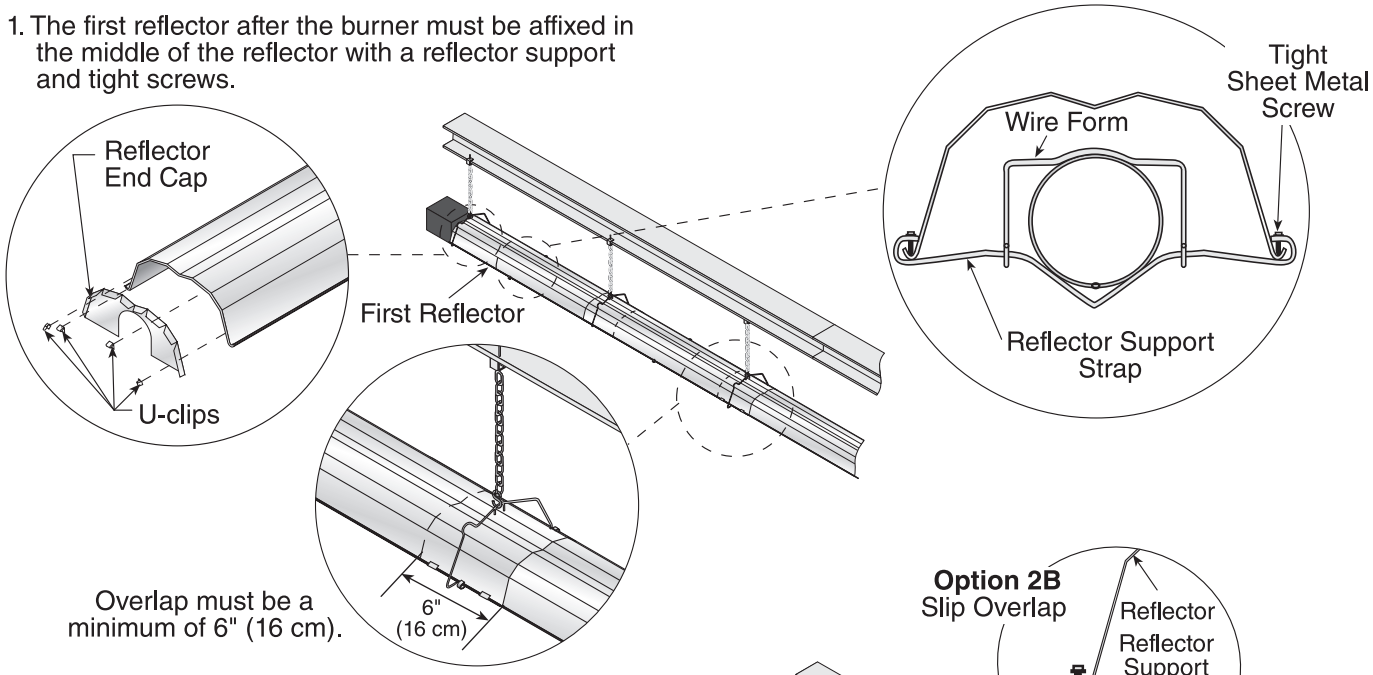
Description	Part Number
Tube/Reflector Hanger	03090100
Burner Tube	03051XXX
Reflector-96" (244 cm)	02750303

Step 7.6.1 Reflector, U-Clip and Reflector Support Installation

The pictorial drawings of the heater construction in *Section 7* are schematic only and provide a general guideline of where hangers, reflector supports and U-clips are to be installed.

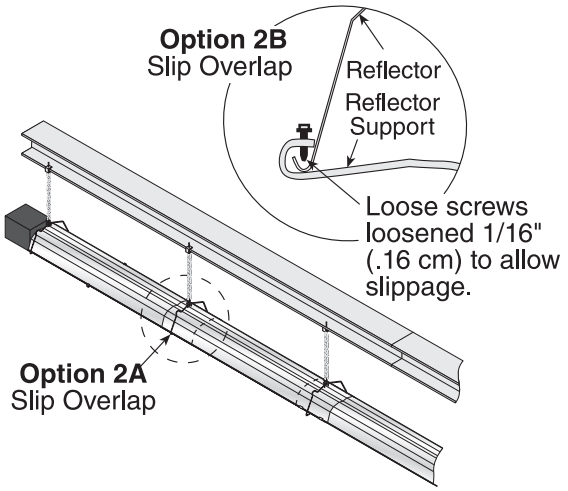
To ensure proper expansion and contraction movement of the reflectors, a combination of U-clips and reflector supports are used. The positioning of reflector supports and U-clips depends on the individual installation. Use either pop rivets or sheet metal screws instead of u-clips when installing end caps and joint pieces in areas where impact and high wind may be a factor. The following rules must be observed.

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



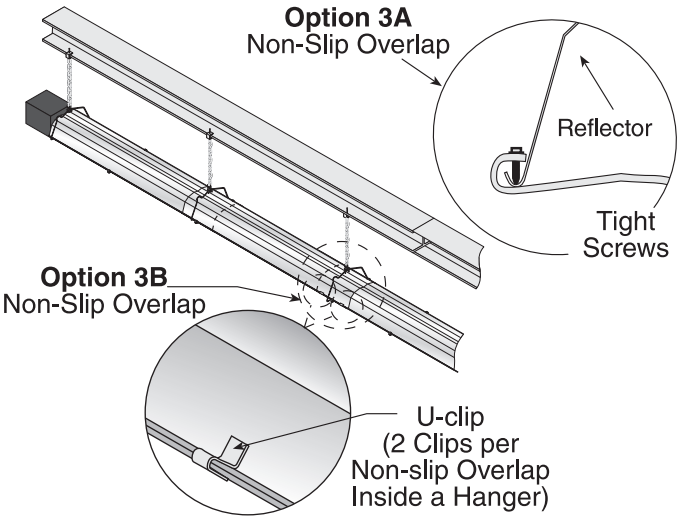
2. The overlap at the first and second reflector is a **slip overlap.** Thereafter, every third reflector joint is a slip overlap. A slip overlap is achieved by either:
   a.) both reflectors lay inside a hanger.

   (No reflector support needed.)
   b.) using a reflector support with loose screws at the reflector overlap.



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

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



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

SECTION 8: OPTIONAL HEATER ACCESSORIES

⚠ WARNING

Cut/Pinch Hazard

Wear protective gear during installation, operation and service.

Edges are sharp.

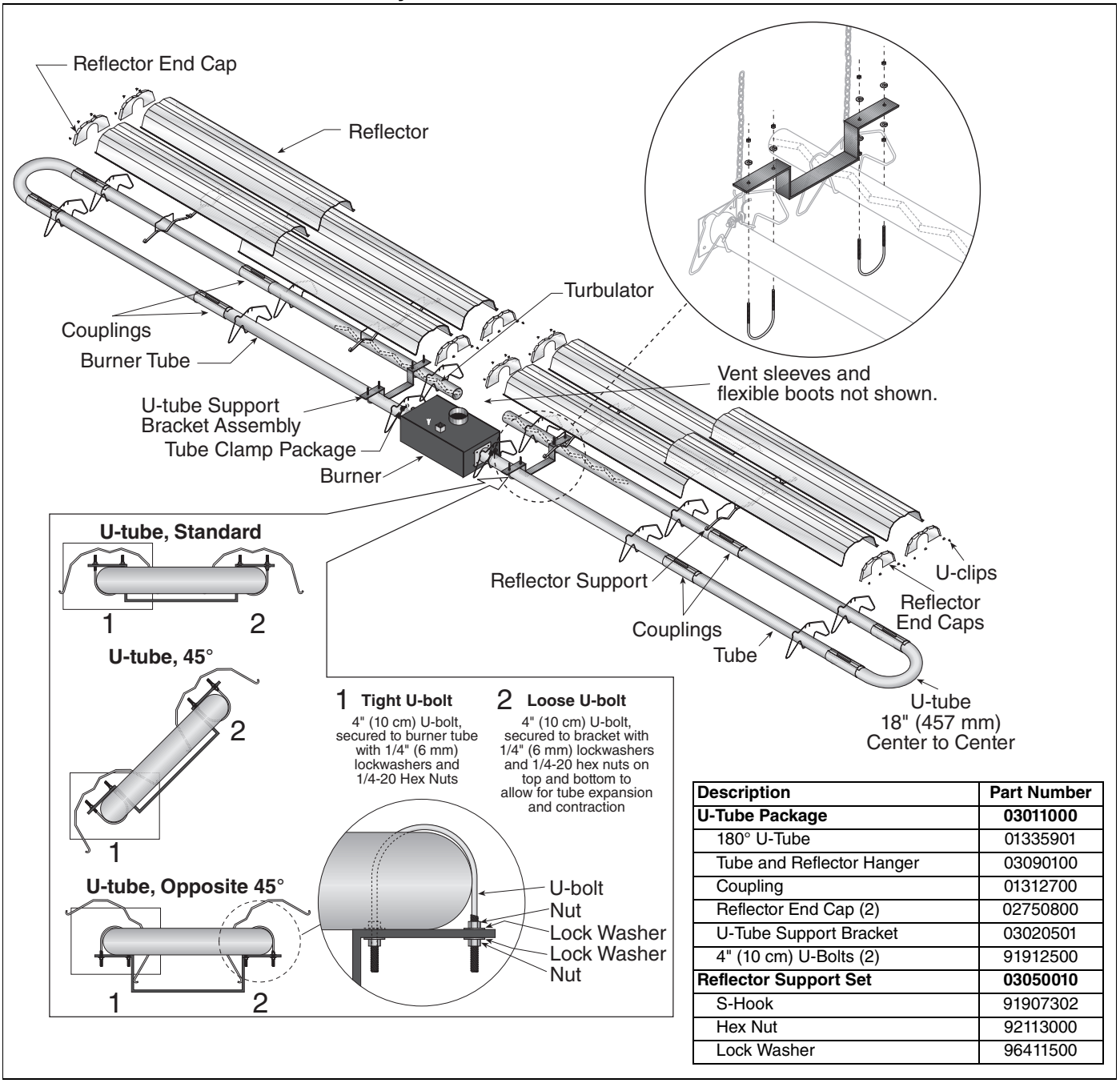
Failure to follow these instructions can result in injury.

8.1 U-Tube Configuration

The heaters are approved for optional U-Tube configurations. This installation requires 1 or 2 U-Tube packages depending on configuration desired. Shown below is an example of a typical 80' (24 m) U-Tube configuration. The U-Tube may be installed in either a standard horizontal position or in an opposite 45° position as shown below. When designing a U-Tube configuration, the following additional rules must be adhered to:

- A minimum of 10' (3 m) on TF-120/160 and a minimum of 15' (4.5 m) on TF-200/250/300/ 350/380 is required between the burner and the U-Tube.
- The correct turbulator (*See Page 24, Step 7.5*) must be installed in the last standard section of tube.
- The burner must never be operated in a tilted position.
- When installed in a full 45° position, the burner must be installed on the lower side.
- The heater must be properly supported at all locations. *See Page 29, Figure 19*.

FIGURE 18: U-Tube Heater Assembly Overview



Description	Part Number
U-Tube Package	**03011000**
180° U-Tube	01335901
Tube and Reflector Hanger	03090100
Coupling	01312700
Reflector End Cap (2)	02750800
U-Tube Support Bracket	03020501
4" (10 cm) U-Bolts (2)	91912500
Reflector Support Set	**03050010**
S-Hook	91907302
Hex Nut	92113000
Lock Washer	96411500

FIGURE 19: U-Tube Heater Layout Overview

U-tube layouts showing one side. Use same measurements for the other side.

LEGEND

- Burner
- Reflector
- Tube 10' (3 m)
- Tube 5' (1.5 m)**
- Tube/Reflector Hanger
- Coupling Assembly
- U-tube

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

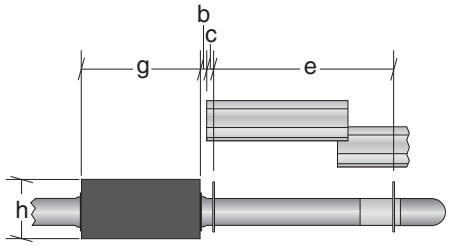
f = 5' (153 cm)
distance between last full tube hanger and half tube hanger

g = 17.5" (44 cm)
burner length

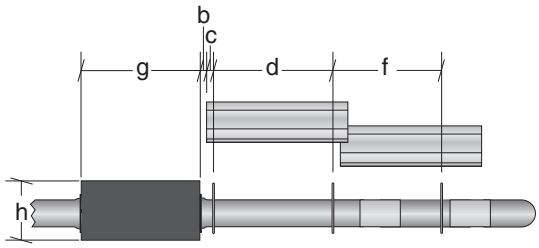
h = 9.5" (24 cm)
burner height

*Requires the last **reflector** before the u-tube to be cut in half for use on both sides.

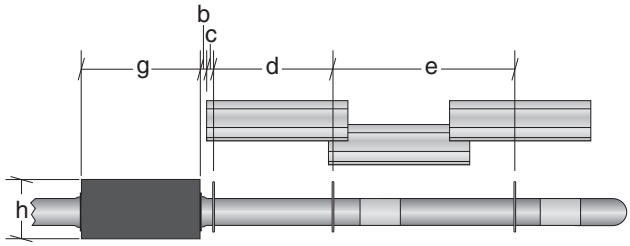
Requires the last **tube before the u-tube to be cut in half for use on both sides.



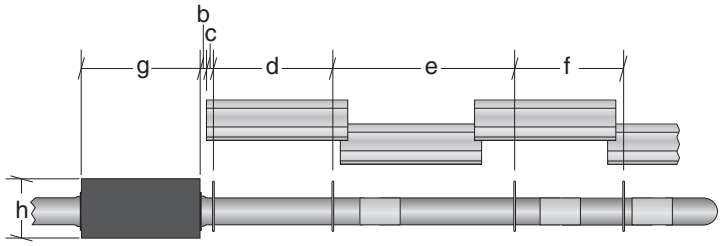
20' (6 m) Tube Length* (Each Side)



30' (9 m) Tube Length**(Each Side)

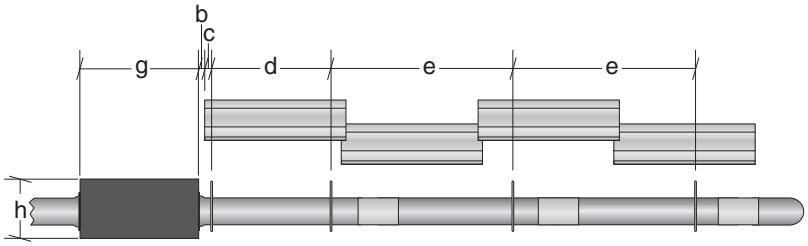


40' (12 m) Tube Length (Each Side)

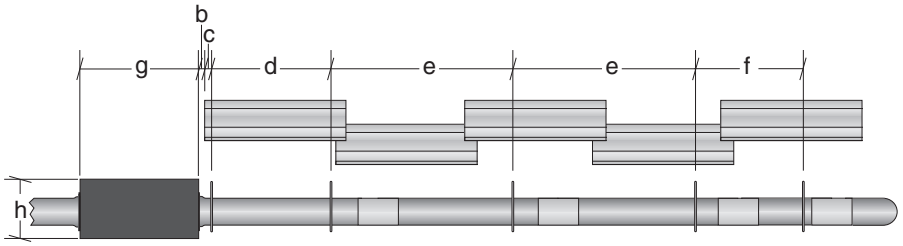


50' (15 m) Tube Length* ** (Each Side)

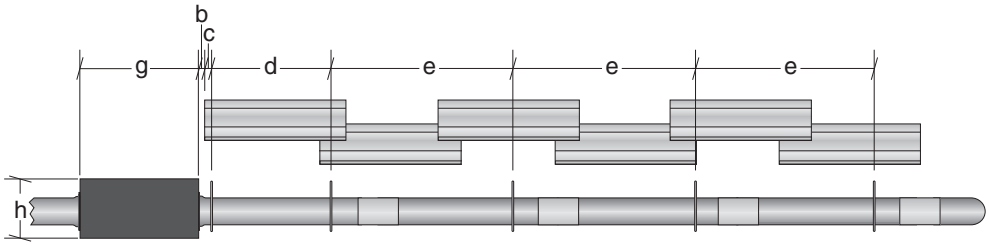
FIGURE 20: U-Tube Heater Layout Overview (Continued)



60' (18 m) Tube Length (Each Side)



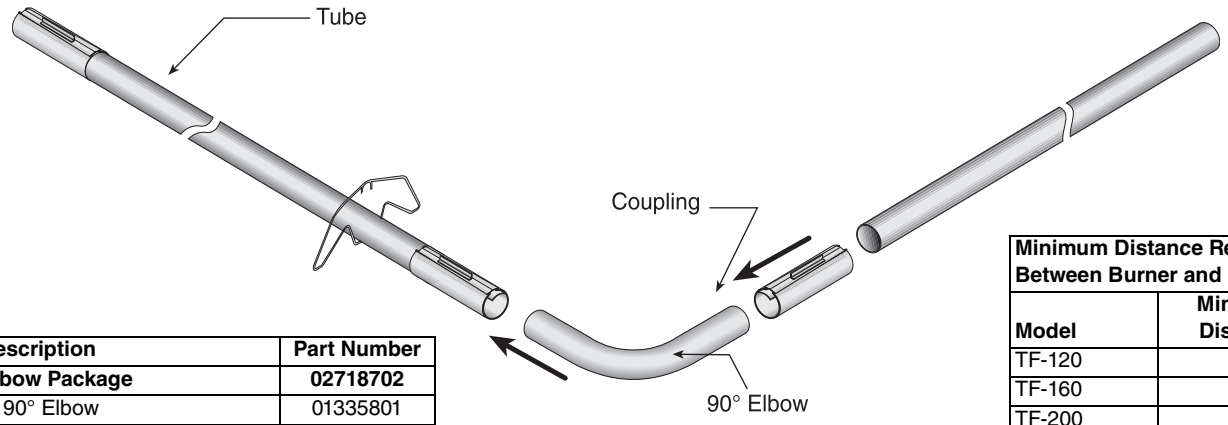
70' (21 m) Tube Length** (Each Side)



80' (24 m) Tube Length** (Each Side)

8.2 Elbow Package Configuration

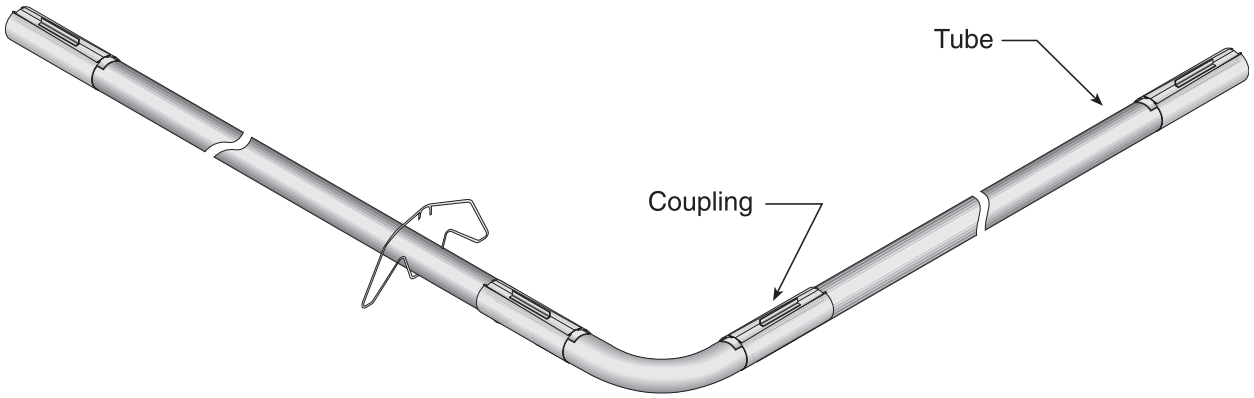
Step 8.2.1 Elbow Installation



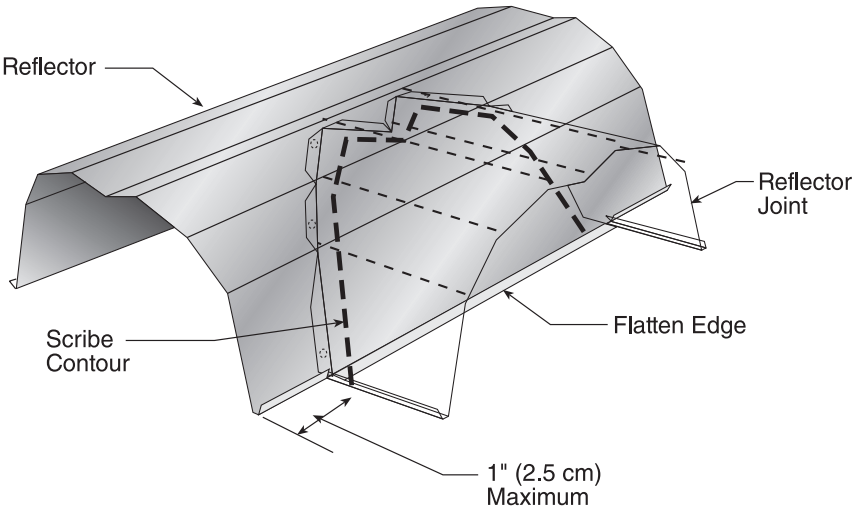
Description	Part Number
Elbow Package	**02718702**
90° Elbow	01335801
Coupling	01312700
Reflector End Cap	02750800
Reflector Joint Piece	02750900
U-Clip Package	**91107720**

Minimum Distance Required Between Burner and Elbow	
Model	**Minimum Distance**
TF-120	10'
TF-160	10'
TF-200	15'
TF-250	15'
TF-300	15'
TF-350	15'
TF-380	15'

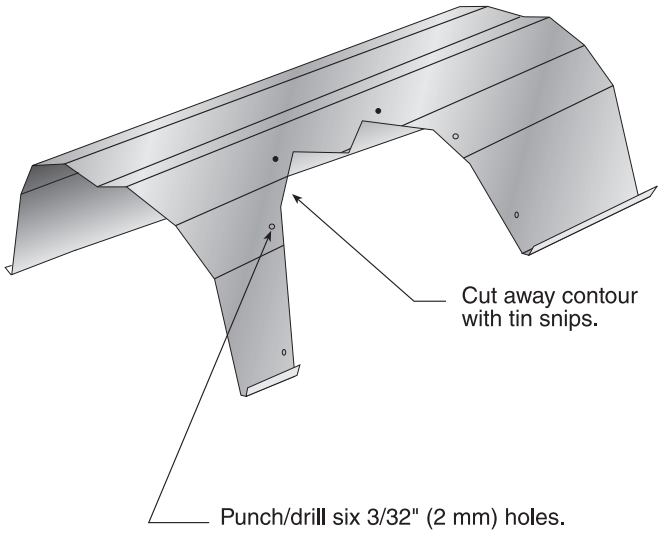
Step 8.2.2 Elbow Installation



Step 8.2.3 Reflector Joint Installation



Step 8.2.4 Reflector Joint Installation



Step 8.2.5 Reflector Joint Detail

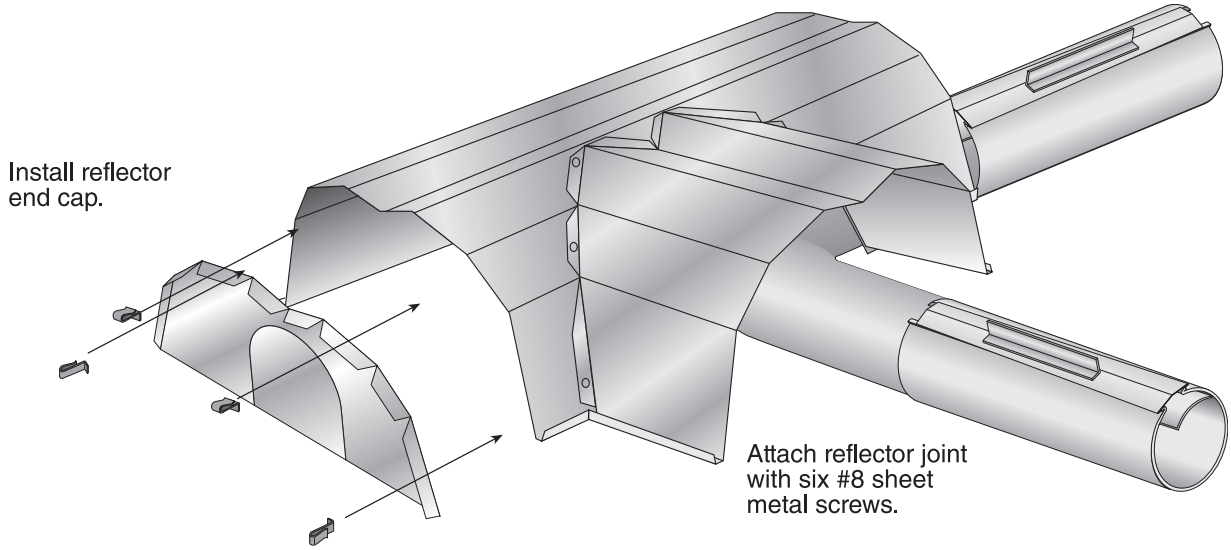
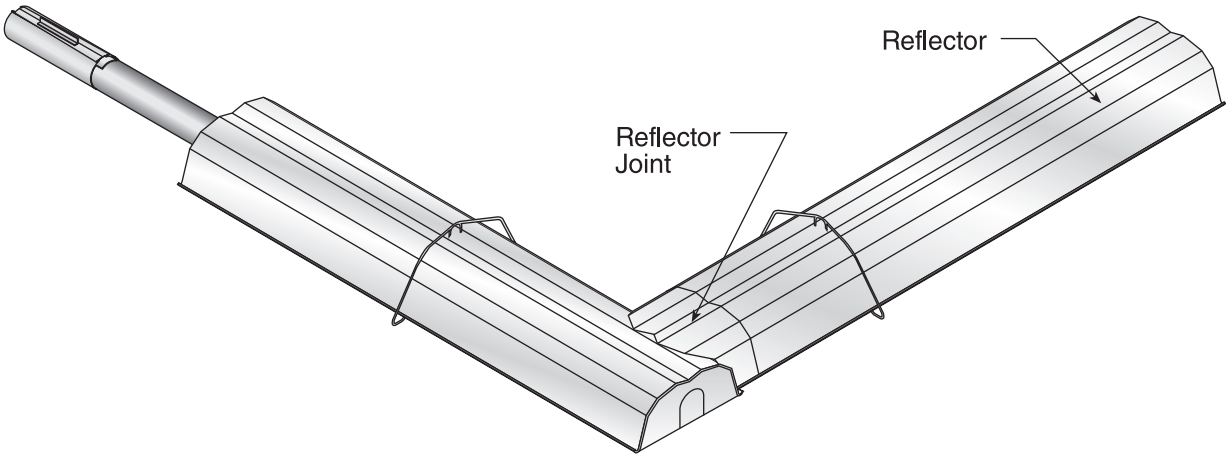
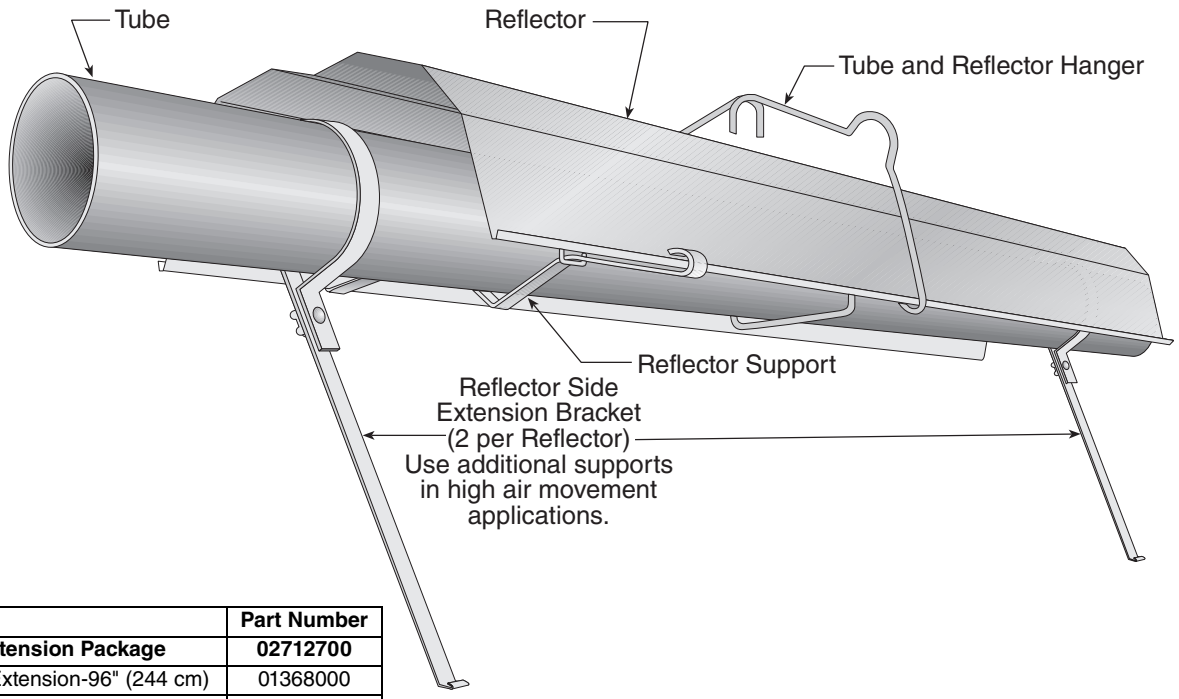


FIGURE 21: Reflector Joint Detail



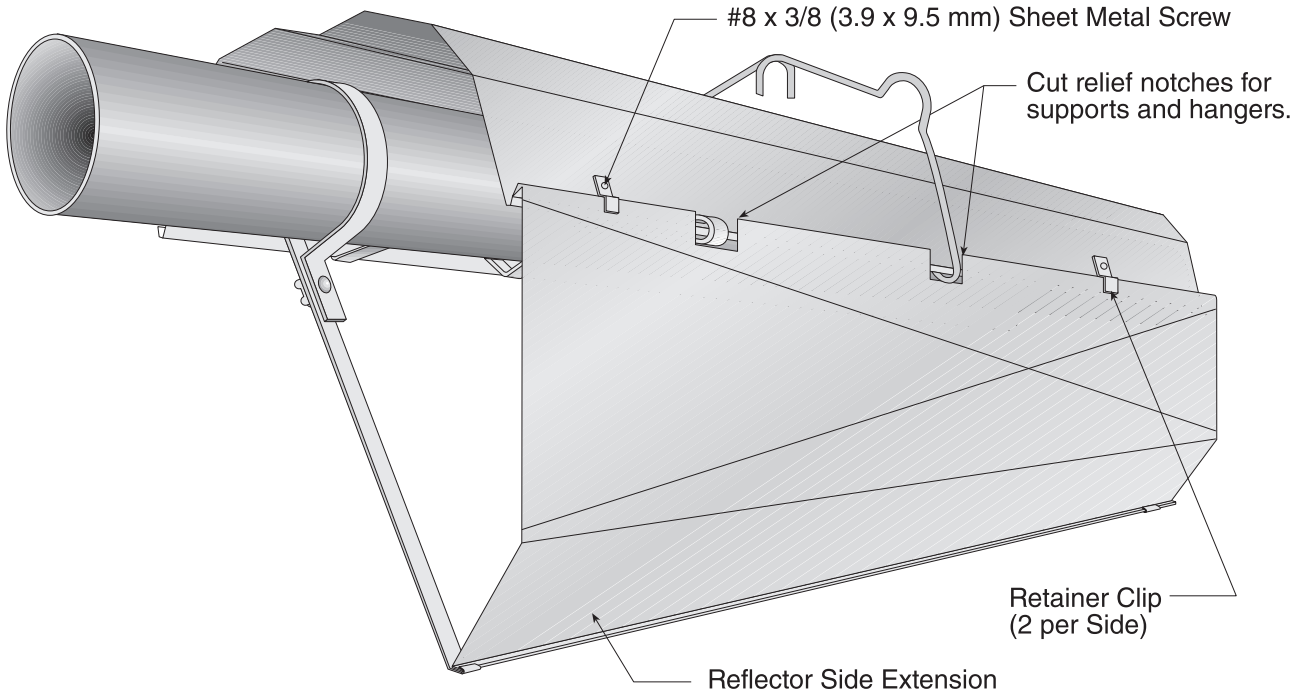
8.3 Reflector Side Extension

Step 8.3.1 Bracket Installation



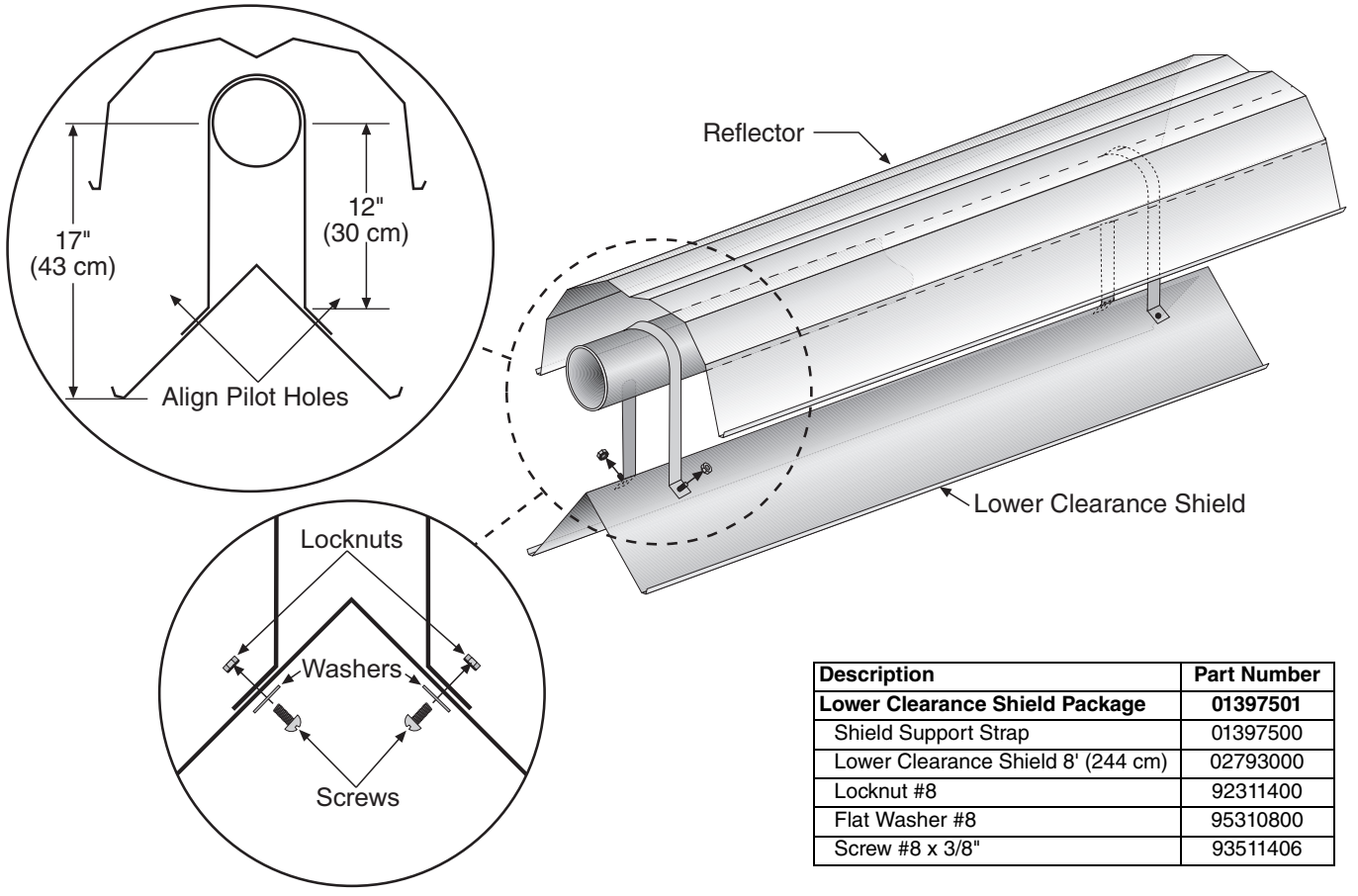
Description	Part Number
Reflector Side Extension Package	**02712700**
Reflector Side Extension-96" (244 cm)	01368000
Retainer Clips	02751200
Sheet Metal Screws	94118106
Order Separately	
Reflector Side Extension Bracket	01329910

Step 8.3.2 Side Reflector Installation



8.4 Lower Clearance Shield Installation

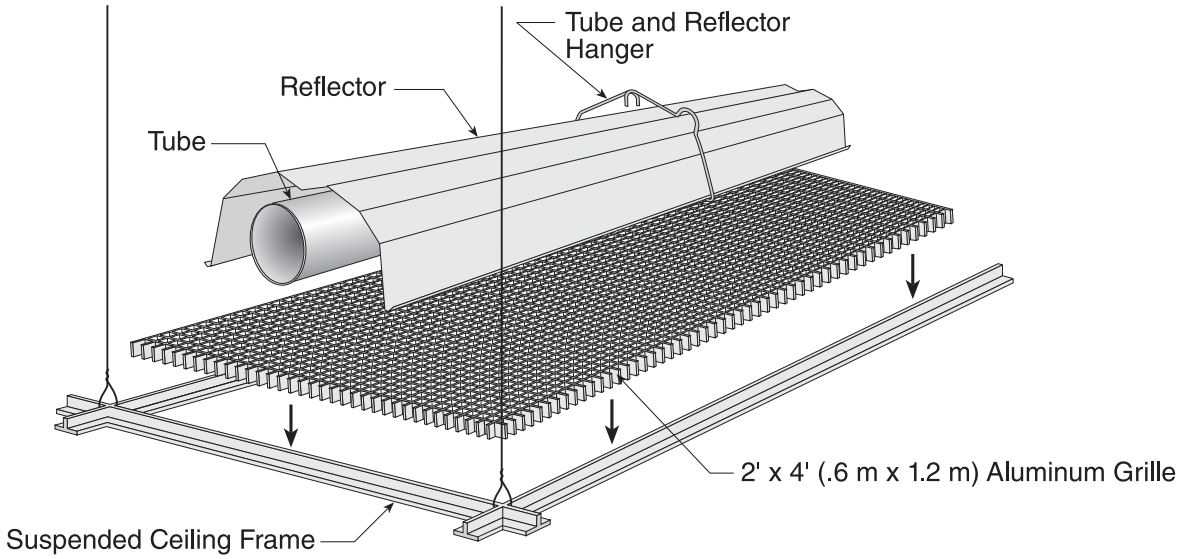
Step 8.4.1 Shield Support Strap Assembly



Description	Part Number
Lower Clearance Shield Package	**01397501**
Shield Support Strap	01397500
Lower Clearance Shield 8' (244 cm)	02793000
Locknut #8	92311400
Flat Washer #8	95310800
Screw #8 x 3/8"	93511406

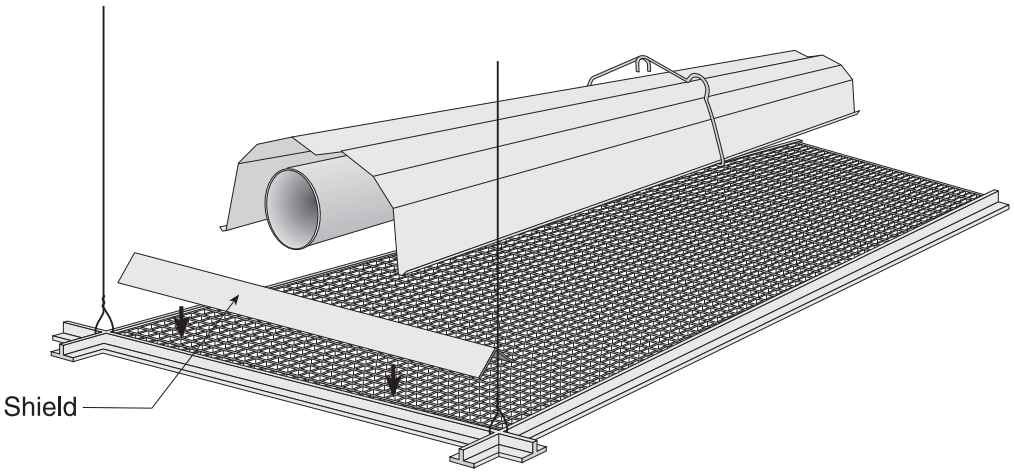
8.5 Two-Foot Decorative Grille Installation

Step 8.5.1 Grille Installation



Description	Part Number
Aluminium Grille 2’ x 4’ (.6 m x 1.2 m)	91407000

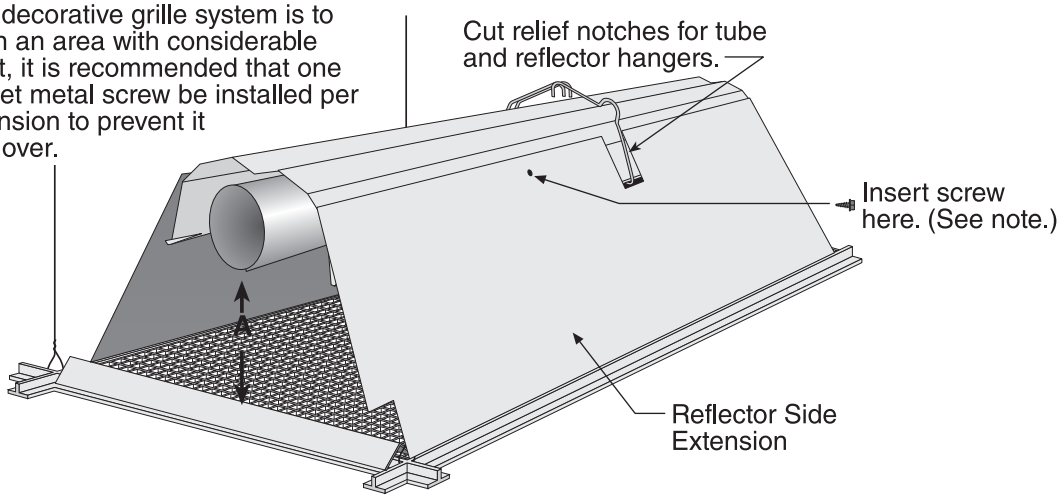
Step 8.5.2 Frame Shield Installation



Description	Part Number
Deco Grille Shield-24" (61 cm)	01365900

Step 8.5.3 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" sheet metal screw be installed per reflector extension to prevent it from blowing over.

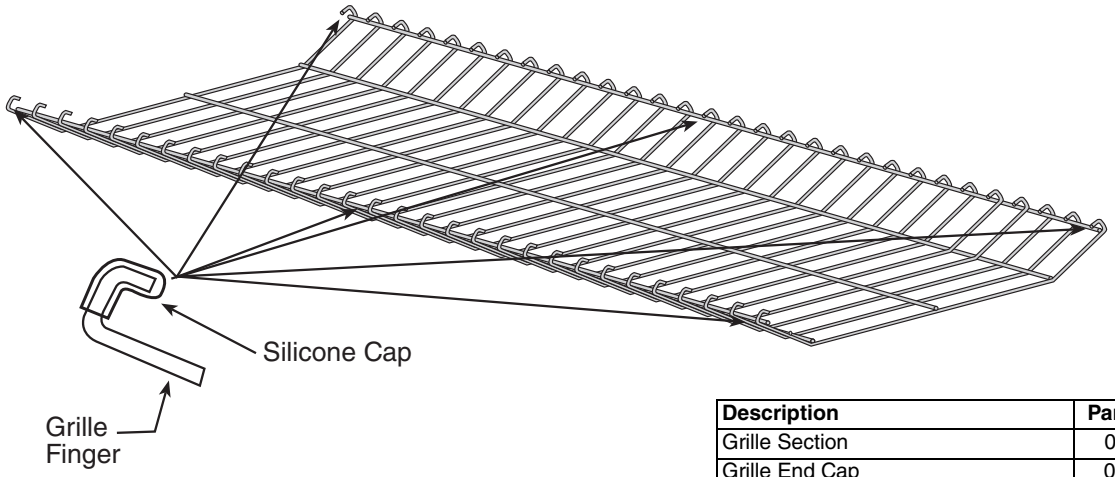


Distance "A"		Extension	
Minimum	Maximum	Part No.	Width
2" (4 cm)	6" (15 cm)	01370408	8" (20 cm)
6" (15 cm)	10" (26 cm)	01370412	12" (30 cm)
10" (26 cm)	14" (37 cm)	01370416	16" (40 cm)

Description	Part Number
Reflector Side Extension-48" (122 cm)	01370412

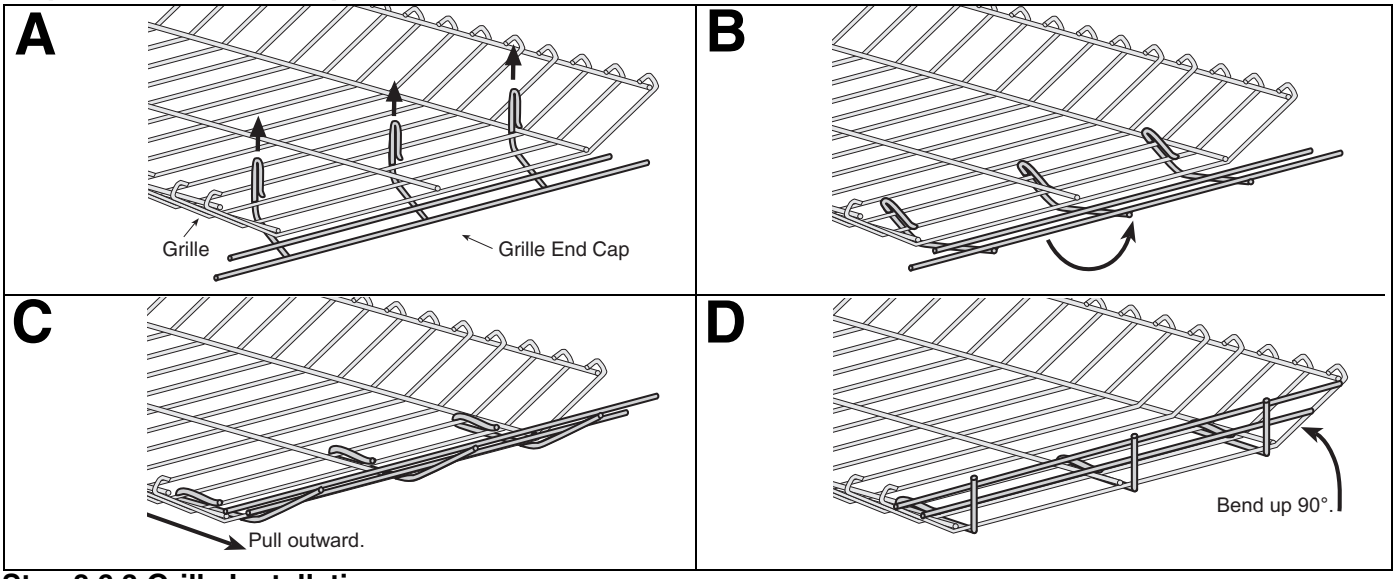
8.6 Protective Grille Installation

Step 8.6.1 Silicone Cap Installation

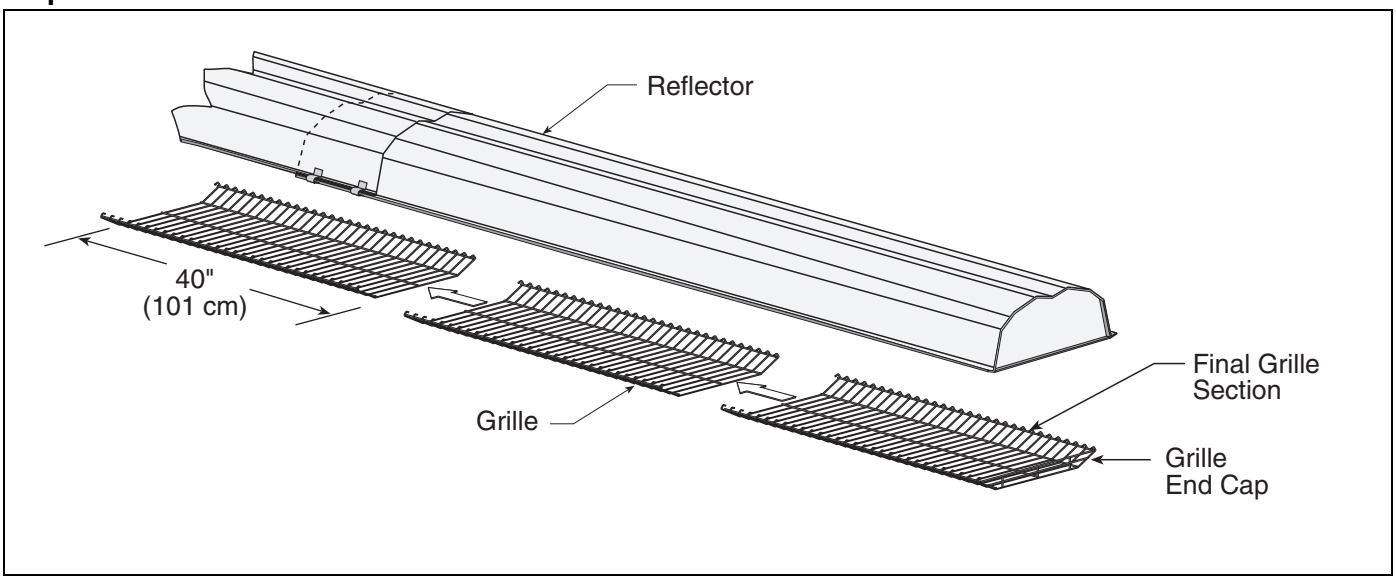


Description	Part Number
Grille Section	08050001
Grille End Cap	08050002
Silicone Cap	91915951-6P

Step 8.6.2 Grille End Cap Installation



Step 8.6.3 Grille Installation



SECTION 9: VENTING

⚠WARNING

Carbon Monoxide Hazard

Heaters installed unvented must be interlocked with sufficient building exhaust.

Heaters must be installed according to the installation manual.

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

⚠WARNING

Cut/Pinch Hazard

Wear protective gear during installation, operation and service.

Edges are sharp.

Failure to follow these instructions can result in injury.

9.1 Venting Requirements

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 National Fuel Gas Code NFPA 54/ANSI Z223.1 - latest revision.

Canada: Refer to Natural Gas and Propane Installation Code CSA B149.1 - latest revision.

Any portion of vent pipe passing through a combustible wall or roof must be dual insulated (Type B) vent pipe and have an approved thimble 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).

Both sides of the TF-Series heater may be individually vented 4" (10 cm) or common vented 6" (15 cm).

The heater may also be installed unvented in certain circumstances according to building ventilation codes. Refer to the above codes for further information. Unvented operation also requires compliance with the clearances to combustibles given *on Page 9, Figure 12*.

The bottom of the vent or air intake terminal shall not be located less than 1' (0.3 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 gases.

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. Vent terminal must be beyond any combustible overhang.

9.1.1 United States Requirements

Vent must terminate at least 3' (0.9 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' (0.3 m) above any door, operable window, or gravity air inlet into any building.

9.1.2 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' (0.9 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.

9.2 Unvented Operation

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

9.3 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 Tjernlund VH1-4 (P/N 90502100) 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 Tjernlund VH1-6 (P/N 90502101) or equivalent, insulated vent terminal. Follow the manufacturer's instructions for proper installation.

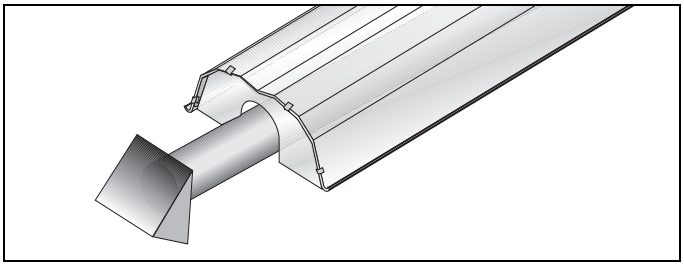
9.4 Vertical Venting

For 4" (10 cm), 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.
A vent shall not extend less than 2' (0.6m) above the highest point where it passes through a flat roof of a building.

9.5 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 22: Tube Termination



9.6 Length Requirements

The maximum vent length, where both tubes are vented together is 45’ (13.7 m) of 6" (15 cm) diameter duct. The maximum vent length, where both tubes are vented individually is 45’ (13.7 m) of 4" (11 cm) diameter duct, or 22.5’ (7 m) on each tube.

The maximum outside air supply duct length allowed is 45’ (13.7 m) of either 4" (10 cm) or 5" (13 cm) diameter, however the maximum length depends on the venting arrangement used.

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 lengths are 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.

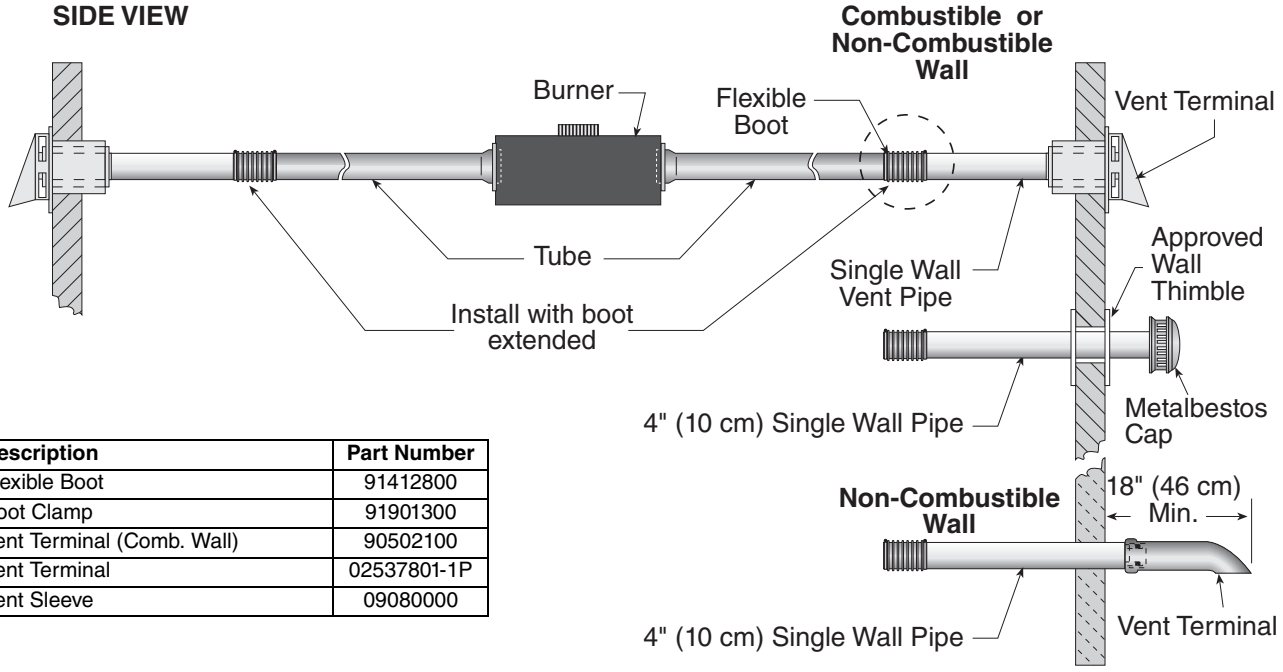
9.7 Vent Material Recommendations

Vent recommendations:

1. Porcelain coated tubing 4'' (10 cm) O.D. (P/N 9141030D)
2. Heat treated aluminized tubing 4'' (10 cm) O.D. (P/N 91409408)
   Heat treated aluminized tubing 6'' (15 cm) O.D. (P/N E0009105)
3. Single wall flue pipe - minimum 26 ga. (Supplied by others)

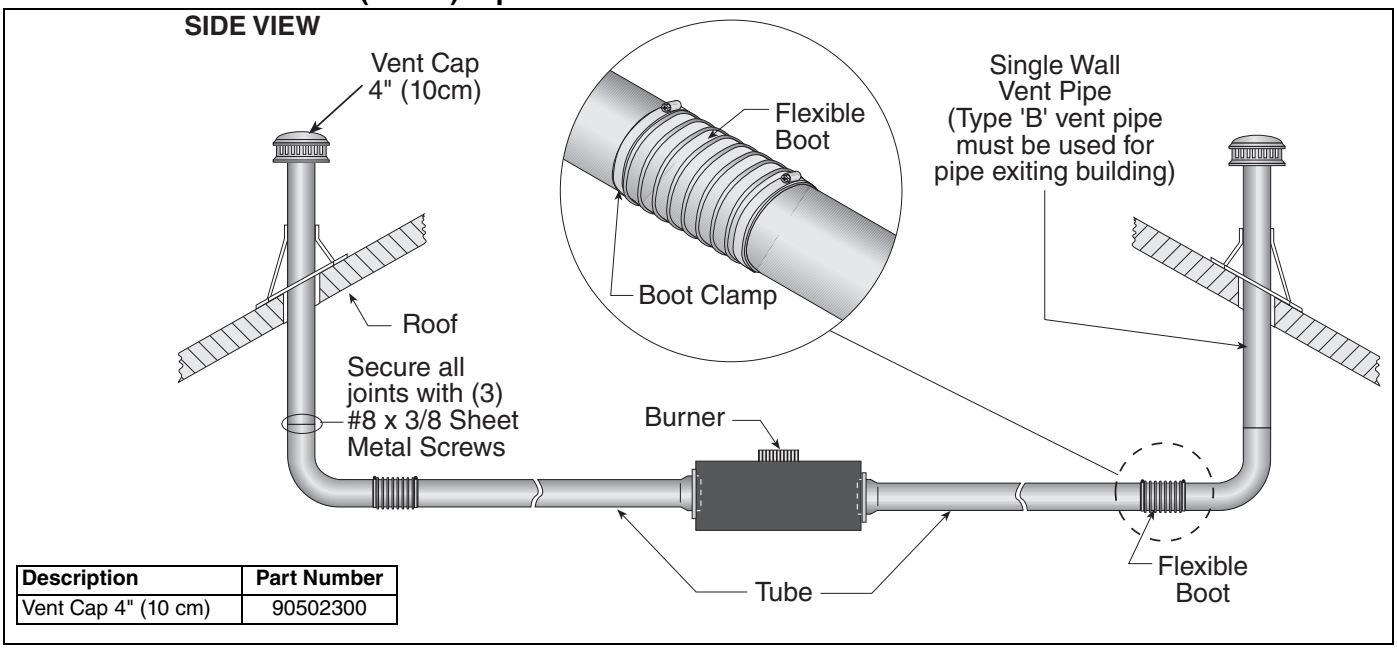
NOTE: 4" (10 cm) O.D. Porcelain coated tubing (P/N 914030D), 4" (10 cm) O.D. Heat treated aluminized tubing (P/N 91409408), and 6" (15 cm) O.D. Heat treated aluminized tubing (P/N E0009105) are equivalent to single wall flue pipe.

9.8 Horizontal Ventilation 4" (10 cm) Pipe



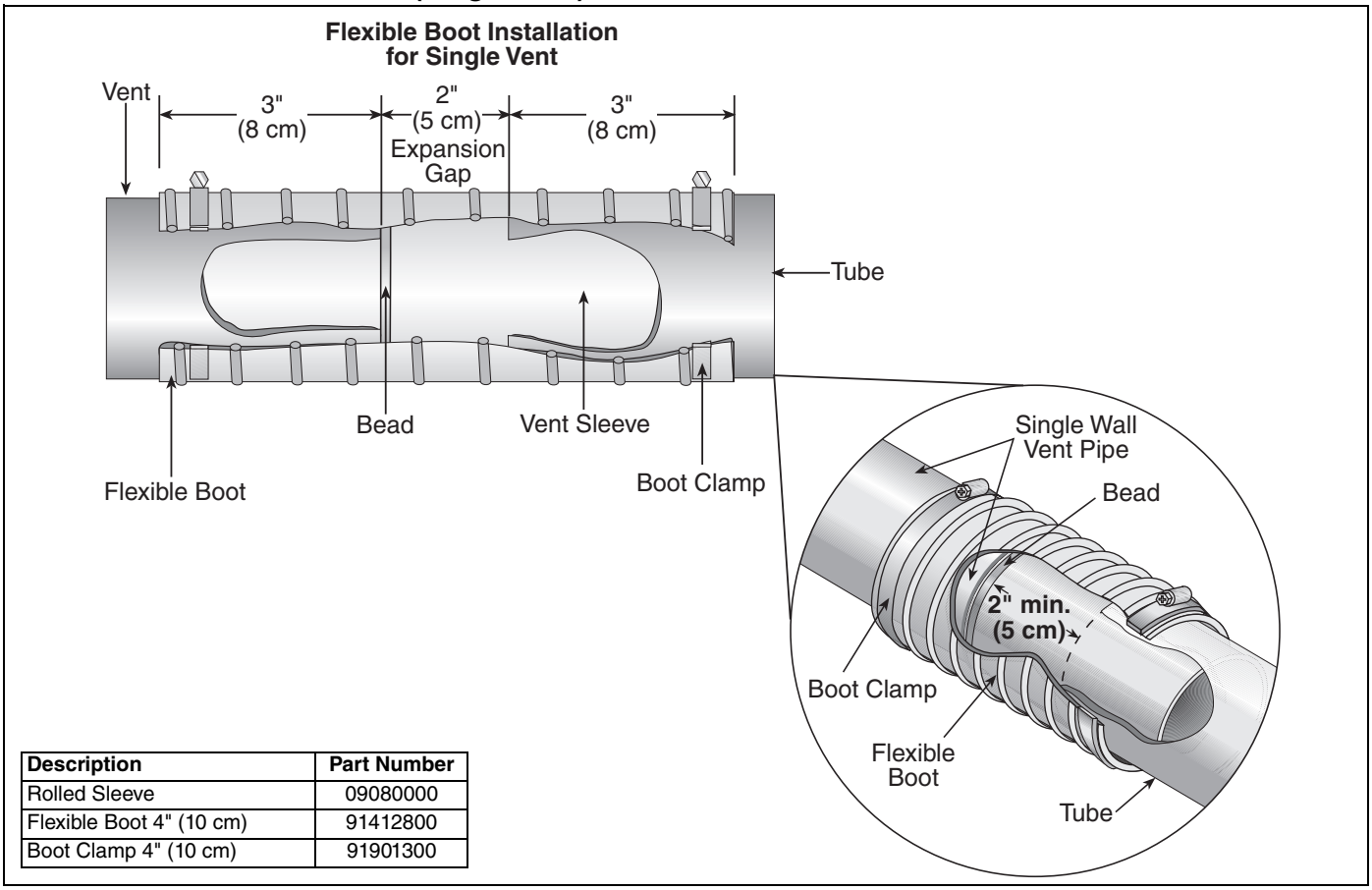
Description	Part Number
Flexible Boot	91412800
Boot Clamp	91901300
Vent Terminal (Comb. Wall)	90502100
Vent Terminal	02537801-1P
Vent Sleeve	09080000

9.9 Vertical Ventilation 4" (10 cm) Pipe



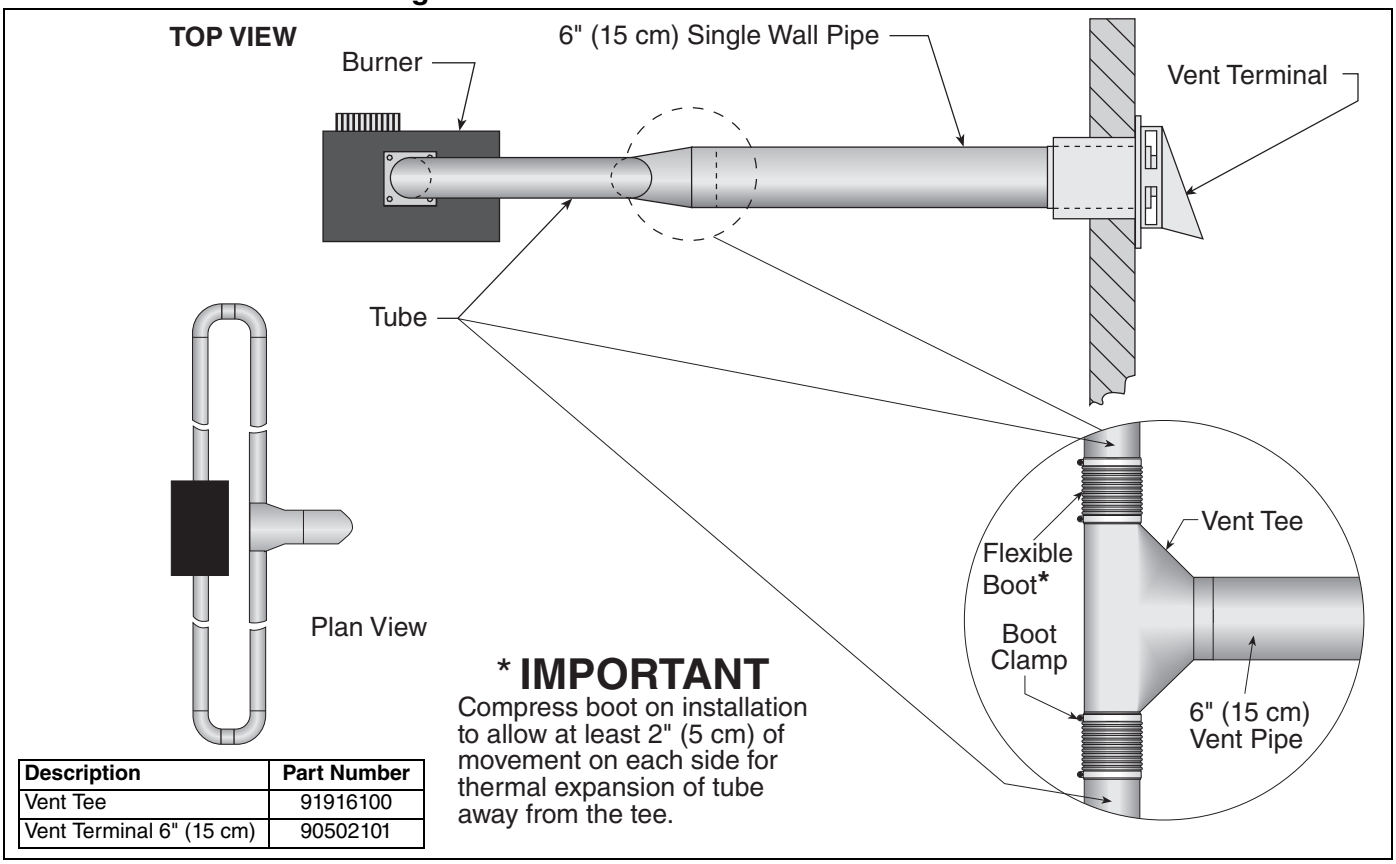
Description	Part Number
Vent Cap 4" (10 cm)	90502300

9.10 Flexible Boot Installation (Single Vent)



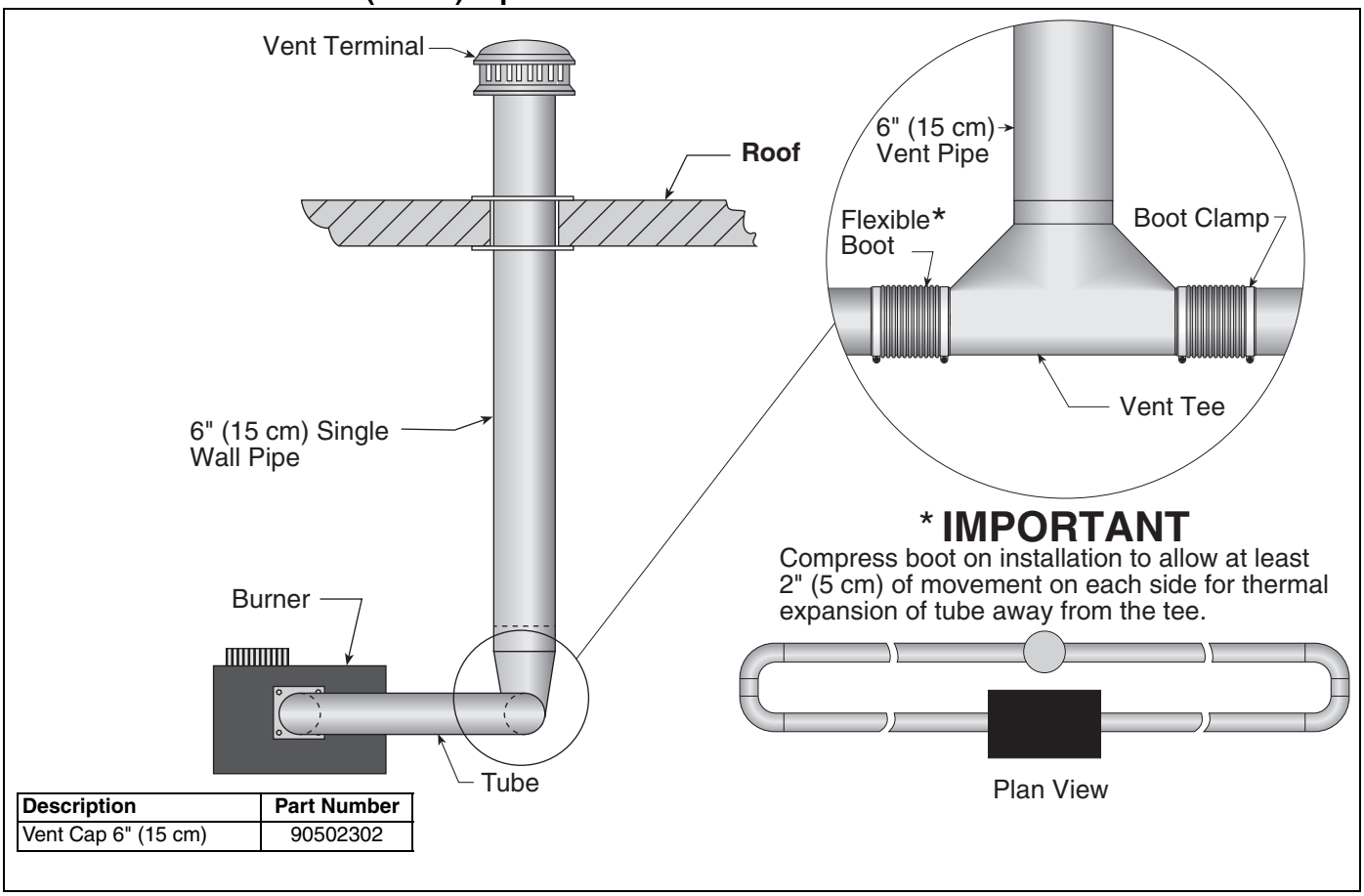
Description	Part Number
Rolled Sleeve	09080000
Flexible Boot 4" (10 cm)	91412800
Boot Clamp 4" (10 cm)	91901300

9.11 Common Sidewall Venting



Description	Part Number
Vent Tee	91916100
Vent Terminal 6" (15 cm)	90502101

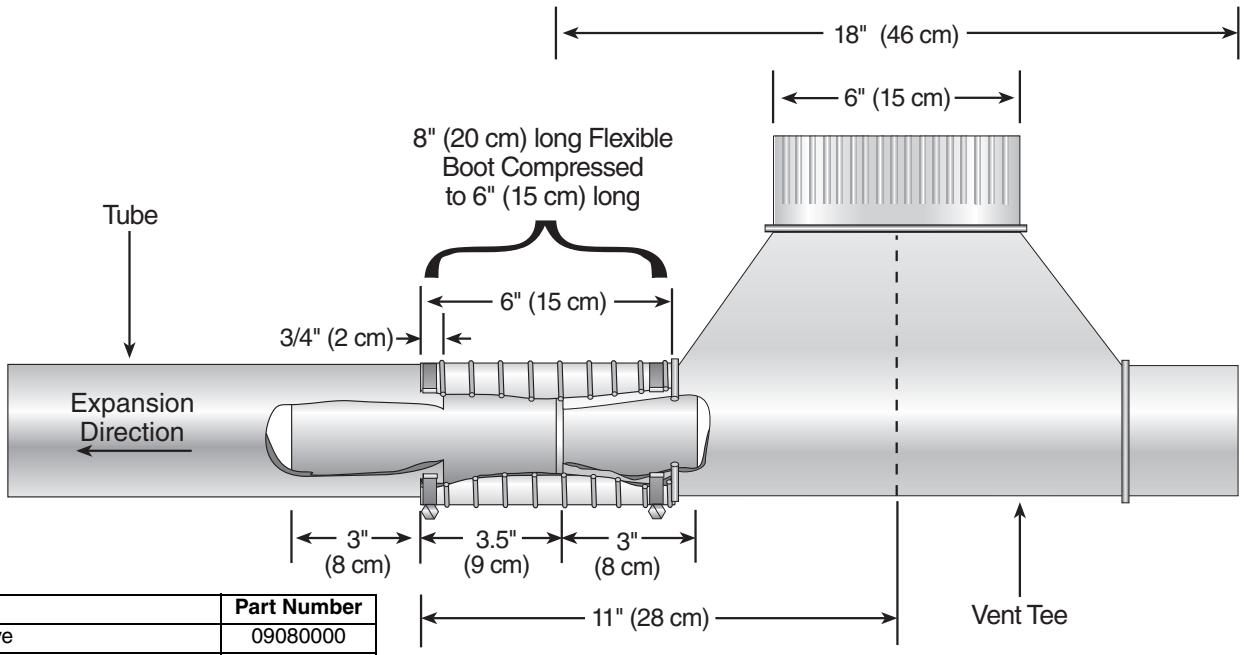
9.12 Vertical Ventilation 6" (15 cm) Pipe



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

9.13 Flexible Boot Installation (Common Vent)

Rolled Sleeve Installation for Common Vent



Description	Part Number
Rolled Sleeve	09080000
Flexible Boot 4" (10 cm)	91412800
Boot Clamp 4" (10 cm)	91901300
Vent Tee - 4" Dia. x 4" Dia. x 6" Dia.	91916100

9.14 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.

For TF-120 4" (10 cm) single wall pipe or for TF-160/200/250/300/350/380 5" (13 cm) single wall pipe, PVC pipe, aluminum flex duct, or equivalent may be used for outside air supply.

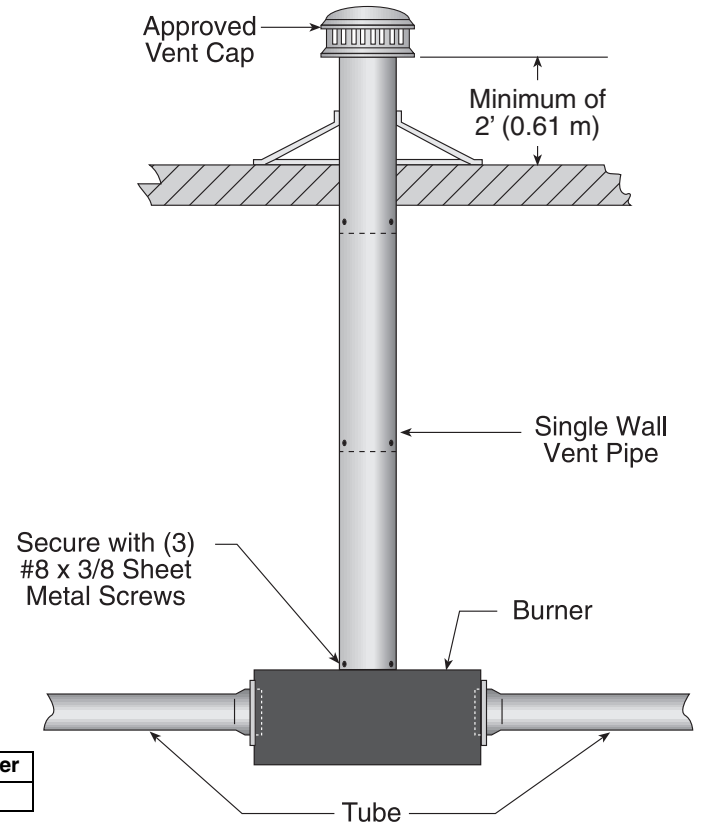
Use of optional outside combustion air is not recommended with unvented heaters.

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 termination while maintaining a minimum distance of 3' (93 cm) for both vertical and horizontal venting.

9.14.1 Length Requirements

Follow the constraints listed *on Page 38, Section 9.6*.

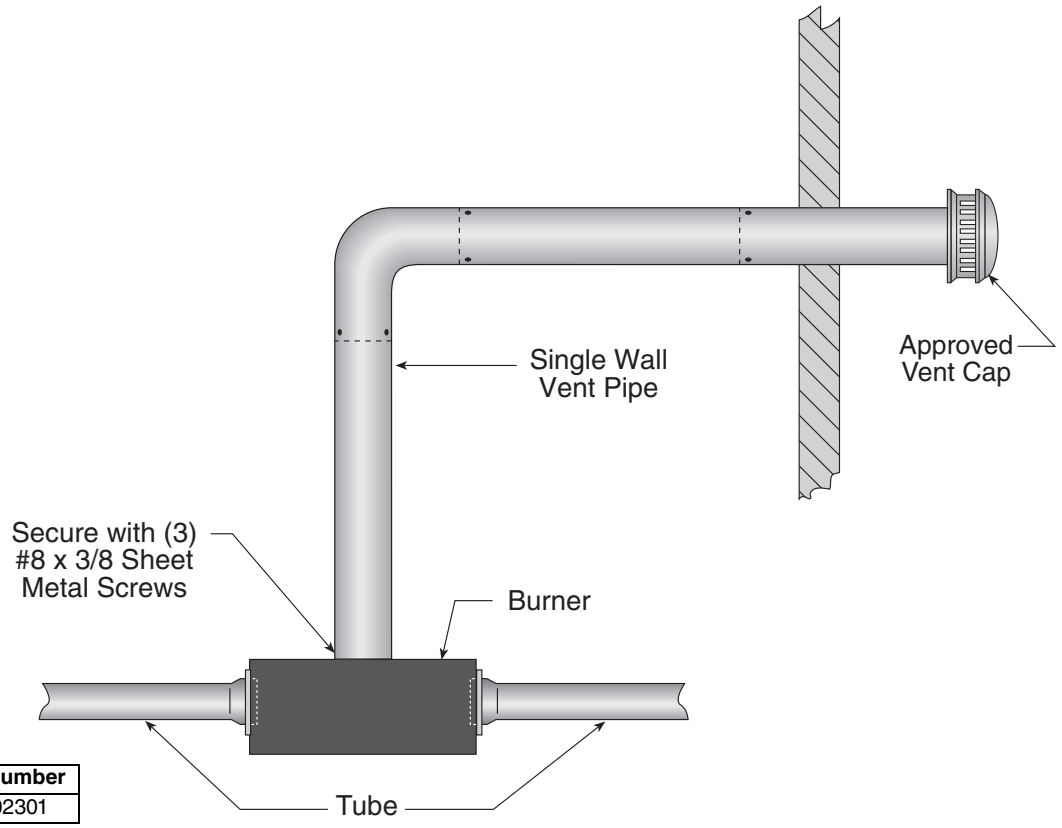
9.14.2 Vertical Outside Air Supply



Suggestion: Wrap pipe with insulation to prevent condensation from forming on outside of pipe.

Description	Part Number
Vent Cap 5" (13 cm)	90502301

9.14.3 Horizontal Outside Air Supply



Description	Part Number
Vent Cap 5" (13 cm)	90502301

SECTION 10: GAS PIPING

⚠ WARNING

Fire Hazard

Tighten gas hose fittings to connect gas supply according to Figure 23.

Gas hose can crack when twisted.

Gas hose moves during normal operation.

Use only 36" (91 cm) long connector of 3/4" nominal ID.

Connector supplied with heater for U.S. models (not with Canadian models).

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

⚠ WARNING

Explosion Hazard

Leak test all components of gas piping before operation.

Gas can leak if piping is not installed properly.

Do not high pressure test gas piping with heater connected.

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

Install the gas hose as shown *on Page 45, Figure 23*. The gas hose accommodates expansion of the heating system and allows for easy installation and service of the burner. A 90° pipe elbow (not supplied) must be installed into the gas valve to ensure proper orientation of the flex gas connector. 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 line. This can cause a gas leak resulting in an unsafe condition if the gas connection is not made in strict accordance with *Figure 23 on Page 45*.

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.

Gas lines must meet applicable codes:

United States: The Flexible Stainless Steel Gas Hose (US models) supplied with the heater is certified per the Standard for Connectors for Gas Appliances, ANSI Z21.24/CSA 6.10 - latest revision.

Canada: The Rubber Type 1 Gas Hose (Canadian models) optional with the heater is certified as being in compliance with the Standard for Elastomeric Composite Hose and Hose Couplings for Conducting Propane and Natural Gas, CAN/CGA 8.1 - Latest revision.

- **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 Flexible Gas Hose

CORRECT POSITIONS

Shut-Off Valve (included with gas hose) must be parallel to burner gas inlet. The 3" (8 cm) displacement shown is for the cold condition. This displacement may reduce when the system is fired.

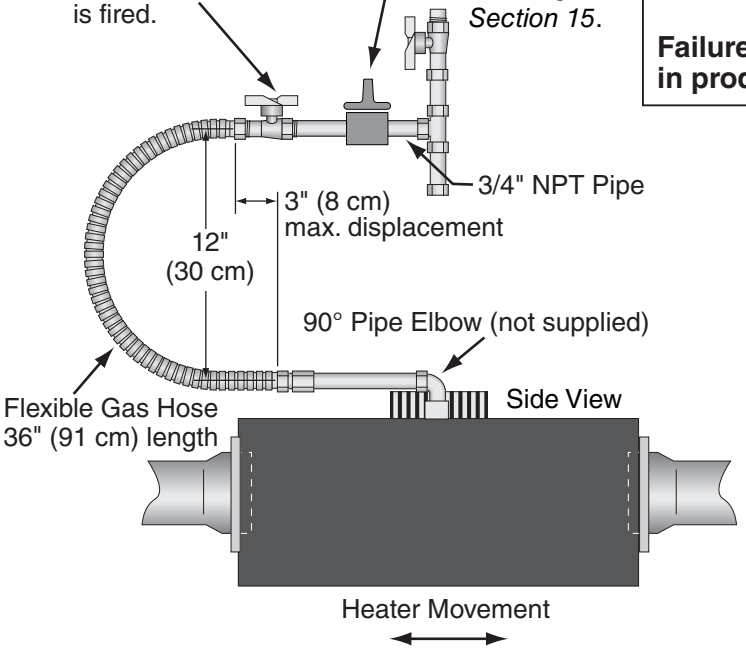
High Gas Pressure Regulator to be installed upstream of flexible has hose if inlet pressure exceeds maximum allowance. *See Page 60, Section 15*.

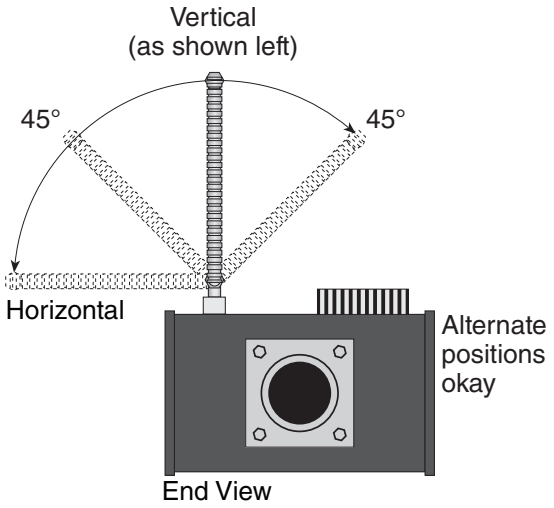
⚠ CAUTION

Product Damage Hazard

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

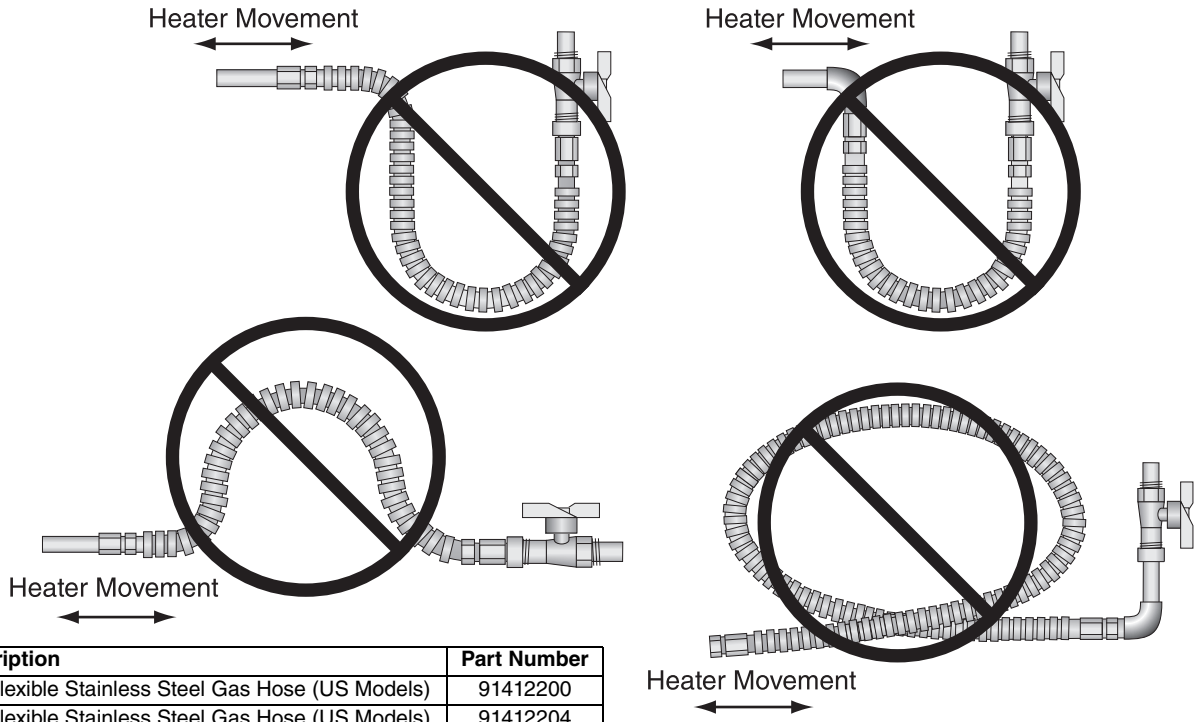
Failure to follow these instructions can result in product damage.





Description	Part Number
High Pressure Regulator - 2 psi	90207600
High Pressure Regulator - 5 psi	90207601

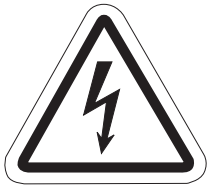
INCORRECT POSITIONS (WRONG INSTALLATION)



Description	Part Number
1/2" Flexible Stainless Steel Gas Hose (US Models)	91412200
3/4" Flexible Stainless Steel Gas Hose (US Models)	91412204
1/2" Rubber Type 1 Gas Hose (Canadian Models)	91412206
3/4" Rubber Type 1 Gas Hose (Canadian Models)	91412207

SECTION 11: WIRING

⚠ DANGER



Electrical Shock Hazard

Disconnect electric before service.

Heater must be properly grounded.

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

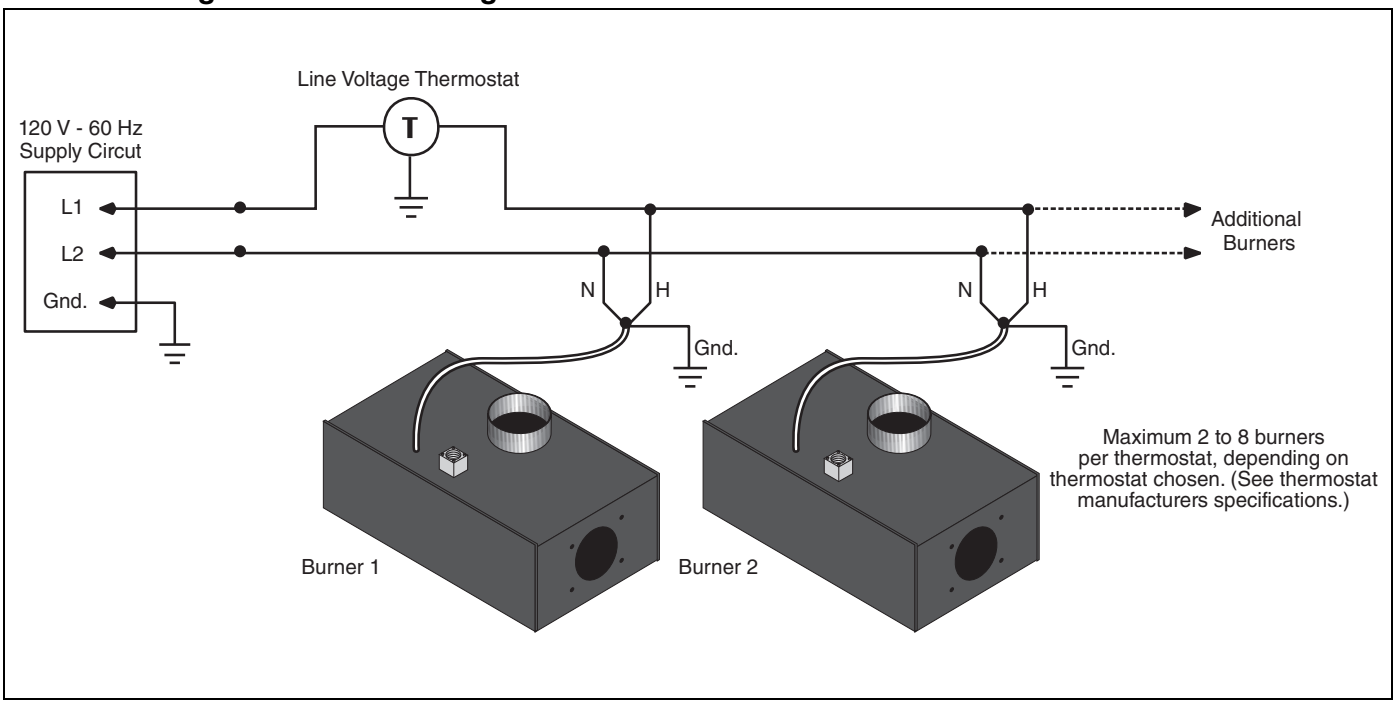
Heaters can be controlled using several methods. Normally thermostats are used to control the heaters but they can also be controlled by an Energy Management System. *Section 11.1* below illustrates the connection for heaters controlled by a line voltage thermostat.

To control multiple heaters on one low voltage thermostat, *See Page 47, Section 11.2*.

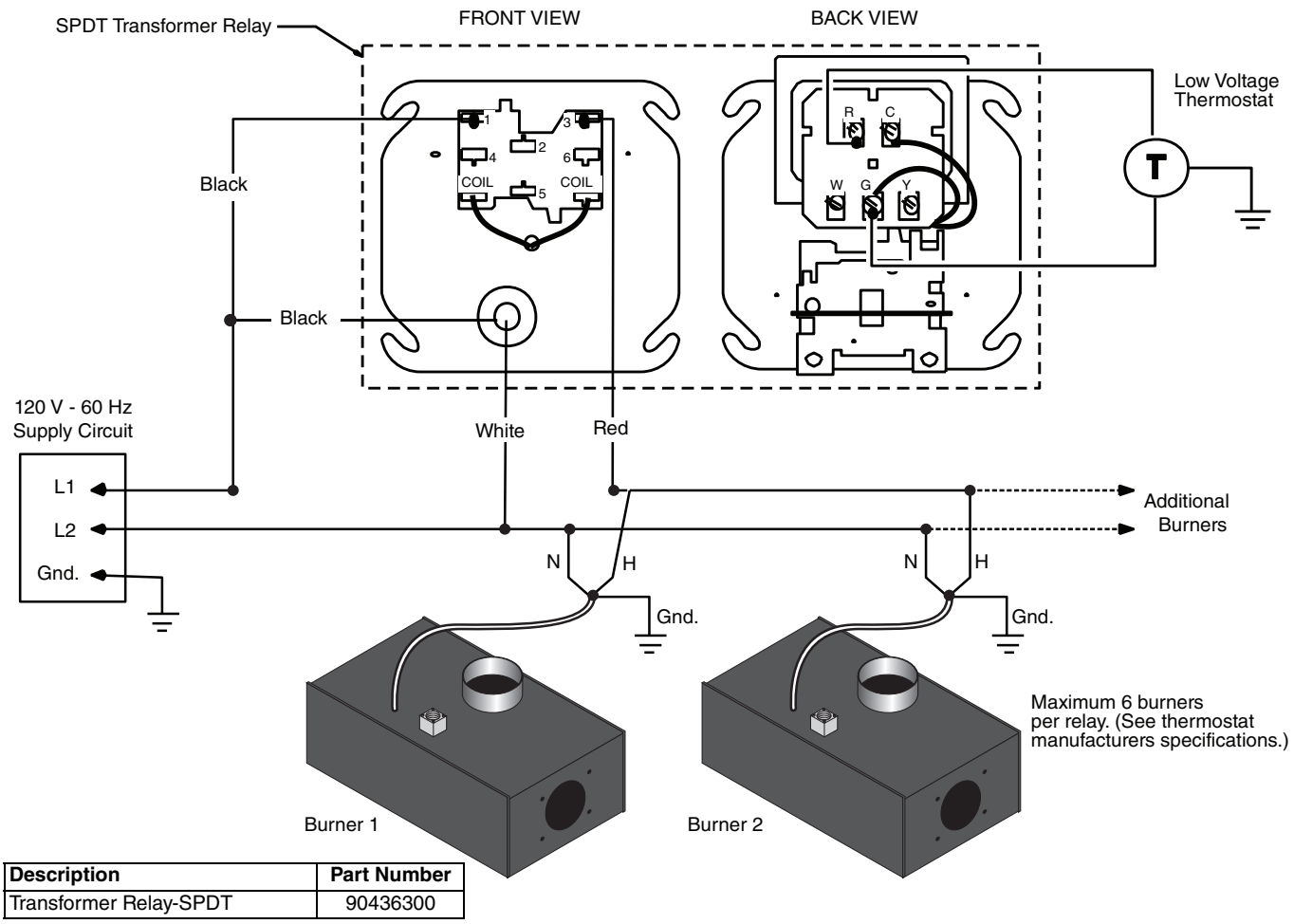
Heaters must be grounded in accordance with applicable codes: United States: refer to National Electrical Code® NFPA 70 - latest revision; Canada: refer to Canadian Electrical Code CSA C22.1 Part I - latest revision.

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 V.

11.1 Line Voltage Thermostat Wiring

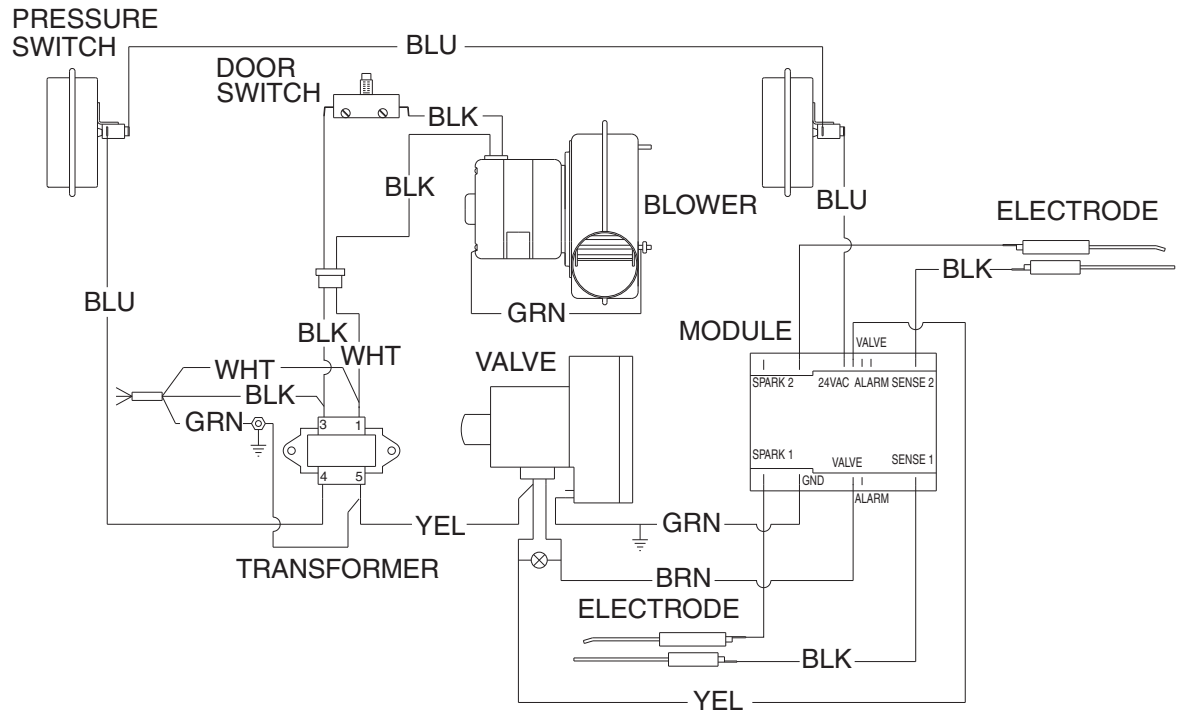


11.2 Low Voltage Thermostat and Relay Wiring

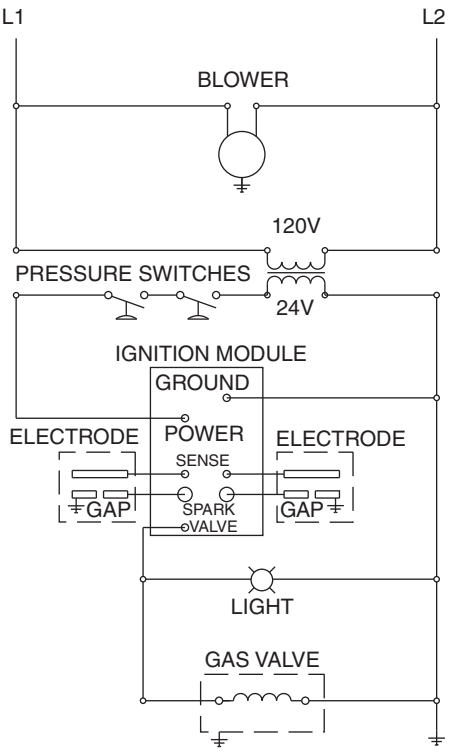


Description	Part Number
Transformer Relay-SPDT	90436300

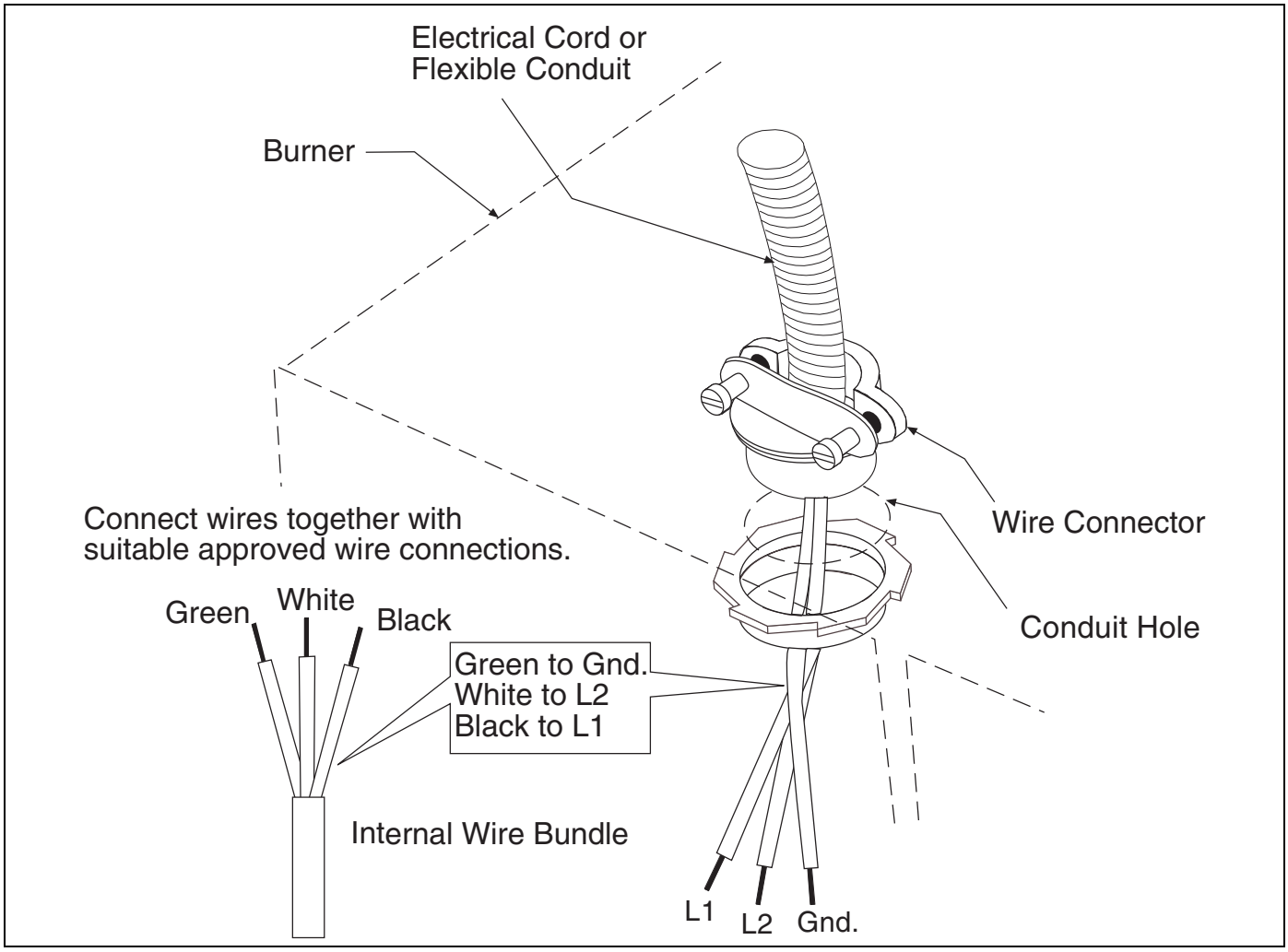
11.3 Internal Wiring



11.4 Ladder Diagram



11.5 Electrical Connection to the Burner



SECTION 12: OPERATION AND MAINTENANCE

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

The heater is equipped with a dual direct spark ignition system.

12.1 Sequence of Operation

4. Turn the thermostat up, the blower motor will energize.
5. When the motor approaches nominal running RPM, the pressure switches will close and activate the ignition module.
6. After a 45 second purge period, the ignition module then opens the gas valve and energizes both spark igniters. The light will be illuminated at any time the gas valve is energized.
7. When both flames are established, the sparking sequence ceases.
8. If both flames are not established during the ignition sequence, the ignition module closes the gas valve and purge begins. The module will try two additional times for ignition with purge between trials. If ignition is not established during either of these trials, the module will lock out.
9. After lock out has occurred, the ignition module must be re-set by turning down the thermostat (disconnecting power) for five seconds, and raising it again to the desired temperature.
10. When the thermostat is satisfied, all power to the heater is shut off.

12.2 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.

12.3 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.

12.4 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.
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 thoroughly inspected.
NOTE: Gas flow and burner ignition are among the first things that should be inspected. Please *see Page 51, Section 12.5* for suggested items to inspect.

12.5 Maintenance Checklist

Installation Code and Annual Inspections:
All installation and service of ROBERTS GORDON® equipment must be performed by a contractor qualified in the installation and service of equipment sold and supplied by Roberts-Gordon LLC and conform to all requirements set forth in the ROBERTS GORDON® manuals and all applicable governmental authorities pertaining to the installation, service and operation and labeling of the equipment.

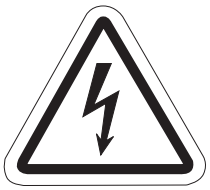
To help facilitate optimum performance and safety, Roberts-Gordon LLC recommends that a qualified contractor conduct, at a minimum, annual inspections of your ROBERTS GORDON® equipment and perform service where necessary, using only replacement parts sold and supplied by Roberts-Gordon LLC.

The Vicinity of the Heater	Do not store or use flammable objects, liquids or vapors near the heater. Immediately remove these items if they are present. *See Page 5, Section 3*.
Vehicles and Other Objects	Maintain the clearances to combustibles. Do not hang anything from, or place anything on, the heater. Make sure nothing is lodged underneath the reflector, in between the tubes or in the decorative or protective grilles (included with select models). Immediately remove objects in violation of the clearances to combustibles. *See Page 5, Section 3*.
Reflector	Support reflector with reflector hanger and support strap. Reflector must not touch tube. Make sure there is no dirt, sagging, cracking or distortion. Do not operate if there is sagging, cracking or distortion. Make sure reflectors are correctly overlapped. *See Page 26, Section 7.6.1*. Clean outside surface with a damp cloth.
Vent Pipe	Venting must be intact. Using a flashlight, look for obstructions, cracks on the pipe, gaps in the sealed areas or corrosion. The area must be free of dirt and dust. Remove any carbon deposits or scale using a wire brush. *See Page 37, Section 9*.
Outside Air Inlet	Inlet must be intact. Look for obstructions, cracks on the pipe, gaps in the sealed areas or corrosion. The area must be free of dirt and dust. Clean and reinstall as required.

Tubes	Make sure there are no cracks. Make sure tubes are connected and suspended securely. *See Page 16, Section 7*. Make sure there is no sagging, bending or distortion. Clean or replace as required.
Gas Line	Check for gas leaks. *See Page 44, Section 10*.
Burner Observation Window	Make sure it is clean and free of cracks or holes. Clean and replace as required.
Blower Scroll, Wheel and Motor	Compressed air or a vacuum cleaner may be used to clean dust and dirt.
Burner Cup and Orifice	Clear of obstructions (even spider webs will cause problems). Carefully remove any dust and debris from the burner.
Electrodes	Replace if there is excessive carbon residue, or erosion of the electrodes. The electrode gap should be 1/8" (3.2 mm).
Thermostat	There should be no exposed wire or damage to the thermostat. *See Page 46, Section 11*.
Suspension Points	Make sure the heater is hanging securely. Look for signs of wear on the chain or ceiling. *See Page 17, Figure 14*.
Decorative and Protective Grille (optional)	The grille must be securely attached. Check that the side reflector extensions are installed correctly and secured in place if necessary (Decorative grille only). *See Page 34, Section 8.5 and Page 36, Section 8.6* Make sure shield is installed correctly and secured in place if necessary. (Decorative grille only.) *See Page 35, Section 8.5.2*.
Lower Clearance Shield (optional)	The lower shield must be securely attached. Inspect shield support straps and lower clearance shield anchor points. Make sure shield is installed correctly and secured in place if necessary. *See Page 34, Section 8.4*.
Wall Tag	If wall tag is present, make sure it is legible and accurate. Please contact Roberts-Gordon LLC or your ROBERTS GORDON® independent distributor, if you need a wall tag. *See Page 4, Section 2.1*.
Safety Labels	Product safety signs or labels should be replaced by the product user when they are no longer legible. Please contact Roberts-Gordon LLC or your ROBERTS GORDON® independent distributor to obtain replacement signs or labels. *See Page 2, Figure 1 through Page 3, Figure 2*.

SECTION 13: TROUBLESHOOTING

⚠ DANGER



Electrical Shock Hazard

Disconnect electric before service.

Heater must be properly grounded.

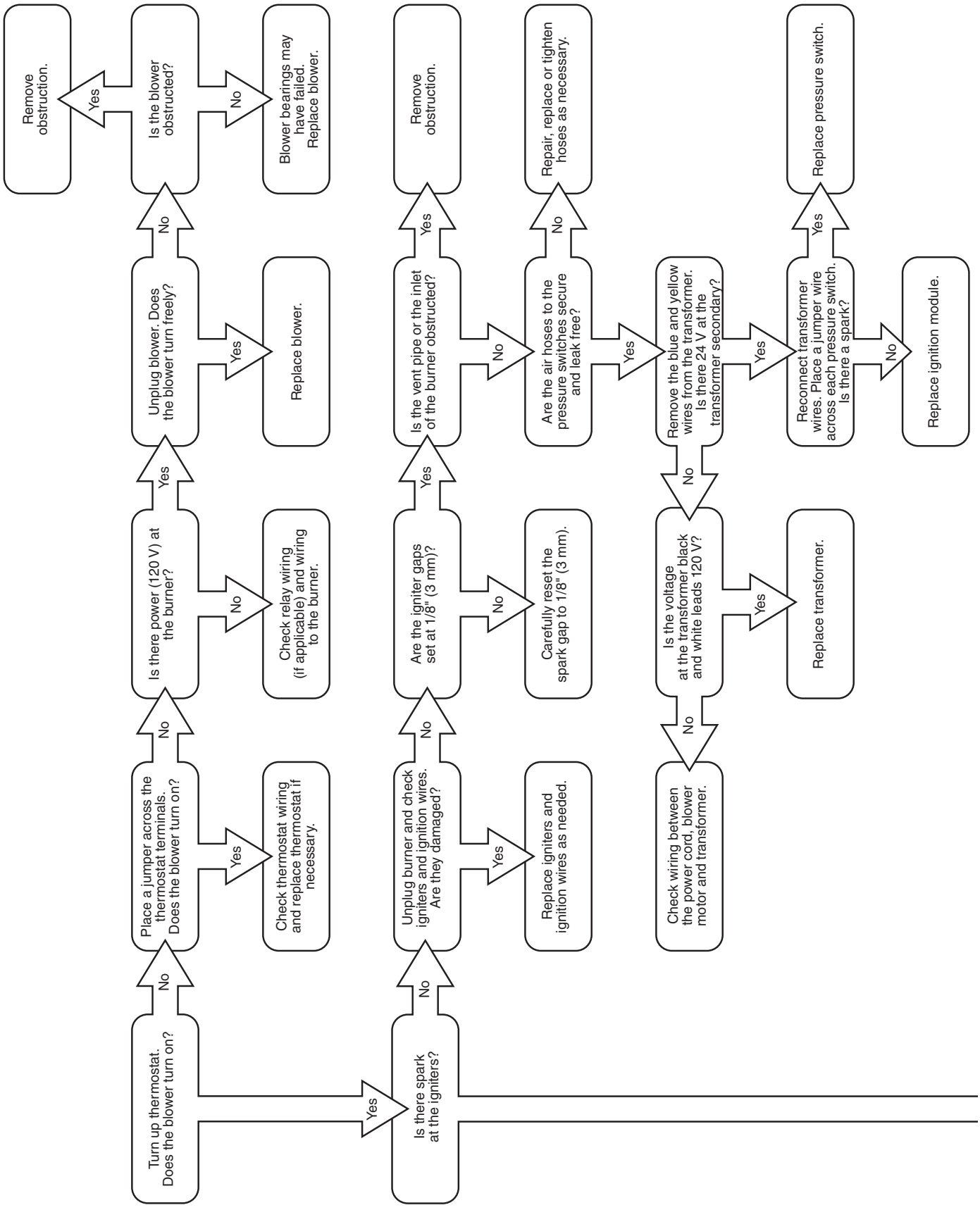
Failure to follow these instructions can result in death or electrical shock.

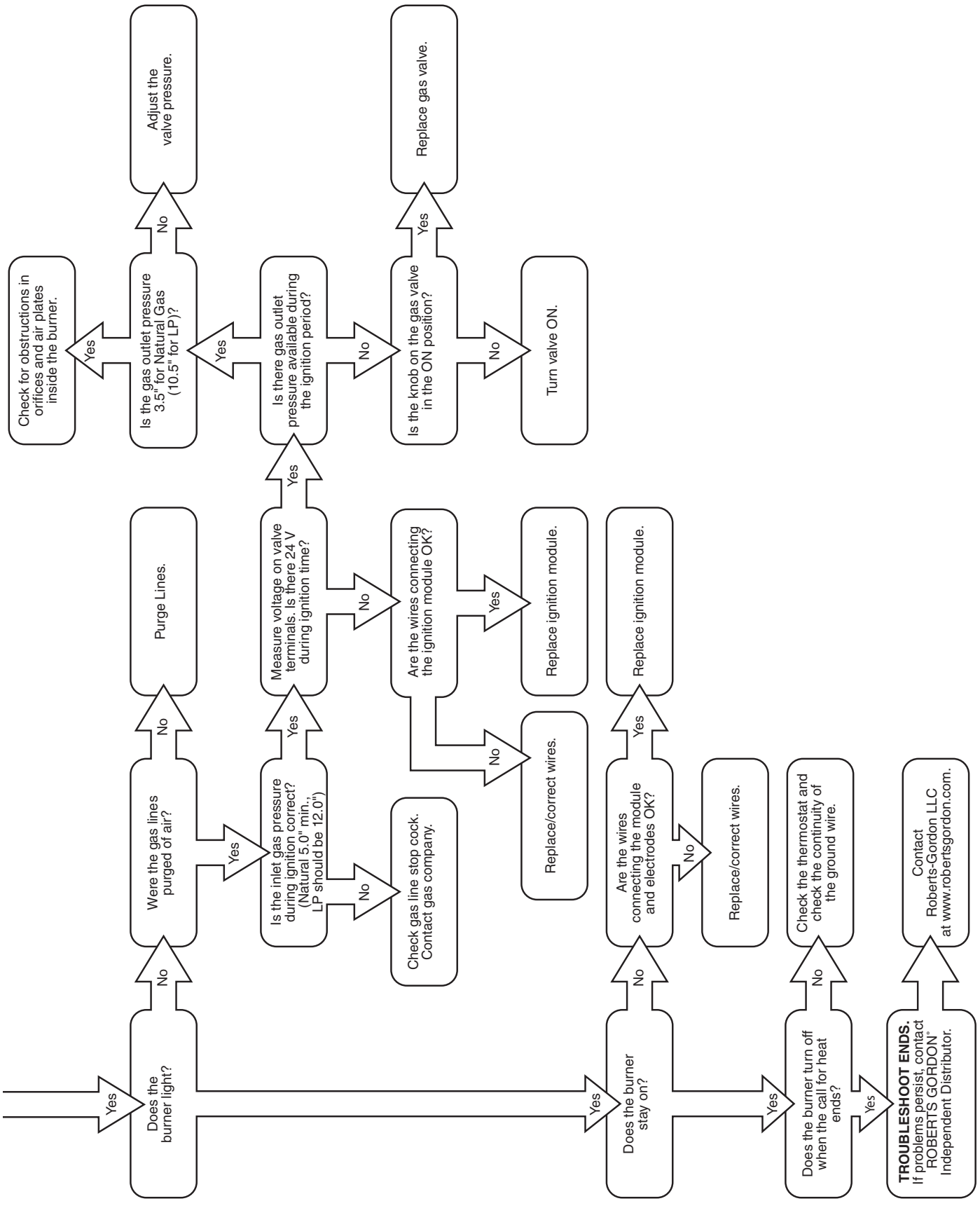
⚠ WARNING

Fire Hazard	**Explosion Hazard**	**Burn Hazard**	**Cut/Pinch Hazard**
Keep all flammable objects, liquids and vapors the minimum required clearances to combustibles away from heater. **Some objects will catch fire or explode when placed close to heater.**	**Turn off gas supply to heater before service.**	**Allow heater to cool before service.** **Tubing may still be hot after operation.**	**Wear protective gear during installation, operation and service.** **Edges are sharp.**

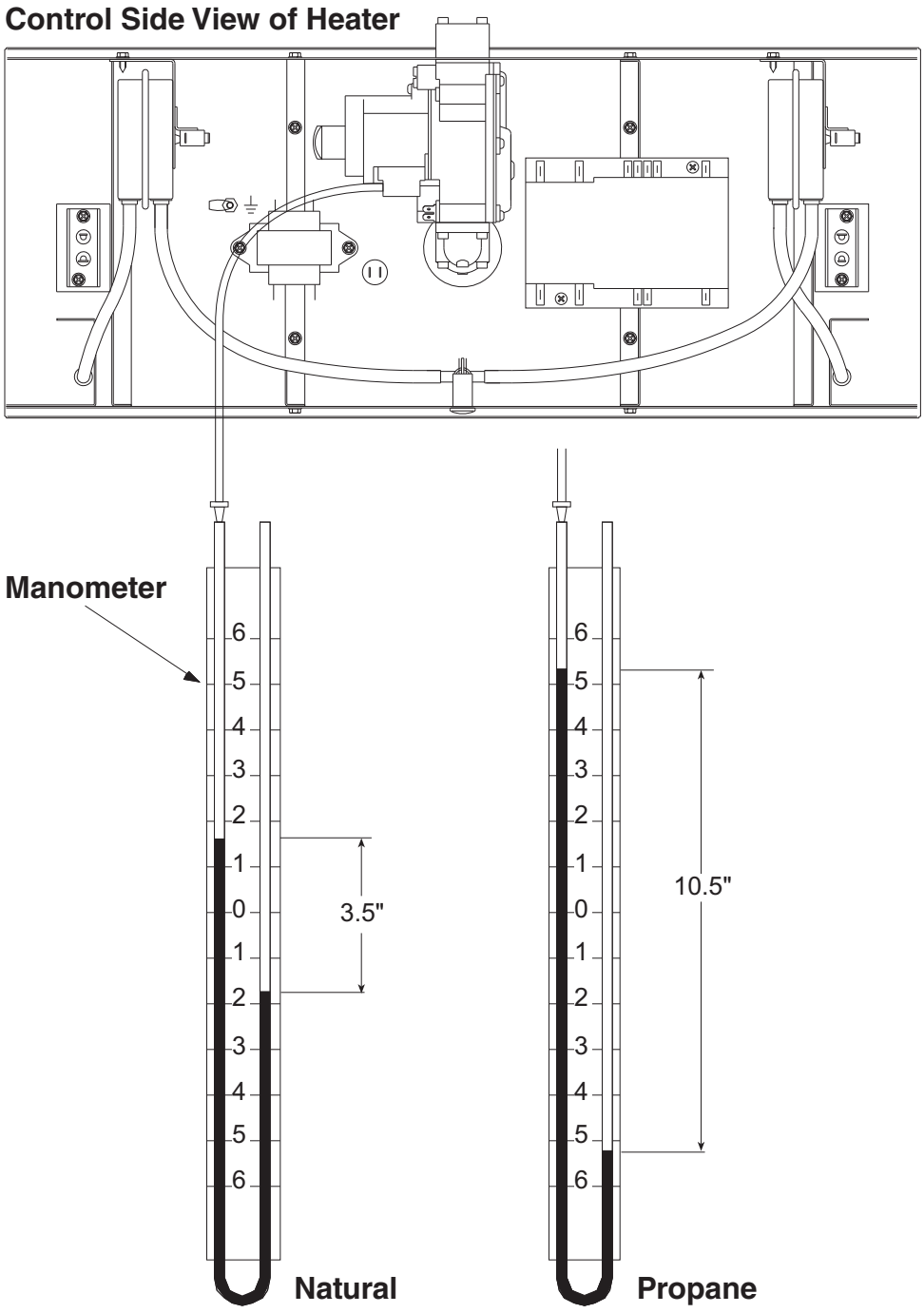
Failure to follow these instructions can result in death, injury or property damage.

13.1 Troubleshooting Flow Chart

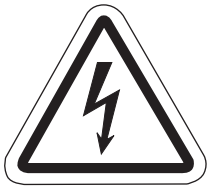



Does the burner light?
Yes
No
Were the gas lines purged of air?
Yes
No
Purge Lines.
Is the inlet gas pressure during ignition correct? (Natural 5.0" min., LP should be 12.0")
Yes
No
Check gas line stop cock. Contact gas company.
Measure voltage on valve terminals. Is there 24 V during ignition time?
Yes
No
Are the wires connecting the ignition module OK?
Yes
No
Replace ignition module.
Replace/correct wires.
Is there gas outlet pressure available during the ignition period?
Yes
No
Is the knob on the gas valve in the ON position?
Yes
No
Replace gas valve.
Turn valve ON.
Is the gas outlet pressure 3.5" for Natural Gas (10.5" for LP)?
Yes
No
Adjust the valve pressure.
Check for obstructions in orifices and air plates inside the burner.
Does the burner stay on?
Yes
No
Are the wires connecting the module and electrodes OK?
Yes
No
Replace ignition module.
Replace/correct wires.
Does the burner turn off when the call for heat ends?
Yes
No
Check the thermostat and check the continuity of the ground wire.
TROUBLESHOOT ENDS.
If problems persist, contact ROBERTS GORDON® Independent Distributor.
Contact Roberts-Gordon LLC at www.robertsgordon.com.

13.2 Manifold Gas Pressure Setting



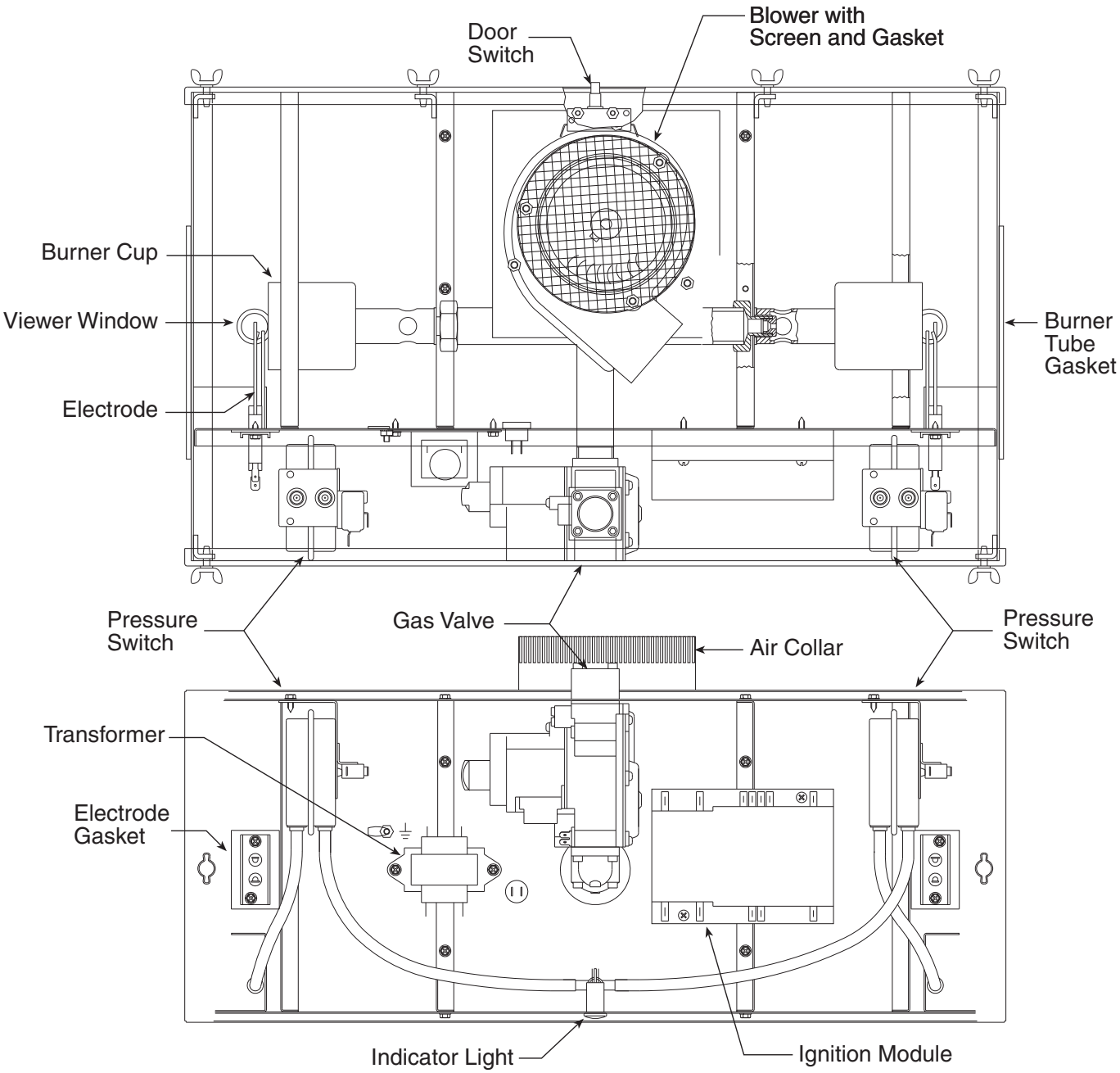
SECTION 14: REPLACEMENT PARTS

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

Use only genuine ROBERTS GORDON® replacement parts per this installation, operation and service manual.

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

See warnings and important information before removing or replacing parts. After any maintenance or repair work, always test fire the heater in accordance with the start-up instructions *on Page 50, Section 12.3* to help ensure all safety systems are in working order before leaving the heater to operate. Minor faults may be traced by using the troubleshooting charts *on Page 53, Section 13 through Page 54.*


Door Switch
Blower with Screen and Gasket
Burner Cup
Viewer Window
Electrode
Burner Tube Gasket
Pressure Switch
Gas Valve
Air Collar
Pressure Switch
Transformer
Electrode Gasket
Indicator Light
Ignition Module

Description	Part Number
Gas Valve (Natural)	90033700
Gas Valve Kit (LP) (consists of NG gas valve and spring conversion kit)	90033700K
Gasket:	
(160/200/250/300/350/380)	09060000
(120)	03050900
Screen	
(160/200/250/300/350/380)	09050000
(120)	03050800
Blower	
(160/200/250/300/350/380)	90710400-P
(120)	90708600-P
Burner Cup Assembly	03020100
Mica Window Assembly	02553203
Electrode	90427403
Ignition Module	90434007
Electrode Gasket	02558501
Indicator Light	91316102
Transformer	90436900K
Door Switch	90436800
Air Collar	
(160/200/250/300/350/380)	08031500
(120)	91911700
Transition Tube Gasket	02568200
Pressure Switch:	
(120/380)	90439802K
(160/200)	90439806K
(250)	90439808K
(350)	90439804K
300	90439807K

SECTION 15: GENERAL SPECIFICATIONS

15.1 Material Specifications

15.1.1 Reflectors

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

15.2 Heater Specifications

15.2.1 Ignition

Fully automatic, three-try, direct spark, electronic ignition control, 100% safety shut-off.

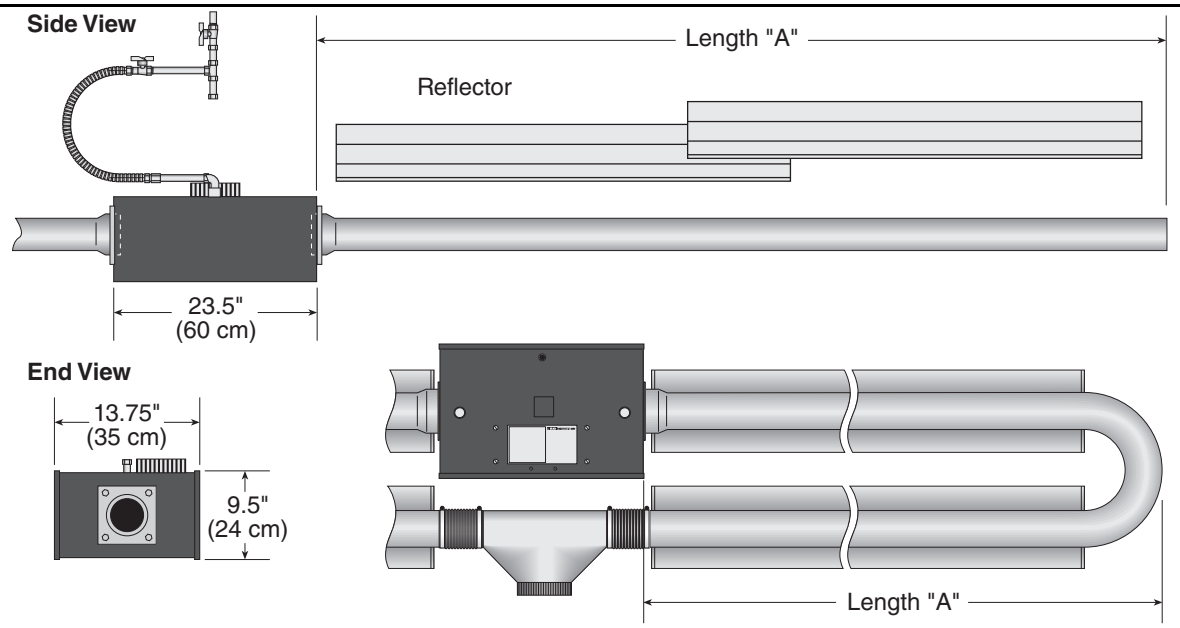
15.3 Suspension Specifications

Hang heater with materials with a minimum working load of 75 lbs (33 kg). *See Page 17, Figure 14*.

15.4 Controls Specifications

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

General Specifications for heaters are as follows:



Model	Heat Input Rate (Btu/h) X (1000)	Length "A" Each Side Minimum Linear	Length "A" Each Side Minimum U-Tube	Recommended Minimum Mounting Height* Space	Recommended Minimum Mounting Height* Spot
TF-120	120	20' (6 m)	11'6" (4 m)	12' (4 m)	9' (3 m)
TF-160	160	20' (6 m)	11'6" (4 m)	15' (5 m)	11' (3 m)
TF-200	200	30' (9 m)	16'6" (5 m)	15' (5 m)	12' (4 m)
TF-250	250	40' (12 m)	21' 6" (7 m)	20' (6 m)	15' (5 m)
TF-300	300	50' (15 m)	26'6" (8 m)	20' (6 m)	20' (6 m)
TF-350	350	50' (15 m)	26'6" (8 m)	25' (8 m)	23' (7 m)
TF-380	380	60' (18 m)	31'6" (10 m)	25' (8 m)	23' (7 m)

**Length "A" Each Side Minimum* — Recommended Minimum Mounting Height*

See Page 5, Section 3 for clearances to combustibles.

GAS PRESSURE AT MANIFOLD:

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

DIMENSIONS:

Vent Connection Size:
4" (10 cm) or 6" (15 cm)
Outside Air Connection Size:
5" (13 cm)
Refer to figure above for dimensional information.

PIPE CONNECTION:

3/4" NPT

GAS INLET PRESSURE:

Natural Gas: 5.0" wc Minimum
16.0" wc Maximum
LP Gas: 12.0" wc Minimum
16.0" wc Maximum

ELECTRICAL RATING (ALL MODELS):

120V - 60 Hz., 1.0 Amp

SECTION 16: THE ROBERTS GORDON® VANTAGE® TF WARRANTY

ROBERTS-GORDON LLC WILL PAY FOR:

Within 36 months from date of purchase by buyer or 42 months from date of shipment by Roberts-Gordon LLC (whichever occurs first), replacement parts will be provided free of charge for any part of the product which fails due to a manufacturing or material defect.

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

ROBERTS GORDON® Replacement Parts are warranted for a period of 12 months from date of shipment from Roberts-Gordon LLC or the remaining ROBERTS GORDON® VANTAGE® TF warranty.

ROBERTS-GORDON LLC 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 ROBERTS GORDON® VANTAGE® TF in any way.
- Use of the ROBERTS GORDON® VANTAGE® TF 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 Roberts-Gordon.
- Failure to install or maintain the ROBERTS GORDON® VANTAGE® TF as directed in the Installation, Operation and Service manual.
- Relocation of the ROBERTS GORDON® VANTAGE® TF after initial installation.
- The use of the ROBERTS GORDON® VANTAGE® TF in a corrosive atmosphere containing contaminants.
- The use of the ROBERTS GORDON® VANTAGE® TF in the vicinity of a combustible or explosive material.
- Any defect in the ROBERTS GORDON® VANTAGE® TF 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 ROBERTS GORDON® VANTAGE® TF is not installed by an 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 ownership of the ROBERTS GORDON® VANTAGE® TF is moved or transferred. This warranty is nontransferable.

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

READ YOUR INSTALLATION, OPERATION AND SERVICE MANUAL

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

Roberts-Gordon LLC
1250 William Street
P.O. Box 44
Buffalo, New York 14240-0044
Telephone: +1.716.852.4400
Fax: +1.716.852.0854
Toll Free: 800.828.7450
www.robertsgordon.com

Roberts-Gordon LLC'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 LLC 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® VANTAGE® TF. 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 LLC 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 Roberts-Gordon LLC any other warranty, obligation or liability.

LIMITATIONS ON AUTHORITY OF REPRESENTATIVES:

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

ROBERTS GORDON®
Infrared Heating

OWNER WARRANTY REGISTRATION CARD

Mail or Fax to:

Roberts Gordon LLC •1250 William Street, P.O. Box 44 • Buffalo, NY 14240-0044 • Phone: 716-852-4400 • Fax: 716-852-0854
Toll Free: 800-828-7450 • www.robertsgordon.com

About the Owner:

Name:_____

Address:_____City:_____State:_____Zip Code:_____

Phone:_____ Fax:_____ E-mail:_____

About the Installer:

Name:_____

Address:_____City:_____State:_____Zip Code:_____

Phone:_____Fax:_____E-mail:_____

Purchased From (if different than installer):

Name:_____

Address:_____City:_____State:_____Zip Code:_____

Phone:_____ Fax:_____ E-mail:_____

About your Heater:

Model#:_____ Serial #:_____ Fuel:_____Installation Date:_____

Type of Installation (check one):

o Automotive	o Manufacturing	o Warehouse	o Recreational	o Aircraft
o Public Building	o Office	o Retail	o Agricultural	o Other_____

Installation Code and Annual Inspections: All installation and service of ROBERTS GORDON® equipment must be performed by a contractor qualified in the installation and service of equipment sold and supplied by Roberts-Gordon LLC and conform to all requirements set forth in the ROBERTS GORDON® manuals and all applicable governmental authorities pertaining to the installation, service, operation and labeling of the equipment.

To help facilitate optimum performance and safety, Roberts-Gordon LLC recommends that a qualified contractor conduct, at a minimum, annual inspections of your ROBERTS GORDON® equipment and perform service where necessary, using only replacement parts sold and supplied by Roberts-Gordon LLC.

These products are not for residential use.

This product is intended to assist licensed professionals in the exercise of their professional judgment.

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

ROBERTS GORDON®
Infrared Heating

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

Know your model number and installed configuration.

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

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

OPERATING INSTRUCTIONS

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

TO TURN OFF THE HEATER

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

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

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

⚠WARNING

Fire Hazard

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

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

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

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

Roberts-Gordon LLC
1250 William Street
P.O. Box 44
Buffalo, NY 14240-0044 USA
Telephone: +1.716.852.4400
Fax: +1.716.852.0854
Toll Free: 800.828.7450

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

This product is not for residential use.

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www.robertsgordon.com P/N 91037912 Rev. K