



## INSTALLATION AND OPERATION INSTRUCTIONS

**OWNER / INSTALLER:** For your safety this manual must be carefully and thoroughly read and understood before installing, operating, or servicing this heater.

### ***GOLF RANGE AND HOSPITALITY***

### **INFRARED RADIANT TUBE HEATER**

Single and Two Stage Push Through System (Positive Pressure)

#### **Models:**

**SPH (20FT): (40, 50, 60, 75, 80, 100, 125) N5/L5/N7/L7**

**SPH (30FT): (50, 60, 75, 80, 100, 125) N5/L5/N7/L7**

**! INSTALLER:** This manual is the property of the owner. Please present this manual to the owner when you leave the job site.

**▲ WARNING:** Improper installation, adjustment, alteration, service, or maintenance can cause property damage, injury or death. Read the installation, operation and maintenance instructions thoroughly before installing or servicing this equipment.

#### **IF YOU SMELL GAS:**

- ! DO NOT** try to light any appliance.
- ! DO NOT** touch any electrical switch; **DO NOT** use any telephone in your building.
- ! IMMEDIATELY** call your gas supplier from a neighbor's telephone. Follow the gas supplier's instructions. If you cannot reach your gas supplier, call the fire department.

#### **FOR YOUR SAFETY**

**DO NOT** store or use gasoline or other flammable vapors and liquids in the vicinity of this or any other appliance.

Scan warranty QR code on the right to register your product.



**!IMPORTANT: SAVE THIS MANUAL FOR FUTURE REFERENCE.**

Manufactured for:

**SUNSTAR HEATING PRODUCTS, INC.**

Post Office Box 36271 (28236) • Charlotte, North Carolina

Phone (704) 372-3486 • Fax (704) 332-5843 • [www.sunstarheaters.com](http://www.sunstarheaters.com) • email: [info@sunstarheaters.com](mailto:info@sunstarheaters.com)

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This heater complies with ANSI Z83.20 (current standard) and CSA 2.34. Copies of the National Fuel Gas Code (ANSI Z223.1-latest edition) are available from the CSA at 8501 East Pleasant Valley Road, Cleveland, Ohio 44131 or 55 Scarsdale Road, Don Mills, Ontario M3B 2R3. All NFPA codes are available from the National Fire Protection Association, Batterymarch Park, Quincy, Massachusetts 02269.

## 1.0) SAFETY

This heater is a self-contained infrared radiant tube heater. Safety information required during installation and operation of this heater is provided in this manual and the labels on the product. The installation, service and maintenance of this heater must be performed by a contractor qualified in the installation and service of gas fired heating equipment.

All personnel in contact with the heater must read and understand all safety information, instructions and labels before operation. The following symbols will be used in this manual to indicate important safety information.



**Warning** instructions must be followed to prevent or avoid hazards which may cause serious injury, property damage or death.



**Caution** instructions must be followed to prevent incorrect operation or installation of the heater which may cause minor injury or property damage.

## 2.0) INSTALLER RESPONSIBILITY

The installer is responsible for the following:

- The heater and venting, as well as electrical and gas supplies must be installed in accordance with these installation instructions and any applicable codes and regulations.
- Every heater shall be located with respect to building construction and other equipment so as to permit access to the heater.
- Each installer must follow the clearances to combustible materials for the heaters.
- Install the heater so that the supports and hangers are correctly spaced in accordance with these instructions. The heater must be supported by materials having a working load limit of at least 115lbs.
- Ensure that the tube integrity safety system TISS™ supplied is installed in accordance with these instructions and that the tension is correct.
- Supply the owner with a copy of these Installation and Operation Instructions.
- Where unvented heaters are used, gravity or mechanical means shall be provided to supply and exhaust at least 4 CFM per 1,000 Btu/hr input of installed heaters.
- Never use the heater as a support for a ladder or other access equipment. Do not hang anything from the heater.
- Supply all installation materials necessary that are not included with the heater.
- Check the nameplate to make sure that the burner is correct for the gas type in the building and the installation altitude.

## 3.0) GENERAL INFORMATION

This heater is a self-contained infrared radiant tube heater for use in locations where flammable gases or vapors are not generally present (as defined by OSHA acceptable limits) and is intended for the heating of **nonresidential** spaces.

### INSTALLATION REQUIREMENTS

The installation must conform to local building codes or in the absence of local codes, with the National Fuel Gas Code ANSI Z223.1/NFPA54 or the Natural Gas and Propane Installation Code CSA B149.1. Heaters shall be installed by a licensed contractor or licensed installer. Clearances to combustibles as outlined in this manual should always be observed. In areas used for storage of combustible materials where they may be stacked below the heater, NFPA54 requires that the installer must post signs that will “specify the maximum permissible stacking height to maintain the required clearances from the heater to combustibles.”

Every heater shall be located with respect to building construction and other equipment so as to permit access to the heater. Each installer shall use quality installation practices when locating the heater and must give consideration to clearances to combustible materials, vehicles parked below, lights, overhead doors, storage areas with stacked materials, sprinkler heads, gas and electrical lines and any other possible obstructions or hazards. Consideration also must be given to service accessibility.

The heater, when installed in aircraft hangars and public garages, must be installed in accordance with ANSI/NFPA 409-latest edition (Standard for Aircraft Hangars), ANSI/NFPA 88a-latest edition (Standard for Parking Structures), and ANSI/NFPA 88b-latest edition (Standard for Repair Garages) with the following clearances:

- a. At least 10 feet above the upper surfaces of wings or engine enclosures of the highest aircraft that may be housed in the hangar and at least 8 feet above the floor in shops, offices, and other sections of hangars communicating with aircraft storage or service areas.
- b. At least 8 feet above the floor in public garages. **▲WARNING:** Minimum clearances marked on the heater must be maintained from vehicles parked below the heater.

**(FOR CANADA ONLY)**

- c. Installation of this appliance is to be in accordance with latest edition of CSA B149.1 (Natural Gas and Propane Installation Code).
- d. For installation in public garages or aircraft hangars, the minimum clearances from the bottom of the infrared heater to the upper surface of the highest aircraft or vehicle shall be 50 percent greater than the certified minimum clearance, but the clearance shall not be less than 8 feet.

Although these heaters may be used in many applications other than space heating (e.g., process heating), SunStar will not recognize the warranty for any use other than space heating.

**For Indoor Installation only. Not for use in residential dwellings.**

This heater is for Indoor Installation and Covered Patio, Golf Range and Restaurant Installation only and can be used in either Vented or Unvented mode. The term Unvented actually means Indirect Vented. While the products of combustion are expelled into the building, national codes require ventilation in the building to dilute these products of combustion. This ventilation may be provided by gravity or mechanical means.

**This heater is not an explosion proof heater.** Where the possibility of exposure to volatile and low flash point materials exists, it could result in property damage or death. This heater must not be installed in a spray booth where the heater can operate during the spraying process. Consult your local fire marshal or insurance company.

**High Altitude:**

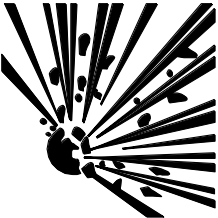
Appliances are supplied as standard for altitudes of 0 to 2,000 feet (0-610 m). High-altitude ratings are obtained by a change in the orifice size. When ordered for high altitude installations, burners are supplied by the factory ready for high altitude installation. Check the nameplate for altitude before proceeding with the installation. In Canada the adjustment for altitude is made in accordance with Standard CGA 2.17, Gas-Fired Appliances for Use at High Altitudes.



**WARNING:**

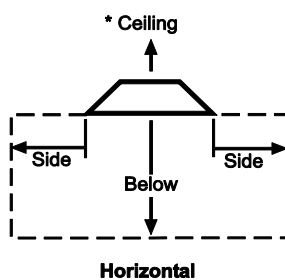
This product can expose you to chemicals including ceramic fibers, which are known to the State of California to cause cancer, and carbon monoxide, which is known to the State of California to cause birth defects or other reproductive harm. For more information go to [www.p65warnings.ca.gov](http://www.p65warnings.ca.gov).

## 4.0) MINIMUM CLEARANCES TO COMBUSTIBLES

| ⚠ WARNING                                                                         |                                                                                                                                                                                                                                          |
|-----------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  | <p style="text-align: center;"><b>FIRE AND EXPLOSION HAZARD</b></p> <p>Combustible material must be located outside the clearance dimensions listed.</p> <p>Failure to do so may result in death, serious injury or property damage.</p> |

Install the warnings card (ordered separately) and complete the blank spaces using the clearances from combustibles table below. See Section 26 for a printed copy of the warnings card.

Minimum clearances to combustibles shall be measured from the outer surfaces as shown in the following diagram:



| MINIMUM CLEARANCES TO COMBUSTIBLES |                      |                  |                     |       |      |
|------------------------------------|----------------------|------------------|---------------------|-------|------|
| Model No.                          | Mounted Horizontally |                  |                     |       |      |
|                                    | Sides                | Ceiling (Vented) | *Ceiling (Unvented) | Below | Ends |
| SPH 40                             | 22"                  | 6"               | 8"                  | 62"   | 15"  |
| SPH 50                             | 22"                  | 6"               | 8"                  | 66"   | 15"  |
| SPH 60                             | 22"                  | 6"               | 8"                  | 66"   | 15"  |
| SPH 75, 80                         | 22"                  | 6"               | 8"                  | 70"   | 15"  |
| SPH 100                            | 28"                  | 6"               | 8"                  | 80"   | 15"  |
| SPH 125                            | 28"                  | 8"               | 10"                 | 86"   | 20"  |

**▲ WARNING:** Certain materials or objects, when stored under the heater, will be subjected to radiant heat and could be seriously damaged. Observe the Minimum Clearances to Combustibles listed in the manual and on the heater at all times.

### NOTE:

1. The clearances specified above must be maintained to combustibles and other materials that may be damaged by temperatures 90°F above ambient temperature. Clearances to combustibles are posted on the burner box. In areas used for storage of combustible materials where they may be stacked below the heater, NFPA54 requires that the installer must post signs that will "specify the maximum permissible stacking height to maintain the required clearances from the heater to combustibles." SunStar recommends posting these signs adjacent to the heater thermostat or other suitable location that will provide enhanced visibility.

2. The stated clearance to combustibles represents a surface temperature of 90 °F (50 °C) above room temperature. Building materials with a low heat tolerance (such as plastics, vinyl siding, canvas, tri-ply, etc.) may be subject to degradation at lower temperatures. It is the installer's responsibility to assure that adjacent materials are protected from degradation.

## 5.0) SPECIFICATIONS

| Model No. | Btu/hr<br>High<br>Input | (2-stage)<br>Btu/hr<br>Low<br>Input | Air Plate<br>Part # | Orifice Size |         |             |         | Minimum *<br>Mounting Height | Turbulator<br>Qty. |
|-----------|-------------------------|-------------------------------------|---------------------|--------------|---------|-------------|---------|------------------------------|--------------------|
|           |                         |                                     |                     | Natural Gas  |         | Propane Gas |         | @<br>Horizontal              |                    |
| SPH 40    | 40,000                  | 25,000                              | 44140061            | #32          | (0.116) | #49         | (0.073) | 10 ft.                       | 4                  |
| SPH 50    | 50,000                  | 30,000                              | 4414006H            | 3.5mm        | (0.138) | #46         | (0.081) | 11 ft.                       | 4                  |
| SPH 60    | 60,000                  | 40,000                              | 4414006H            | #26          | (.147)  | n/a         | n/a     | 11 ft.                       | 4                  |
| SPH 60    | 60,000                  | 40,000                              | 44140060            | n/a          | n/a     | #43         | (.089)  | 11 ft.                       | 4                  |
| SPH 75    | 75,000                  | 50,000                              | 44140063            | #21          | (0.159) | 2.5mm       | (0.098) | 13 ft.                       | 4                  |
| SPH 80    | 80,000                  | 55,000                              | 44140065            | 4.3mm        | (0.169) | 2.6mm       | (0.102) | 13 ft.                       | 4                  |
| SPH 100   | 100,000                 | 65,000                              | 44140065            | #12          | (0.189) | #32         | (0.116) | 14 ft.                       | 3                  |
| SPH 125   | 125,000                 | 80,000                              | 44140066            | #4           | (0.209) | #30         | (0.129) | 14 ft.                       | 4                  |

\* MOUNT HEATERS AS HIGH AS POSSIBLE. Minimums are shown for indoor applications as a guideline for human comfort and uniform energy distribution for complete building heating applications. Consult your Space-Ray representative for the particulars of your installation requirements.

### Model Identification:

| Control Option Suffix | Gas Type | Description                                            |
|-----------------------|----------|--------------------------------------------------------|
| N5                    | Natural  | Single Stage Gas Valve – Single Stage Input            |
| L5                    | Propane  | Single Stage Gas Valve – Single Stage Input            |
| N7                    | Natural  | Two Stage Gas Valve – Modulating Input – High/Low Fire |
| L7                    | Propane  | Two Stage Gas Valve – Modulating Input – High/Low Fire |

| Type Gas           | Gas Pipe Connection | Tube Diameter | Flue Connection <sup>1</sup> | Fresh Air Connection <sup>1</sup> | Electrical Supply       | Current Rating |
|--------------------|---------------------|---------------|------------------------------|-----------------------------------|-------------------------|----------------|
| Natural or Propane | ½" MPT (Male)       | 4"            | 4" Round                     | 4" Round                          | 120 Volt, 60Hz, 1 Phase | 1.74 Amp       |

<sup>1</sup> See Section 14.0) for vent sizes when multiple heaters are connected into a common vent

| Module Electrical Rating:                                                                                                                                     | Ignition System (direct spark):                                                                                                                                                   |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Input-Control: 18-30 VAC 50/60 Hz (class 2 transformer)<br>Input Power-Line: 120 VAC (L1, IND contacts only)<br>Flame Sensitivity: 0.7 uA (microamps) minimum | 15 second trial for ignition period<br>15 second pre-purge period<br>60 second inter-purge period<br>30 second post-purge period<br>3 tries for ignition (separate flame sensor). |

### Available vented and unvented models

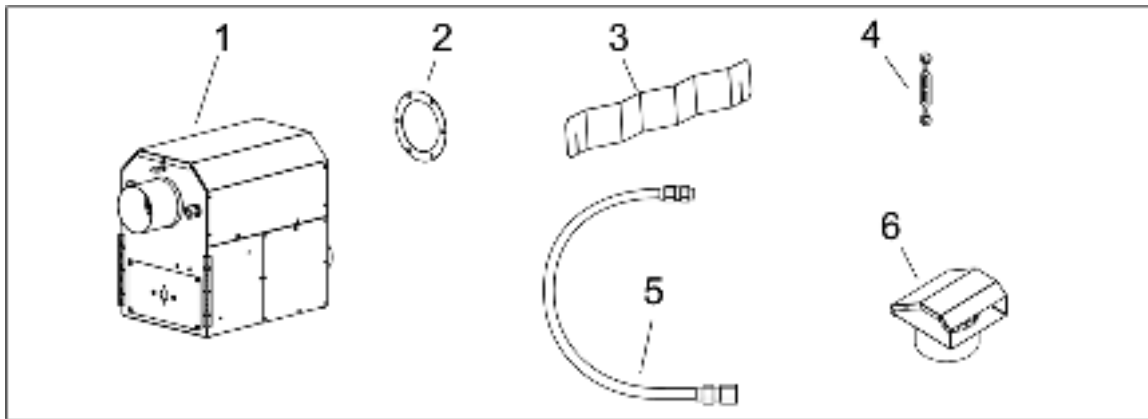
|             |          | Model SPH |     |    |    |    |    |    |
|-------------|----------|-----------|-----|----|----|----|----|----|
| Body length |          | 125       | 100 | 80 | 75 | 60 | 50 | 40 |
| 20 ft       | unvented | x*        | x   | x  | x  | x  | x  | x  |
|             | vented   | -         | -   | -  | -  | x  | x  | x  |
| 30 ft       | unvented | x         | x   | x  | x  | x  | x  | -  |
|             | vented   | -         | -   | -  | x  | x  | x  | -  |

\*Special Application

## 6.0) PACKING LIST

### A. SPH Burner Package

| Ref. | Part #    | Each Burner Package Includes:                                          | Qty. |
|------|-----------|------------------------------------------------------------------------|------|
| 1    | See Chart | Burner Package (Refer to the following chart for Package Part Numbers) | 1    |
| 2    | 42907040  | <b>Control Fastener Kit – comprising of:</b>                           | 1    |
| -    | 02189020  | Screw, Hex Washer Head - #10 x 1/2" "TEKS"                             | 2    |
| -    | 02167010  | Locknuts 1/4-20                                                        | 3    |
| -    | 42921000  | Tube Flange Gasket                                                     | 1    |
| 3    | 44152240  | Turbulator 24" Long (See chart above for required quantities)          | *    |
| 4    | 30545040  | Turnbuckle                                                             | 1    |
| 5    | 30302360  | Gas Connector 5/8" OD x 36" – USA only                                 | 1    |
| 6    | 30779300  | Exhaust Hood SPH Assembly (required for <b>UNVENTED</b> heaters only)  | 1    |
| 7    | 43343130  | Installation & Operation Instruction Manual -not shown-                | 1    |



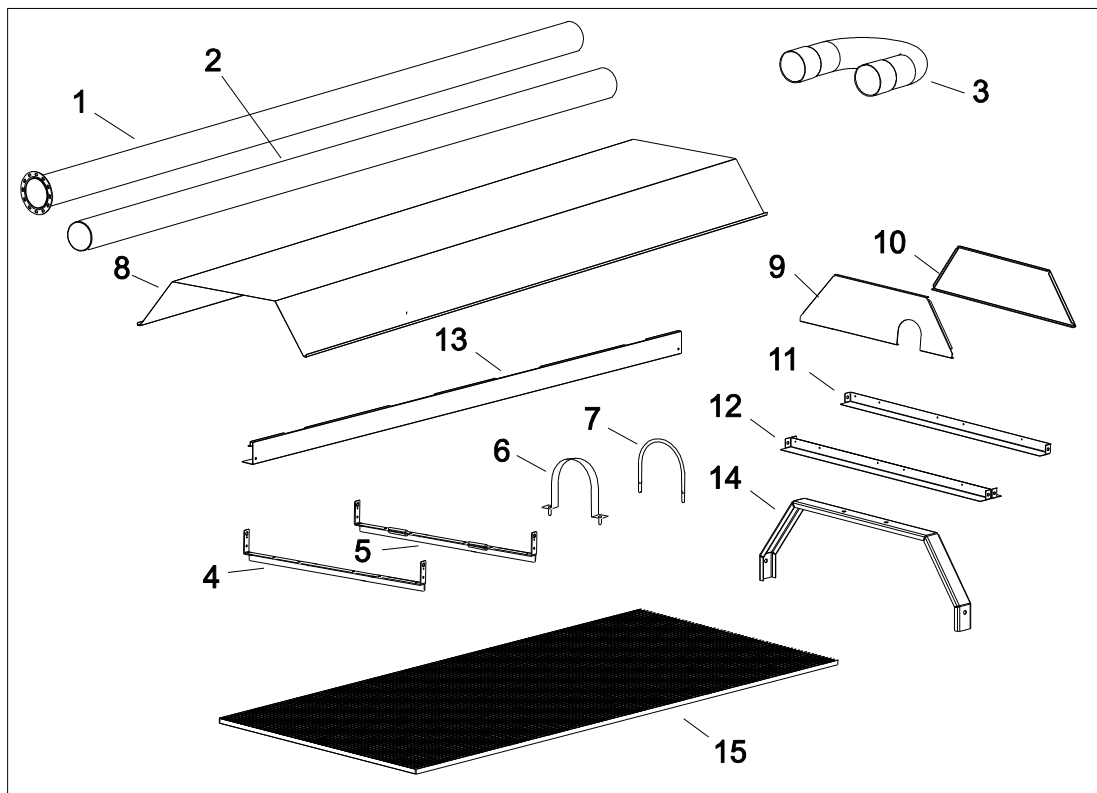
#### BURNER PACKAGE NUMBERS

| SINGLE STAGE CONTROLS |          |          |
|-----------------------|----------|----------|
| MODEL NO.             | PART NO. | GAS TYPE |
| SPH 40-N5             | 44641010 | NATURAL  |
| SPH 50-N5             | 44641030 | NATURAL  |
| SPH 60-N5             | 44641050 | NATURAL  |
| SPH 75-N5             | 44641070 | NATURAL  |
| SPH 80-N5             | 44641090 | NATURAL  |
| SPH 100-N5            | 44641110 | NATURAL  |
| SPH 125-N5            | 44641130 | NATURAL  |
| SPH 40-L5             | 44641020 | PROPANE  |
| SPH 50-L5             | 44641040 | PROPANE  |
| SPH 60-L5             | 44641060 | PROPANE  |
| SPH 75-L5             | 44641080 | PROPANE  |
| SPH 80-L5             | 44641100 | PROPANE  |
| SPH 100-L5            | 44641120 | PROPANE  |
| SPH 125-L5            | 44641140 | PROPANE  |

| TWO STAGE CONTROLS |          |          |
|--------------------|----------|----------|
| MODEL NO.          | PART NO. | GAS TYPE |
| SPH 40/25-N7       | 44641510 | NATURAL  |
| SPH 50/30-N7       | 44641530 | NATURAL  |
| SPH 60/40-N7       | 44641550 | NATURAL  |
| SPH 75/50-N7       | 44641570 | NATURAL  |
| SPH 80/55-N7       | 44641590 | NATURAL  |
| SPH 100/65-N7      | 44641610 | NATURAL  |
| SPH 125/80-N7      | 44641630 | NATURAL  |
| SPH 40/25-L7       | 44641520 | PROPANE  |
| SPH 50/30-L7       | 44641540 | PROPANE  |
| SPH 60/40-L7       | 44641560 | PROPANE  |
| SPH 75/50-L7       | 44641580 | PROPANE  |
| SPH 80/55-L7       | 44641600 | PROPANE  |
| SPH 100/65-L7      | 44641620 | PROPANE  |
| SPH 125/80-L7      | 44641640 | PROPANE  |

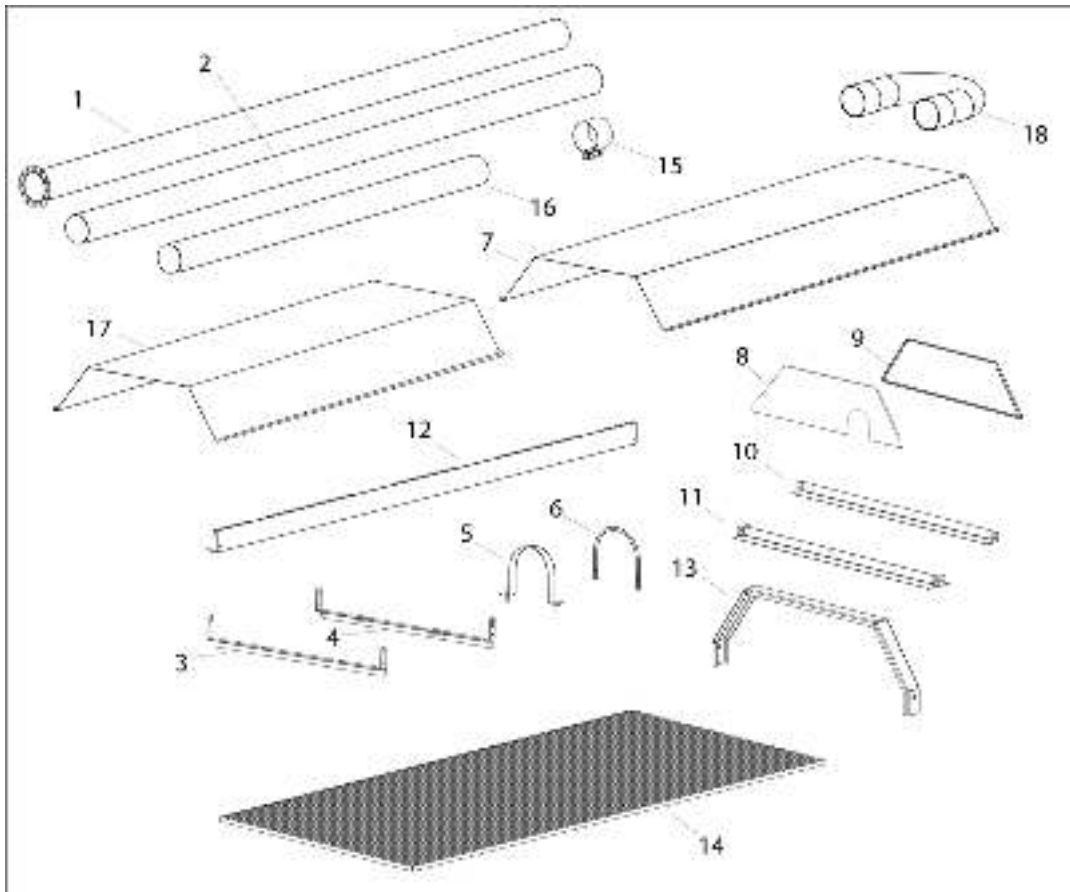
**B. SPH 40 through 125 Series 20FT Body Package Descriptions – ALC (Aluminized Calorized)**  
(Package Part Number is indicated on the outside of each corresponding carton.)

| 20FT SPH Body Packages – Aluminized Calorized |          |                                              | 20 Ft. Package<br>42881260 |
|-----------------------------------------------|----------|----------------------------------------------|----------------------------|
| Ref.                                          | Part #   | Each Body Package Includes:                  | Qty.                       |
| 1                                             | 42912230 | 111" Tube with 12 Hole Flange (Aluminized)   | 1                          |
| 2                                             | 41932080 | 104" Tube less Flanges (Aluminized)          | 1                          |
| 3                                             | 42913008 | U-Bend                                       | 1                          |
| 4                                             | 42898100 | Hanger Bracket                               | 1                          |
| 5                                             | 42898150 | Hanger Bracket (with rollers)                | 2                          |
| 6                                             | 40517059 | Tube Retainer Strap                          | 3                          |
| 7                                             | 42873000 | U-Bolt                                       | 3                          |
| 8                                             | 42894100 | Reflector, 28" x 119.5"                      | 1                          |
| 9                                             | 42895150 | Reflector End – Burner End (1" lip)          | 1                          |
| 10                                            | 42896160 | Reflector End – U-Bend End (4" lip)          | 1                          |
| 11                                            | 44616100 | Support Grille End Reflector                 | 2                          |
| 12                                            | 44616500 | Cross Brace Assembly – Grill Support         | 1                          |
| 13                                            | 44617000 | Side Rail – 61"                              | 4                          |
| 14                                            | 44618009 | Suspension Bracket - Body                    | 2                          |
| 15                                            | 30366090 | Decorative Grille 28" x 59.75"               | 2                          |
| 16                                            | 42907011 | <b>Body Fastener Kit - comprising:</b>       |                            |
|                                               | 02104080 | Nut, Speed #10                               | 8                          |
|                                               | 02112010 | Hex Head Cap Screw – 3/8-16 x 1/2"           | 4                          |
|                                               | 02127130 | Nut, Hex – 3/8-16                            | 4                          |
|                                               | 02130130 | Lockwasher, Spring – 3/8                     | 4                          |
|                                               | 02189030 | Screw, Hex Washer Head - #8-18 x 1/2" "TEKS" | 47                         |
|                                               | 02192010 | Screw, Hex Washer Head - #10 x 1/2"          | 8                          |



**C. SPH 50 through 125 Series 30FT Body Package Descriptions – ALC (Aluminized Calorized)**  
(Package Part Number is indicated on the outside of each corresponding carton.)

| 30FT SPH Body Package – Aluminized Calorized |                 |                                              |      |
|----------------------------------------------|-----------------|----------------------------------------------|------|
| Body Package 1 of 2 - 42881300               |                 |                                              |      |
| Ref.                                         | Part #          | Each Body Package Includes:                  | Qty. |
| 1                                            | 42912230        | 111" Tube with 12 Hole Flange (Aluminized)   | 1    |
| 2                                            | 41932080        | 104" Tube less Flanges (Aluminized)          | 1    |
| 3                                            | 42898100        | Hanger Bracket                               | 1    |
| 4                                            | 42898150        | Hanger Bracket (with rollers)                | 2    |
| 5                                            | 40517059        | Tube Retainer Strap                          | 3    |
| 6                                            | 42873000        | U-Bolt                                       | 3    |
| 7                                            | 42894100        | Reflector, 28" x 119.5"                      | 1    |
| 8                                            | 42895150        | Reflector End – Burner End (1" lip)          | 1    |
| 9                                            | 42896150        | Reflector End – U-Bend End (1.5" lip)        | 1    |
| 10                                           | 44616100        | Support Grille End Reflector                 | 2    |
| 11                                           | 44616500        | Cross Brace Assembly – Grill Support         | 2    |
| 12                                           | 44617000        | Side Rail – 61"                              | 6    |
| 13                                           | 44618009        | Suspension Bracket - Body                    | 2    |
| 14                                           | 30366090        | Decorative Grille 28" x 59.75"               | 3    |
| 15                                           | 30462980        | 4" OD Torctite Coupling                      | 2    |
| Body Package 2 of 2 - 42881350               |                 |                                              |      |
| Ref.                                         | Part #          | Each Body Package Includes:                  | Qty. |
| 16                                           | 41932050        | 60" Tube less Flanges (Aluminized)           | 2    |
| 17                                           | 42894200        | Reflector, 28" x 80"                         | 1    |
| 18                                           | 42913008        | U-Bend                                       | 1    |
| 19                                           | <b>42907011</b> | <b>Body Fastener Kit - comprising:</b>       |      |
|                                              | 02104080        | Nut, Speed #10                               | 8    |
|                                              | 02112010        | Hex Head Cap Screw – 3/8-16 x 1/2"           | 4    |
|                                              | 02127130        | Nut, Hex – 3/8-16                            | 4    |
|                                              | 02130130        | Lockwasher, Spring – 3/8                     | 4    |
|                                              | 02189030        | Screw, Hex Washer Head - #8-18 x 1/2" "TEKS" | 47   |
|                                              | 02192010        | Screw, Hex Washer Head - #10 x 1/2"          | 8    |
|                                              | 02189020        | Screw, Self-Tapping - #10 x 1/2"             | 4    |



## 6.1) ACCESSORY PACKAGES

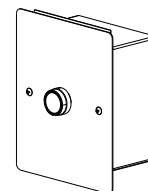
### D. Kit, Control – 1 Timer/Switch, Part #44610550 (Option for SPH Series)

Contains:

Timer Relay

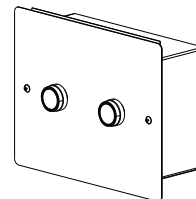
24VAC 1Amp - 1 Hour Time Delay.....QTY - 1

Illuminated Switch (OFF/LOW/HIGH.....QTY - 1



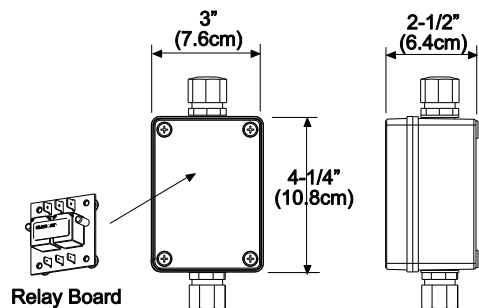
**E. Kit, Control – 2 Timer/Switch,**  
**Part #44610560**  
 (Option for SPH Series)

Contains:  
 Timer Relay  
 24VAC 1Amp - 1 Hour Time Delay.....QTY – 2  
 Illuminated Switch (OFF/LOW/HIGH.....QTY - 2



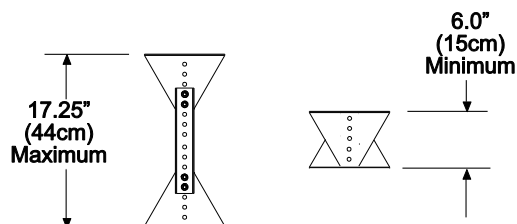
**F. Kit, 2-Stage Relay Board,**  
**Part #44195000**

Contains:  
 Relay Board , #30709058.....QTY-1  
 Enclosure, #30709059.....QTY-1  
 Cord Connector – 1/2" , #30635040.....QTY-2



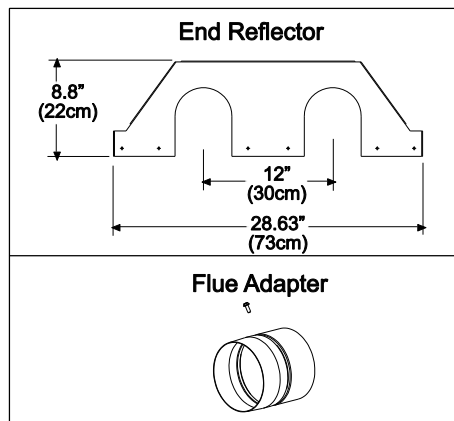
**G. Hanger Bracket Set (Adjustable),**  
**Part #44618050**

Contains:  
 Strut Bracket , #44618069.....QTY-2  
 Base Bracket, #44618079.....QTY-4  
 Hex Head Screw 3/8" x 1/2" , #02112010...QTY-12  
 Hex Nut 3/8". #02127130 ...QTY-12  
 Spring Lockwasher 3/8" ...QTY-12

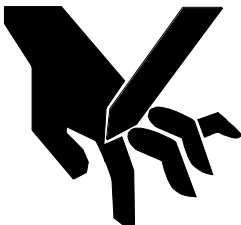


**H. Vent Kit**  
**Part #44622000**  
 (Option for SPH Series venting)

Contains:  
 End Reflector , #42895160.....QTY-1  
 Flue Adapter, #30504500.....QTY-1



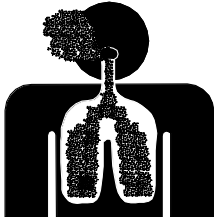
## 7.0) GENERAL HEATER ASSEMBLY REQUIREMENTS – ALL MODELS

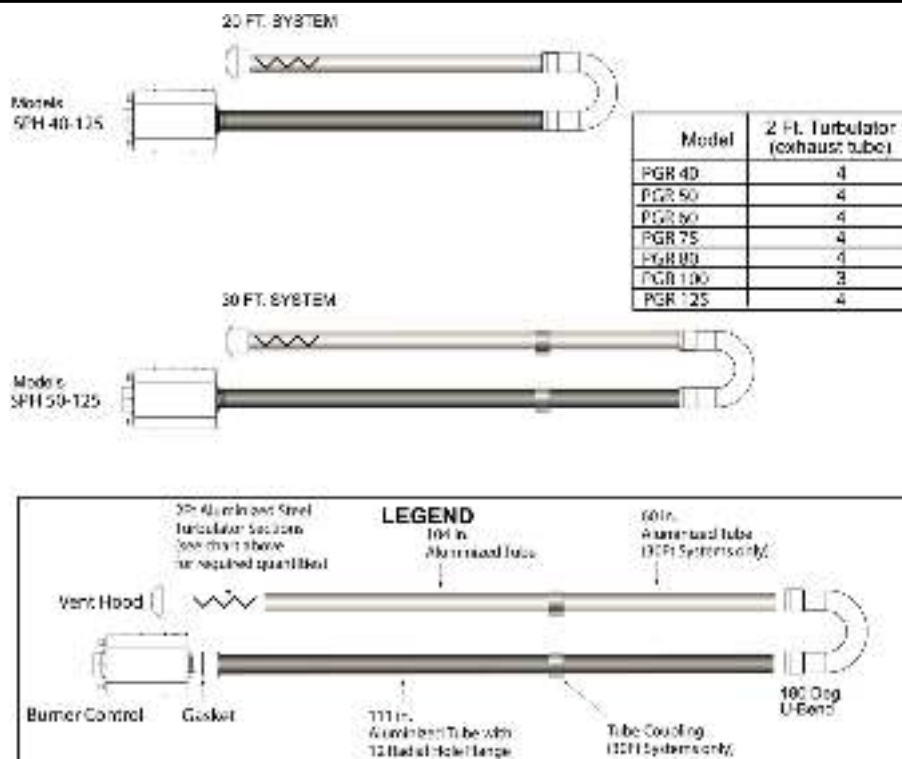
| <b>! CAUTION</b>                                                                  |                                                                                                                                                                                                                                                    |
|-----------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  | <p style="text-align: center;"><b>CUT HAZARD</b></p> <p>Sheet metal parts, particularly reflectors and vent have sharp edges. Always use gloves when handling.</p> <p>Failure to do so may result in death, serious injury or property damage.</p> |

During field assembly of the heater, the recommended procedure is as follows:

- Before hanging heater sections, first determine the actual layout of the system. See section 8.0 for complete heater dimensions. Consideration must also be taken for flue pipe, fresh air ducting, gas piping, clearances to combustibles, etc. before hanging heater. Typical suspension methods are shown in Section 9.0.

## 7.1) TYPICAL ASSEMBLY LAYOUT – (WITH TURBULATORS)

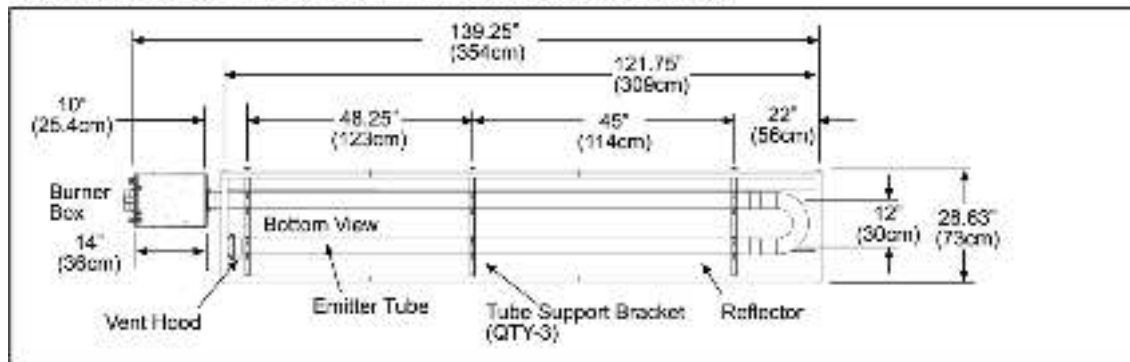
| <b>! WARNING</b>                                                                   |                                                                                                                                                                                                                                                                                                                                                                                                         |
|------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  | <p style="text-align: center;"><b>POISONOUS GAS AND SOOT HAZARD</b></p> <p>The heater must be assembled with the correct number of turbulator sections and tube length for the rated heat input.</p> <p>The turbulator must be installed in the last tube section as shown.</p> <p>Failure to do so may result in death, serious injury, property damage or illness from Carbon Monoxide poisoning.</p> |



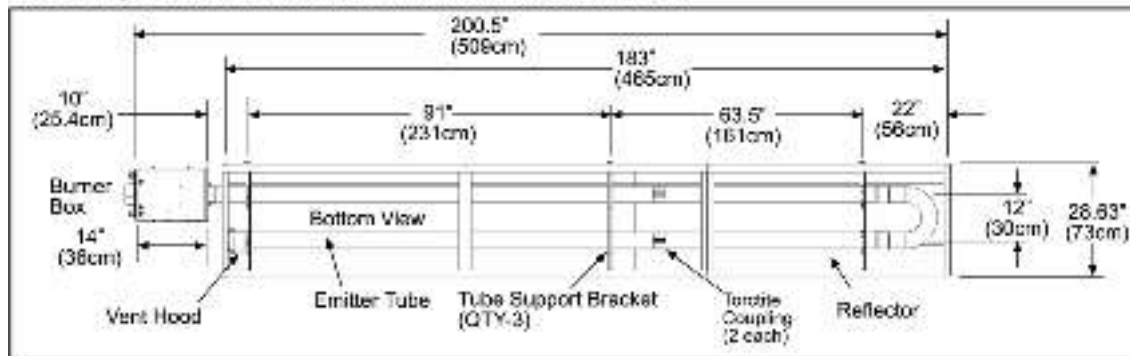
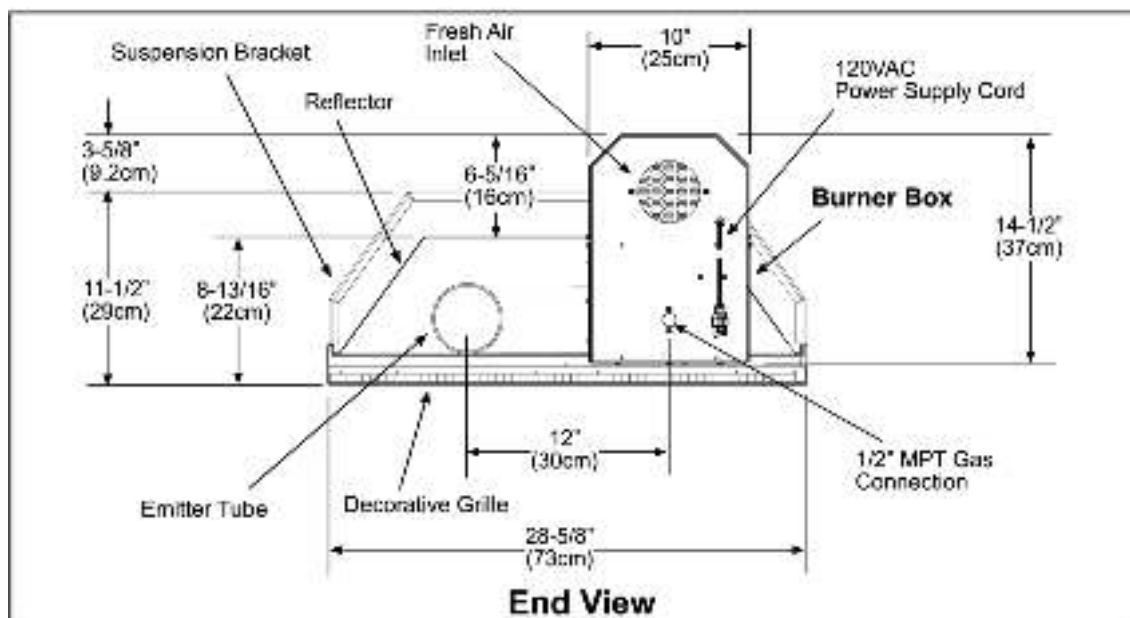
## 8.0) DIMENSIONS – SPH SERIES

Typical Dimensions (decorative grille not shown).

20Ft Body Section - Models: SPH 40, 50, 60, 75, 80, 100, 125



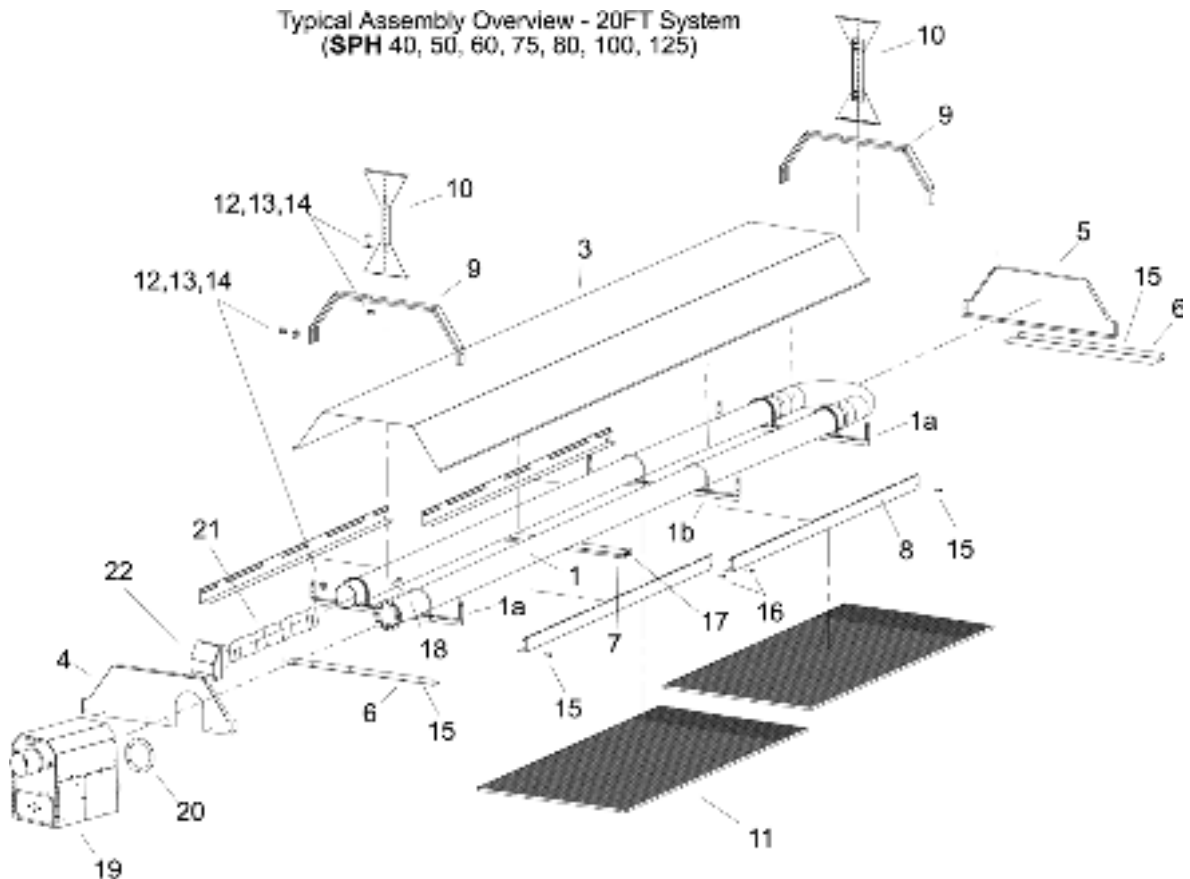
30Ft Body Section - Models: SPH 50, 60, 75, 80, 100, 125



End View

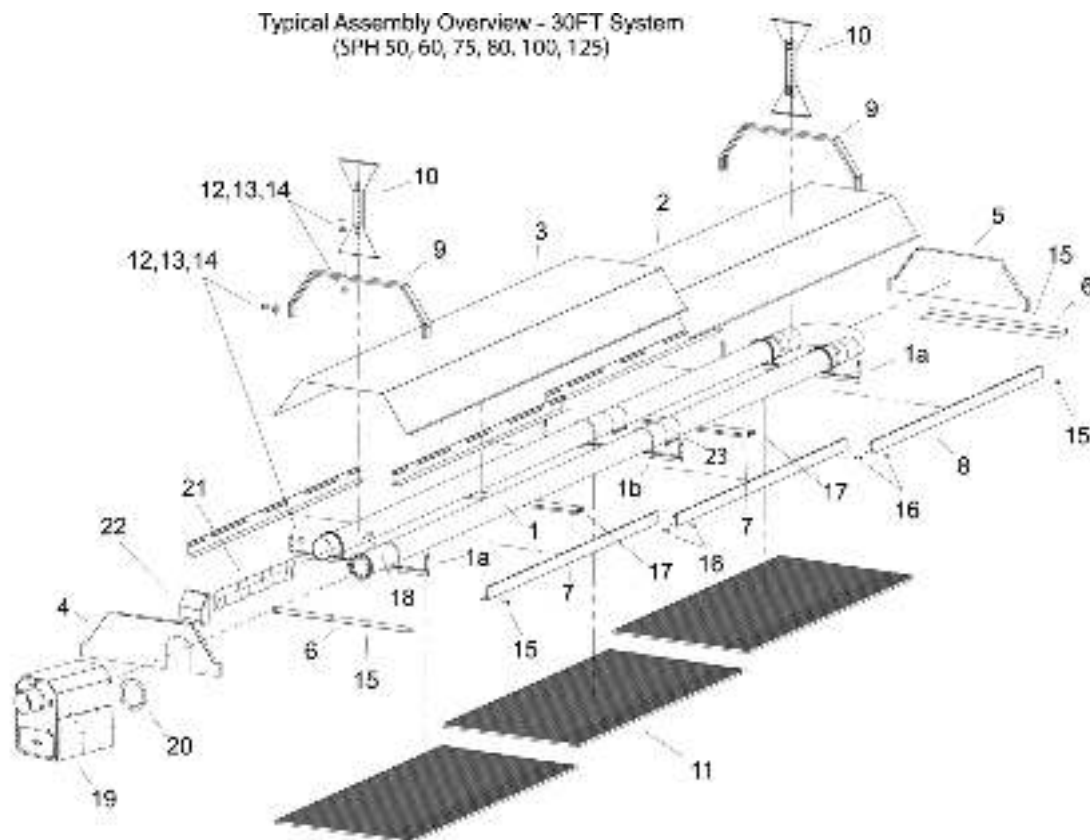
## 8.1) HEATER ASSEMBLY OVERVIEW – 20FT BODY MODELS SPH 40, 50, 60, 75, 80, 100, 125

| Ref. | Part #    | Description                                   | Qty.      |
|------|-----------|-----------------------------------------------|-----------|
| 1    | 42914260  | Tube Body Section – (pre-assembled)           | 1         |
| 1a   | 42898150  | Hanger Bracket (with rollers)                 | 2         |
| 1b   | 42898000  | Hanger Bracket                                | 1         |
| 2    |           |                                               |           |
| 3    | 42894100  | Reflector, 28" x 119.5"                       | 1         |
| 4    | 42895150  | Reflector End – Burner End                    | 1         |
| 5    | 42896160  | Reflector End – U-Bend End (3.5" lip)         | 1         |
| 6    | 44616100  | Support Grille End Reflector                  | 2         |
| 7    | 44616500  | Cross Brace Assembly – Grill Support          | 1         |
| 8    | 44617000  | Side Rail – 61"                               | 4         |
| 9    | 44618009  | Suspension Bracket - Body                     | 2         |
| 10   | 44618050  | Hanging Bracket Set of Two (accessory)        | 1         |
| 11   | 30366090  | Decorative Grille 28" x 59.75"                | 2         |
| 12   | 02112010  | Hex Head Cap Screw – 3/8-16 x 1/2"            | 4         |
| 13   | 02127130  | Nut, Hex – 3/8-16                             | 4         |
| 14   | 02130130  | Lockwasher, Spring – 3/8                      | 4         |
| 15   | 02189030  | Screw, Hex Washer Head – #8-18 x 1/2" "TEKS"  | 34        |
| 16   | 02192010  | Screw, Hex Washer Head – #10 x 1/2"           | 6         |
| 17   | 02104080  | Nut, Speed #10                                | 6         |
| 18   | 02167010  | Locknut 1/4-20 "KEPS" (included with control) | 3         |
| 19   | See Chart | Burner Control Assembly                       | 1         |
| 20   | 42921000  | Tube Flange Gasket (included with control)    | 1         |
| 21   | 44152240  | Turbulator (included with control)            | See Chart |
| 22   | 30779300  | Draft Hood (included with control)            | 1         |



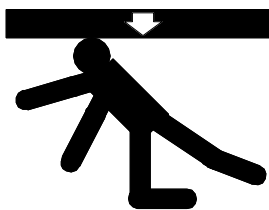
## 8.2) HEATER ASSEMBLY OVERVIEW – 30FT BODY MODELS SPH 50, 60, 75, 80, 100, 125

| Ref. | Part #    | Description                                   | Qty.      |
|------|-----------|-----------------------------------------------|-----------|
| 1    | 42914250  | Tube Body Section – (pre-assembled)           | 1         |
| 1a   | 42898150  | Hanger Bracket (with rollers)                 | 2         |
| 1b   | 42898000  | Hanger Bracket                                | 1         |
| 2    | 42894200  | Reflector, 28" x 80"                          | 1         |
| 3    | 42894100  | Reflector, 28" x 119.5"                       | 1         |
| 4    | 42895150  | Reflector End – Burner End                    | 1         |
| 5    | 42896150  | Reflector End – U-Bend End (1" lip)           | 1         |
| 6    | 44616100  | Support Grille End Reflector                  | 2         |
| 7    | 44616500  | Cross Brace Assembly – Grill Support          | 2         |
| 8    | 44617000  | Side Rail – 61"                               | 6         |
| 9    | 44618009  | Suspension Bracket - Body                     | 2         |
| 10   | 44618050  | Hanging Bracket Set of Two (accessory)        | 1         |
| 11   | 30366090  | Decorative Grille 28" x 59.75"                | 3         |
| 12   | 02112010  | Hex Head Cap Screw – 3/8-16 x 1/2"            | 4         |
| 13   | 02127130  | Nut, Hex – 3/8-16                             | 4         |
| 14   | 02130130  | Lockwasher, Spring – 3/8                      | 4         |
| 15   | 02189030  | Screw, Hex Washer Head – #8-18 x 1/2" "TEKS"  | 47        |
| 16   | 02192010  | Screw, Hex Washer Head – #10 x 1/2"           | 8         |
| 17   | 02104080  | Nut, Speed #10                                | 8         |
| 18   | 02167010  | Locknut 1/4-20 "KEPS" (included with control) | 3         |
| 19   | See Chart | Burner Control Assembly                       | 1         |
| 20   | 42921000  | Tube Flange Gasket (included with control)    | 1         |
| 21   | 44152240  | Turbulator (included with control)            | See Chart |
| 22   | 30779300  | Draft Hood (included with control)            | 1         |
| 23   | 30462980  | 4" OD Torctite Coupling                       | 2         |



## 9.0) TYPICAL SUSPENSION METHODS

### ⚠ WARNING



#### SUSPENSION HAZARD

Burner must be secured to the mounting flange with nuts.

All materials used to suspend the heater must have a minimum working load of 115 lbs.

All "S" Hooks must be crimped closed.

Never use the heater to support a ladder or other access equipment.

Failure to do so may result in death, serious injury or property damage.

Various means of suspending the heater can be used. See the following drawings for typical examples.

1. Use only noncombustible materials for suspending hangers and brackets.
2. A minimum No. 2 chain with a working load limit of 115 lbs. is required.
3. Turnbuckles can be used with chains to allow leveling of the burner box. All "S" hooks and eye bolts must be manually crimped closed by the installer. See Figure A
4. For outdoor installations SunStar recommends that the body section be suspended using the adjustable suspension brackets (supplied as accessories) shown in Figure B. An optional method to suspend the body section using 3/8" threaded rod and nuts (not supplied) as shown in Figure C.
5. For indoor installations the heater may be suspended by chain. See Figure D.
6. Heaters must not be supported by gas or electric supply lines and must be suspended from a permanent structure with adequate load capacity.

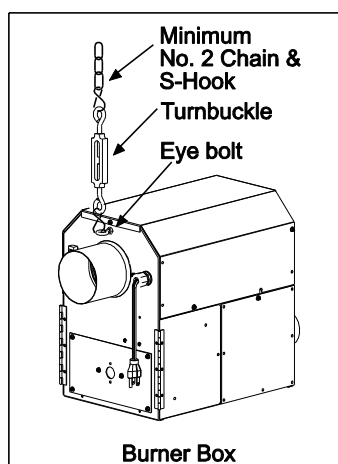


Figure A

#### OPTIONAL OUTDOOR SUSPENSION ACCESSORIES

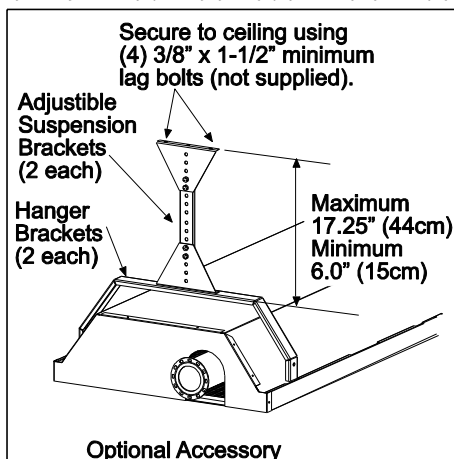


Figure B

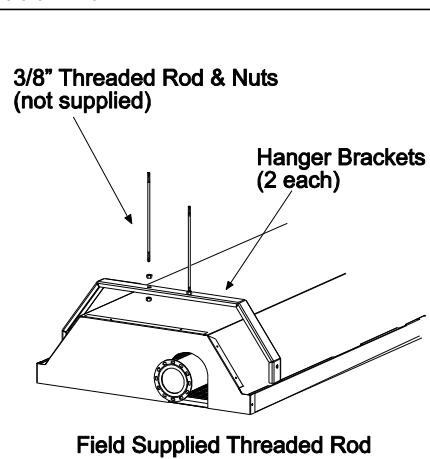


Figure C

#### OPTIONAL INDOOR SUSPENSION WITH CHAIN

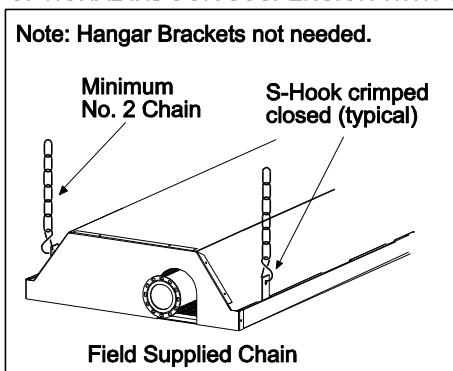
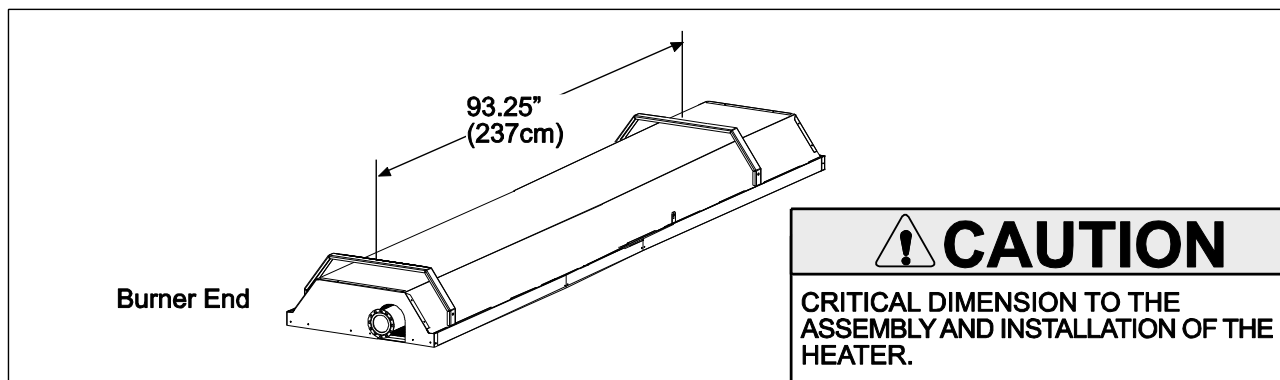
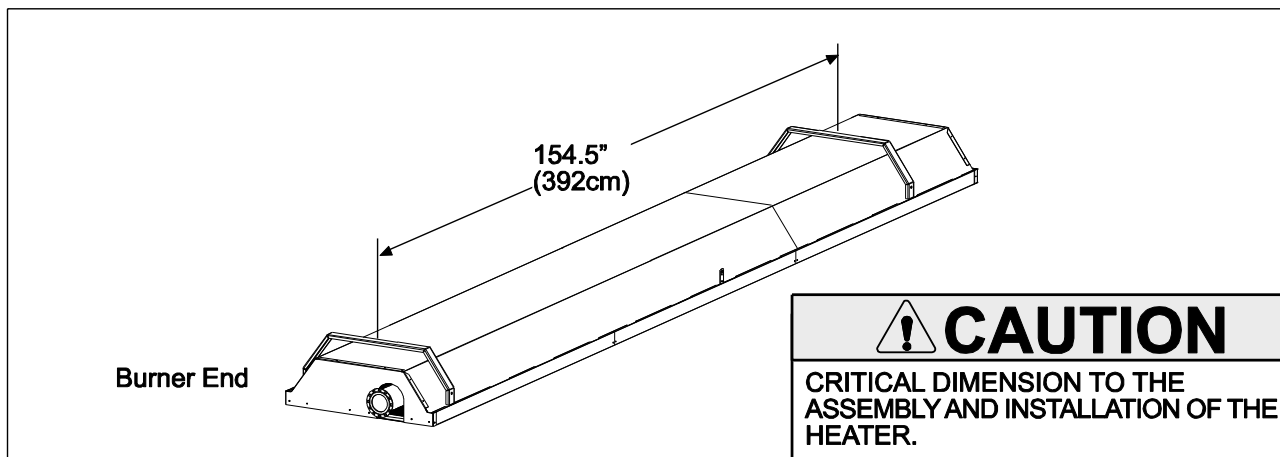


Figure D

## Suspension – 20FT Body - Models: SPH 40, 50, 60, 75, 80, 100, 125



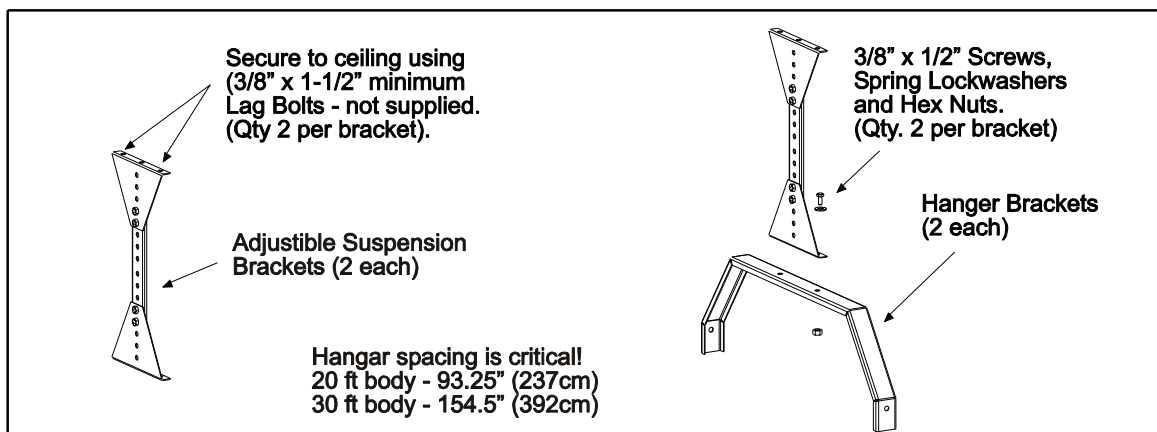
## Suspension – 30FT Body - Models: SPH 50, 60, 75, 80, 100, 125



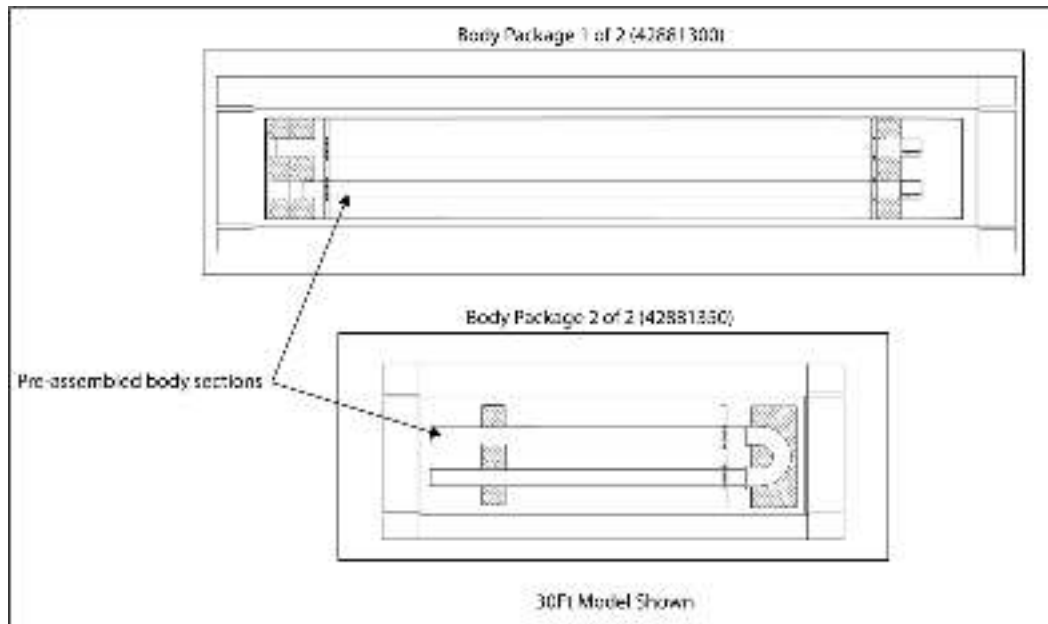
## 10.0) HEATER ASSEMBLY

|                |                                                                                                        |
|----------------|--------------------------------------------------------------------------------------------------------|
| <b>CAUTION</b> |                                                                                                        |
|                | <b>CUT HAZARD</b>                                                                                      |
|                | Sheet metal parts, particularly reflectors and vent have sharp edges. Always use gloves when handling. |
|                | Failure to do so may result in death, serious injury or property damage.                               |

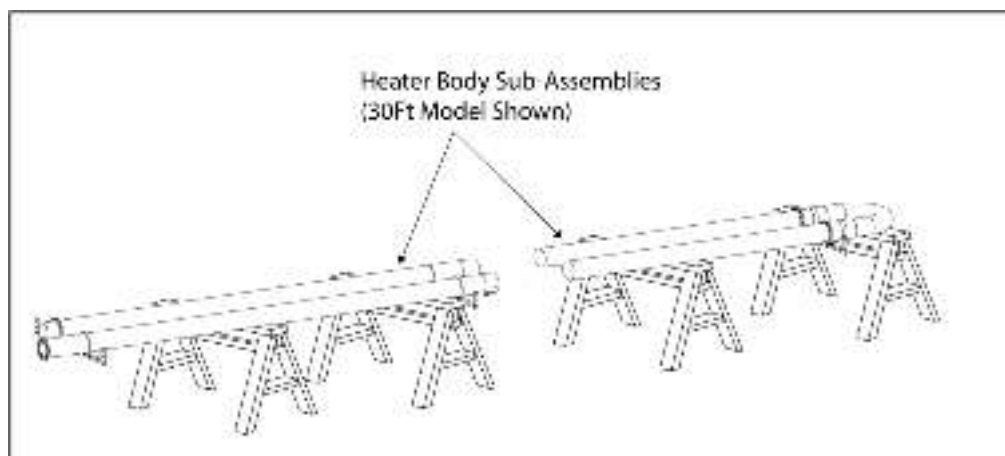
1. Pre-assemble the adjustable suspension brackets (accessories only) or 3/8" threaded rod (field supplied) to the hanger brackets. Install these to the ceiling at the dimensions outlined in section 9.0 using best building practices.



2. The recommended method for assembling the heater is to assemble the tubes and reflectors portions at ground level and raise it into the final hanging position before final assembly.
3. Open the body packaging and lift the pre-assembled body section up and out (30Ft model shown; 20Ft models consist of one package only).



4. Roll the pre-assembled body section over and place on the sawhorses to begin the assembly.

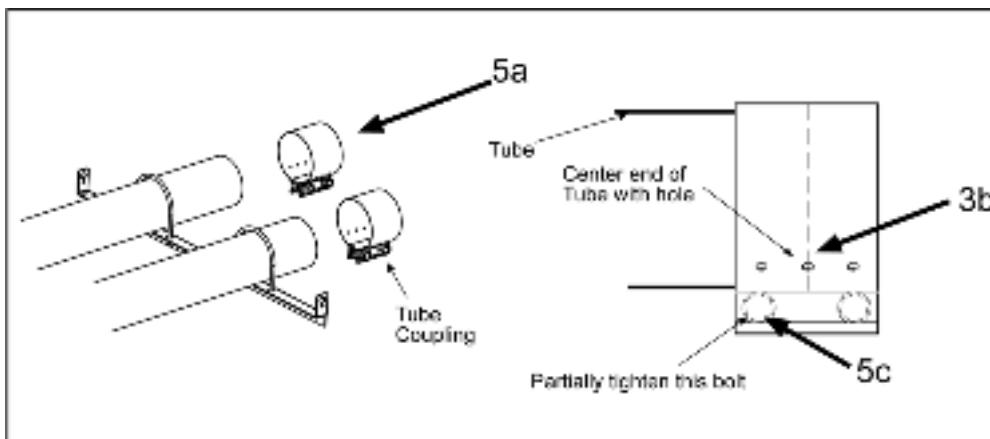


5. **For 30Ft models only:** Connect the tubes together as described in the following steps:  
Join the exhaust tubes from each body assembly together and secure with tube couplings as follows:

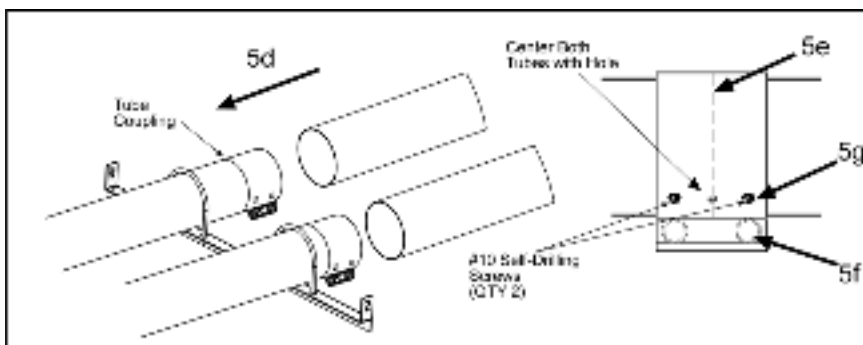
## **! WARNING**

The following coupling tightening instructions **MUST** be followed properly to ensure the integrity of the tube connections. Two #10 self-drilling screws **MUST** be installed at every coupling as shown in the instructions below. Failure to do so may result in serious injury or property damage.

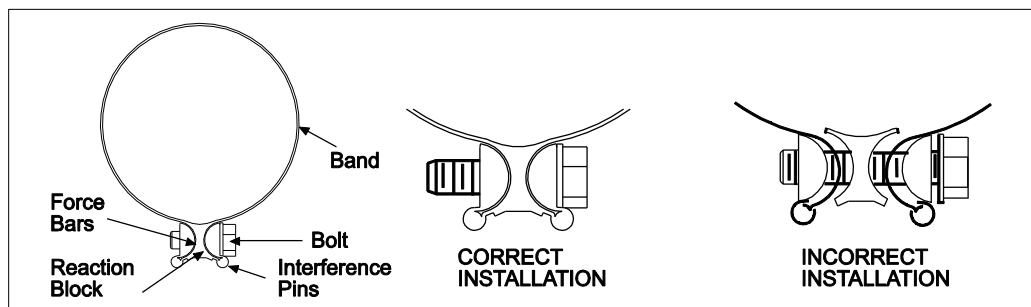
- a) Place the compression coupling over the end of the tube.
- b) Use the small hole at the centerline of the coupling to check that the coupling is inserted correctly.
- c) Partially tighten the bolt nearest the end of the tube (approximately half closed).



- d) Slide the next tube into the coupling.
- e) Make sure both ends are butted together.
- f) Finish tightening both bolts to 40-60 ft. lbs. torque to ensure a complete seal.
- g) Use the two self-drilling screws through the pre-punched holes to secure the tubes in the coupling.



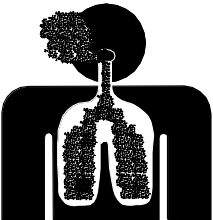
- h) Check to ensure that the hardware is completely closed and the band is seated on the reaction block and interference pins as shown below.

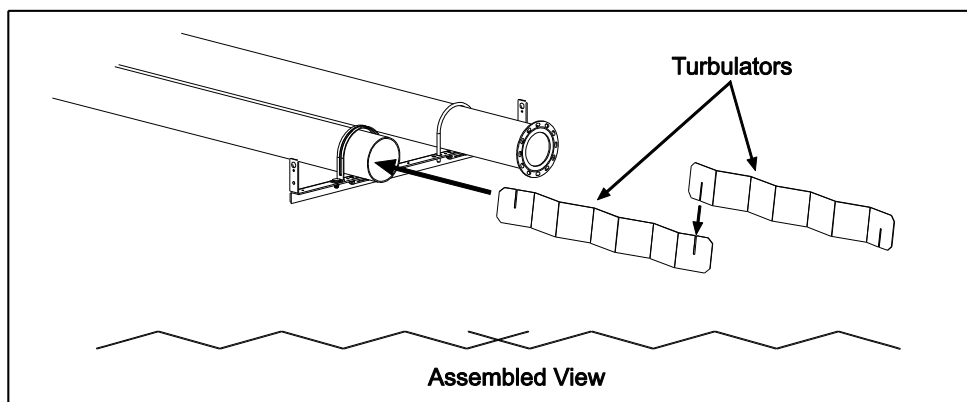


## ⚠ CAUTION

**Important: NEVER reuse a coupling. Always install a new coupling only and torque as per instructions above and the diagrams below.**

6. Assemble the turbulators together by interlocking the slotted end portions. Slide these into the exhaust tube section until they are flush with the tube end. Refer to the table below for the required quantity of turbulators for each heater model.

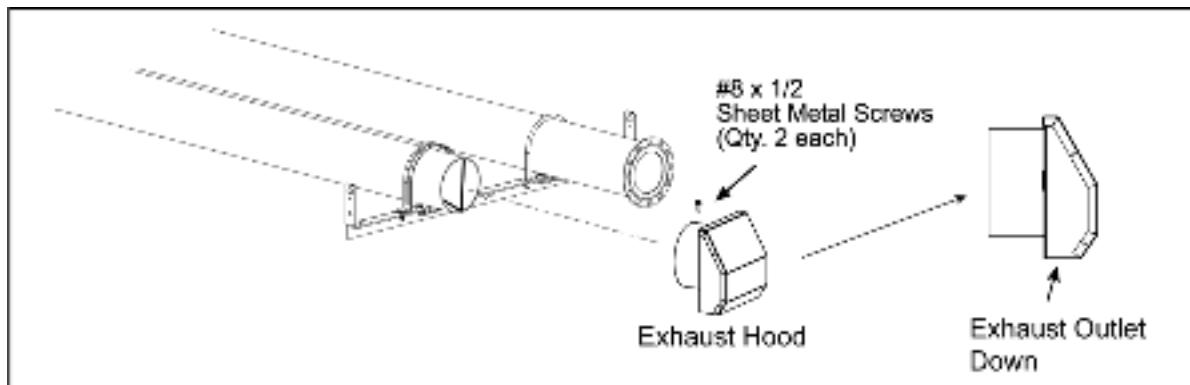
| <div style="display: inline-block; width: 20px; height: 20px; background: white; border: 1px solid black; margin-right: 5px;"></div> <b>WARNING</b> |                                                                                                                              |
|-----------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------|
|                                                                    | <b>POISONOUS GAS AND SOOT HAZARD</b>                                                                                         |
|                                                                                                                                                     | <p>The heater must be assembled with the correct number of turbulator sections and tube length for the rated heat input.</p> |
|                                                                                                                                                     | <p>The turbulator must be installed in the last tube section as shown.</p>                                                   |
|                                                                                                                                                     | <p>Failure to do so may result in death, serious injury, property damage or illness from Carbon Monoxide poisoning.</p>      |



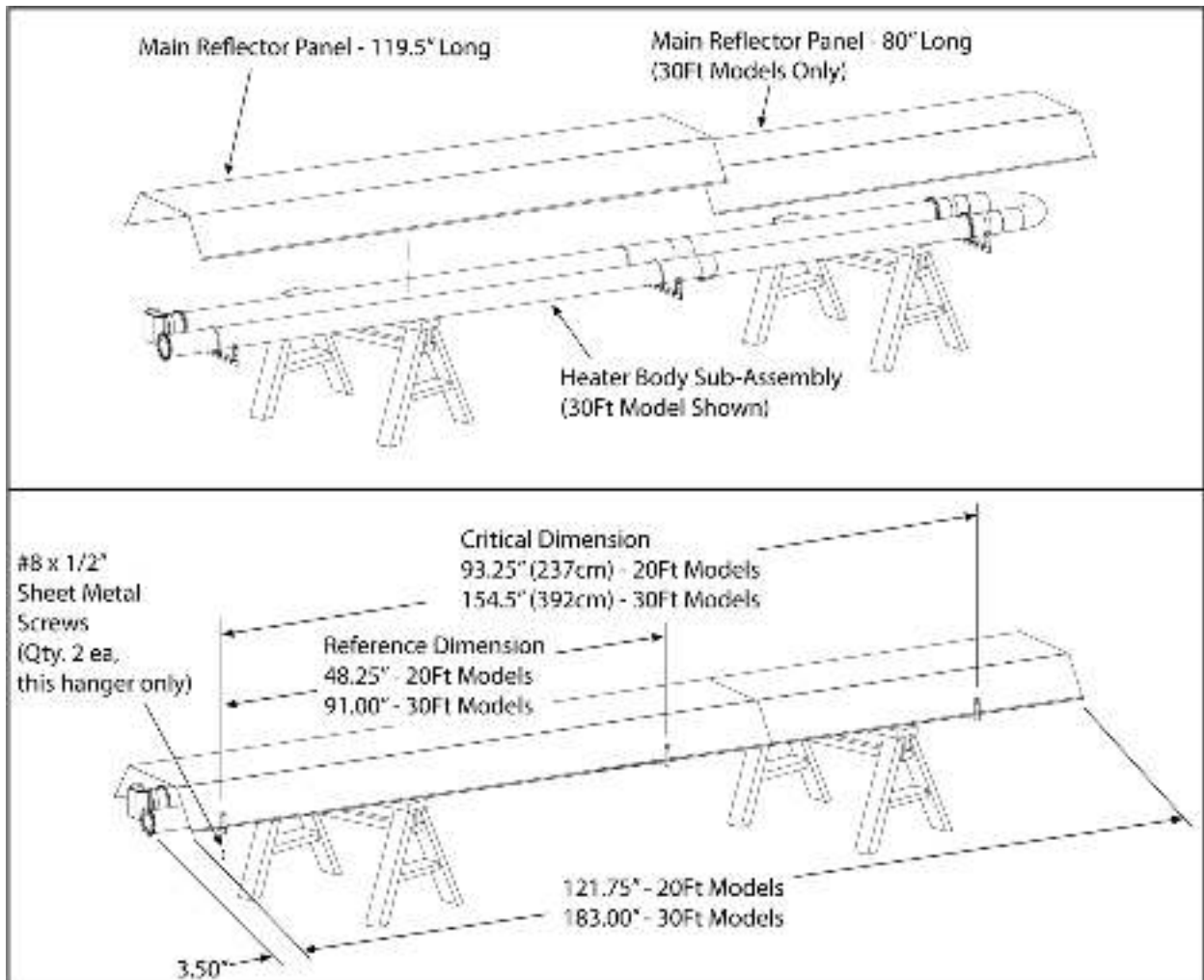
| MODEL   | 2 Ft. Turbulator Sections |
|---------|---------------------------|
| SPH 40  | 4                         |
| SPH 50  | 4                         |
| SPH 60  | 4                         |
| SPH 75  | 4                         |
| SPH 80  | 4                         |
| SPH 100 | 3                         |
| SPH 125 | 4                         |

7. Attach the exhaust draft hood to the exhaust tube of the heater using #8 sheet metal screws provided. **The exhaust hood outlet must be pointing down.**

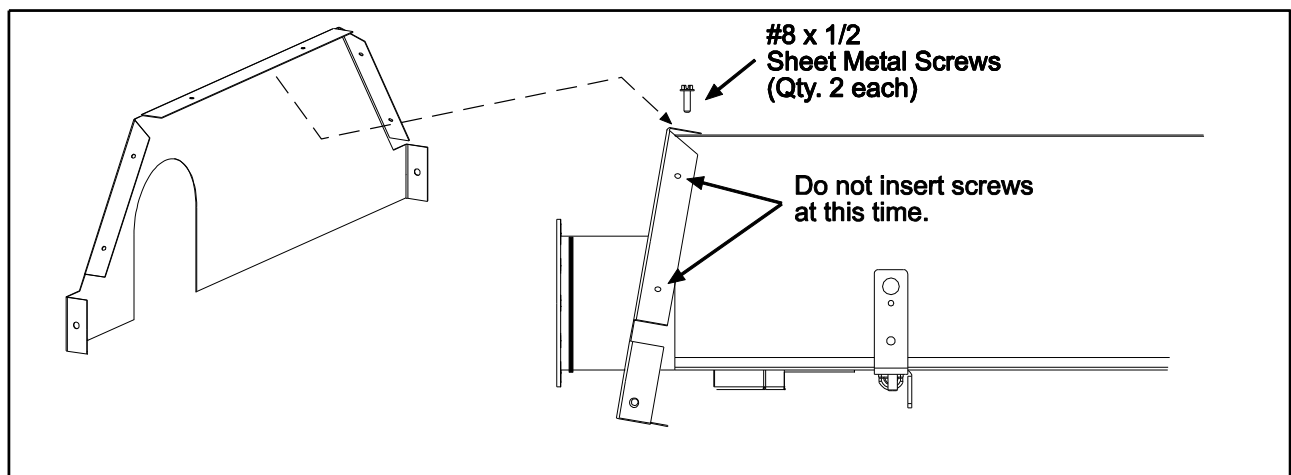
Note: The draft hood is required for **UNVENTED** use only. If the heater is to be **VENTED** use the 4" flue adapter collar (PN 30504500) and the end reflector accessory having (2) slotted holes (PN 42895160). The optional accessories vent kit PN 44622000 is required. Refer also to the Venting Section 14 of the manual.



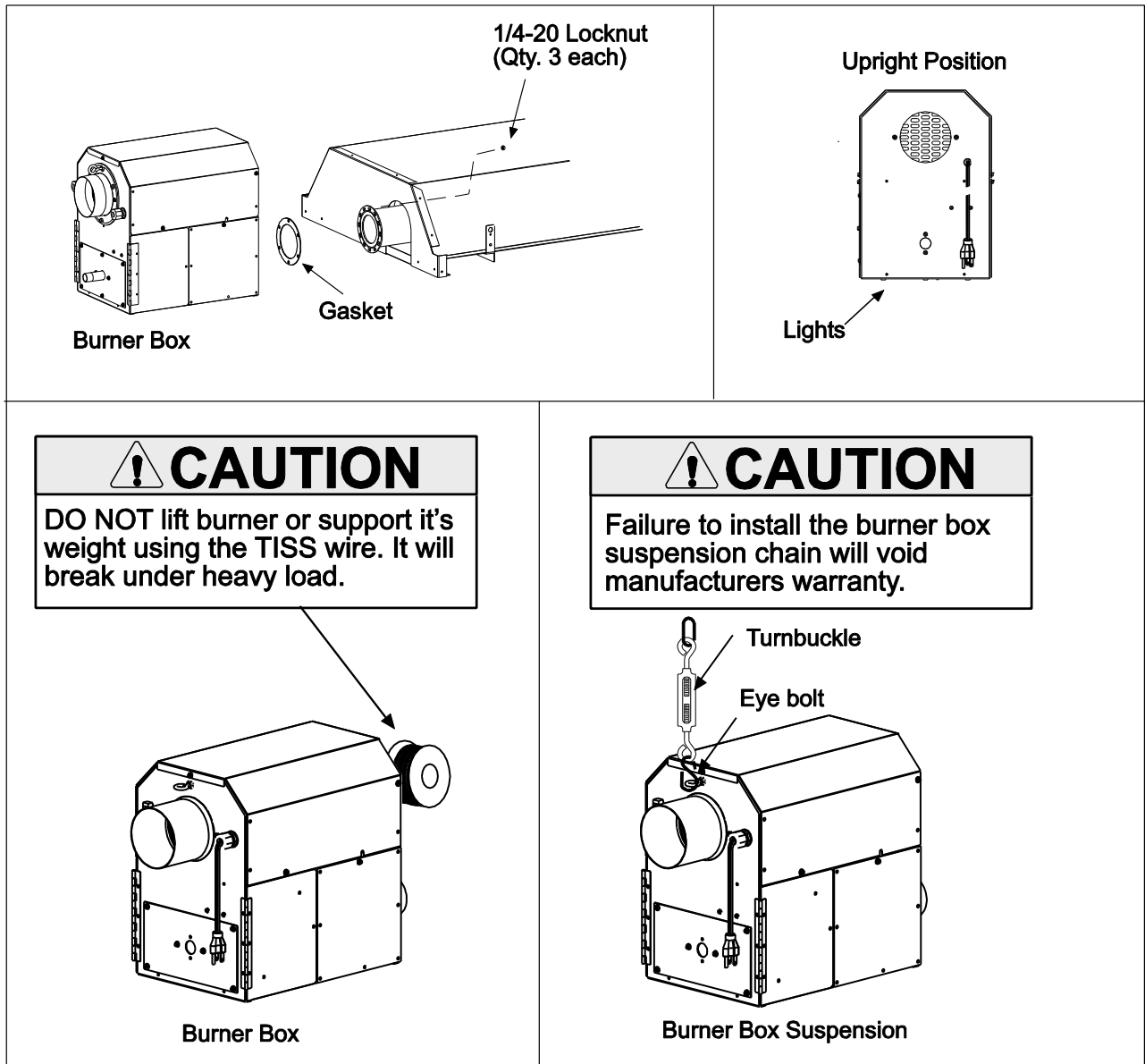
8. Install the reflectors onto the pre-assembled body section. Measure from end of reflector to tube flange and set at specified distance. Install sheet metal screws through first hanging bracket and into reflector to keep it in place. Note: 20Ft models require (1) reflector only.



9. Place the reflector end to the top end portion of the reflector and secure with (2) #8 sheet metal screws provided. **DO NOT** insert any other screws at this time.



10. Attach the burner box and gasket to end of tube flange and secure with 1/4-20 locknuts provided. The heater must be mounted **horizontally** and the burner control **must** be positioned **upright** as shown below. **Failure to install the burner control in an UPRIGHT position will VOID the manufacturer's warranty.**



**! CAUTION**

The burner box weighs 38 lbs. Use caution when handling it.

Failure to install the burner box in an upright position and lights facing the floor will void the manufacturer's warranty.

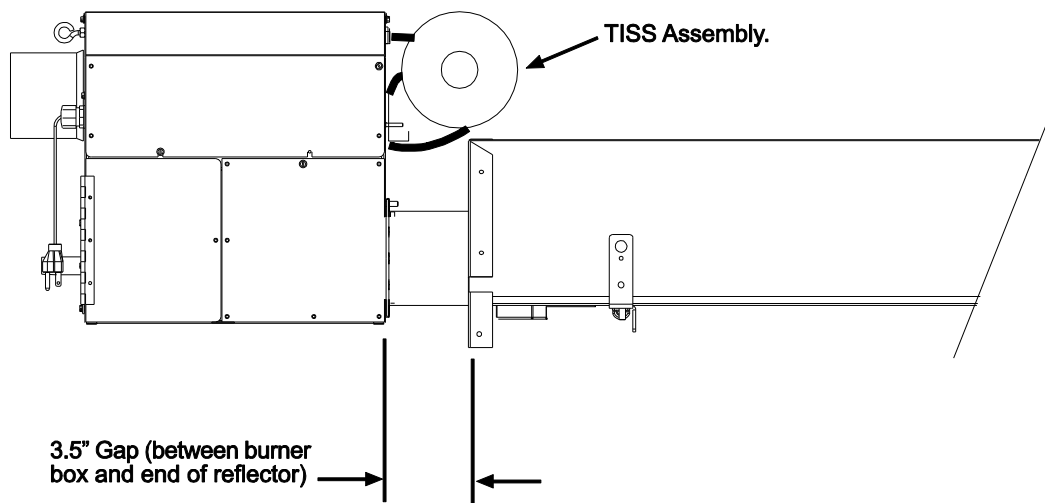
## CONNECTING THE TISS SYSTEM

**The heater can be used without a TISS wire when installed below a non-combustible ceiling only. For other installations with combustibile ceilings the TISS wire must be added as shown below.**

**Description:** The **TISS (Tube Integrity Safety System)** is designed to shut the main burner off in the event that a burnout occurs in the first 10ft. section of firing tube. **Note:** When replacing the firing tube a new **TISS** wire assembly PN 44176510 (**spring and spring retainer clamp not included**) must also be installed.

### Instructions:

- A. Make sure that the gap between the burner box and end of reflector is 3.5" and the reflector is securely attached to the reflector support bracket. Make adjustments if necessary.

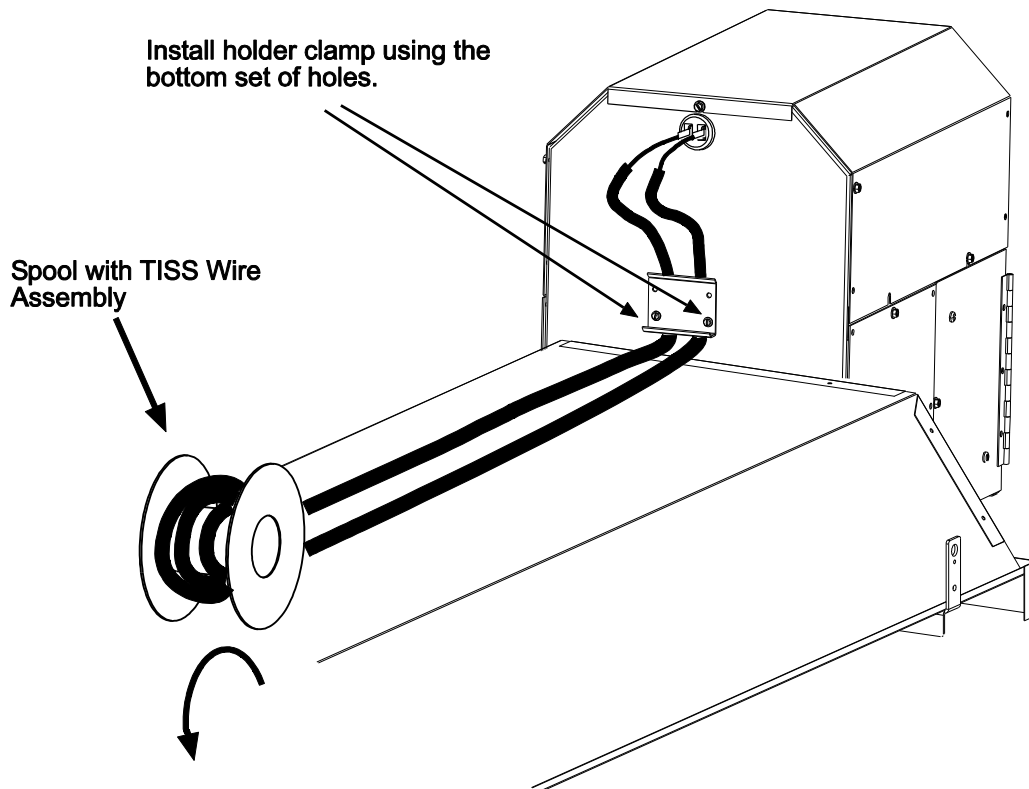


### Step 1

## ! CAUTION

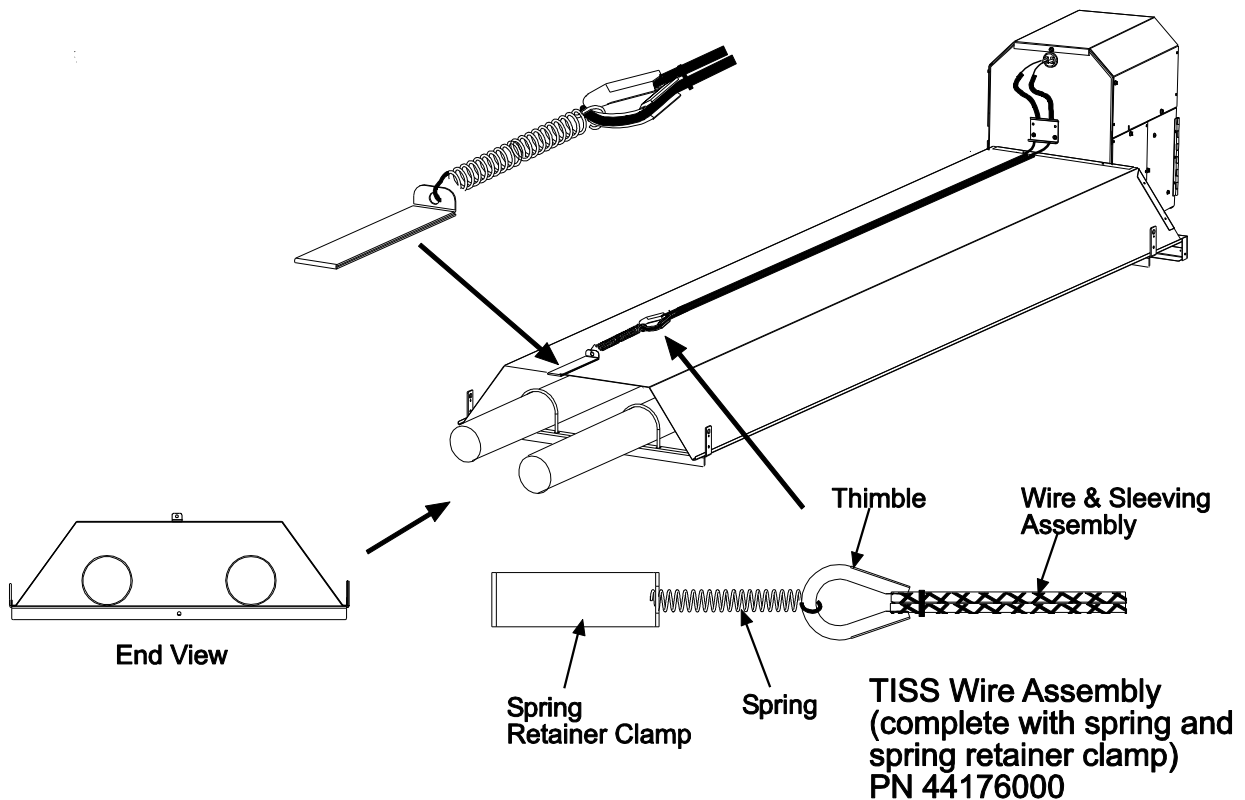
**Failure to maintain 3.5" gap as shown will result in pre-mature TISS wire failure.**

- B. Un-roll the **TISS** wire assembly from the spool. Be careful not to kink the wires. The holder clamp must be installed to the burner control using the bottom set of holes as shown in the label view.



## Step 2

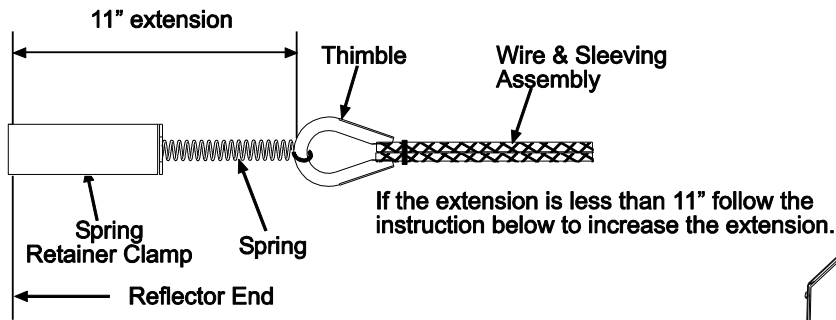
- C. Hold the spring retainer clamp and pull the **TISS** wire assembly to end of reflector at overlap joint. Slide spring retainer clamp over end of reflector as shown.



## Step 3

D. After attachment of the **TISS**, check to make sure that there is sufficient tension on the wire. **Follow the diagram below to increase or decrease the tension as necessary.**

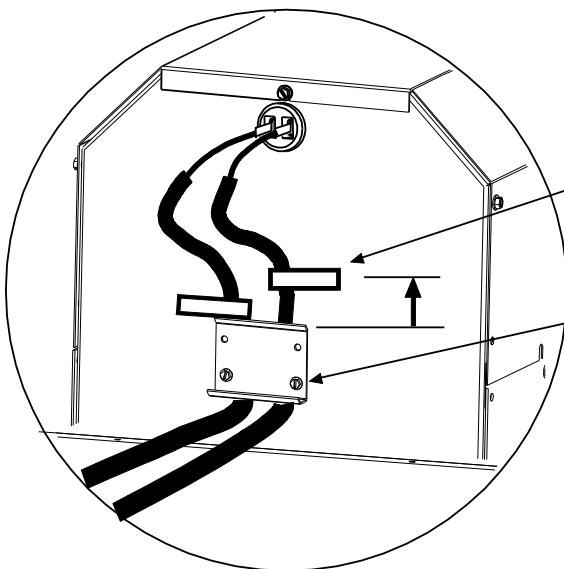
1. Measure the extension of the spring from the end of the reflector to the thimble as shown below.



2. Tape one end of the sleeve to the burner box or use a marker.

3. Mark the other end of the sleeve with tape or other marker. Use the top of the retainer as a reference.

4. Loosen screws.



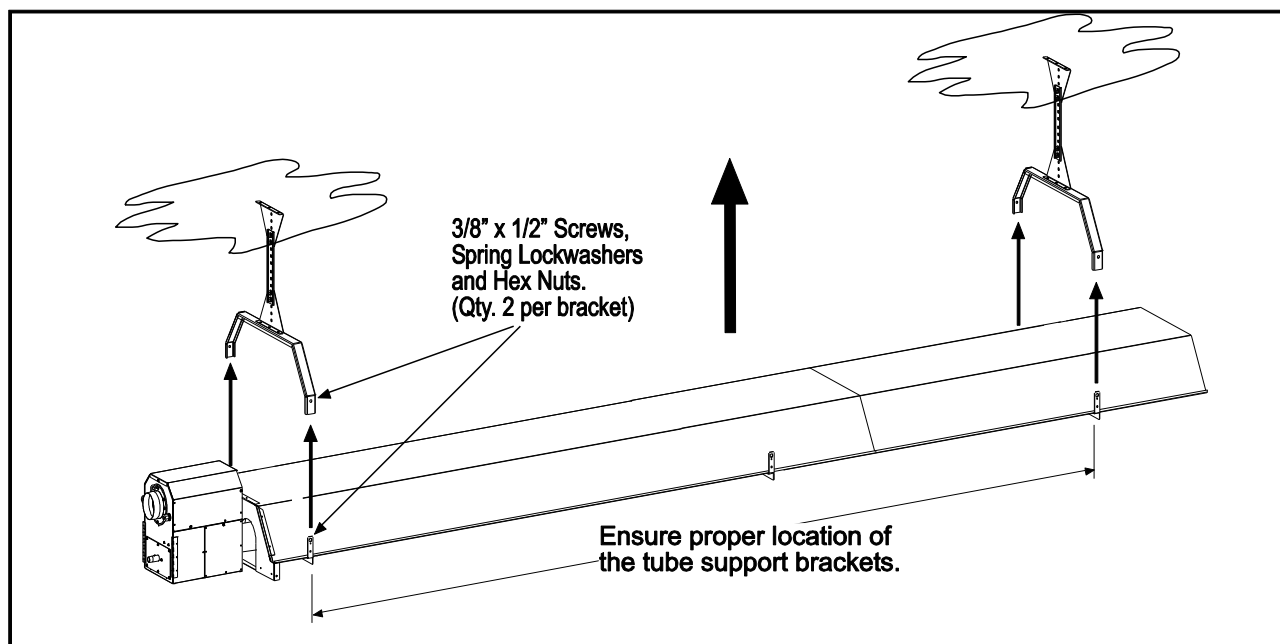
5. Pull one end of the sleeve and wire inside until the marker is raised by the total adjustment length. ie. if the extension is 10" then pull through 1" to increase the extension to 11".

6. Tighten screws.

7. Check extension using the method in step 1.

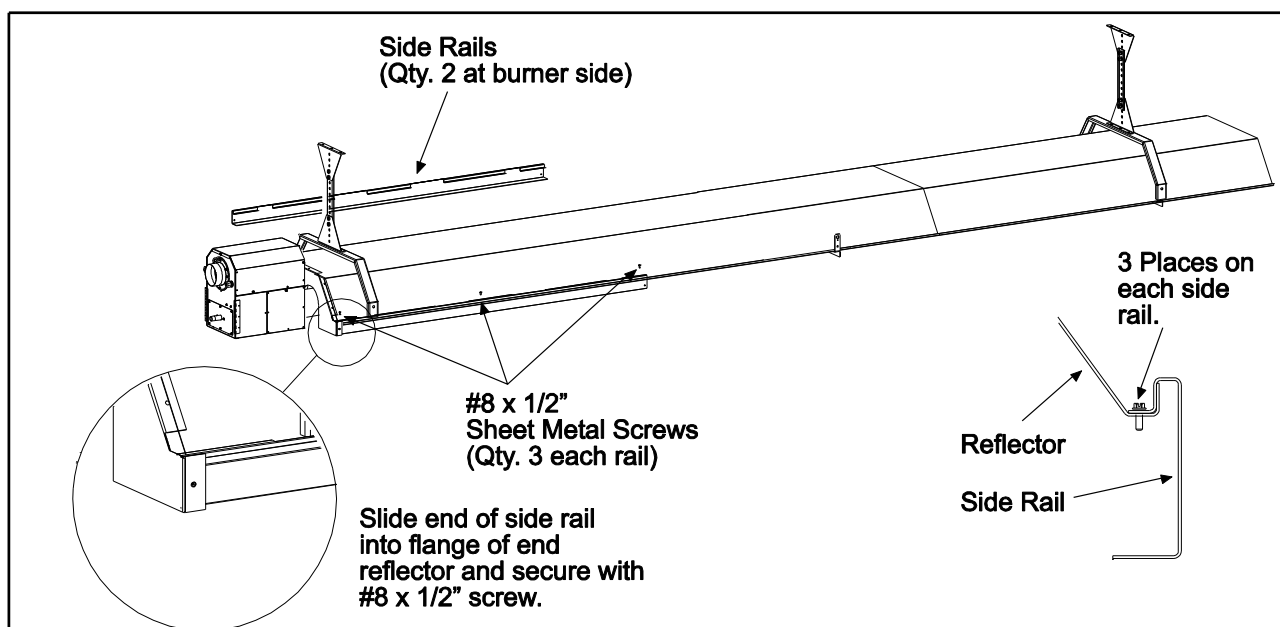
**Step 4**

11. Lift the heater into place and attach it to the tube support brackets previously installed to the ceiling. Use the 3/8" x 1/2" screws, spring lock washers and hex nuts supplied in the fastener kit. Once the heater is suspended, make sure that the heater system is level.

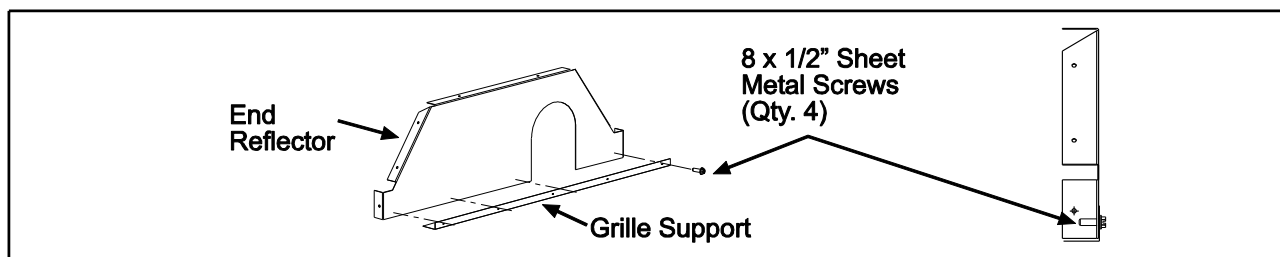


12. Install (2) side rails on the burner end of heater and align with edge of reflector. The side rail rests inside the reflector lip. Attach each side rail to the reflector from the top using (3) #8 sheet metal screws provided.

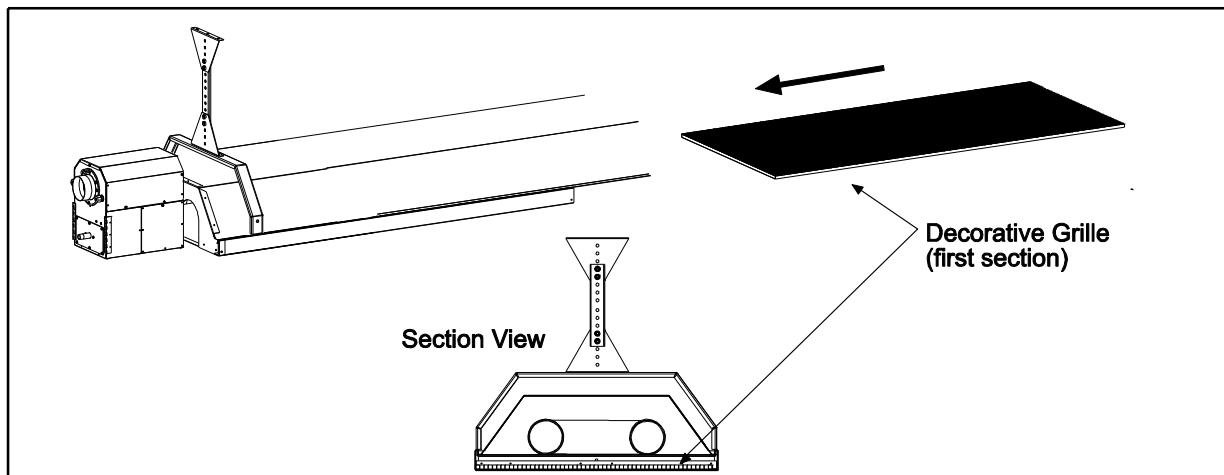
13. Slide end of side rail into flange of end reflector and secure with (1) #8 sheet metal screw provided. Finish securing the end reflector using (4) #8 sheet metal screws provided.



14. Secure support grille to end reflector with (4) #8 sheet metal screw provided.

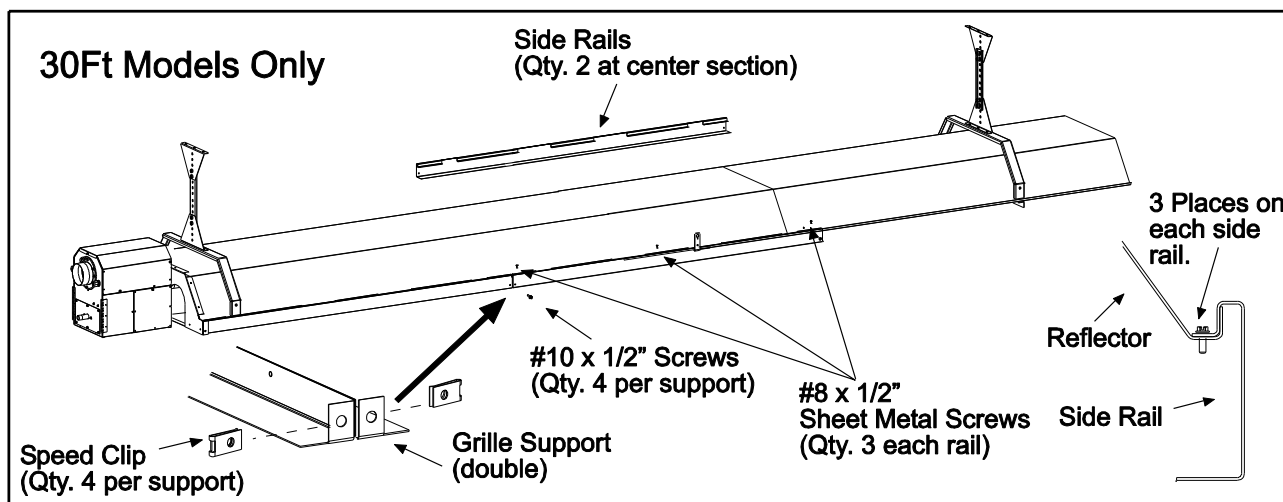


15. Slide one decorative grille panel into the side rails of the heater body.

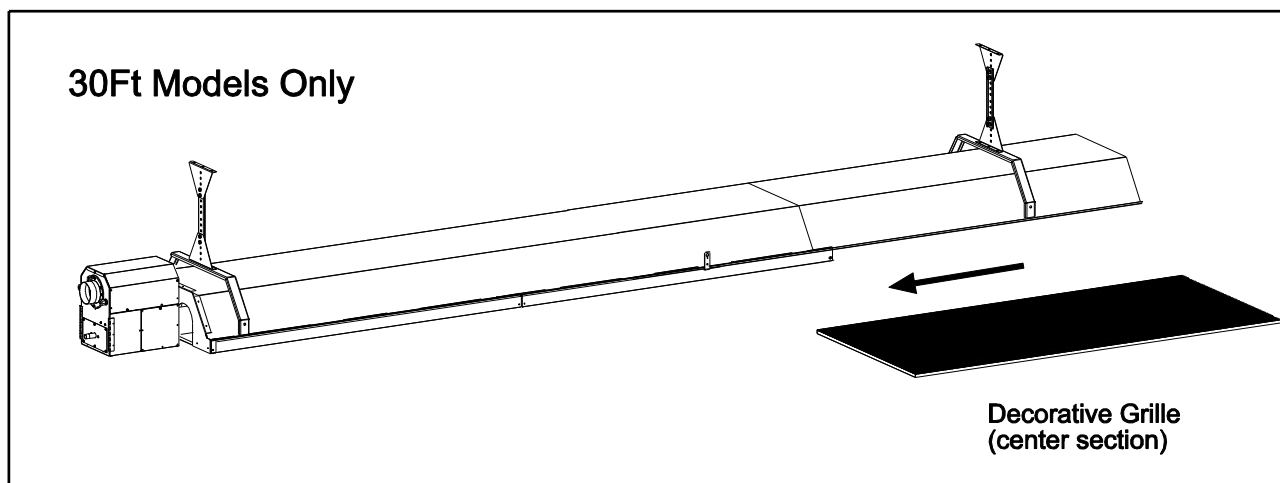


16. Install the double grill support at the end of the side panels. Fasten this in place using (1) speed clip and #10 screw provided on each side of the grill support.

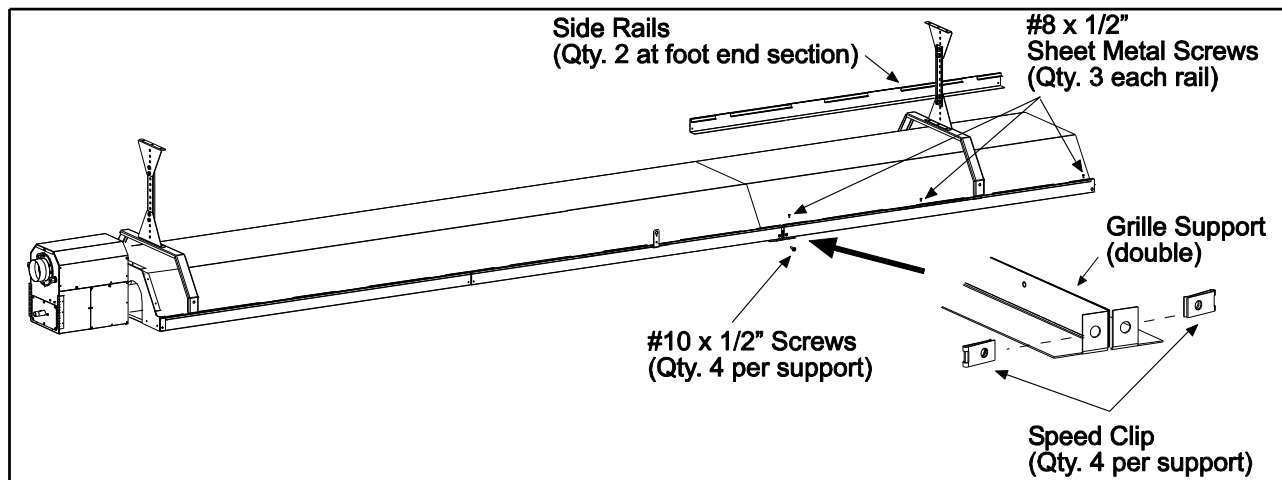
17. Install (2) side rails on the center section of heater. Attach each side rail to the reflector from the top using (3) #8 sheet metal screws provided. Attach each side rail using (1) speed clip and #10 screw provided on each side of the grill support. Note: The center double grill support and side rails are used on the 30Ft models only.



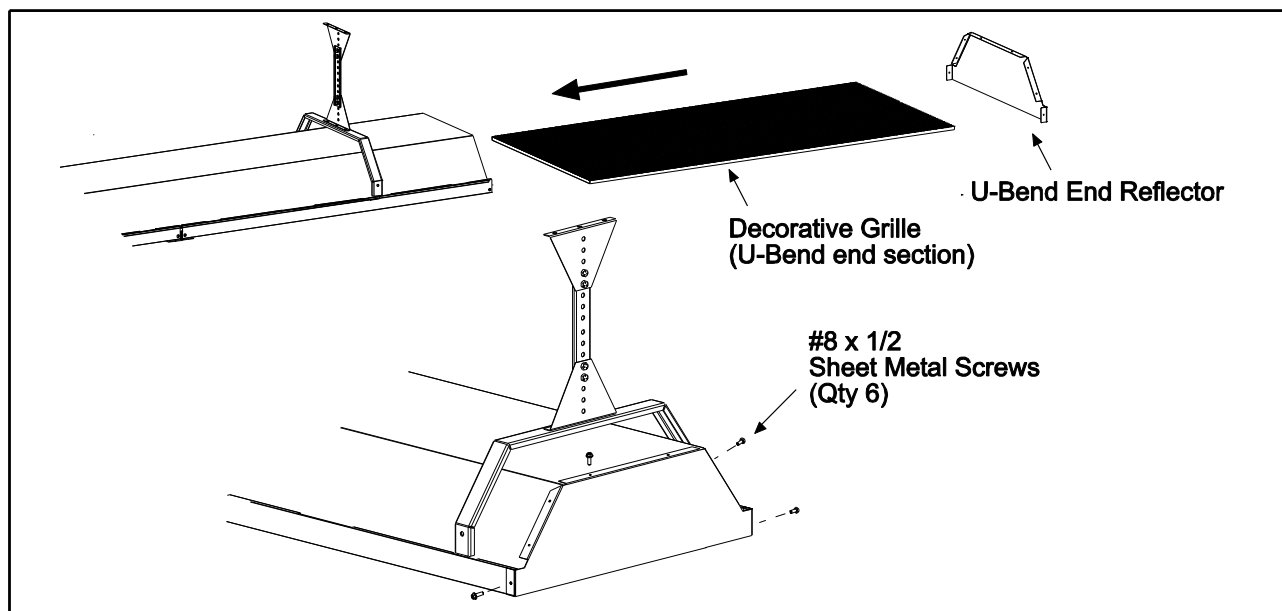
18. Slide one decorative grille panel into the side rails of the center section. Note: This decorative grill panel is used on the 30Ft models only.



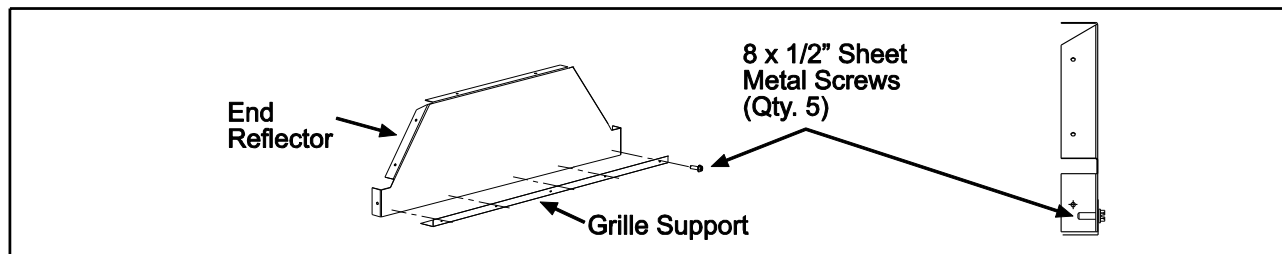
19. Install the remaining double grill support at the end of the center side rails. Fasten this in place using (2) speed clips and #10 screws provided on each side of the grill support. Note: This double grill support is used on the 30Ft models only.
20. Install the remaining (2) side rails on the foot end section of heater. Attach each side rail to the reflector from the top using (3) #8 sheet metal screws provided. Attach each side rail using (1) speed clip and #10 screw provided on each side of the grill support. Note: The center double grill support and side rails are used on the 30Ft models only.



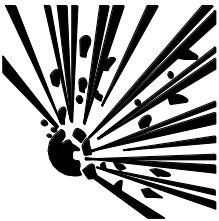
21. Slide the remaining decorative grille panel into the side rails of the foot end section of the heater.
22. Attach the foot end reflector flush with the main body reflector using (8) #8 sheet metal screws provided.



23. Secure support grille to end reflector with (4) #8 sheet metal screw provided.



## 11.0) GAS CONNECTIONS AND REGULATIONS

| <b>⚠ WARNING</b>                                                                  |                                                                                   |                                                                                                                                                                                                                                                                                                                                                    |
|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  |  | <b>FIRE AND EXPLOSION HAZARD</b><br>Tighten flexible gas hose and components securely.<br><br>Flexible metal gas hoses must be installed without any twists or kinks in them. The hose will move during operation of the heater and it can crack if it is twisted.<br><br>Failure to do so may result in death, serious injury or property damage. |

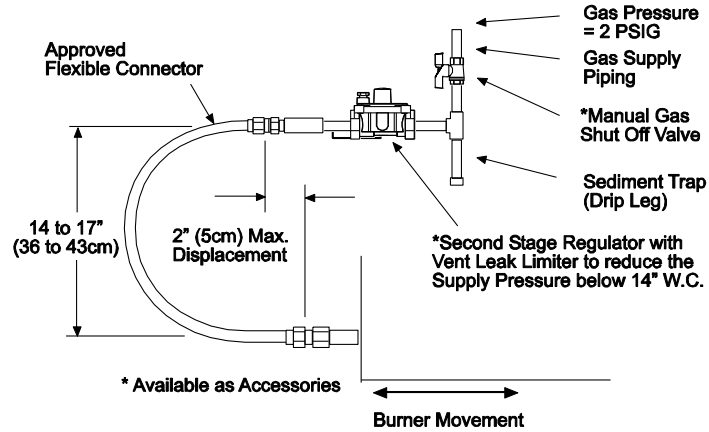
### IMPORTANT BEFORE CONNECTING THE GAS TO THE HEATER

1. Connect to the supply tank or manifold in accordance with the latest edition of National Fuel Gas Code (ANSI Z223.1), and local building codes. Authorities having jurisdiction should be consulted before the installation is made. (In Canada, refer to the latest edition of CSA B149.1, Natural Gas and Propane Installation Code.)
  - A. Check that the gas fuel on the burner rating plate matches the fuel for the application.
  - B. Check that the gas supply piping has the capacity for the total gas consumption of the heaters and any other equipment connected to the line.
  - C. Check that the calculated supply pressure with all gas appliances and heaters operating will not drop below the minimum supply pressure required for these heaters. Check inlet supply pressures on Section 12.0).
  - D. All gas supply lines must be located in accordance with the required clearances to combustibles from the heater as listed on the clearances label of the heater and Section 4.0) of this manual.
  - E. Pipe joint compounds must be resistant to the action of liquefied petroleum gases.
  - F. Tube heaters will expand/contract during operation. Where local codes do not prohibit, a CSA or U.L. approved flexible connector supplied with this heater is required for connections between the rigid piping and the heater. A union should be installed before the burner box inlet. An approved shut off valve should be installed within 6 feet of the union.
  - G. The gas pipe, flexible hose and connections must be self-supporting. The gas pipe work must not bear any of the weight of the heater or any other suspended assembly.
  - H. This appliance is equipped with a step-opening, combination gas valve. **The maximum supply pressure to the appliance is 14" W.C. or 1/2 P.S.I.** If the line pressure is more than the maximum supply pressure, then a second stage regulator which corresponds to the supply pressure must be used.
  - I. After all gas connections have been made, make sure the heater and all gas outlets are turned off before the **main gas supply is turned on slowly**. Turn the gas supply pressure on and check for leaks. To check for leaks, check by one of the methods listed in Appendix D of the National Fuel Gas Code.
  - J. If a 2nd stage regulator is used, the ball valve down-stream in the supply line must be closed when purging the gas lines to prevent gas seeping through it. If initial gas pressure is higher than 14" w.c. the redundant combination gas valve is designed to lock out. Pressure build-up in the supply lines prior to the heater must be released before proper heater operation.

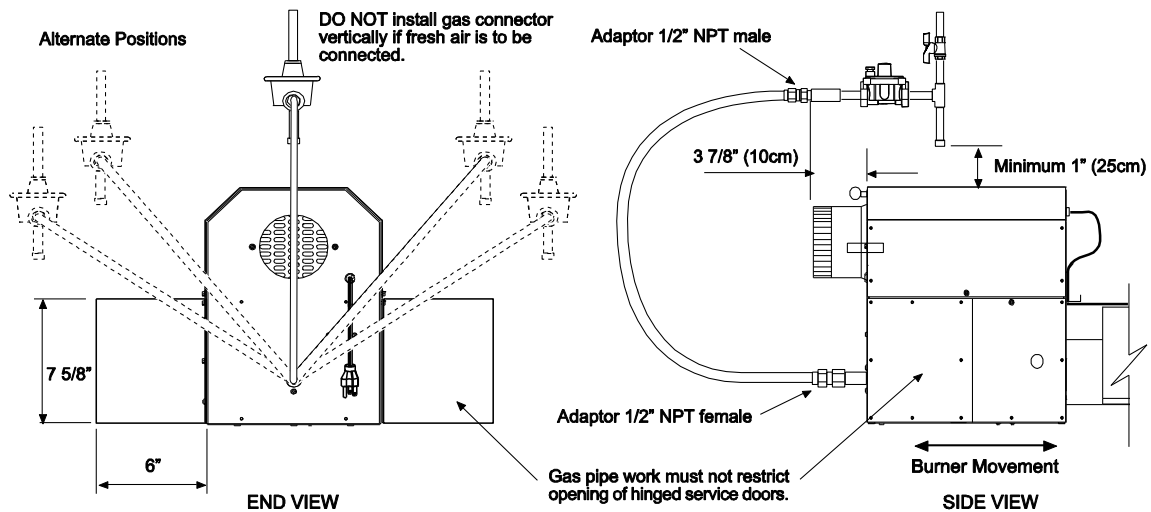


**Do not use an open flame of any kind to test for leaks.**

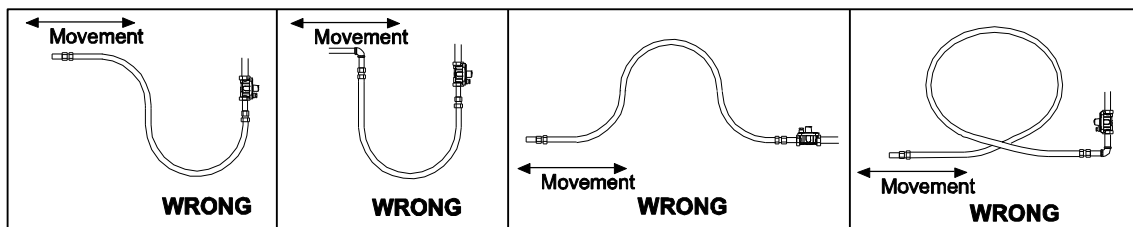
## KEY DIMENSIONS AND COMPONENTS OF THE GAS CONNECTIONS



## RECOMMENDED GAS CONNECTION POSITIONS WITH 36" FLEXIBLE GAS HOSE



## INCORRECT POSITIONS



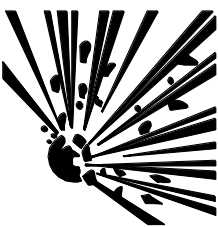
## ⚠ WARNING

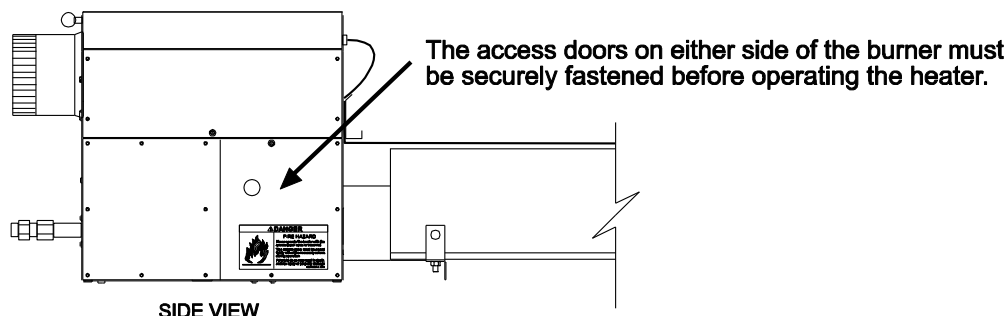
**US ONLY:** Connector MUST be installed in "⌋" configuration. Use only the 36" long connector that was furnished with this heater.

**US ONLY:** A gas connector certified for use on a tubular type infrared heater per the standard for Connectors for Gas Appliances, ANSI Z21.24/CSA 6.10 is supplied for installation in US only. The gas connector is 36" long and 1/2" nominal ID, and must be installed as shown above, in one plane, and without sharp bends, kinks or twists.

**CANADA ONLY:** A Type I hose connector should be used that 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) and is of length of 36+/- 6 in (90+/- 15 cm). The gas connector must be installed as shown above, in one plane, and without sharp bends, kinks or twists.

## 12.0) INSTRUCTIONS FOR PRESSURE TEST GAUGE CONNECTION

| <b>⚠ WARNING</b>                                                                  |                                                                                   |                                                                                                                                                                                                                                                                                         |
|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  |  | <b>FIRE AND EXPLOSION HAZARD</b><br><br>Never operate the heater with the access panel open or removed.<br><br>The access panels must be closed tightly with all the necessary screws during operation.<br><br>Failure to do so may result in death, serious injury or property damage. |



### SUPPLY PRESSURE

1. The installer will provide a 1/8" N.P.T. tapped plug, accessible for test gauge connection immediately upstream of the gas supply connection to the heater.

### OUTLET GAS PRESSURE CHECK AND ADJUSTMENTS

Gauges that measure pressure in pounds per square inch are not accurate enough to measure or set the manifold pressure. All measurements **MUST BE** made when the heater and all other gas burning equipment that are connected to the gas supply system are operating at maximum capacity. The combination gas valve is factory set and should not need adjustment. If gas pressure adjustment is required, follow the instructions:

1. Turn off all electrical power to the system to connect manometer hoses.
2. Turn the pressure test screw (3/32" Hex) in the center of the boss **not more than one turn counterclockwise**. Attach a 5/16" hose and manometer over the tapered outlet pressure boss on the valve (see **Figures 1** and **2** below). If regulator needs to be adjusted, see instructions below.

#### TO ADJUST REGULATOR (single stage gas valves):

1. Turn on power and energize the main gas valve. Remove regulator cover screw (see **Figure 1** below). Turn regulator adjustment screw **clockwise** ⤵ to **increase pressure**, or **counterclockwise** ⤴ to decrease pressure. Replace regulator cover screw and tighten securely.

#### DO NOT EXCEED THE PRESSURES SHOWN IN THE GAS PRESSURE TABLE.

2. After testing pressure and adjusting the regulator, turn off all electrical power to the system, remove manometer hoses, turn outlet test screw (3/32" Hex) clockwise to seal pressure port. Tighten to 7 in lb minimum. Turn on system power.

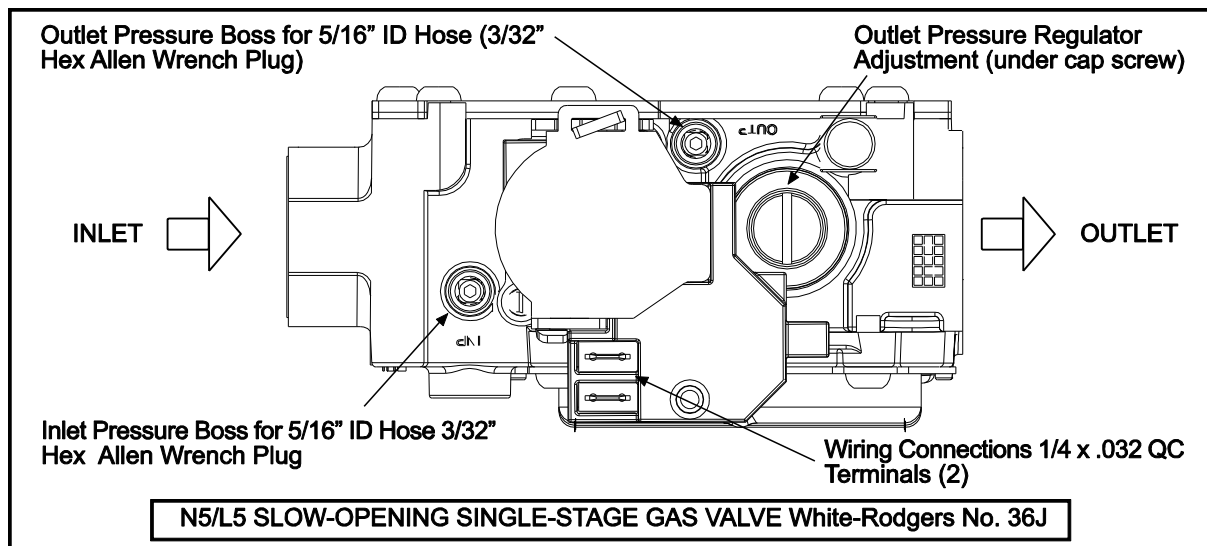


**Figure 1**

**TO ADJUST REGULATOR (two stage gas valves):**

1. Turn on power and energize main gas valve solenoid. Do not energize the **HI** solenoid.
2. Remove regulator cover screw from the **low** outlet pressure regulator (see **Figure 2** below) and turn screw clockwise  to increase pressure, or counterclockwise  to decrease pressure. Replace regulator cover screw and tighten securely.
3. Energize main gas valve solenoid as well as the **HI** terminal.
4. Remove regulator cover screw from the **high** outlet pressure regulator (see **Figure 2** below) and turn screw clockwise  to increase pressure, or counterclockwise  to decrease pressure. Replace regulator cover screw and tighten securely.

**DO NOT EXCEED THE PRESSURES SHOWN IN THE GAS PRESSURE TABLE.**

5. After testing pressure and adjusting the regulator, turn off all electrical power to the system, remove manometer hoses, turn outlet test screw (3/32" Hex) clockwise to seal pressure port. Tighten to 7 in-lb minimum. Turn on system power.

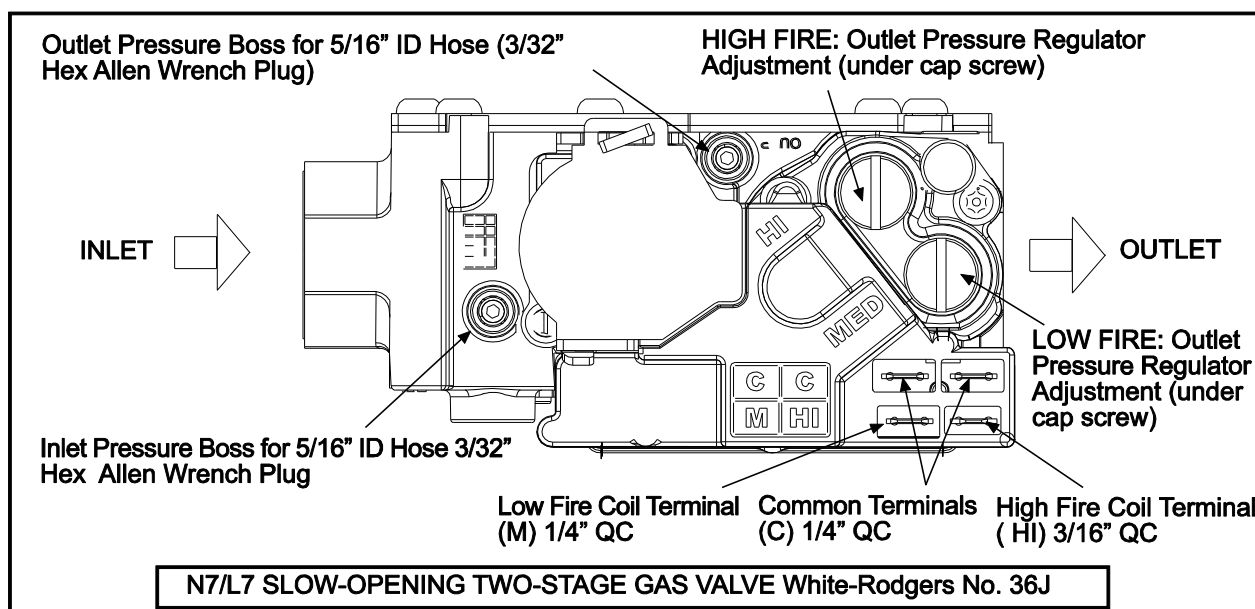


**Figure 2**