

Please read and save these instructions. This heater must be installed and serviced by trained gas installation and service personnel only! Read carefully before attempting to assemble, install, operate, or maintain the product described. Protect yourself and others by observing all safety information. Failure to comply with instructions could result in personal injury and/or property damage! Retain these instructions for future reference.

# Dayton<sup>®</sup> Tube Heaters

## Description

Dayton tube heaters are gas-fired infrared heaters designed to provide comfort heat. They consist of three (3) main components: a burner control box, radiant tube, and reflector assembly. The heaters are typically suspended from the ceiling by chains and controlled by a thermostat. They can be installed either vented or unvented, and may use outside air for combustion if necessary. The radiant tube may be installed in different configurations depending on the heating requirements.

These heaters use infrared energy to heat spaces. When heat is required, the burner control box ignites a gas/air mixture and pushes the hot gases into the radiant tube. As the gases pass through the assembly, the tubing is heated and emits infrared, which is then directed toward the floor by reflectors. This is known as primary infrared and is absorbed by the floor, objects and people in the space, raising their temperatures. They in turn re-radiate this heat, known as secondary infrared, to create a comfort zone at the floor level. This is how Dayton tube heaters can heat large spaces without having to provide primary infrared for every square foot of area. However, if the goal is to spot heat a small area within a large space, only the primary infrared makes this possible. Dayton tube heaters are design certified for use in industrial and commercial buildings, such as warehouses, manufacturing plants, aircraft hangars and vehicle maintenance shops. They are **not** certified for residential use **or** where flammable gases or vapors are generally present, such as spray booths.

## ⚠ WARNING



Improper installation, adjustment, alteration, service, or maintenance can cause property

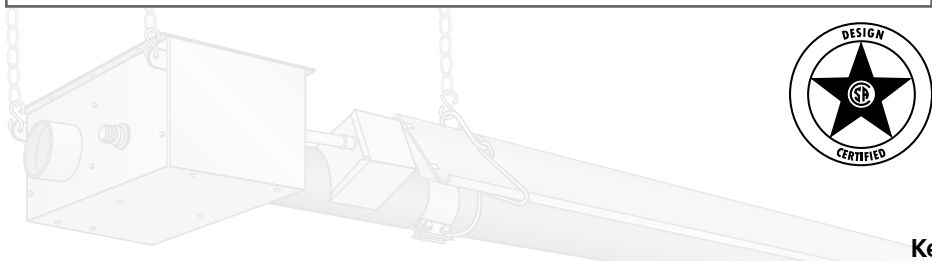
damage, injury, or death. Read and understand the installation, operating, and maintenance instructions thoroughly before installing or servicing this equipment.

This heater must be installed and serviced by trained gas installation and service personnel only. Failure to comply could result in personal injury, asphyxiation, death, fire, and/or property damage.

## ⚠ WARNING



In locations used for the storage of combustible materials, signs must be posted to specify the maximum permissible stacking height to maintain the required clearances from the heater to the combustibles. Signs must either be posted adjacent to the heater thermostats or, in the absence of such thermostats, in a conspicuous location.



## For Your Safety - If you smell gas:

- Do not try to light any appliance.
- Immediately call your gas supplier from a neighbor's phone.
- Do not touch any electrical switch.
- Follow the gas supplier's instructions.
- Do not use any phone in your building.
- If you cannot reach your gas supplier, call the fire department.

Keep these instructions for future reference.

# Dayton® Tube Heaters

## TABLE OF CONTENTS

<b>INTRODUCTION</b> .....	3
Overview .....	3
<b>SAFETY</b> .....	4
Warning Symbols.....	4
Specific Applications .....	4
Standards, Certifications, and Government Regulations .....	5
Clearances to Combustibles .....	6
<b>INSTALLATION</b> .....	8
Design Considerations and Prechecks.....	8
Recommended Mounting Heights.....	10
Hanger Placement and Suspension.....	11
Optional U-Bend or Elbow Accessory Configuration .....	14
Radiant Tube Assembly .....	15
Burner Control Box Suspension .....	18
Reflector Assembly.....	19
Baffle Assembly and Placement.....	21
Final Heater Assembly.....	22
Venting.....	23
Combustion Air Requirements .....	30
Gas Supply .....	32
Electrical Requirements .....	35
<b>OPERATION</b> .....	37
<b>MAINTENANCE</b> .....	38
Troubleshooting Guide.....	39
<b>PARTS</b> .....	40
Repair Parts Illustration.....	40
Repair Parts List.....	41
<b>LIMITED WARRANTY</b> .....	44

### Kit Contents

Prior to installation, verify that you have received all heater components included with your tube heater. Refer to the chart below for a list of the kit contents for your model heater. Materials not included in the kit (e.g. sheet metal screws, vent material, terminals, etc.) are the responsibility of the installer.

Filled By:		5VD67A- 5VD70A	5VD71A- 5VD72A	5VD73A- 5VD78A	5EAJ0-J2, 5EAH3-H5	5VD79A-80A, 5EAH6-H8
Part #	Description	20 ft.	30 ft.	40ft.	50ft.	60ft.
<b>TP-19B</b>	4" Tube Hanger with Tension Spring	3	4	5	6	7
<b>TP-21B</b>	4" Tube Clamp	2	3	4	5	6
<b>TP-33B</b>	1/2" Shut-off Ball Valve/Inlet Tap	1	1	1	1	1
<b>TP-82</b>	4" Reflector Center Support	2	3	4	5	6
<b>TP-83</b>	24" Stainless Steel Flexible Gas Connector	1	1	1	1	1
<b>TP-105</b>	Reflector End Cap	2	2	2	2	2
<b>TP-106</b>	Reflector End Cap Clips	8	8	8	8	8
<b>THCS</b>	Tube Heater Chain Sets	5	6	7	8	9
<b>IOM</b>	Installation, Operation & Maintenance Manual	1	1	1	1	1

## Models 7D837A thru 7D849A, 7D851A, 7AR79 thru 7AR88

### INTRODUCTION

#### Overview

The intent of this manual is to provide information regarding general safety, installation, operation, and maintenance of this tube heater. You must read and understand all instructions and safety warnings before installing or servicing the tube heater.

#### Available Models - Tube Heater Burner Box and Tube Reflector Combinations

Combo #	Burner Box #	Tube & Reflector Pkg #	Tube Type	Length	BTU/h	Baffle Quantity	Gas Type
7D837A	5VD67A	5VD88	20-4"-ALUM	20	50,000	5	NAT
7D838A	5VD68A	5VD88	20-4"-ALUM	20	50,000	5	PROP
7D839A	5VD69A	5VD88	20-4"-ALUM	20	75,000	5	NAT
7D840A	5VD70A	5VD88	20-4"-ALUM	20	75,000	5	PROP
7D841A	5VD71A	5VD89	30-4"-ALUM	30	100,000	5	NAT
7D842A	5VD72A	5VD89	30-4"-ALUM	30	100,000	5	PROP
7D843A	5VD73A	5VD91	40-4"-ALUM	40	100,000	4	NAT
7D844A	5VD74A	5VD91	40-4"-ALUM	40	100,000	4	PROP
7D845A	5VD75A	5VD91	40-4"-ALUM	40	125,000	4	NAT
7D846A	5VD76A	5VD91	40-4"-ALUM	40	125,000	4	PROP
7D847A	5VD77A	5VD90	40-4"-TITAN	40	150,000	4	NAT
7D848A	5VD78A	5VD90	40-4"-TITAN	40	150,000	4	PROP
7AR80	5EAJ0	5VD90 & 5EAH2	40-4"-TITAN & 10-4"-ALUM	50	150,000	4	NAT
7AR79	5EAJ1	5VD90 & 5EAH2	40-4"-TITAN & 10-4"-ALUM	50	150,000	4	PROP
7AR83	5EAJ2	5VD90 & 5EAH2	40-4"-TITAN & 10-4"-ALUM	50	175,000	2	NAT
7AR81	5EAH3	5VD90 & 5EAH2	40-4"-TITAN & 10-4"-ALUM	50	175,000	2	PROP
7AR87	5EAH4	5VD90 & 5EAH2	40-4"-TITAN & 10-4"-ALUM	50	200,000	2	NAT
7AR85	5EAH5	5VD90 & 5EAH2	40-4"-TITAN & 10-4"-ALUM	50	200,000	2	PROP
7D849A	5VD79A	5VD90 & 5VD88	40-4"-TITAN & 20-4"-ALUM	60	150,000	2	NAT
7D851A	5VD80A	5VD90 & 5VD88	40-4"-TITAN & 20-4"-ALUM	60	150,000	2	PROP
7AR84	5EAH6	5VD90 & 5VD88	40-4"-TITAN & 20-4"-ALUM	60	175,000	2	NAT
7AR82	5EAH7	5VD90 & 5VD88	40-4"-TITAN & 20-4"-ALUM	60	175,000	2	PROP
7AR88	5EAH8	5VD90 & 5VD88	40-4"-TITAN & 20-4"-ALUM	60	200,000	2	NAT
7AR86	5EAH9	5VD90 & 5VD88	40-4"-TITAN & 20-4"-ALUM	60	200,000	2	PROP

# Dayton® Tube Heaters

## SAFETY

### ⚠ WARNING



Improper installation, adjustment, alteration, service, or maintenance can cause property damage, serious injury, or death. Read and understand the installation, operating, and maintenance instructions thoroughly before installing or servicing this equipment. Only trained, qualified gas installation and service personnel may install or service this equipment.

### ⚠ WARNING

#### Not for residential use!



Do not use this heater in the home, sleeping quarters, attached garages, etc.

## Safety Symbols

Safety is the most important consideration during installation, operation, and maintenance of the tube heater. You will see the following symbols and signal words when there is a hazard related to safety or property damage.

### ⚠ WARNING

**Warning** indicates a potentially hazardous situation which, if not avoided, could result in death or injury.

### Applications

This is not an explosion-proof heater. No heater may be used in a Class 1 or Class 2 Explosive Environment. Consult the local fire marshal, fire insurance carrier and other authorities for approval if the proposed installation is in question.

### Commercial and Industrial

This tube heater is designed and certified for use in industrial and commercial buildings such as, warehouses, manufacturing plants, aircraft hangars, and vehicle maintenance shops.

### ⚠ CAUTION

**Caution** indicates a potentially hazardous situation which, if not avoided, could result in minor or moderate injury.

### NOTICE

**Notice** indicates a potentially hazardous situation which, if not avoided, could result in property damage.

### ⚠ WARNING

#### California Proposition 65

This product can expose you to chemicals including lead and carbon monoxide, which are 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).

## Models 7D837A thru 7D849A, 7D851A, 7AR79 thru 7AR88

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### Standards, Certifications, and Government Regulations

The installation of this tube heater must comply with all applicable local, state, and national specifications, regulations, and building codes (contact the local building inspector and/or fire marshal for guidance) before installing the heater system.

In the absence of local codes, the installation must conform to the latest edition of the National Fuel Code ANSI Z223.1 (NFPA 54).

Refer to the following Standards and codes for application specific guidelines:

#### Public Garages:

The installation of this heater in public garages must conform with the Standard for Parking Structures, ANSI/NFPA 88A (latest edition), or the Code for Motor Fuel Dispensing Facilities and Repair Garages NFPA 30A (latest edition) and must be at least 8 ft. above the floor.

#### Aircraft Hangars:

The installation of this heater in aircraft hangars must conform with the Standard for Aircraft Hangars, ANSI/NFPA 409 (latest edition). The heater must be installed at least 10 ft. above the upper wing surfaces and engine enclosures of the highest aircraft which might be stored in the hangar. In areas adjoining the aircraft storage area, the heaters must be installed at least 8 ft. above the floor. The heaters must be located in areas where they will not be subject to damage by aircraft, cranes, moveable scaffolding, or other objects.

#### High Altitude:

The installation of this tube heater is approved, without modifications, for elevations up to 6,000 ft. above MSL (sea level). Contact Dayton for installations above these elevations.

#### Electrical:

The heater, when installed, must be electrically grounded in accordance with the National Electrical Code ANSI/NFPA 70 (latest edition). Under no circumstances is either the electrical supply line or gas supply line to provide any assistance in the suspension of the heater.

#### Venting:

Venting must be installed in accordance with the requirements set forth in this manual and with the NFPA 54/ANSI Z223.1 National Fuel Gas Code (latest edition).


This unit complies with or is certified by one or more of the following organizations or standards:

- CSA International (CSA).
- American National Standards (ANSI Z83.20b).
- National Fuel Gas Code (NFPA 54/ANSI Z223.1).
- Occupational Safety and Health Act (OSHA).

# Dayton® Tube Heaters


## Clearances to Combustibles

**! WARNING**




This is not an explosion-proof heater. Do not store or use flammable objects, liquids, or vapor in the vicinity of the heater. Where there is the possibility of exposure to flammable vapors or highly combustible materials, consult the local fire marshal, fire insurance carrier, and other authorities for approval of the proposed installation.

**! WARNING**



This heater should be installed so that the minimum clearances to combustibles, as marked on the heater, will be maintained from vehicles parked below. If vehicle lifts are present, ensure that these clearances will be maintained from vehicles parked below. If vehicle lifts are present, ensure that these clearances will be maintained from the highest raised vehicle.

**! WARNING**



**Fire Hazard.** Always maintain published clearances to combustibles. Failure to comply with the stated clearances to combustibles could result in personal injury, death, and/or property damage.

## Hazards

For maximum safety, the building must be evaluated for hazards before installing this heating system. A critical safety factor before installation is the clearances to combustibles.

Clearance to combustibles is defined as *the minimum distance that **must** be maintained between the tube surface or reflector and combustible materials*. It also pertains to the distance that must be maintained from moving objects (e.g. overhead doors, cranes, vehicle lifts, etc.) around the tube heater.

The following is a partial list of items to maintain clearances from:

- Gas and electrical lines
- Combustible and explosive materials
- Chemical storage areas
- Areas of high chemical fume concentrations
- Vehicle parking areas
- Vehicle lifts
- Hoists or cranes
- Storage areas with stacked materials
- Lighting
- Sprinkler heads
- Overhead doors and tracks
- Dirty, contaminated areas
- Plastics

If you are unsure about the proposed installation, consult your local fire marshal, fire insurance carrier, or other qualified authorities for the approval of the proposed installation.

### Safety Signs and Labels

It is important to provide warnings to alert individuals to potential hazards and safety actions. ANSI Z83.20 and CSA 2.34, require you to post a sign “specifying the maximum permissible stacking height to maintain the required published clearances from the heater to combustibles” near the heater’s thermostat or, in the absence of such thermostats, in a conspicuous location.

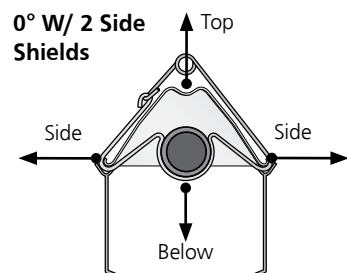
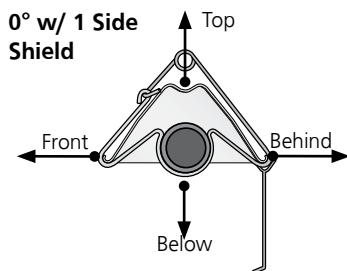
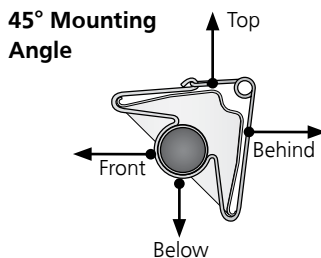
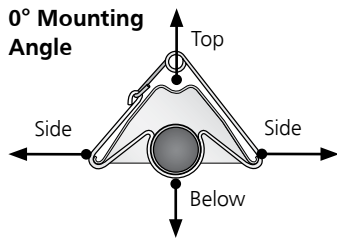
All safety labels must be maintained on this appliance. Contact Grainger if replacement labels are needed.

# Models 7D837A thru 7D849A, 7D851A, 7AR79 thru 7AR88

## Clearances to Combustibles

For the safe installation of this unit, the clearance to combustibles data below (Figure 1.1) contains clearances that must be maintained. Check the heater's rating plate to verify the minimum clearance to combustibles and gas type for your model heater.

Figure 1.1 - Clearances to Combustibles Data



Model No.	Mounting Angle *	Side		Top	Below
		Front	Behind		
<b>Dayton - 5VD67A, 5VD68A (20' min. to 40' max.)</b>					
<b>50,000 BTU/H [N, P]</b>	0°	9	9	6	47
7D - 837A, 838A	45°	39	8	10	47
0° w/ 1 side shield	0°	29	8	6	47
0° w/ 2 side shields	0°	9	9	6	47
20 ft. from burner	0°	7	7	6	30
<b>Dayton - 5VD69A, 5VD70A (20' min. to 40' max.)</b>					
<b>75,000 BTU/H [N, P]</b>	0°	9	9	6	60
7D - 839A, 840A	45°	39	8	10	60
0° w/ 1 side shield	0°	29	8	6	60
0° w/ 2 side shields	0°	9	9	6	60
20 ft. from burner	0°	7	7	6	30
<b>Dayton - 5VD71A, 5VD72A, 5VD73A, 5VD74A (30' min. to 40' max.)</b>					
<b>100,000 BTU/H [N, P]</b>	0°	14	14	6	66
7D - 841A, 842A, 843A, 844A	45°	39	8	10	66
0° w/ 1 side shield	0°	29	8	6	66
0° w/ 2 side shields	0°	16	16	6	66
20 ft. from burner	0°	7	7	6	30
<b>Dayton - 5VD75A, 5VD76A (40' min. to 60' max.)</b>					
<b>125,000 BTU/H [N, P]</b>	0°	20	20	6	76
7D - 845A, 846A	45°	58	8	10	76
0° w/ 1 side shield	0°	42	8	6	76
0° w/ 2 side shields	0°	20	20	6	76
20 ft. from burner	0°	7	11	6	30
<b>Dayton - 5VD77A, 5VD78A, 5VD79A, 5VD80A, 5EAJ0, 5EAJ1 (40' min. to 60' max.)</b>					
<b>150,000 BTU/H [N, P]</b>	0°	24	24	6	81
7D-847A, 848A, 849A, 851A, 7AR-79, 80	45°	58	8	10	81
0° w/ 1 side shield	0°	42	8	6	81
0° w/ 2 side shields	0°	23	23	6	81
20 ft. from burner	0°	11	11	6	44
<b>Dayton - 5EAJ2, 5EAH3, 5EAH6, 5EAH7 (50' min. to 60' max.)</b>					
<b>175,000 BTU/H [N, P]</b>	0°	34	34	6	92
7AR - 81, 82, 83, 84	45°	63	8	10	92
0° w/ 1 side shield	0°	50	8	6	92
0° w/ 2 side shields	0°	30	30	6	92
20 ft. from burner	0°	11	11	6	44
<b>Dayton - 5EAH4, 5EAH5, 5EAH8, 5EAH9 (50' min. to 60' max.)</b>					
<b>200,000 BTU/H [N, P]</b>	0°	41	41	6	94
7AR - 85, 86, 87, 88	45°	63	8	10	94
0° w/ 1 side shield	0°	54	8	6	94
0° w/ 2 side shields	0°	30	30	6	94
20 ft. from burner	0°	11	11	6	44

**Minimum end clearance for all models is 12 inches.** \*Heaters mounted on an angle between 0° and 45° must maintain clearances posted for both 0° and 45° mounting angles, whichever is greater.

# Dayton® Tube Heaters

## INSTALLATION

### Design Considerations and Prechecks

Placement of infrared tube heaters is influenced by many factors. Aside from safety factors, considerations such as the number of elbows that are allowed, maximum vent lengths, ducting of combustion air, and combining vents are a few examples. This manual, along with national, state,

and local codes, addresses these issues. It is critical that all guidelines and instructions are followed.

To ensure a properly designed heating system, a heating layout should be developed for the correct placement of the burner control box, radiant

tubing, venting, and combustion air intake ducts. Inspect and evaluate the mounting conditions, vent locations, gas supply, and electrical wiring. Refer to the chart below for the recommended distances for the model being installed.

### Heater Installation Chart

Model #	BTU/h	Recommended Mounting Heights	Distance Between Heaters	Distance Between Heater Rows	Maximum Distance Between Heater and Wall
7D837A-7D838A	50,000	9' to 14'	10' to 20'	20' to 40'	16'
7D839A-7D840A	75,000	11' to 18'	20' to 30'	30' to 50'	20'
7D841A-7D844A	100,000	13' to 23'	20' to 30'	30' to 50'	20'
7D845A-7D846A	125,000	14' to 25'	20' to 30'	30' to 50'	25'
7D847A-7D851A, 7AR79-7AR80	150,000	15' to 35'	30' to 40'	40' to 60'	25'
7AR81-7AR84	175,000	17' to 35'	30' to 40'	40' to 60'	30'
7AR85-7AR88	200,000	18' to 40'	30' to 40'	40' to 60'	30'

### When designing an infrared radiant heating system, consider the following:

- Has the building's heat loss been evaluated?
- Does the design meet the needs of the space?
- Have all clearances to combustibles situations been observed?
- Have recommended mounting heights been observed?
- Is the supply (burner) end of the heater located where more heat is required?
- Is it best to offset the heaters and/or rotate the reflectors towards the heat zone?
- Are protective guards, side shields, 'U' or 'L' reflector covers needed?
- Does the heater require outside fresh air for combustion?
- Is the environment harsh or contaminated (requiring outside air for combustion)?
- Are chemicals or vapor a concern (requiring outside air for combustion)?

**NOTE:** The effective infrared surface temperature of a person or object may be diminished with wind above 5 mph. The use of adequate wind barrier(s) may be required.

**NOTE:** When heated, materials high in hydrocarbons (solvents, paint thinner, mineral spirits, formaldehydes, etc.) can evaporate. This may result in odors or fumes being emitted into the environment. To correct this problem, clean the area and/or introduce additional ventilation.

Heaters installed and serviced in accordance with the installation manual do not emit odors into the environment. See notice on page 30 additional information.

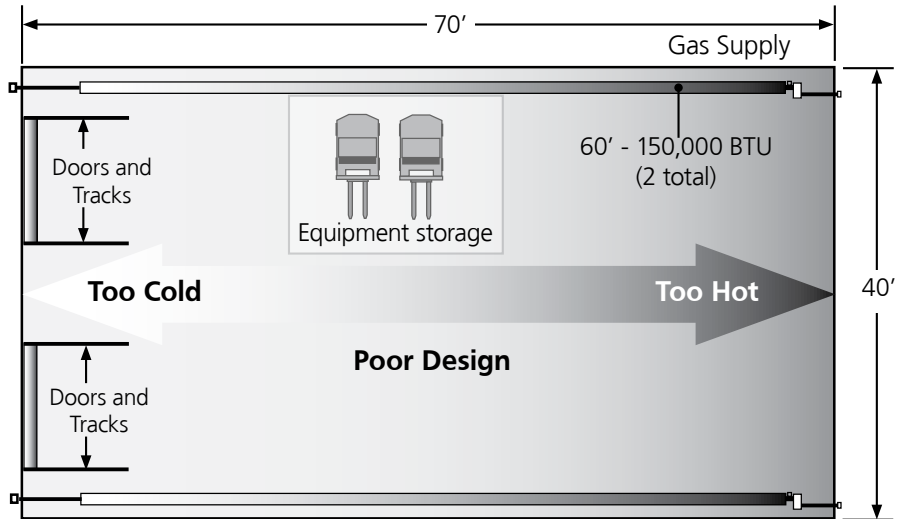
# Models 7D837A thru 7D849A, 7D851A, 7AR79 thru 7AR88

## Design Scenario

A tube heater system is being installed in 70' (L) x 40' (W) space with 12' ceilings. Two overhead doors are located at one end and an equipment storage area exists on one side. The calculated heat load is 300,000 BTU/h.

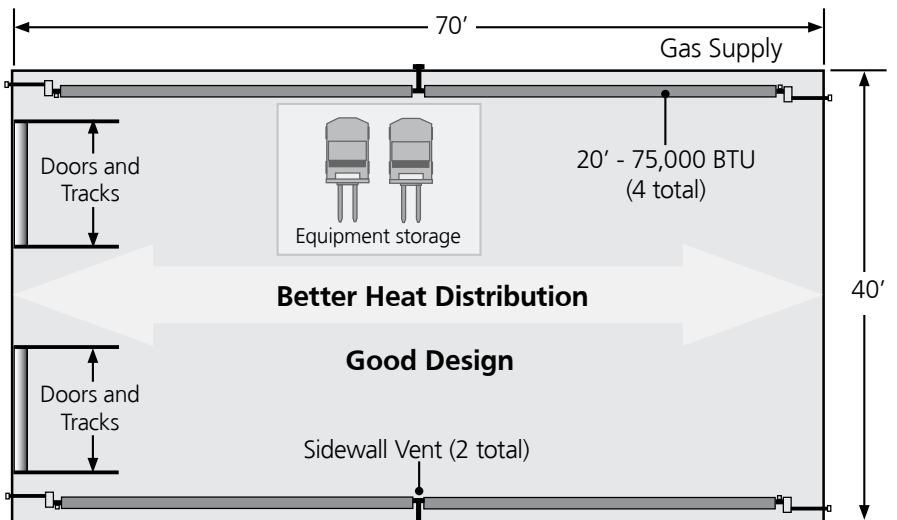
### Figure 2.1 - Poor Design

- Two burners (150,000 BTU/h each) are placed at one end, opposite the area of highest demand (overhead doors).
- Recommended mounting heights are not observed.
- Produces an uneven heat distribution.



### Figure 2.2 - Good Design

- Four burners (75,000 BTU/h each) are placed in each corner. Burner (hotter) ends direct heat to areas of highest head demand.
- Recommended mounting heights observed.
- Distributes heat more evenly.



# Dayton® Tube Heaters

## Recommended Mounting Heights

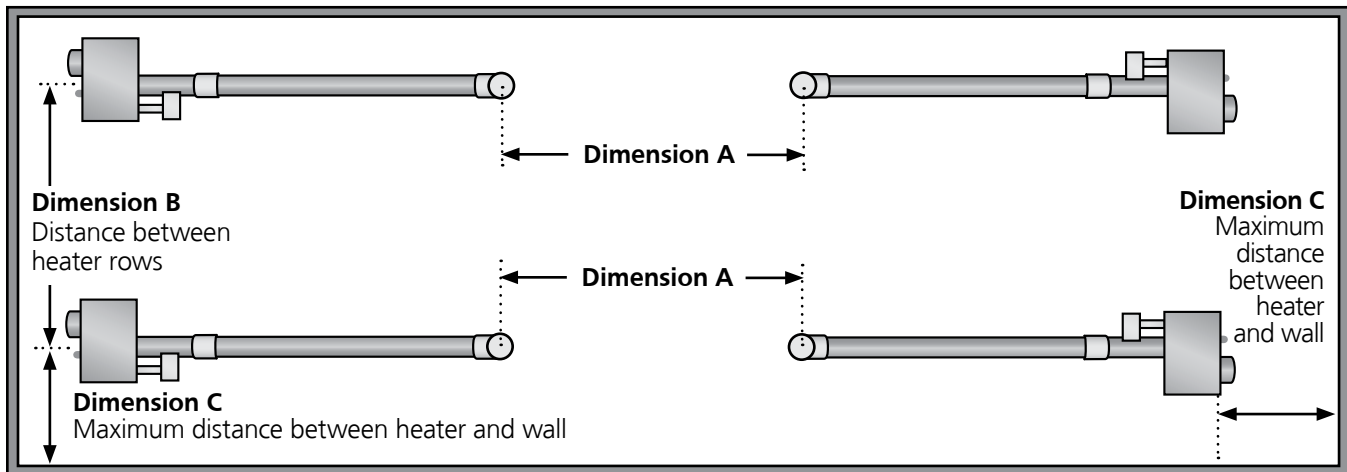
Model	BTU Range	Recommended Mounting Heights	Coverage Straight Config. (LxW)	Coverage U-Tube Config. (LxW)	Distance Between Heater Rows (Ft.) Dim. A	Distance Between Heater Rows (Ft.) Dim. B	Max. Distance Between Heaters and Wall (Ft.) Dim C
20 ft.	50 MBH	10' - 16'	20' x 12'	12' x 12'	10' - 20'	20' - 40'	16'
	75 MBH	12' - 20'	22' x 15'	12' x 12'	20' - 30'	30' - 50'	18'
30 ft.	100 MBH	13' - 20'	33' x 18'	N/A	20' - 30'	30' - 50'	20'
40 ft.	100-125 MBH	13' - 25'	44' x 21'	23' x 17'	20' - 30'	30' - 50'	20'
	150 MBH	16' - 30'	45' x 26'	24' x 20'	30' - 40'	40' - 60'	25'
50 ft.	150-200 MBH	16' - 30'	56' x 30'	N/A	30' - 40'	40' - 60'	25'
60 ft.	150-200 MBH	17' - 40'	67' x 34'	34' x 26'	30' - 40'	40' - 60'	25'

**NOTE:** Factory recommended mounting heights are listed as a guideline. If infrared heaters are mounted too low or too high, they may result in heat discomfort or lack of heat. It is generally recommended to

observe the recommended mounting heights to optimize comfort conditions. However, certain applications such as spot heating, freeze protection, outdoor patio heating, or very high ceilings may result in the heaters

being mounted outside of the factory recommended mounting heights. Clearances to combustibles **must** always be maintained.

Figure 2.3 - Recommended Mounting Heights and Distances - see chart above for dimensions.



## Models 7D837A thru 7D849A, 7D851A, 7AR79 thru 7AR88

### Hanger Placement and Suspension

Suspension of the heater must conform to applicable codes referenced in the Safety section and these instructions.

1. Lay radiant tubing out in the following order. Position tubes in their approximate locations. Figure 2.4.

- 10 ft. primary combustion chamber.
- Radiant emitter tubes.

**IMPORTANT!** 150 MBH models must use the 10 ft. titanium alloy treated combustion chamber as the first tube connected to the burner control box. The combustion chamber has an orange identification sticker located on the swaged end of the tube.

2. Mark locations for hanging points. Figure 2.4 Chart.

**NOTE:** If the available hanging points do not allow for the recommended spacing (or if an alternative hanging method is utilized) then additional hangers may be necessary.

- The spacing between the burner control box mounting brackets and the first hanger should be approximately 2'-4".
- The space between the first two hangers placed on the first tube should be approximately 8'-10".
- The space between hangers thereafter, one per tube, should be approximately 9'-8".

#### **WARNING**



Failure to maintain the published clearances to combustibles may result in fire and/or explosion, property damage, serious injury, or death. Always maintain clearances and post signs where needed.

#### **WARNING**



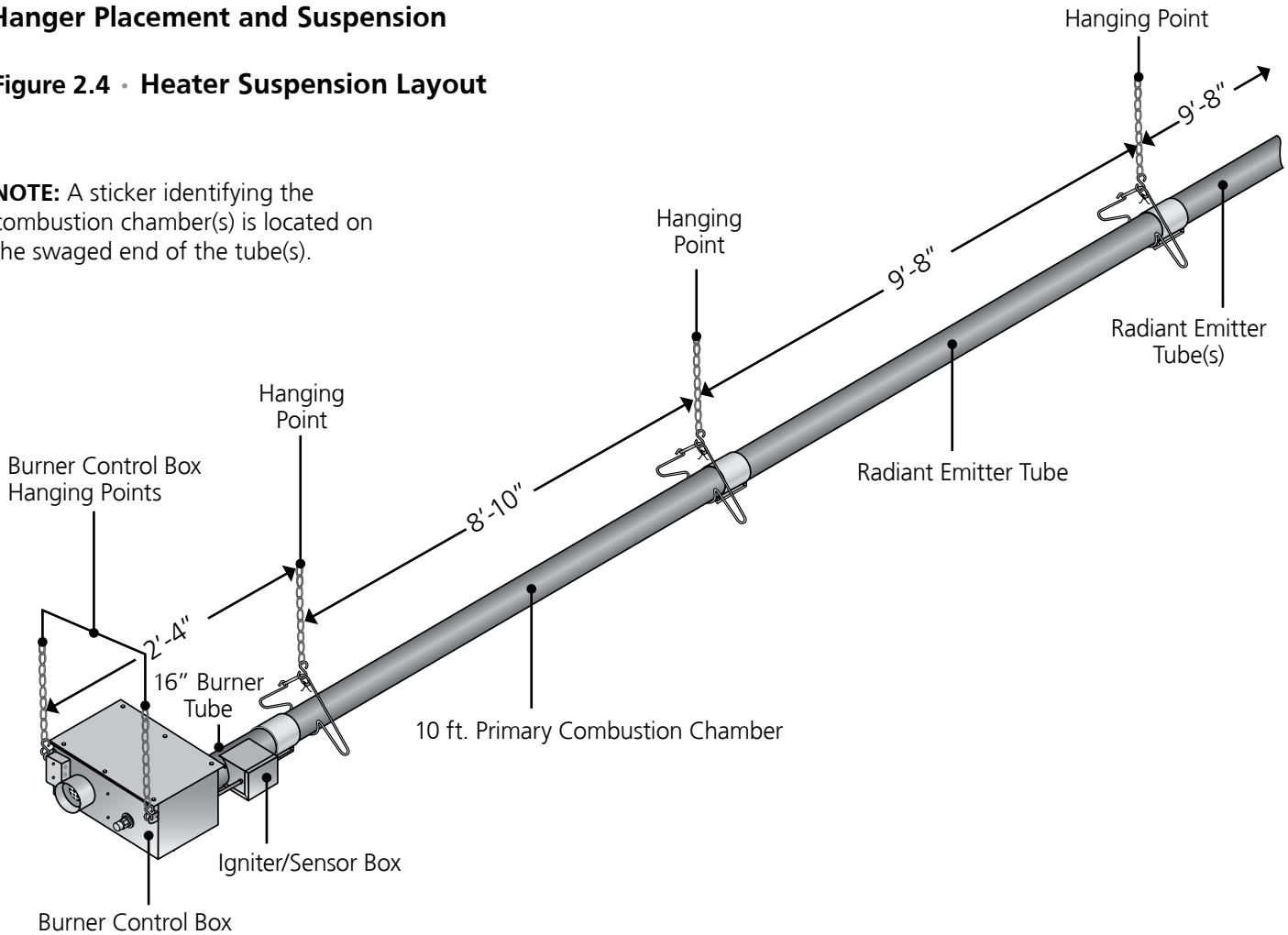
Improper suspension of the heater may result in collapse and being crushed. Always suspend the appliance from a permanent part of the building structure that can support the total weight and force of the heater.

# Dayton® Tube Heaters

## Hanger Placement and Suspension

Figure 2.4 • Heater Suspension Layout

**NOTE:** A sticker identifying the combustion chamber(s) is located on the swaged end of the tube(s).



## Heater Mounting Requirements and Weights

Model	Dimension Straight Config.	Hanging Points	Control Box Hanging Points	Shipping Weight	Chain Set Qty. Straight Config.	Chain Set Qty. U-Tube Config.	Optional Brass Knuckles (P/N: 5VD54)	Optional Single Mount Bracket (P/N: 5VD85) U Config. Only.
20 ft.	21'-8"	3	2	120 lbs.	5	6	3	2
30 ft.	31'-4"	4	2	160 lbs.	6	N/A	4	N/A
40 ft.	41'-0"	5	2	190 lbs.	7	8	5	3
50 ft.	50'-8"	6	2	235 lbs.	8	N/A	6	N/A
60 ft.	60'-4"	7	2	265 lbs.	9	10	7	4



## Models 7D837A thru 7D849A, 7D851A, 7AR79 thru 7AR88

### Heater Placement and Suspension

Suspension of the heater must conform to applicable codes referenced in the Safety section and these instructions.

3. Prepare the mounting surface. If necessary, weld blocks, drill holes, etc. Figure 2.5.

**NOTE:** The burner control box and radiant tubes should be in straight alignment and level.

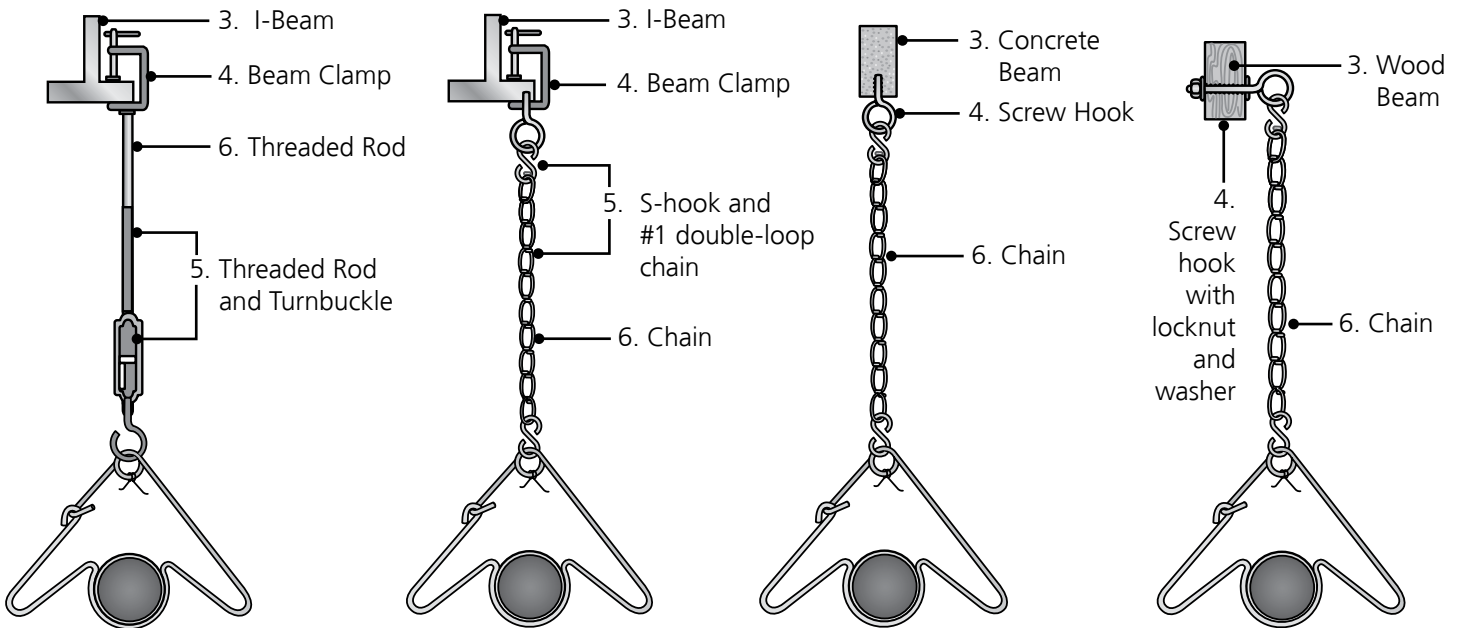
4. Fasten beam clamp, screw hook, or other type of suspension anchor to hanging point.

5. Attach and close S-hook and #1 double-loop chain to anchor. Check that it is securely attached.  
**NOTE:** Threaded rod and turnbuckles may be used.

6. Attach hangers to chains. Adjust chain lengths until radiant tubing is level and equal weight distribution is achieved.

**NOTE:** Chains must be straight up and down. Do not install chains at an angle as this can result in tube warpage or separation.

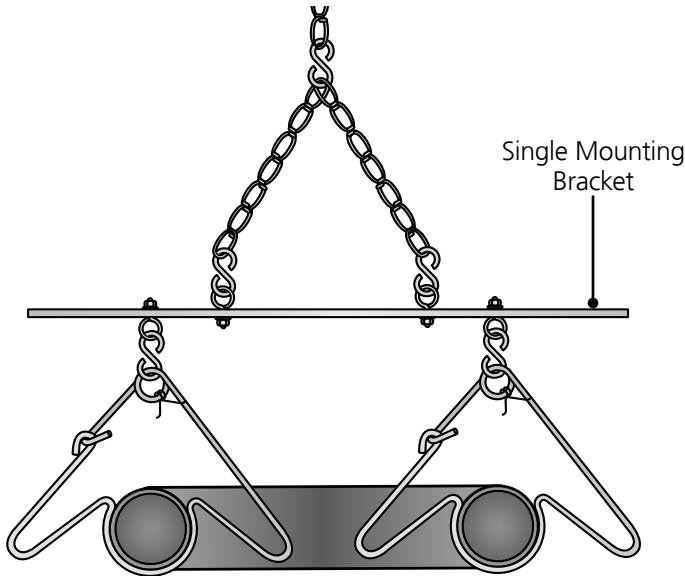
Figure 2.5 - Mounting the Hangers



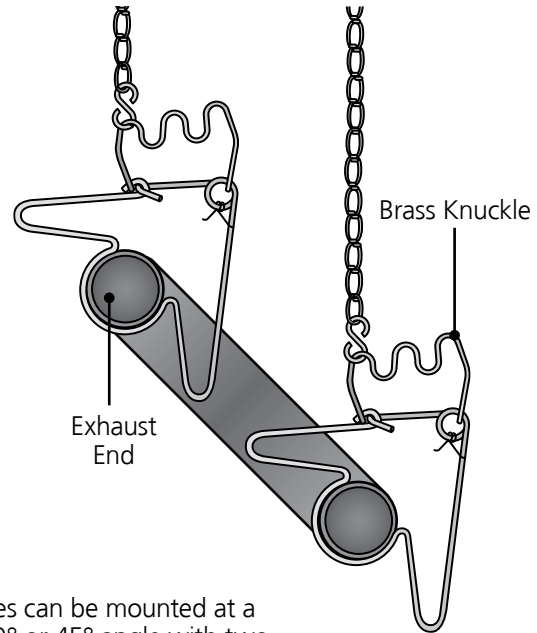
# Dayton® Tube Heaters

## Optional U-Bend or Elbow Accessory Configuration

Figure 2.6 • U-Tube Hanger Mounting Options

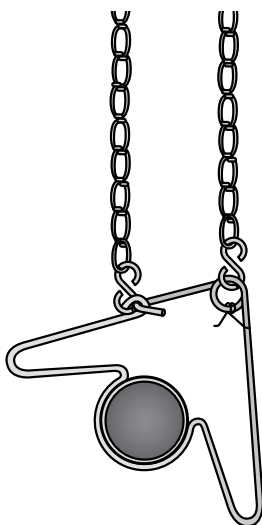


U-Tubes can be mounted from a single suspension point using a Single Mounting Bracket (P/N: 5VD85) with five S-hooks and #1 double-loop chains.

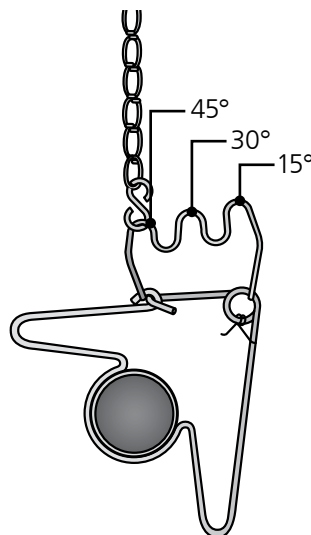


U-Tubes can be mounted at a 15°, 30° or 45° angle with two suspension points using two Brass Knuckle (P/N: 5VD54) fittings, #1 double-loop chains, and S-hooks.

Figure 2.7 • Angled Hanger Mounting Options



For 45° hanging angle, use two S-hooks and two #1 double-loop chains.



For variety of hanging angles, use the Brass Knuckle (P/N: 5VD54) fitting with a #1 double-loop chain and S-hook.

## Models 7D837A thru 7D849A, 7D851A, 7AR79 thru 7AR88

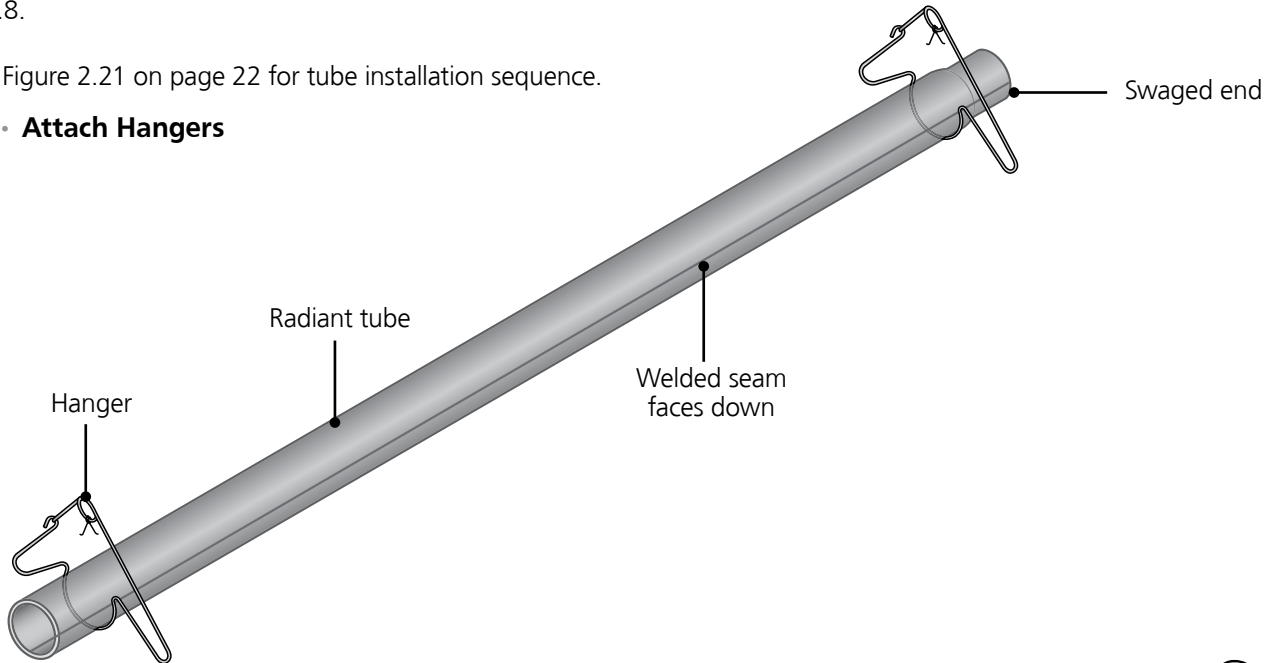
### Radiant Tube Assembly

#### To install the radiant tubes:

1. Place tubes in hangers with the welded seam facing downward and the swaged end of the tube towards the exhaust end of the heater system. Figure 2.8.

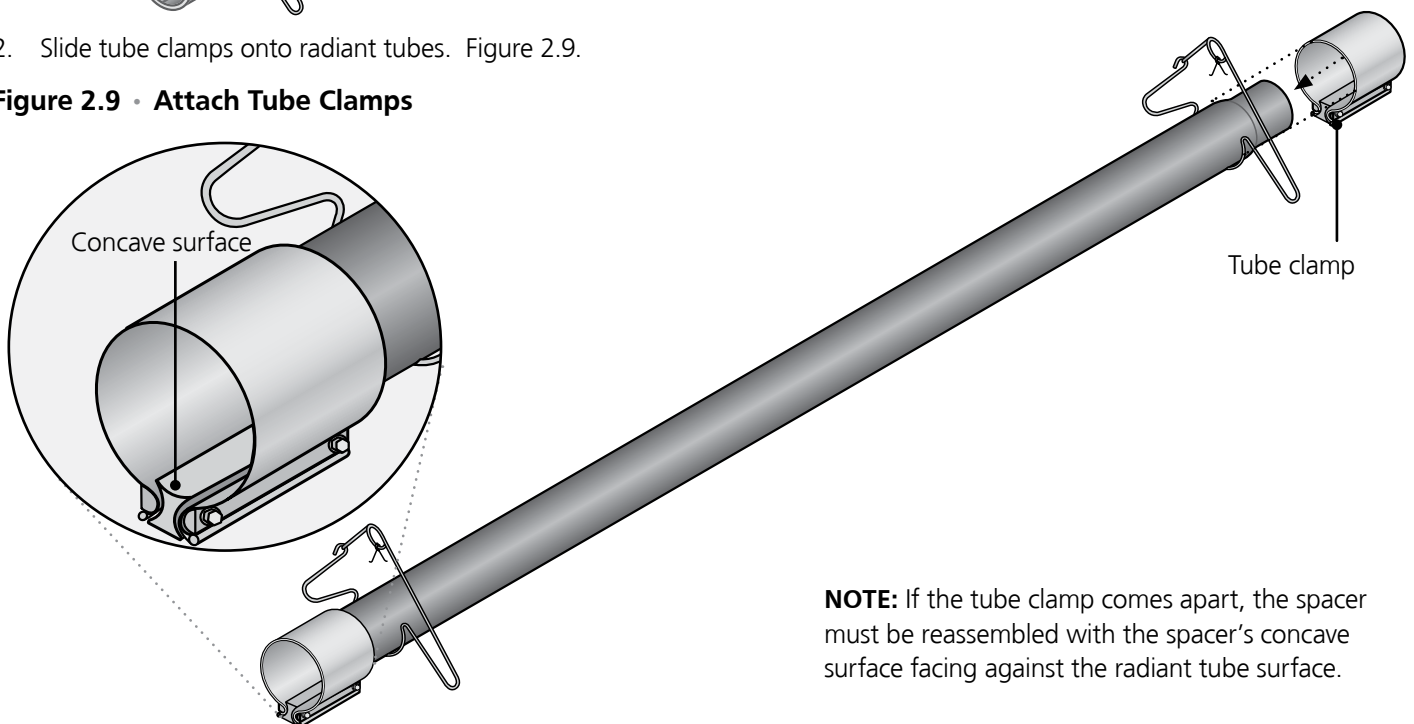
Refer to Figure 2.21 on page 22 for tube installation sequence.

**Figure 2.8 - Attach Hangers**



2. Slide tube clamps onto radiant tubes. Figure 2.9.

**Figure 2.9 - Attach Tube Clamps**



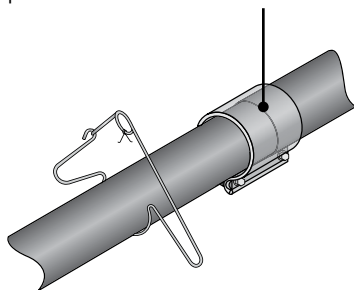
# Dayton® Tube Heaters

## Radiant Tube Assembly

- Slip-fit the radiant tube sections together until tightly connected (install swaged end of each tube towards exhaust end). **NOTE:** If it is difficult to mate the tubes, they may be installed incorrectly.
- Center tube clamps over the seams where two radiant tube sections connect. If necessary, rotate tube clamps so they will not interfere with the reflector end caps during expansion and contraction of the heater while operating.
- Tighten tube clamp bolts to secure. When proper compression is obtained (40-60 ft-lbs. torque), the tube seam will create a visible mark on the tube clamp. **NOTE:** Excessive torque may damage the tube clamp.
- Determine the location of the burner control box and note the placement of the mounting chains.

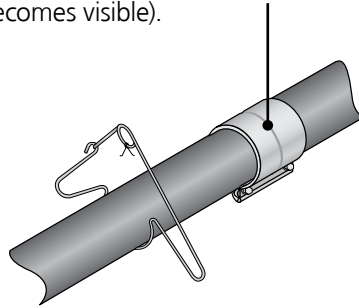
### Figure 2.10 • Tube Connections

Tubes fit snugly together and the tube clamp is centered over the seam.

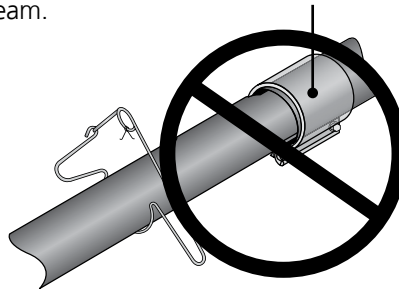


**Correct Tube Connection**

The tube clamp is tight when proper torque is achieved (normally when seam becomes visible).



Tubes are not fit snugly together and the tube clamp is not centered over the seam.



**Incorrect Tube Connection**

A 180° U-Bend or 90° accessory fitting may be installed in the radiant tube heater system.

Refer to chart on page 17 for minimum distance requirements from the burner control box.

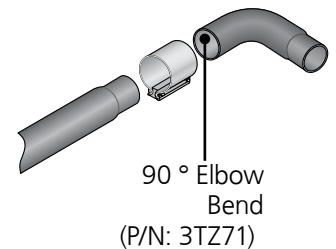
### When Installing a U-Bend or Elbow Accessory Fitting:

- The top clearance of an uncovered (no reflector) U-bend or elbow accessory fitting to combustibles is 18 inches.
- If operating the heater unvented, separate the intake air to the heater from its exhaust products a minimum of 4 feet. Further separation may be necessary. Combustion air may also be supplied.

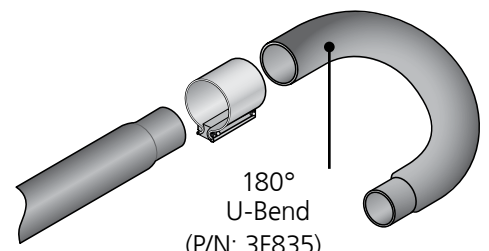
- A maximum of one 180° U-Bend or two 90° elbows can be installed on a heater.
- Omit one 36" section of turbulator baffle. Refer to Baffle Assembly section.

### Optional U-Bend or Elbow Accessory Configurations

#### Figure 2.11 • Optional Tube Connections



90° Elbow Bend  
(P/N: 3TZ71)



180° U-Bend  
(P/N: 3F835)

# Models 7D837A thru 7D849A, 7D851A, 7AR79 thru 7AR88

## Radiant Tube Assembly

Figure 2.12 • Elbow and U-Bend Clearances

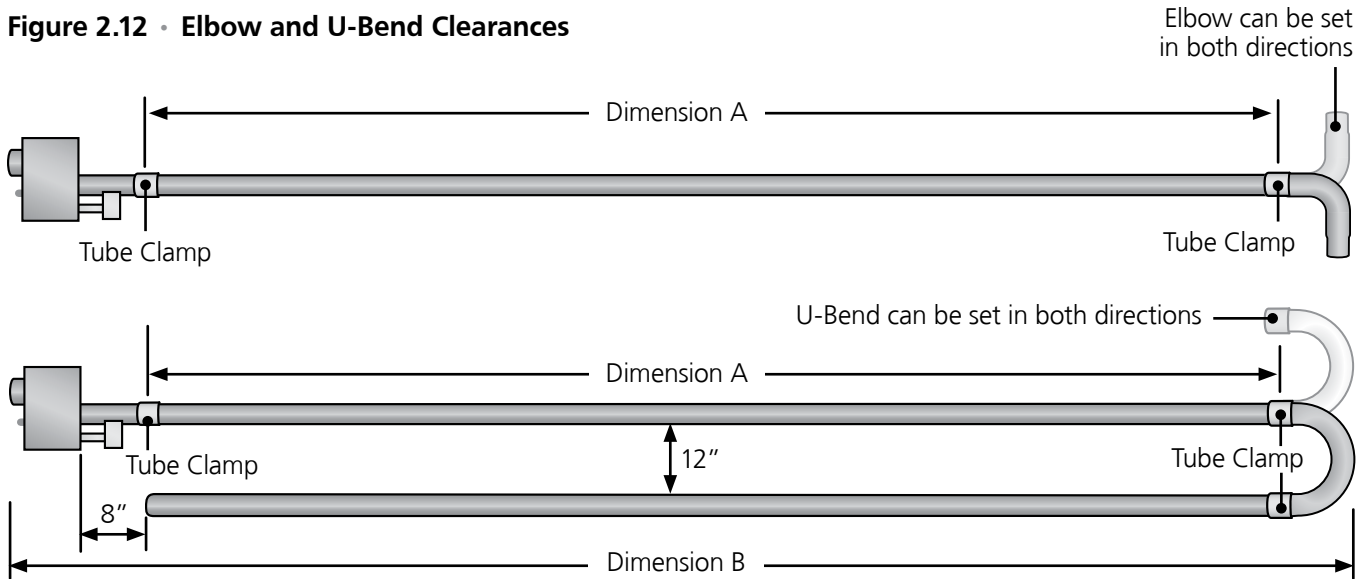
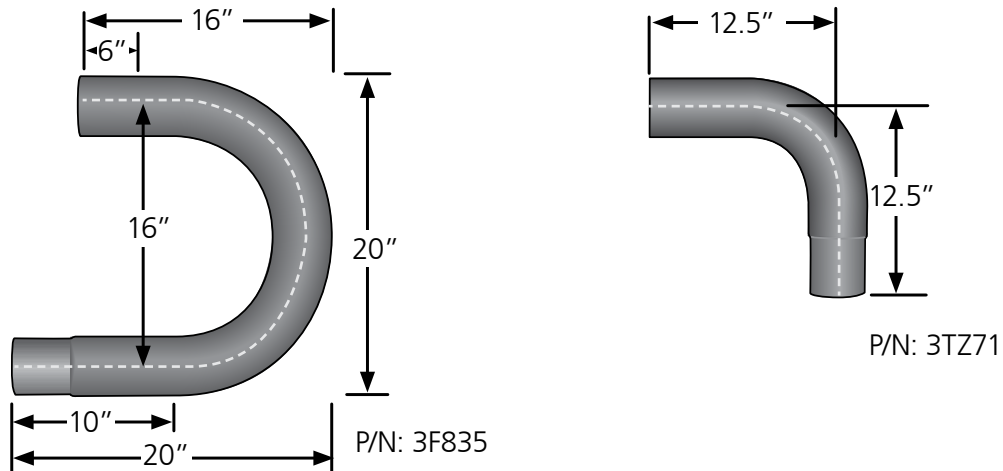


Figure 2.13 • U-Bend and Elbow Dimensions



### Minimum Distance from Burner Control Box to U-Bend or Elbow Accessory

Models	Dimension A
50-100 MBH	10 ft.
125 MBH	15 ft.
150-175 MBH	20 ft.
200 MBH	25 ft.

### Overall Dimensions for Heaters Configured with U-Bend (P/N: 3F835)

Model	Dimension B
20 ft.	13'-0"
30 ft.	N/A
40 ft.	22'-8"
50 ft.	N/A
60 ft.	32'-4"

# Dayton® Tube Heaters

## Burner Control Box Suspension

Suspending the burner control box must be done in accordance with applicable codes listed in the Safety section and these instructions.

The burner control box must be in straight alignment with the radiant tubes and level.

1. Determine the mounting chain locations for hanging the burner control box.
2. Fasten beam clamp, screw hook or other type of suspension anchor to hanging point.
3. Attach and close S-hook and #1 double-loop chain to anchor. Check that is securely connected.
4. Attach chain assemblies and S-hooks to mounting brackets on the burner control box. Adjust chain lengths until level and in straight alignment with the radiant tubes. The burner sight glass will be visible from the floor.

Figure 2.14 • Burner Control Box Assembly • Side View

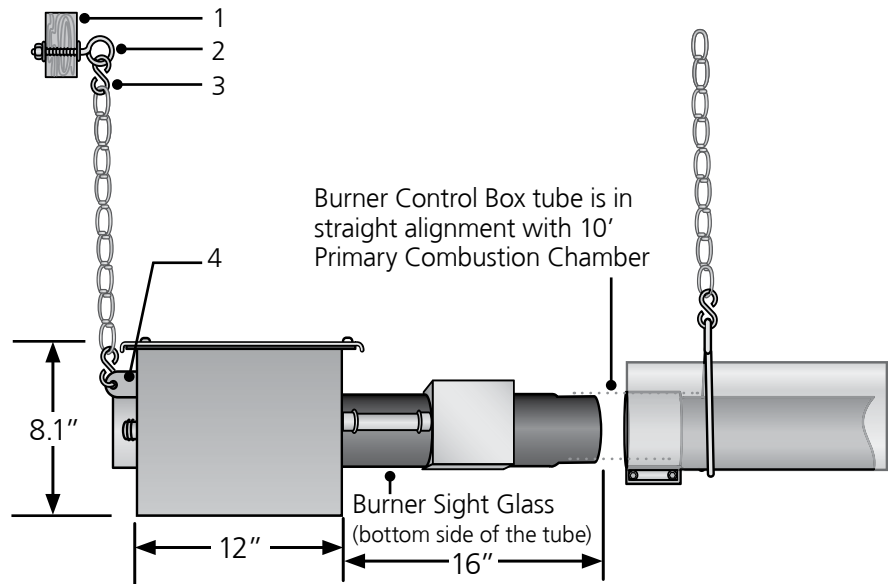
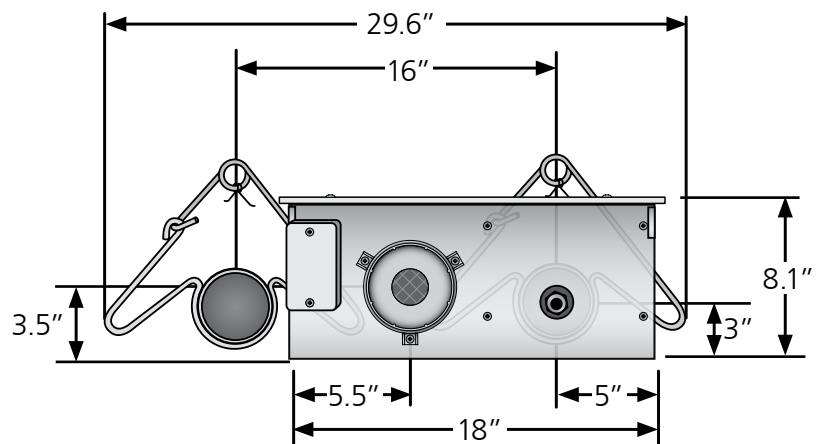


Figure 2.15 • Burner Control Box with U-Bend • End View



# Models 7D837A thru 7D849A, 7D851A, 7AR79 thru 7AR88

## Reflector Assembly

### To install the reflectors:

1. Attach reflector center supports onto radiant tubes.
2. Slide each reflector section through the hangers and adjust the reflector tension spring into the V-groove on the top of the reflector. The reflectors should overlap approximately 4".
3. To prevent the reflectors from shifting, secure the reflector sections together using sheet metal screws except at the expansion joint. Figure 2.21. **NOTE:** Installer to provide sheet metal screws.
4. Attach reflector end caps, with polished side inward, to each end of the reflector run.

Reflectors, and reflector accessories, direct infrared energy to the floor level. The reflector assembly depends on the heater configuration, proximity to combustibles and the space surrounding the heater.

Before you begin assembly, determine if the use of reflector accessories are necessary. Figure 2.18.

Figure 2.16 · Reflector Assembly

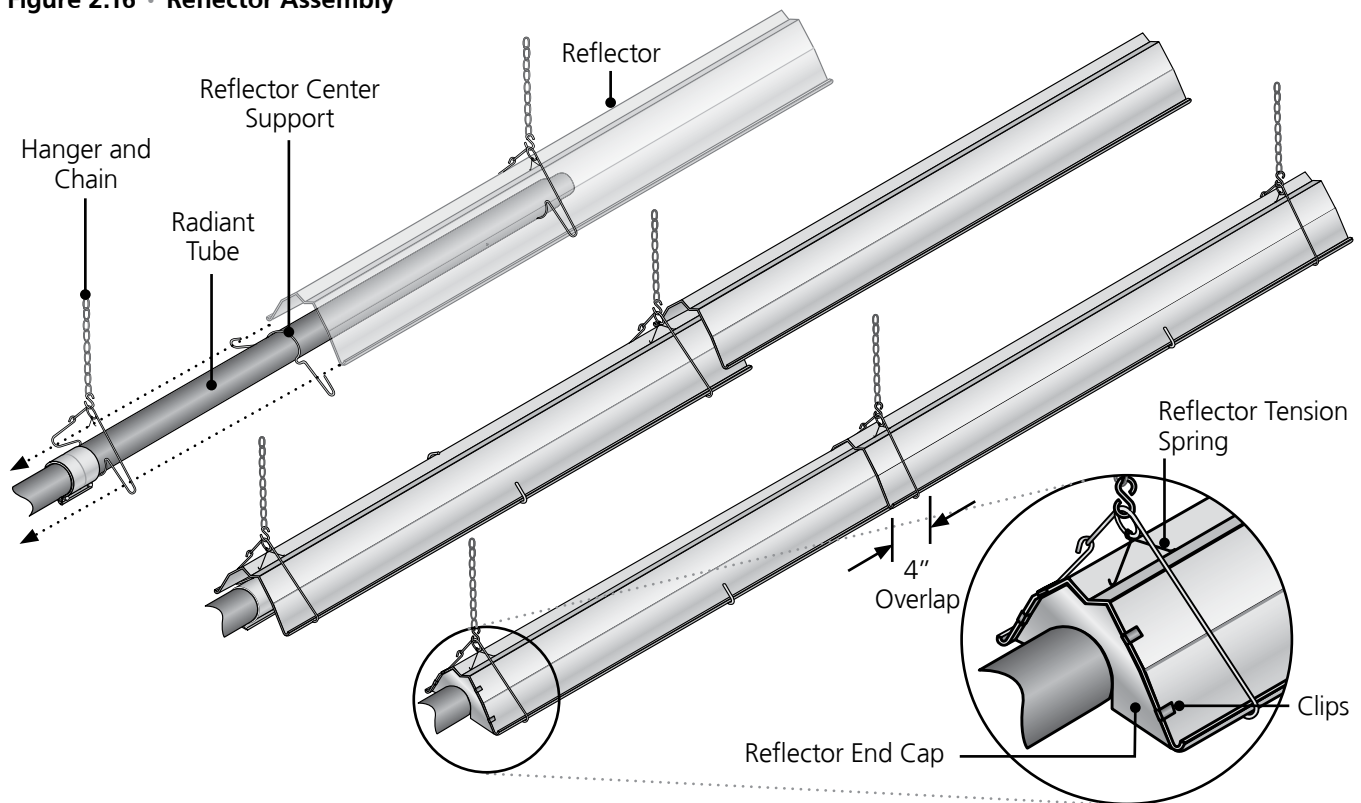
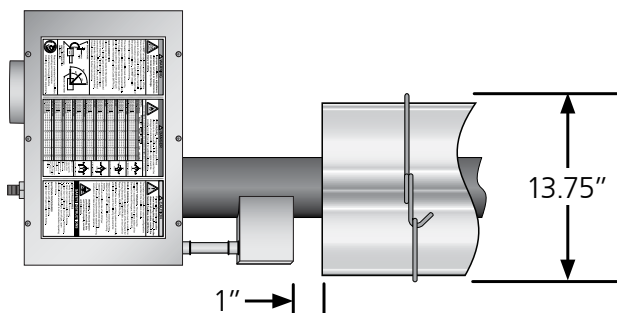


Figure 2.17 · Width of Installed Reflector - Top View



# Dayton® Tube Heaters

## Reflector Assembly

### Common Optional Accessories

Reflector Accessories	Description	Part #
Elbow Reflector*	90° bend, highly polished aluminum reflector elbow. Designed to fit atop one elbow accessory fitting.	5VD83
U-Reflector*	180° bend, highly polished aluminum reflector U-Bend. Designed to fit atop one U-Bend accessory fitting.	5VD84
Side Shield Reflector *^	Highly polished side shield extension used to direct infrared rays downward, away from side walls and combustibles.	SSE†

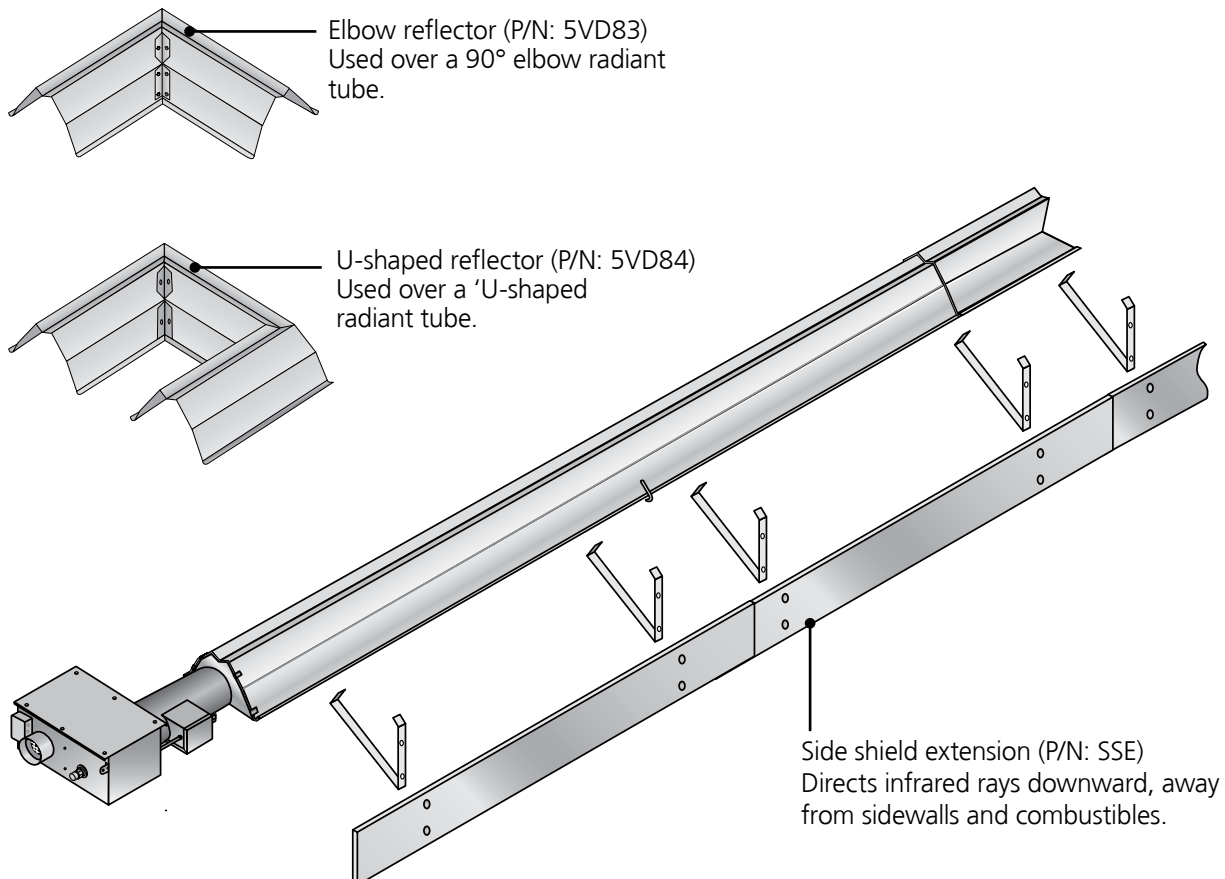
\* Reflectors cannot be rotated when used with this accessory.

^ Refer to the Clearances to Combustibles chart on page 7 for minimum distances to combustibles when side shield extension(s) are used.

† Accessory is available through Grainger Sourcing.

Additional accessory options are available in the W.W. Grainger catalog.

**Figure 2.18 • Reflector Shield Accessories**



## Models 7D837A thru 7D849A, 7D851A, 7AR79 thru 7AR88

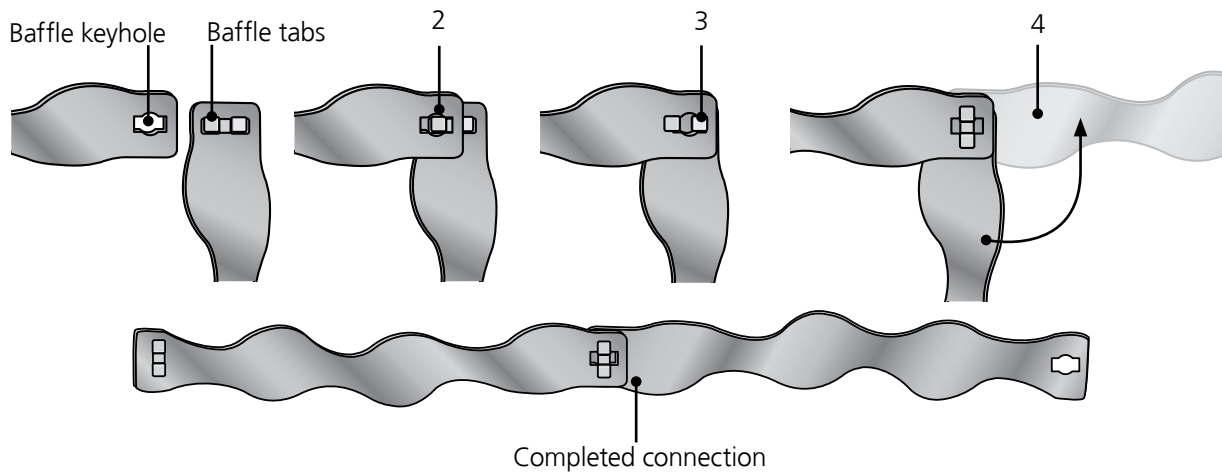
### Baffle Assembly and Placement

**To assemble the baffles:**

**NOTE:** Baffles may be inserted into the tube while being assembled.

1. Determine the number of baffles needed for your model number. Remove one 36" baffle section if heater is installed with an elbow or U-Bend accessory.
2. Install the baffle tabs at a 90° angle to the baffle keyhole. Figure 2.19.
3. Insert one baffle tab into keyhole and slide completely to one side until both baffle tabs appear in the keyhole.
4. Adjust the tabs to the center of the keyhole and rotate the baffle 90° to lock the baffle sections together.
5. Repeat this process with remaining baffle sections to complete assembly.

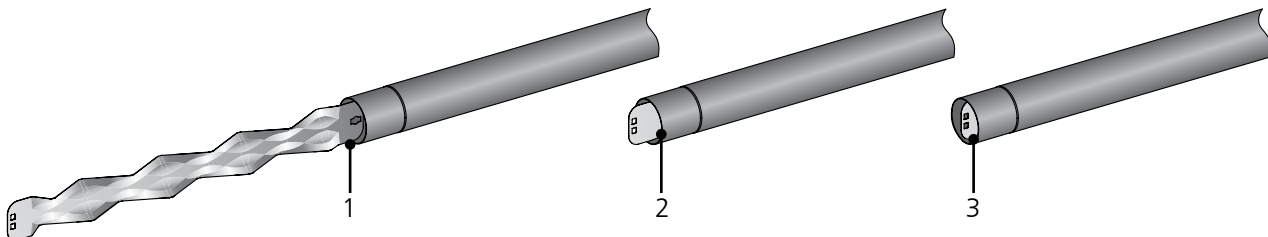
**Figure 2.19 • Assembling the Baffles**



**To insert the baffles:**

1. Insert baffles with the keyhole end first.
  2. Rotate baffle assembly so that it is in the vertical position.
  3. Slide baffle assembly into the last radiant tube section, furthest from burner control box.
- NOTE:** Baffle assemblies longer than 10' will continue to be fed into next tube section.

**Figure 2.20 • Inserting the Baffles**



**IMPORTANT:** Baffle assembly must be flush with the end of the last tube section and in the vertical position.

# Dayton® Tube Heaters

## Final Heater Assembly

### NOTICE

Different inputs and models utilize different baffle lengths. Remove all enclosed baffle sections from box and retain with applicable heater. Reference shipping label for proper baffle size.

Each 36" baffle section must be assembled with other baffles and placed in the radiant tube section furthest from the burner. Important: Omit one section of baffle if heater is configured with a U-Bend or Elbow accessory fitting.

Figure 2.21 • Secured Reflector Joints and Baffle Location



## Models 7D837A thru 7D849A, 7D851A, 7AR79 thru 7AR88

### Venting

#### **WARNING**



Gas-fired heaters must be vented. A built in power exhauster is provided. Additional external power exhausters are not required or permitted.

Insufficient ventilation and/or improperly sealed vents may release gas into the building which could result in health problems, carbon monoxide poisoning, or death. Improper venting may result in fire, explosion, injury, or death.

#### **WARNING**

**Do not** vent this appliance into another heater's vents or through a masonry chimney.

**Do not** use dampers in the heater vent pipe.

Single wall vent pipe must not pass through any unoccupied attic, inside wall, concealed space, or floor.

Un-insulated single wall vent pipe must not be used outdoors for venting appliances in regions where winter design temperature is below freezing.

The heating system must be vented as described here to properly direct flue gases from the unit to the outside atmosphere. The venting can terminate vertically through the roof (up) or horizontally through a sidewall (sideways).

Follow these guidelines and all applicable codes for all models prior to installing the vent material. Local codes may vary.

In the absence of local codes:

**United States:** Refer to NFPA 54/ ANSI Z223.1 (latest edition), National Fuel Gas Code.

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

### Replacing Existing Equipment

If the heater is replacing existing equipment and using an existing vent system, inspect the venting for proper size and horizontal pitch as directed in these instructions and the latest edition of the National Fuel Gas Code, ANSI Z223.1 (NFPA 54) or CSA B149.1 Installation Code. When an existing Category I heater is removed or replaced, the original venting system may no longer be sized to properly vent the attached appliances.

Determine that there is no blockage or restriction, leakage, corrosion, or other deficiencies that can cause hazards. The vent pipe should be corrosion-resistant galvanized steel of a thickness that meets the National Fuel Gas Code. Minimum thickness for connectors varies depending on the pipe diameter. Never vent the heater with PVC or plastic pipe.

#### **WARNING**



If replacing an existing heater, vents may require re-sizing. Improperly sized venting systems can result in vent gas leakage or condensation. Refer to the National Fuel Gas Code ANSI Z223.1 (NFPA 54) or CSA B149.1 - latest edition. Failure to follow these instructions can result in serious injury or death.

# Dayton® Tube Heaters

## General Venting Requirements

The venting system may terminate horizontally through a sidewall or vertically through the roof, and may be individually or commonly vented. Configuration of the vent termination determines the category type. All model heaters must be installed in accordance with the requirements of this section, as well as the requirements of its category determination, as described in this manual. To determine your applications category type, review "Vertical Venting (Category I)" and "Horizontal Venting (Category III)" sections of this manual.

## All Model Requirements

- Exhaust vent pipe must be 4 inch nominal size unless common venting. For vent pipe sizes when common venting, see pages 27-28.
- Use vent pipe material that is corrosion-resistant galvanized steel of a thickness that meets the National Fuel Gas Code.
- Do not exceed a maximum vent length of 20 feet.
- Maintain a minimum vent length of 3 feet.
- Maintain a minimum of 12 inches of straight pipe from the flue outlet before any directional changes are made in the venting system.
- Have all vent pipe seams or connectors sealed with high temperature silicone sealant approved for at least 550°F (field supplied) and fastened together with at least three (3) corrosion resistant sheet metal screws (field supplied).
- Maintain a 6 inch clearance around all single wall vent pipe from any combustible materials. For double-wall type B vent or Duravent PVP venting, follow the vent manufacturer's clearances to combustibles.
- The equivalent length for a 4 inch 90° elbow is 5 feet.
- Avoid using more than two 90° directional changes in the venting system.
- Suspend and secure all horizontal runs in a manner consistent with local codes and in such a way that the vent system is supported to prevent sagging.
- Vent termination must maintain a minimum distance of 6 feet from any mechanical air supply inlet.
- The vent terminal must be installed to prevent any blockage by snow and protect building material from degradation by flue gases.
- Consult NFPA ANSI Z223.1 Gas Vent Termination criteria for vents that terminate on a roof pitch that exceeds 9:12.
- **Canada:** Vents must terminate a minimum of 3 feet from a window or door that may be opened, and a non-mechanical air supply inlet or combustion air inlet into the building.

When possible, avoid venting through an unconditioned space. Venting through an unconditioned space promotes condensation. When venting through an unconditioned space is unavoidable, or if the unit is installed in an area that is prone to condensation, insulate venting runs greater than 5 feet to minimize the production of condensation. Inspect for leakage prior to insulating the venting and only use insulation that is non-combustible with a temperature rating of not less than 550°F. Install a tee fitting at the low point of the vent system and provide a drip leg with a clean out cap as shown in Figure 2.22.

When venting pipe passes through a combustible interior wall or floor, a metal thimble with a diameter 4 inches greater than the vent pipe diameter must be used. If there is 6 feet or more of vent pipe prior to passing through the combustible wall or floor, then the metal thimble need only be 2 inches greater than the vent pipe diameter. If a metal thimble is not used, all clearances to combustibles from the vent pipe must be 6 inches. When permitted, type B vent or Duravent PVP venting may be used for the last section of vent pipe to reduce the required clearances to combustibles when passing through a combustible wall or floor. When using type B vent or Duravent PVP venting, follow the manufacturer's recommended clearances to combustibles. Any material used to close or insulate the opening must be non-combustible.

## Models 7D837A thru 7D849A, 7D851A, 7AR79 thru 7AR88

### Vertical Venting (Category I)

An appliance that operates with a non-positive vent static pressure and with a vent gas temperature that avoids excessive condensate production in the vent is said to be 'Category I'. The heater is considered a Category I appliance if the venting system meets all of the following criteria:

- The vent system terminates vertically (up).
- The length of the horizontal portion of the vent run is less than 75% of the vertical rise length. (e.g.- If the vertical vent height is 10 feet, the horizontal run is less than 7 1/2 feet).
- The vent terminates a minimum of 5 feet above the vent connection on the unit.
- Horizontal venting sections of the vent pipe must be installed with an upward slope from the appliance at a pitch of 1/4 inch per foot.

For vertical vent termination, the venting must comply with all parts of this section, in addition to the requirements of the general venting.

Category I (Vertical) venting is venting at a non-positive pressure. An appliance vented as a Category I is considered a fan-assisted appliance and the vent system does not have to be 'gas tight'. It is recommended that the venting system is installed with a tee, drip leg, and clean-out cap as shown in Figure 2.22.

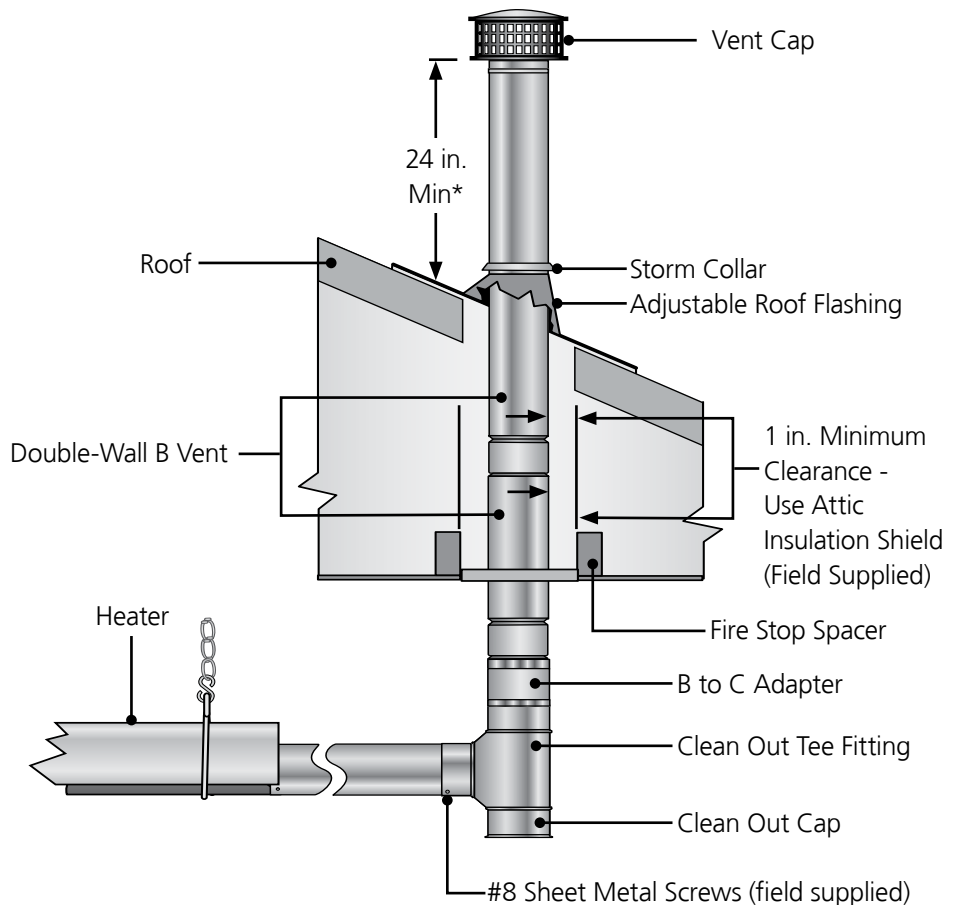
### Vent Locations and Clearances:

- Separate air intake duct from vent pipe by a minimum of 4 feet by placing vent pipes higher than adjacent air intake ducts.
- Utilize a listed type B vent termination cap.
- The vent terminal must extend a minimum of 2 feet above the roof.
- Vent caps should be located a minimum of 2 feet away from adjoining structures.

All vertically vented heaters that are Category I must be connected to a chimney or vent complying with a recognized standard, or lined masonry (or concrete) chimney with a material acceptable to the authority having jurisdiction. Venting into an unlined masonry chimney is not permitted. Refer to the National Fuel Gas Code and page 24 of this manual.

Use a listed vent terminal to reduce down drafts and moisture in the vent.

Figure 2.22 - Rooftop Venting - Side View



\*Consult the NFPA ANSI Z223.1 Gas Vent Termination criteria if roof pitch exceeds 9:12

# Dayton® Tube Heaters

## Horizontal Venting (Category III)

An appliance that operates with a positive vent static pressure and with a vent gas temperature that avoids excessive condensate production in the vent is said to be "Category III". The heater is considered a Category III appliance if the venting system meets all of the following criteria:

- The vent system terminates horizontally (sideways).
- The vent terminates vertically, but the length of the horizontal portion of the vent run exceeds 75% of the vertical rise length. (e.g.- If the vertical vent height is 10 feet, the horizontal run is greater than 7 1/2 feet).
- The vent terminates below 5 feet of the vent connection on the unit.
- Horizontal venting sections of the vent pipe must be installed with a downward slope from the appliance at a pitch of 1/4 inch per foot.

Vent enclosed spaces and buildings according to the guidelines in this manual and applicable national, state, provincial, and local codes.

The venting system must be provided by the installer and should be comprised of single-wall venting materials with a thickness of no less than 26 gauge. All joints must be sealed with a high temperature silicone sealant approved for at least 550°F using a minimum bead of 1/4" x 1/4", and fastened with at least three corrosion resistant #8 sheet metal screws evenly spaced.

One continuous section of double-wall B vent or Duravent PVP vent may be used to pass through a combustible wall or barrier, or the installer may continue to use single-wall vent provided a combustible wall thimble is used which provides adequate clearances to combustibles.

All horizontal Category III vents must be terminated with a Simpson-Duravent sidewall vent cap (P/N: SWD-4 for 4" venting and P/N: SWD-6 for 6" venting).

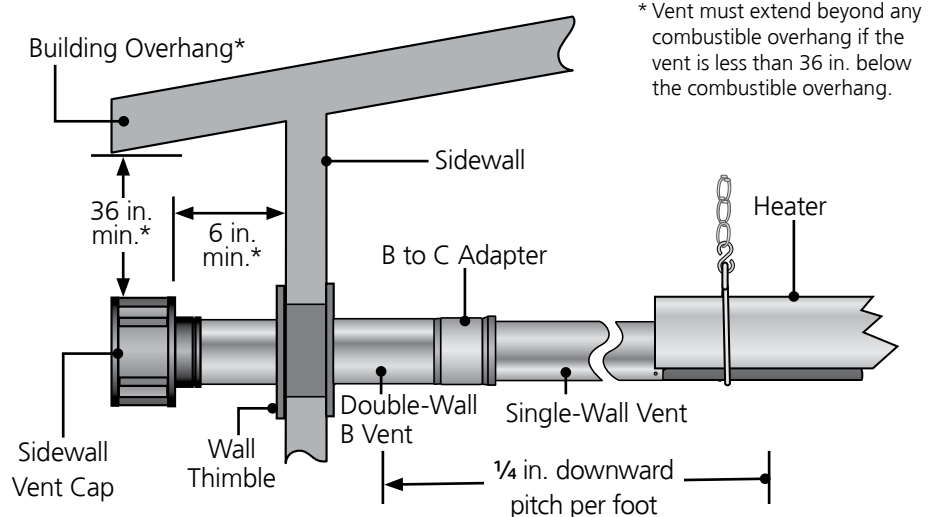
**IMPORTANT!** Once all silicone sealant has fully cured according to manufacturer's instructions, the installer must perform a leak test on the complete venting system. A solution of soap and water may be used to test the venting inside the occupied space. Once the installer has verified the venting system is completely sealed and free of leaks, the heater may be placed into operation.

## Vent Locations and Clearances:

- Vent must terminate a minimum of 4 feet below, 4 feet horizontally from, or 1 foot above any window or door that may be opened or gravity air inlet into the building.
- Vent must terminate a minimum of 3 feet above any forced air inlet that is located within 10 feet.
- The bottom of the vent terminate must be located a minimum of 12 inches above grade level and must extend beyond any combustible overhang. Vents adjacent to public walkways must terminate a minimum of 7 feet above grade level.
- The vent cap must be a minimum of 6 inches from the sidewall of the building.
- Vent must be a minimum of 36 inches below or extend beyond any combustible overhang.

Never join two sections of double wall vent pipe within one horizontal vent system as it is impossible to verify that inner pipes are completely sealed.

**Figure 2.23 - Sidewall Venting Requirements**



## Models 7D837A thru 7D849A, 7D851A, 7AR79 thru 7AR88

### Common Venting (Category I)

The common vent system and all attached appliances must be Category I and must be on the same control device.

The vent connector should be routed in the most direct route from the units to the common vent.

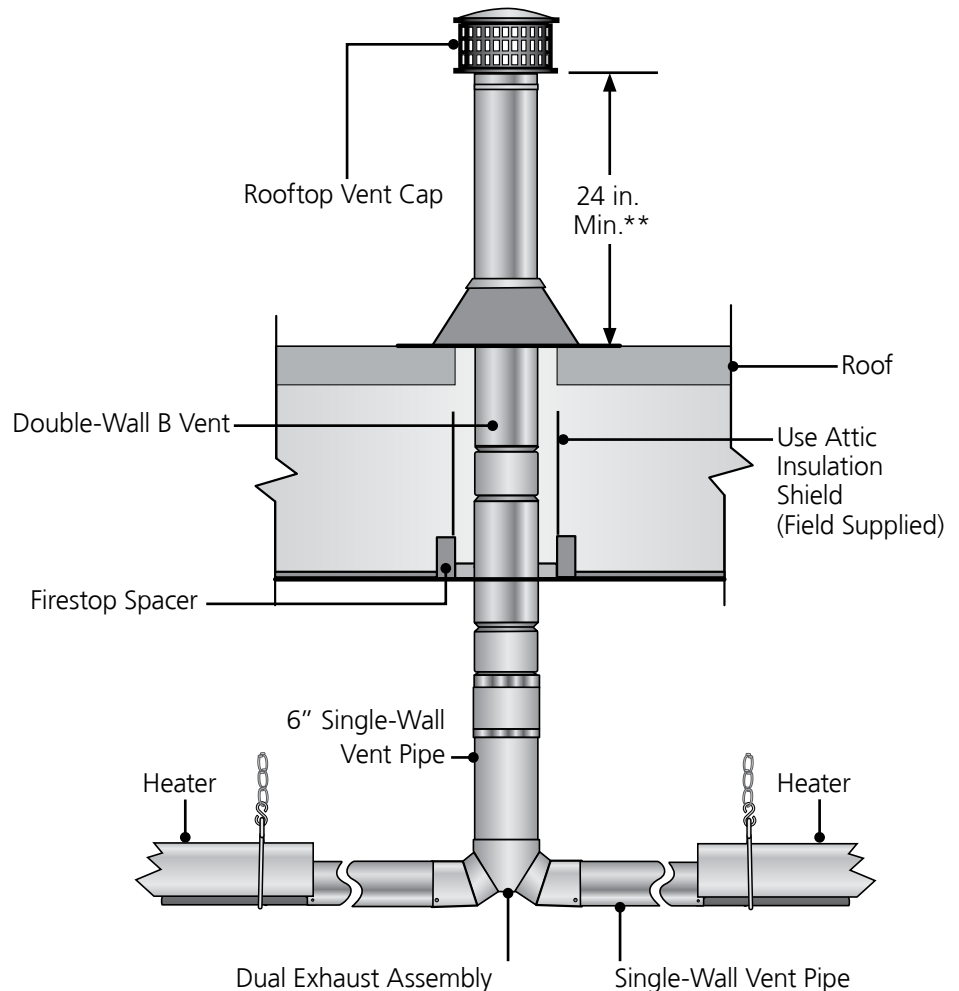
Where two or more vent connectors enter a common gas vent or chimney flue, the smaller connector shall enter at the highest level consistent with the available head room or clearance to combustible material.

Restrictions within the common vent such as elbows should be minimized. Each elbow installed within the common portion of the vent carrying system reduces the maximum common vent capacity by 10%. Refer to NFPA 54 IFEC tables 11.2 and 11.3 for capacity.

The vent connector capacities allow for the use of two 90° directional changes. For each additional required elbow, the vent connector capacity is reduced by 10%.

The common vent cross sectional area must be equal to or greater than the largest vent connector cross sectional area.

Figure 2.24 • Common Rooftop Venting - Side View



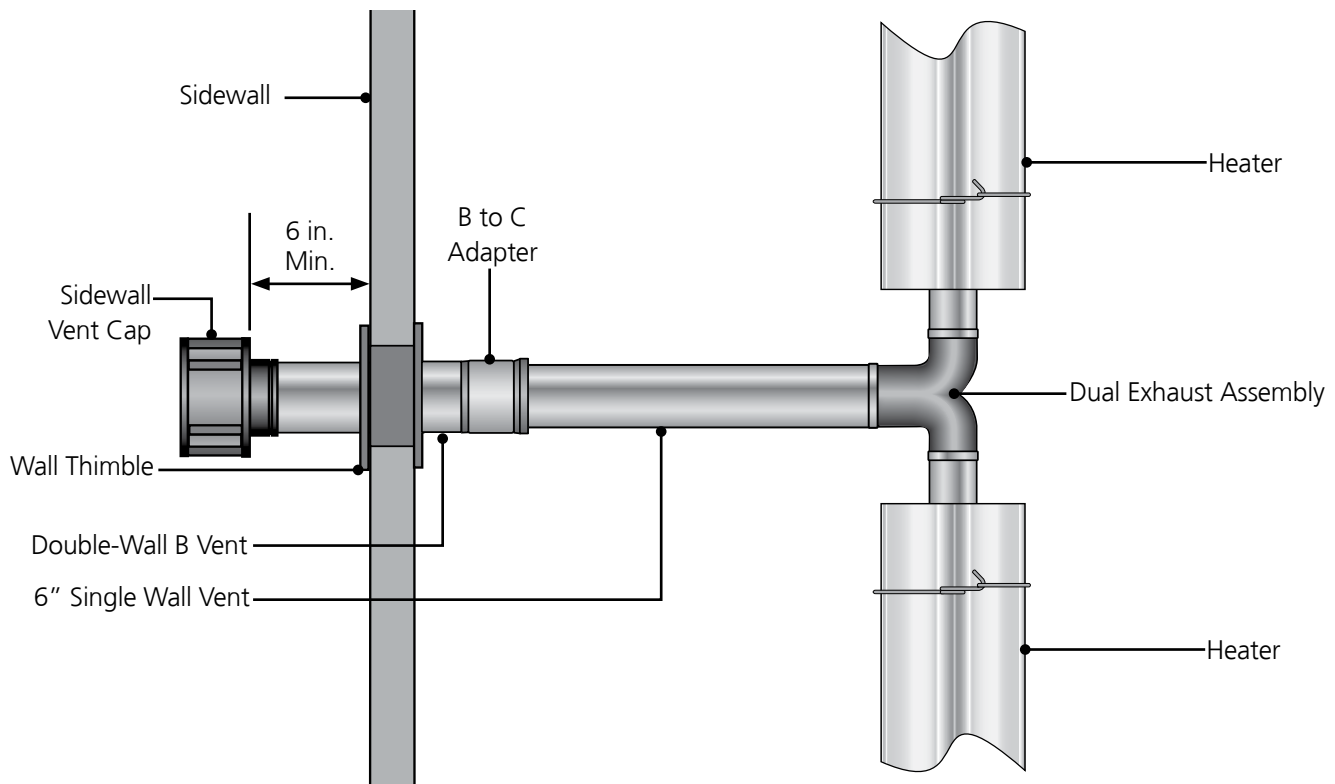
\*\*Consult the NFPA ANSI Z223.1 Gas Vent Termination criteria if roof pitch exceeds 9:12.

# Dayton® Tube Heaters

## Common Venting (Category III)

- A staggered arrangement or a dual exhaust assembly (P/N: Y) must be used when joining two heaters to a common vent so that by-products of one heater do not flow into the adjoining vent of the other heater.
- A Category III appliance may be common vented **only if** the appliances are on the same control device so that they may only be operated at the same time to prevent the backflow of exhaust gases into a non-operational appliance. The venting system must follow all guidelines for Category III venting as listed on page 26.
- 6" diameter double-wall type B-vent and 6" vent cap (P/N: SWD-6) must be used.
- The vent connector should be routed in the most direct route from the units to the common vent.
- Where two or more vent connectors enter a common gas vent or chimney flue, the smaller connector shall enter at the highest level consistent with the available head room or clearance to combustible material.
- Restrictions within the common vent such as elbows should be minimized. Each elbow installed within the common portion of the vent carrying system reduces the maximum common vent capacity by 10%. Refer to NFPA 54 IFEC tables 13.2(a) through 13.2(e) for capacity.
- The vent connector capacities allow for the use of two 90° directional changes. For each additional required elbow, the vent connector capacity is reduced by 10%.
- The common vent cross sectional area must be equal to or greater than the largest vent connector cross sectional area.

Figure 2.25 • Common Sidewall Venting - Top View



## Models 7D837A thru 7D849A, 7D851A, 7AR79 thru 7AR88

### Optional Unvented Operation

**! WARNING**

**Not for residential use.**

The use of unvented tube heaters in residential indoor spaces may result in property damage, serious injury, or death. Use unvented operation in commercial and industrial installations with proper ventilation rates only.

#### When installing in an unvented configuration:

- A factory vent cap/diffuser (P/N: 3F839) must be used.
- Where unvented heaters are used, natural or mechanical means must be provided to supply and exhaust a minimum of 4 CFM/1,000 BTU/h input of installed heaters.

**NOTE:** Gravity or mechanical means may be used to accomplish the air displacement. Local codes may require that the mechanical exhaust system be interlocked with the electrical supply line to the heaters, enabling both to function simultaneously.

- The minimum clearance between the air intake and the exhaust terminal is 4 feet.

**NOTE:** When installing in a U-tube configuration, use extra caution to separate vent gases from heater intake.

- Exhaust openings for removing the flue products must be located above the level of the heater(s).

Figure 2.26 · Minimum End Clearance for Unvented Heater



# Dayton® Tube Heaters

## Combustion Air Requirements

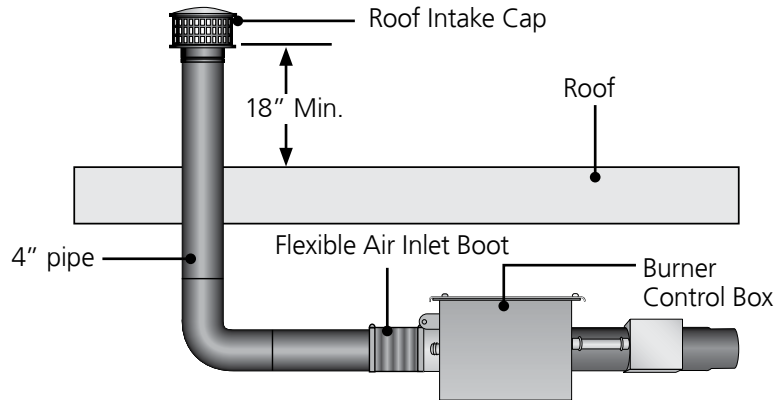
### NOTICE

This heater has a factory preset air orifice for proper combustion air supply. If using combustion air intake from indoors, the required volume of the space must be a minimum of 50 ft<sup>3</sup>/1000 BTU/h of installed heater input unless the building is of unusually tight construction. If the building has air infiltration rates of less than 0.40 air changes per hour, outside combustion air is typically needed unless the sheer size of the building allows otherwise.

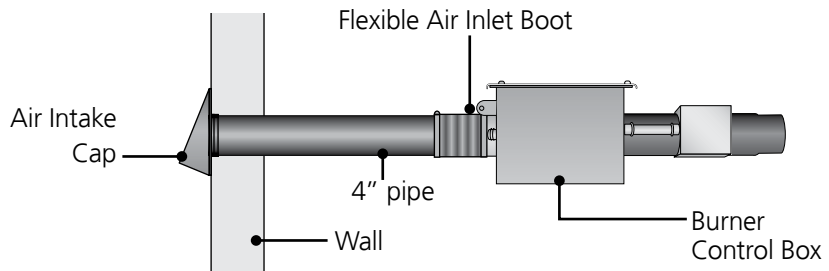
Non-contaminated air for combustion must be ducted to the heater if chlorinated or fluorinated contaminants, high humidity, and other contaminants such as sawdust or welding smoke are present in the area where the heater is installed, or if the building has a negative pressure.

Combustion air intake may be located on either the sidewall or the roof. Figures 2.27 - 2.29.

**Figure 2.27 · Vertical Outside Air Supply for Single Heater Side View**

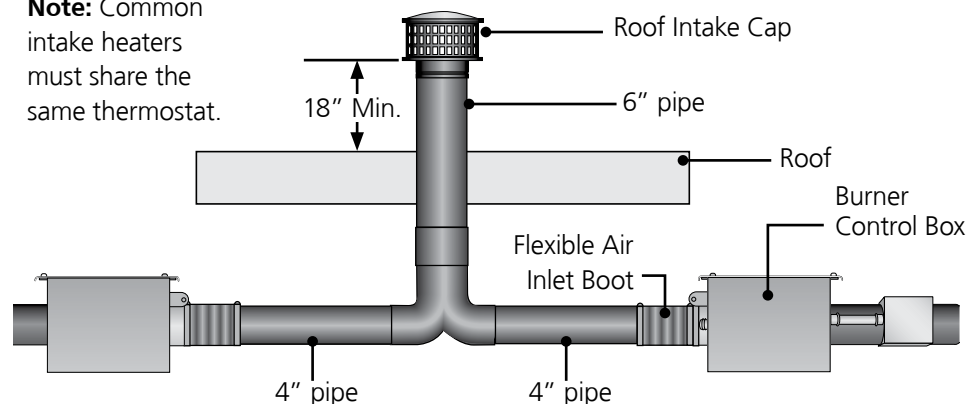


**Figure 2.28 · Horizontal Outside Air Supply for Single Heater Side View**



**Figure 2.29 Vertical Outside Air Supply for Common Heater · Side View**

**Note:** Common intake heaters must share the same thermostat.



## Models 7D837A thru 7D849A, 7D851A, 7AR79 thru 7AR88

### Combustion Air Requirements

#### Guidelines:

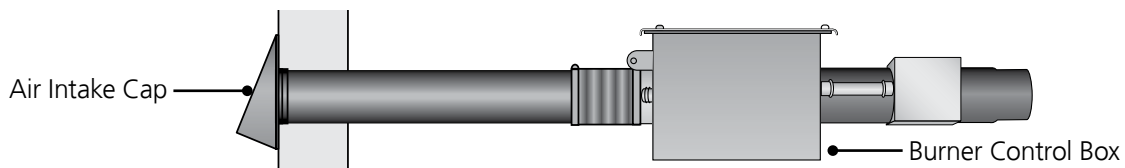
#### General Requirements

- No more than two 90° elbows are allowed.
- Allow for expansion. Use a 4" flexible hose to connect the duct to the burner control box.
- Do not draw air from attic space.
- In humid environments, use insulated duct, PVC pipe, or DWV (drain waste vent) to prevent condensation on the outer surface.
- Separate air intake duct from vent pipe a minimum of 4'. Also, place pipe higher than adjacent air intake duct.
- A factory approved wall intake cap (P/N: 3F837) must be used with horizontal outside intake ducts. The wall intake cap (P/N: 3F837) must be installed to prevent blockage. Locate the intake where dirt, steam, snow, etc. will not contaminate or clog the intake screen.

#### Limitations for length and size of combustion air intake duct

Single Heater Intake		Dual Heater Intake	
Air Intake Duct Size	Max. Intake Length	Duct Size	Max. Intake Length
4 in.	20 ft.	4 in.(single)/6 in.(dual)	20 ft.
5 in.	30 ft.	4 in.(single)/8 in.(dual)	30 ft.
6 in.	40 ft.	Consult factory for longer intake lengths.	


Figure 2.30 • Combustion Air Intake



# Dayton® Tube Heaters

## Gas Supply

**⚠ WARNING**





Improperly connected gas lines may result in fire, explosion, poisonous fumes, toxic gases, asphyxiation, or death. Connect gas lines in accordance to national, state, provincial, and local codes.

**IMPORTANT!** Before connecting the gas supply to the burner control box:

- Verify that the heater's gas type (as listed on the rating plate) match that of your application.
- Check that the gas piping and service has the capacity to handle the total gas consumption of all heaters being installed, as well as any other gas appliances being connected to the supply line.
- Check that the main gas supply line is of proper diameter to supply the required fuel pressures.
- If utilizing used pipe, verify that its condition is clean and comparable to a new pipe. Test all gas supply lines in accordance with local codes.
- Test and confirm that inlet pressures are correct. Refer to the rating plate on the burner control box for required minimum and maximum pressures (see chart below). The gas supply pipe must be of sufficient size to provide the required capacity and inlet pressure to the heater (if necessary, consult the local gas company). Do not exceed the maximum allowed pressure for the heater, the space or the gas piping system.

## Manifold Pressure

Type of Gas	Required Manifold Pressure	Minimum Inlet Pressure	Maximum Inlet Pressure
Natural	3.5 Inches W.C.	5.0 Inches W.C.	14.0 Inches W.C.
Propane	10.0 Inches W.C.	11.0 Inches W.C.	14.0 Inches W.C.


**Note:** Check manifold pressure at the tap on the gas valve. Readings will be above atmospheric pressure.


**Pressure Equivalents:** 1 Inch W.C. = .058 oz/sq. in. = 2.49 Mbar

## Models 7D837A thru 7D849A, 7D851A, 7AR79 thru 7AR88

### Gas Connection

#### To connect the gas:

 **WARNING**

 Failure to install, operate, or service this appliance in the approved manner may result in property damage, injury, or death. Only trained, qualified gas installation and service personnel may install or service this equipment.

**This heater must be installed and serviced by trained gas installation and service personnel only.**

The installation must conform with local building codes or, in the absence of such codes, the National Fuel Code (NFPA 54) and in conjunction with ANSI Z21.24/CSA 6.10 "Connectors for Gas Appliances".

**IMPORTANT!** The heating system will expand and contract during operation. Allowances for expansion must be made between the connection to the heater and the gas supply. Excessive bending, kinks, twists, or vibration must be avoided. A flexible gas connection of approved type is required. Flexible stainless steel gas connectors installed in one plane, and without sharp bends, kinks, or twists is recommended.

The gas pipe and connection must be supported independently. Do not install gas supply line in a manner that bears the weight of the heater. Connect the main gas supply line with an approved flexible connector (Figures 2.31 & 2.32) or, if national or local codes require rigid piping, a swing joint. See the safety messages at the beginning of this section.

The gas outlet must be in the same room as the appliance and accessible. It may not be concealed within or run through any wall, floor, or partition. When installing the heater in a corrosive environment (or near corrosive substances), use a gas connector suitable for the environment. Do not use the gas piping system to electrically ground the heater.

1. Install a sediment trap / drip leg if condensation may occur at any point of the gas supply line. This will decrease the possibility of loose scale or dirt in the supply line entering the heater's control system and causing a malfunction.

**NOTE:** High pressure gas above 14" W.C. (water column pressure) requires a high pressure regulator and ball valve.

2. Form the stainless steel flexible connector into a smooth C-shape allowing 12 in. between the flexible connector's end nuts. Figure 2.31.
3. Attach the ball valve to the gas supply pipe. Apply pipe compound to NPT adapter threads to seal the joint. Use only a pipe compound resistant to the actions.

**NOTE:** Provide a 1/8 in. NPT plugged tapping accessible for test gauge connection immediately upstream of gas connection to the heater (provided on ball valve).

# Dayton® Tube Heaters

## Gas Supply

- Attach the flexible connector to the adapter and burner control box inlet. Seal the joints.

**NOTE:** Excessive torque on the manifold may misalign the orifice. **Always** use two wrenches to tighten mating pipe connections.

- Final assembly must be tested for gas leaks according to NFPA or local codes.

### CAUTION

When using a stainless steel flexible connector, **do not** attach the connector nuts directly to the gas pipe supply. Connector nuts must be installed to an approved adapter.

### WARNING



Testing for gas leaks with an open flame or other sources of ignition may lead to a fire or explosion and cause serious injury or death. Test in accordance with NFPA or local codes.

Figure 2.31 • Flexible Gas Connection Side View

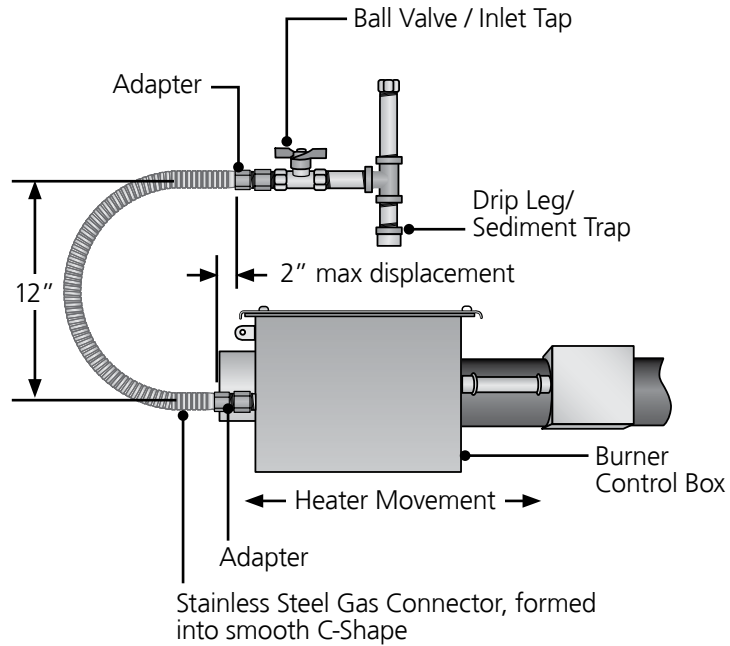
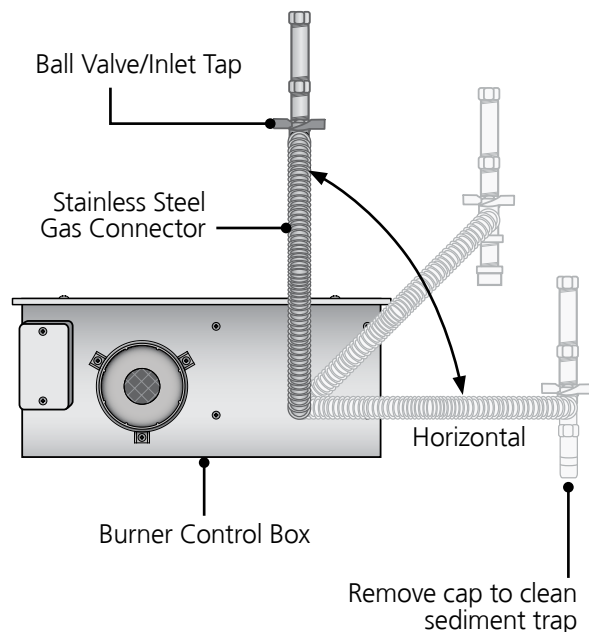


Figure 2.32 • Flexible Gas Connection End View

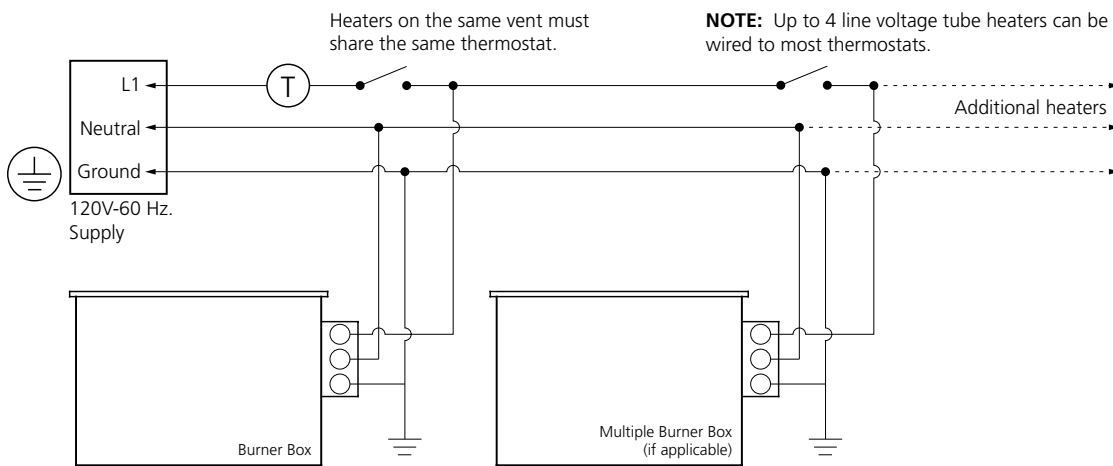


# Models 7D837A thru 7D849A, 7D851A, 7AR79 thru 7AR88

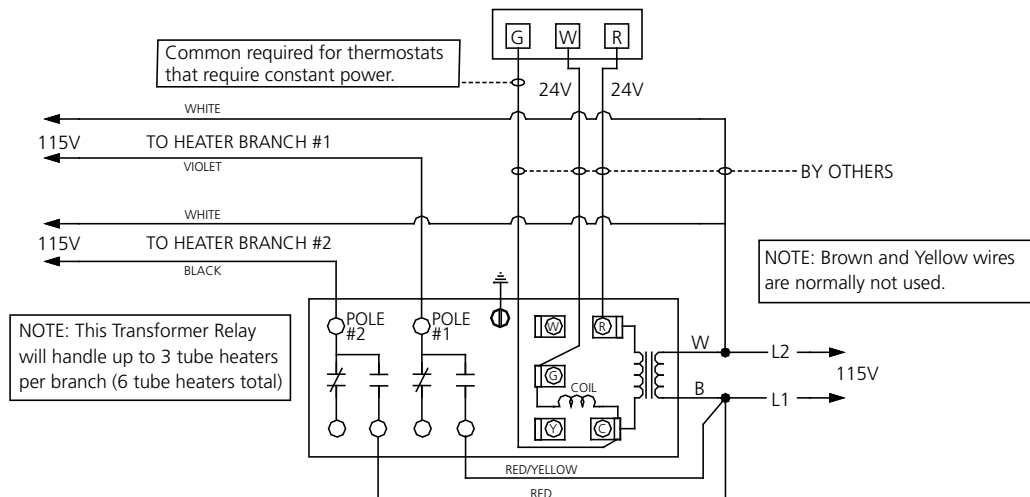
## Electrical Requirements

- Verify that the heater's voltage (as listed on the rating plate) matches that of your application.
- Heaters operate on 120 volts, 60Hz., single phase. The maximum amperage requirement is 4.8 amps starting current; 1.1 amps running current per heater.
- Observe proper electrical polarity.
- The heater must be grounded in accordance with the National Electrical Code ANSI/NFPA70 (latest edition).
- It is recommended that the thermostat be installed on the hot side of a fused supply line and have sufficient amp rating for the heater(s) that it controls.
- Clearances to combustibles must be maintained between electrical apparatus and wiring. See clearance data on page 7.
- Wiring must not be run above or below the heater or exposed to the radiant output.
- Installations utilizing a 24 volt thermostat require a relay transformer. Figure 2.34.

**Figure 2.33 - Field Wiring 120V Connection(s)**



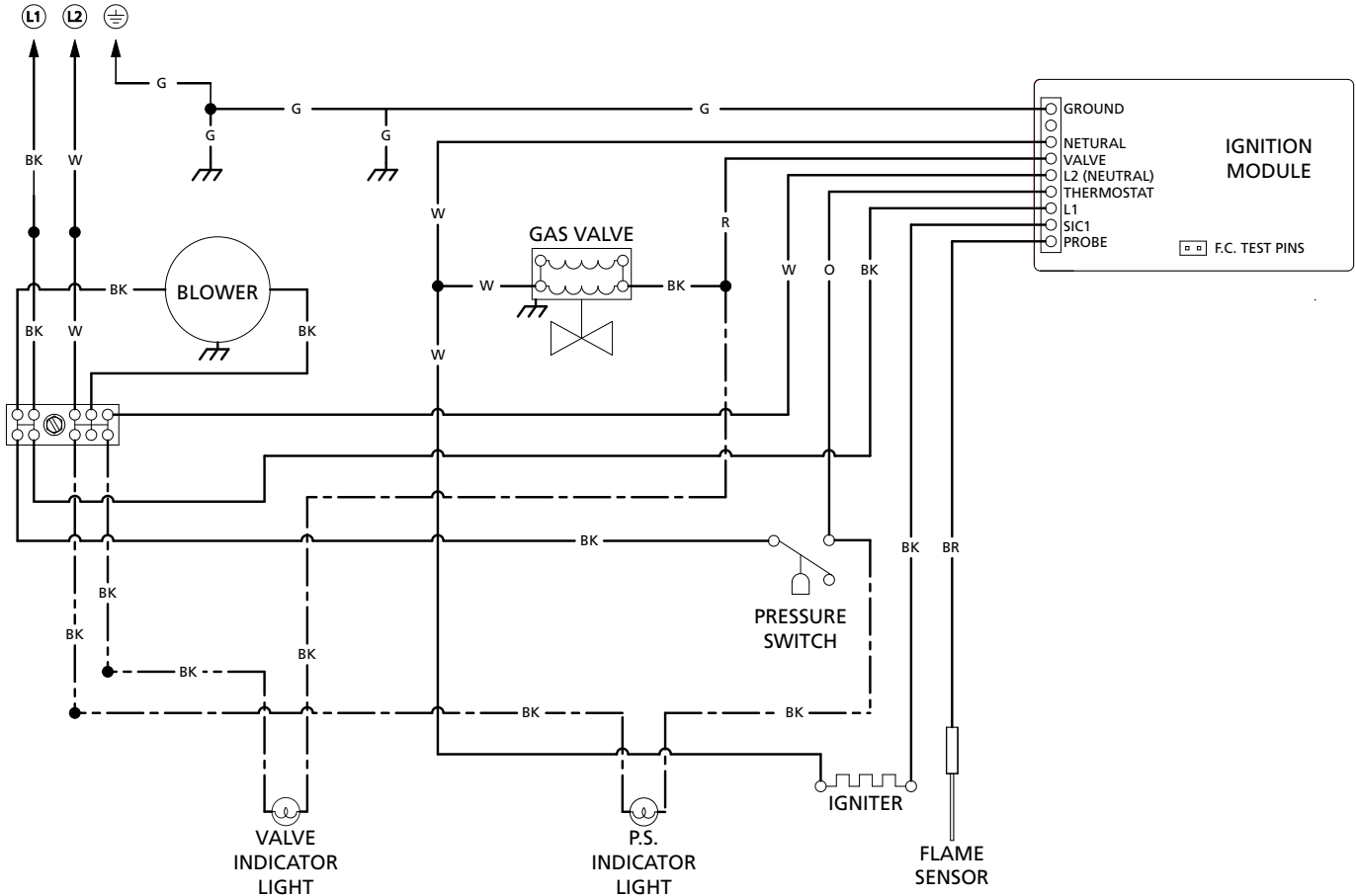
**Figure 2.34 - General Thermostat Wiring Diagram with Combination Relay Transformer**



# Dayton® Tube Heaters

## Internal Wiring Diagram

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



### COMPONENT CODES

⊕ EARTH GROUND	☐ TRANSFORMER	⊕ PRESSURE SWITCH
⏏ CHASSIS GROUND	⊕ BLOWER MOTOR	⊕ S.P.S. RELAY
⊕ LINE VOLTAGE	⊕ HOT SURFACE IGNITER	⊕ INDICATOR LIGHT
⊕ NEUTRAL	⊕ SPARK IGNITER	⊕ GAS VALVE
● WIRE NUT	⊕ FLAME SENSOR	○ QUICK-CONNECT TERM.

### WIRING COLORS:

BK.....	BLACK
BN.....	BROWN
R.....	RED
O.....	ORANGE
Y.....	YELLOW
G.....	GREEN
BL.....	BLUE
PR.....	PURPLE
W.....	WHITE
GY.....	GRAY
PK.....	PINK

### WIRING INFORMATION:

#### LINE VOLTAGE:

FACTORY STANDARD	—————
FACTORY OPTION	- - - - -
FIELD INSTALLED	- - - - -

#### LOW VOLTAGE:


FACTORY STANDARD	—————
FACTORY OPTION	- - - - -
FIELD INSTALLED	- - - - -



## Models 7D837A thru 7D849A, 7D851A, 7AR79 thru 7AR88

### OPERATION

**⚠ WARNING**



This heater is not equipped with a pilot ignition system.

**Do not** attempt to light the system manually.

#### LIGHTING PROCEDURES:

1. Verify that service lid is secured.
2. Open (turn on) gas supply to the heater.
3. Close (turn on) electrical circuit (typically thermostat).
4. If the heater fails to light, turn off gas, open electrical circuit (set thermostat to lowest setting or to off). Wait five (5) minutes before repeating above steps.

#### SHUTDOWN PROCEDURES:

1. Open (turn off) electrical circuit.
2. Close (turn off) gas supply to the heater.
3. Wait five (5) minutes before relighting heater.

### Sequence of Operation

#### Starting Circuit

Upon a call for heat, the fan is energized. Once operational static pressure is achieved, the differential switch will close initiating the ignition sequence. After a 5-second delay, the hot surface igniter is energized for 45 seconds and the control allows the gas valve to open.

The trial for ignition is 8 seconds. If flame sense is not established within 8.5 seconds, the heater will attempt two (2) additional ignition sequences before proceeding to soft lockout. Soft lockout automatically retries after one (1) hour or the control can be reset by briefly interrupting the power source.

#### Running Circuit

After ignition, the flame rod monitors the burner flame. If sense of flame is lost, the control immediately acts to reignite the gas-air mixture (identical to the starting sequence). If flame sense is not established within 8.5 seconds, the heater will attempt two (2) additional ignition sequences before proceeding to soft lockout. The control can be reset by briefly interrupting the power source.

# Dayton® Tube Heaters

## MAINTENANCE

### Routine Inspection

#### WARNING

Personal injury or death may result if maintenance is not performed by properly trained gas installer or service personnel. Contact the installing distributor or place of purchase for service. **Do not operate heating system if repairs are necessary.**

#### WARNING



Allow heater to cool prior to servicing.

#### WARNING



Disconnect power to heater before servicing.

#### WARNING



Use protective glasses when cleaning the heater.

At least once per year, the heating system should be inspected and serviced by trained gas installation and service personnel only. This inspection should be performed at the beginning of the heating season to ensure that all heater components are in proper working order and that the heating system operates at peak performance. Particular attention should be paid to the following items.

- Blower Motor: Annual oiling of the blower motor with SAE 20 oil will extend bearing life significantly. Ensure that the squirrel cage in the blower is kept clean. If dirt becomes a problem, installation of outside air intake ducts for combustion is recommended.
- Vent pipe system: Check the outside termination and the connections at the heater. Inspect the vent exhausts for leakage, damage, fatigue, corrosion, and obstructions. If dirt becomes a problem, installation of outside air intake ducts for combustion is recommended.
- Combustion air intake system (when applicable): Check for blockage and/or leakage. Check the outside termination and the connection at the heater.
- Heat exchangers: Check the integrity of the heat exchangers. Replace if there are signs of structural failure. Check for corrosion and/or buildup within the tube exchanger passageways.
- Burner: Check for proper ignition, burner flame, and flame sense. Flame should extend directly outward from burner without floating or lifting.
- Wiring: Check electrical connections for tightness and/or corrosion. Check wires for damage.
- Gas Connection: Inspect the integrity of the gas connection to the heater. Check for leaks, damage, fatigue, or corrosion. Do not operate if repairs are necessary and turn off gas supply to the heater. Contact service personnel.
- Reflectors: To maintain effective infra-red heating, always keep both sides of the reflector clean. Maintenance can vary significantly depending on the environment. Dirt and dust can be vacuumed or wiped with a soap and water solution. Use metal polish if the reflectors are severely dirty.

Contact service personnel if repairs are necessary. Do not operate unit.

## Models 7D837A thru 7D849A, 7D851A, 7AR79 thru 7AR88

### Troubleshooting Guide

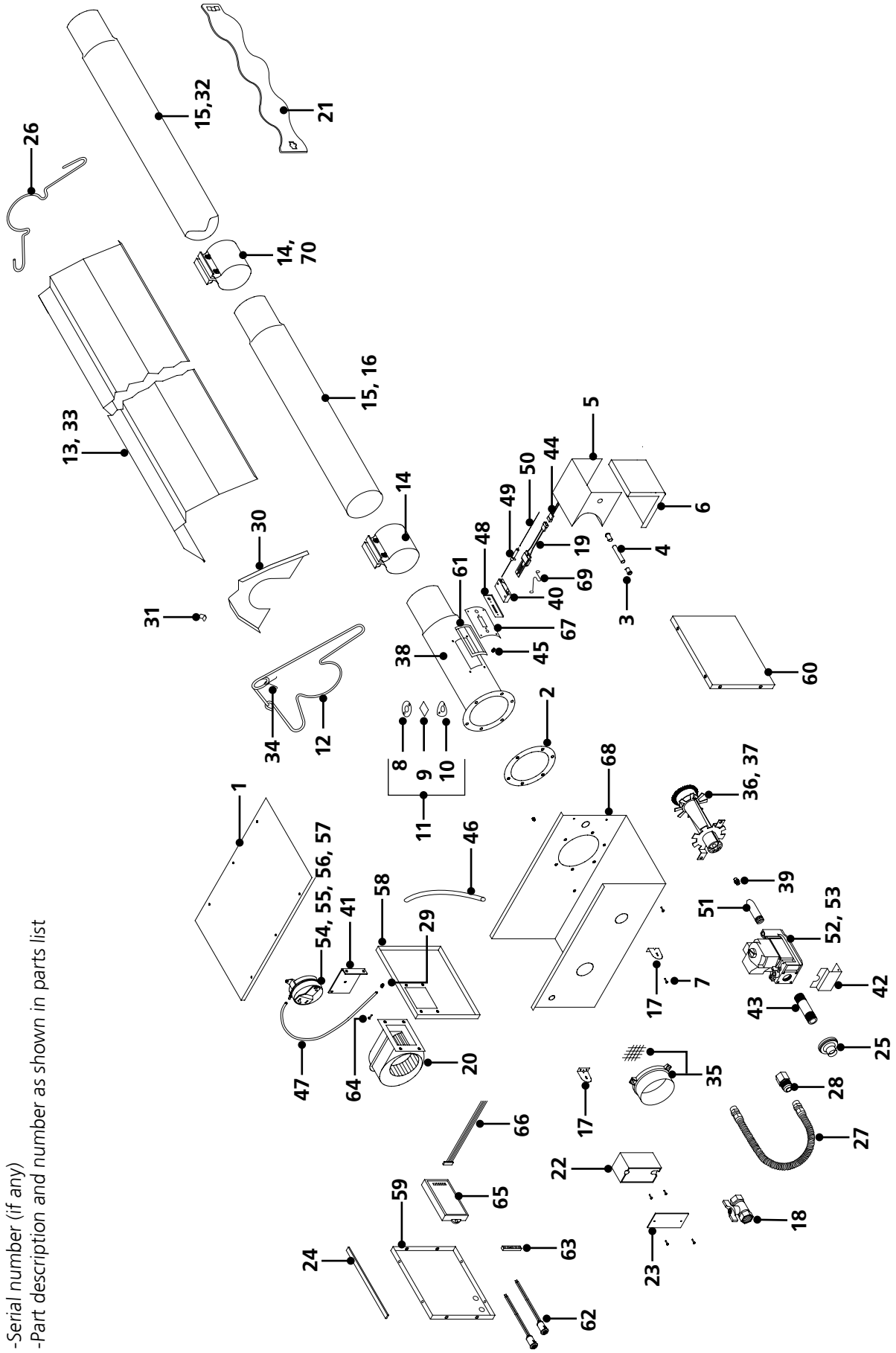
Symptom	Possible Cause	Corrective Action
Thermostat closed, fan doesn't operate.	<ul style="list-style-type: none"> <li>Blown fuse.</li> <li>Faulty thermostat.</li> <li>Loose or disconnected wire.</li> <li>Faulty fan.</li> </ul>	<ul style="list-style-type: none"> <li>Replace.</li> <li>Replace.</li> <li>Repair as required.</li> <li>Lubricate, repair or replace.</li> </ul>
Thermostat closed. Fan operates. Switch does not close.  <b>Note:</b> If hot surface igniter is energized, the indicator light is faulty.	<ul style="list-style-type: none"> <li>Loose or disconnected wire.</li> <li>Box lid or gasket not in place.</li> <li>Plugged pressure switch lines.</li> <li>Plugged or restricted exhaust vent.</li> <li>Baffle location incorrect.</li> <li>Faulty pressure switches.</li> </ul>	<ul style="list-style-type: none"> <li>Repair as required.</li> <li>Put in place.</li> <li>Clean as necessary.</li> <li>Remove foreign matter.</li> <li>Re-position baffles at vent end.</li> <li>Replace only. Do not adjust.</li> </ul>
Thermostat closed. Fan operates. Pressure switch closes. No hot surface igniter.	<ul style="list-style-type: none"> <li>Faulty hot surface igniter.</li> <li>Faulty circuit board.</li> </ul>	<ul style="list-style-type: none"> <li>Replace.</li> <li>Replace.</li> </ul>
Thermostat closed. Fan operates. Pressure switch closes. Hot surface igniter energizes. Valve does not open.	<ul style="list-style-type: none"> <li>Disconnect gas valve wires.</li> <li>Faulty circuit board.</li> <li>Faulty gas valve.</li> </ul>	<ul style="list-style-type: none"> <li>Repair as required.</li> <li>Replace.</li> <li>Replace.</li> </ul>
Thermostat closed. Fan and hot surface igniter operate. Ignition occurs, burner cycles off in less than 60 seconds.	<ul style="list-style-type: none"> <li>Low gas pressure.</li> <li>Baffle improperly positioned.</li> <li>Faulty exhaust pressure switch.</li> <li>Restricted flue vent.</li> <li>No electrical ground.</li> <li>Reversed polarity.</li> </ul>	<ul style="list-style-type: none"> <li>Provide required gas pressure.</li> <li>Re-position baffle at vent end.</li> <li>Replace.</li> <li>Remove foreign matter.</li> <li>Connect electrical ground to junction box.</li> <li>Repair.</li> </ul>
Thermostat closed. Fan and hot surface igniter operate. After 45 seconds hot surface igniter shuts off. No ignition.	<ul style="list-style-type: none"> <li>Closed gas supply.</li> <li>Dirty or restricted orifice.</li> <li>Faulty valve. Disconnected wire.</li> <li>Inlet pressure exceeds 14 Inches W.C.</li> </ul>	<ul style="list-style-type: none"> <li>Open all gas connections.</li> <li>Remove. Clean with a soft object.</li> <li>Replace or repair.</li> <li>Lower inlet pressure.</li> </ul>
Loss of heater efficiency.	<ul style="list-style-type: none"> <li>Low gas pressure.</li> <li>Dirty or restricted orifice.</li> <li>Foreign matter inside burner.</li> <li>Unit cycles on and off.</li> <li>Reflector is dirty or not in place.</li> <li>Clogged fan blower.</li> </ul>	<ul style="list-style-type: none"> <li>Provide required gas pressure.</li> <li>Remove. Clean with a soft object.</li> <li>Clean as necessary.</li> <li>Check previous symptom.</li> <li>Clean with aluminum cleaner and soft cloth.</li> <li>Clean.</li> </ul>
Radiant tube leaking burnt gases.	<ul style="list-style-type: none"> <li>Loose tube connections.</li> <li>Holes or cracks in radiant tubes.</li> </ul>	<ul style="list-style-type: none"> <li>Ensure that tubes are fully connected and clamped properly.</li> <li>Replace.</li> </ul>
Condensation.	<ul style="list-style-type: none"> <li>Stack length is too long.</li> <li>Light gauge flue stack used.</li> <li>Contaminated combustion air.</li> </ul>	<ul style="list-style-type: none"> <li>Shorten stack length.</li> <li>Minimum of 26 ga. vent pipe required.</li> <li>Provide fresh air inlet duct.</li> </ul>
Tube bowing.	<ul style="list-style-type: none"> <li>Insufficient combustion air.</li> <li>Over fired.</li> <li>Contaminated combustion air.</li> <li>Heater unable to expand properly.</li> </ul>	<ul style="list-style-type: none"> <li>Provide 1 sq. in. of free air for every 5,000 BTU/h of input.</li> <li>Check gas pressure and orifice size.</li> <li>Provide fresh air inlet duct.</li> <li>Remount with flexible inlet or vent pipe.</li> </ul>
Tube corroding.	<ul style="list-style-type: none"> <li>Contaminated combustion air.</li> </ul>	<ul style="list-style-type: none"> <li>Provide fresh air inlet duct.</li> </ul>
Visual inspection of burner operation not possible.	<ul style="list-style-type: none"> <li>Dirty or sooted sight glass.</li> <li>Unit mounted upside-down.</li> </ul>	<ul style="list-style-type: none"> <li>Remove, clean or replace.</li> <li>Mount correctly.</li> </ul>
Stack sooting.	<ul style="list-style-type: none"> <li>Insufficient combustion air.</li> <li>Improper gas.</li> <li>Dirty fan or blockage.</li> </ul>	<ul style="list-style-type: none"> <li>Provide 1 sq. in. of free air for every 5,000 BTU/h of input.</li> <li>Correct with proper gas input (or clean).</li> </ul>
Odor or fumes in space (normal during first firing and will subside after initial burn off, approximately 20 minutes).	<ul style="list-style-type: none"> <li>Vaporized solvents decomposing when contacting radiant tubes.</li> <li>Evaporation of oils, solvents at floor level.</li> <li>Fork lifts.</li> <li>Loose tube / vent connections.</li> </ul>	<ul style="list-style-type: none"> <li>Provide proper ventilation.</li> <li>Provide proper ventilation.</li> <li>Tighten tube clamps to 50-100 ft-lb.</li> <li>Seal vent pipes.</li> </ul>

### For Repair Parts, call 1-800-323-0620

**24 hours a day - 365 days a year**

Please provide following information:

- Model number
- Serial number (if any)
- Part description and number as shown in parts list



Repair Parts Illustration for Dayton Tube Heater

## Repair Parts List for Dayton Tube Heater

Ref. No.	Description	Part No.	Quantity	Ref. No.	Description	Part No.	Quantity
1	Control Box Cover	TP-1	1	36	Burner (50-100 MBH models)	TP-3072	1
2	Flange Gasket	TP-5	1	37	Burner (125-200 MBH models)	TP-201B	1
3	Conduit Coupling	TP-9	1	38	16" Burner Tube w/ Flange (fittings included)	TP-380	1
4	Conduit 4" x 1/2"	TP-10	1	39	Gas Orifice - Consult Factory	TP-204	1
5	Hot Surface Igniter Box	TP-11	1	40	Hot Surface Igniter Holder	TP-205	1
6	Hot Surface Igniter Box Cover	TP-12	1	41	Pressure Switch Mounting Bracket	TP-207	1
7	8 x 1/2" Self-drilling Screw	TP-13	4	42	Gas Valve Mounting Bracket	TP-208B	1
8	Sight Glass Gasket	TP-14	1	43	1/2" x 3" Pipe Nipple	TP-212	1
9	Sight Glass	TP-15	1	44	Hot Surface igniter Wiring Harness	TP-214	1
10	Sight Glass Washer	TP-16	1	45	Pressure Switch Barb	TP-217	1
11	Sight Glass Kit	TP-17	1	46	Vinyl Pressure Sensing Tube (exhaust)	TP-218	1
12	4" Wire Hanger with Tension Spring	TP-19B	3-7	47	Vinyl Pressure Sensing Tube (burner)	TP-219	1
13	120" Aluminum Reflector	TP-20C	2-6	48	Hot Surface Igniter Holder Gasket	TP-221	1
14	4" Standard Tube Clamp	TP-21B	2-6	49	Flame Rod	TP-222	1
15	120" ALUM Combustion/Radiant Tube	TP-26A	2-5	50	Flame Rod Wire	TP-222A	1
16	120" AL-TI Combustion Tube (150-200MBH Models)	TP-26B	1	51	Gas Manifold	TP-223	1
17	Control Box Mounting Bracket	TP-31B	2	52	Gas Valve Assembly - Natural Gas	TP-240	1
18	1/2" Shut-off Ball Valve/ Inlet Tap	TP-33B	1	53	Gas Valve Assembly - Propane Gas	TP-241	1
19	Silicone Carbide Hot Surface Igniter	TP-50A	1	54	Differential Pressure Switch (50-100 MBH)	TP-264B	1
20	Fan Blower	TP-55A	1	55	Differential Pressure Switch (125-150 MBH)	TP-264E	1
21	36" Interlocking Heat Baffle	TP-65I	2-5	56	Differential Pressure Switch (175 MBH)	TP-264D	1
22	2" x 4" Outlet Box	TP-66	1	57	Differential Pressure Switch (200 MBH)	TP-264F	1
23	2" x 4" Outlet Box Cover	TP-67	1	58	Divider Panel w/ Pressure Switch Mtg. Tabs	TP-301	1
24	Control Box Gasket (per foot)	TP-70	6	59	Left End Panel with Light Holes	TP-302	1
25	Rubber Grommet	TP-76	1	60	Right End Panel	TP-303	1
26	Reflector Center Support	TP-82	2-6	61	Ignition Plate Gasket	TP-321	1
27	Stainless Steel Flexible Gas Connector	TP-83	1	62	120V Amber Operational Indicator Light	TP-328	2
28	1/2" Female/Male Flare Fitting	TP-84	1	63	1/4" Terminal Block	TP-329	1
29	1/4" x 1/4" Brass Atmos. Barb Fitting	TP-97	1	64	Green Self-tap Screw	TP-331	1
30	Aluminum Reflector End Cap	TP-105	2	65	Potted Circuit Board	TP-351A	1
31	Reflector End Cap Clip (pkg. of 8)	TP-106	1	66	Circuit Board Wiring Harness	TP-352A	1
32	60" ALUM Radiant Tube	TP-111	1	67	Hot Surface Igniter Plate	TP-383A	1
33	60" Aluminum Reflector	TP-112	1	68	Burner Control Box Outer Shell	TP-804	1
34	Reflector Tension Spring	TP-113	1	69	Global Holder Spring Clip	TP-206	1
35	Plastic Air Orifice w/ Screen - Consult Factory	TP-114	1	70	Stainless Steel Tube Clamp (150-200MBH Models)	TP-220	1

- Conversions from natural gas to LP gas require the use of one TP-241 and one TP-204-Size and TP-114-Size.
- Conversions from LP gas to Natural gas require the use of one TP-204-Size and one TP-114-Size.
- Conversions between different BTU's sizes are not allowed.





# Dayton® Tube Heaters

## LIMITED WARRANTY

**Dayton One-Year Limited Warranty.** Dayton Radiant Tube Heaters, Models 7D837A thru 7D849A, 7D851A, 7AR79 thru 7AR88 covered in this manual, are warranted by Dayton Electric Mfg. Co. (Dayton) to the original user against defects in workmanship or materials under normal use for one year after date of purchase. Any part which is determined to be defective in material or workmanship and returned to an authorized service location, as Dayton designates, shipping costs prepaid, will be, as the exclusive remedy, repaired or replaced at Dayton's option. For limited warranty claim procedures, see PROMPT DISPOSITION below. This limited warranty gives purchasers specific legal rights which vary from jurisdiction to jurisdiction.

**Additional Limited Warranty.** In addition to the above mentioned one-year warranty, Dayton warrants the original purchaser an additional 4-year extension on the combustion chamber, radiant tubes and stainless steel burner. This 4-year extension excludes electrical/purchased components.

**General Conditions.** Dayton will not be responsible for labor charges for the analysis of a defective condition of the heater or for the installation of replacement parts. The warranties provided herein will not apply if the input of the heater exceeds the rated input at time of manufacturing or if the heater in the judgement of the Company has been subjected to misuse, excessive dust, improper conversion, negligence, accident, corrosive atmospheres, excessive thermal shock, excessive vibration, physical damage to the heater, alterations by unauthorized service personnel, operation contrary to Dayton's instructions or if the serial number has been altered, defaced or removed. Dayton shall not be liable for any default or delay in the performance of these warranties caused by contingency beyond its control, including war, government restriction or restraints, strikes, fire, flood, short or reduced supply of raw materials, or parts. The warranties herein shall be null and void if the heater is not installed by a competent heating contractor and/or if the heater is not installed according to Dayton's instructions, normal industry practices and/or if the heater is not maintained and repaired according to Dayton's instructions. Normal product degradation and wear (rust, oxidation, etc.) does not constitute a material defect and applicable warranty claim.

**Limitation of Liability.** To the extent allowable under applicable law, Dayton's liability for consequential and incidental damages is expressly disclaimed. Dayton's liability in all events is limited to and shall not exceed the purchase price paid.

**Warranty Disclaimer.** Dayton has made a diligent effort to provide product information and illustrate the products in this literature accurately; however, such information and illustrations are for the sole purpose of identification, and do not express or imply a warranty that the products are merchantable, or fit for a particular purpose, or that the products will necessarily conform to the illustrations or descriptions. Except as provided below, no warranty or affirmation of fact, expressed or implied, other than as stated in the "LIMITED WARRANTY" above is made or authorized by Dayton.

**Product Suitability.** Many jurisdictions have codes and regulations governing sales, construction, installation, and/or use of products for certain purposes, which may vary from those in neighboring areas. While Dayton attempts to assure that its products comply with as many codes, it cannot guarantee compliance, and cannot be responsible for how the product is installed or used. Before purchase and use of a product, review the product applications, and all applicable national and local codes and regulations, and be sure that the product, installation, and use will comply with them.

Certain aspects of disclaimers are not applicable to consumer products: e.g., (a) some jurisdictions do not allow the exclusion or limitation of incidental or consequential damages, so the above limitation or exclusion may not apply to you; (b) also, some jurisdictions do not allow a limitation on how long an implied warranty lasts, consequently the above limitation may not apply to you; and (c) by law, during the period of this limited warranty, any implied warranties of implied merchantability or fitness for a particular purpose applicable to consumer products purchased by consumers, may not be excluded or otherwise disclaimed.

**Prompt Disposition.** Dayton will make a good faith effort for prompt correction or other adjustment with respect to any product which proves to be defective within limited warranty. For any product believed to be defective within limited warranty, first write or call dealer from whom the product was purchased. Dealer will give additional directions. If unable to resolve satisfactorily, write to Dayton at address below, giving dealer's name, address, date and number of dealer's invoice, and describe the nature of the defect. Title and risk of loss pass to buyer on delivery to common carrier. If product was damaged in transit to you, file claim with carrier.