AKHL Series

Installation, Operation, Maintenance and Parts Manual

CE Certified: 230V-50Hz (G20, G25, G31) Infra-Red Tube Heater.

The AKHL Series Infra-Red Tube Heater is a positive pressure, dual-stage radiant heater system. All persons involved with the installation, operation and maintenance of the heater system must read and understand the information in this manual.

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.

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.

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

CE 0087

Keep these instructions for future reference

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AVAILABLE MODELS

Model Number	High Fire Rate	Low Fire Rate	Length (Installation Kit)			Combustion Chamber	Radiant Tubes
AKHL-20	20 kW	15 kW	6m (20-kit)	9m (30-kit)	12m (40-kit)	Aluminized	Aluminized or HRT
AKHL-75*	22,1 kW	15,6 kW	6m (20-kit)	9m (30-kit)	12m (40-kit)	Aluminized	Aluminized or HRT
AKHL-25	25 kW	15 kW	6m (20-kit)	9m (30-kit)	12m (40-kit)	Aluminized	Aluminized or HRT
AKHL-100*	29,4 kW	20,8 kW	X	9m (30-kit)	12m (40-kit)	Aluminized	Aluminized or HRT
AKHL-30	30 kW	20 kW	9m (30-kit)	12m (40-kit)	15m (50-kit)	Aluminized	Aluminized or HRT
AKHL-35	35 kW	30 kW	X	12m (40-kit)	15m (50-kit)	Aluminized	Aluminized or HRT
AKHL-40	40 kW	30 kW	12m (40-kit)	15m (50-kit)	18m (60-kit)	Aluminized	Aluminized or HRT
AKHL-150*	44,1 kW	31,2 kW	12m (40-kit)	15m (50-kit)	18m (60-kit)	Titanium & Aluminized	Aluminized or HRT
AKHL-45	45 kW	30 kW	12m (40-kit)	15m (50-kit)	18m (60-kit)	Titanium & Aluminized	Aluminized or HRT
AKHL-50	50 kW	35 kW	12m (40-kit)	15m (50-kit)	18m (60-kit)	Titanium & Aluminized	Aluminized or HRT
AKHL-50	50 kW	35 kW	X	X	21m (70-kit)	Titanium & Aluminized	Aluminized or HRT
AKHL-175*	51,5 kW	36,4 kW	15m (50-kit)	18m (60-kit)	21m (70-kit)	Titanium & Aluminized	Aluminized or HRT
AKHL-55	55 kW	40 kW	15m (50-kit)	18m (60-kit)	21m (70-kit)	Titanium & Aluminized	Aluminized or HRT
AKHL-60	60 kW	45 kW	15m (50-kit)	18m (60-kit)	21m (70-kit)	Titanium & Aluminized	Aluminized or HRT

Note: HRT = Hot rolled tubes
* = old model but still in use, by new model burner control box is facelifted

1.0 AKHL Series Technical Specifications

Model (input)	Gas type	Injector (mm)	Injector Marking (DMS)	Air Inlet Orifice (mm)	Air Inlet Marking (“)	Min Gas Pressure (mbar)	Max. Gas Pressure (mbar)	High Rate Burner Pressure (mbar)	Low Rate Pressure (mbar)	Baffle length by Model length (m)						Air Proving Set Point (mbar)
										6	9	12	15	18	21	
AKHL-20 (20 kW)	G20	3,98	22	36,5	1 7/16	11,5	50	9,0	5,5	3,35	3,35	2,52	X	X	X	0,50
	G25	3,98	22	36,5	1 7/16	15,5	50	13,0	9,0	3,35	3,35	2,52	X	X	X	
	G31	2,48	40	36,5	1 7/16	27,5	50	25,0	15,0	3,35	3,35	2,52	X	X	X	
AKHL-75 (22,1 kW)	G20	4,22	19	39,7	1 9/16	11,5	50	9,0	4,5	4,22	3,35	1,68	X	X	X	0,35
	G25	4,22	19	39,7	1 9/16	15,5	50	13,0	6,5	4,22	3,35	1,68	X	X	X	
	G31	2,64	37	41,3	1 5/8	27,5	50	25,0	12,5	4,22	3,35	1,68	X	X	X	
AKHL-25 (25 kW)	G20	4,39	17	39,7	1 9/16	11,5	50	9,0	5,5	4,22	3,35	2,52	X	X	X	0,50
	G25	4,39	17	39,7	1 9/16	15,5	50	13,0	9,0	4,22	3,35	2,52	X	X	X	
	G31	2,70	36	39,7	1 9/16	27,5	50	25,0	15,0	4,22	3,35	2,52	X	X	X	
AKHL-100 (29,3 kW)	G20	4,85	11	41,3	1 5/8	11,5	50	9,0	4,5	X	4,22	3,35	X	X	X	0,35
	G25	4,85	11	41,3	1 5/8	15,5	50	13,0	6,5	X	4,22	3,35	X	X	X	
	G31	2,94	32	47,6	1 7/8	27,5	50	25,0	12,5	X	4,22	3,35	X	X	X	
AKHL-30 (30 kW)	G20	4,85	11	41,3	1 5/8	11,5	50	9,0	5,5	X	4,22	2,52	1,68	X	X	0,63
	G25	4,85	11	41,3	1 5/8	15,5	50	13,0	9,0	X	4,22	2,52	1,68	X	X	
	G31	2,94	32	47,6	1 7/8	27,5	50	25,0	15,0	X	4,22	2,52	1,68	X	X	
AKHL-35 (35 kW)	G20	5,21	5	44,5	1 3/4	11,5	50	9,0	5,5	X	4,22	3,35	1,68	X	X	0,63
	G25	5,21	5	44,5	1 3/4	15,5	50	13,0	9,0	X	4,22	3,35	1,68	X	X	
	G31	3,04	31	47,6	1 7/8	27,5	50	25,0	15,0	X	4,22	3,35	1,68	X	X	
AKHL-40 (40 kW)	G20	5,30	4	44,5	1 3/4	11,5	50	9,0	5,5	X	X	3,35	2,52	1,68	X	0,75
	G25	5,30	4	44,5	1 3/4	15,5	50	13,0	9,0	X	X	3,35	2,52	1,68	X	
	G31	3,45	29	50,8	2	27,5	50	25,0	15,0	X	X	3,35	2,52	1,68	X	
AKHL-150 (44,1 kW)	G20	5,41	3	47,6	1 7/8	12,5	50	10,0	5,0	X	X	3,35	3,35	1,68	X	0,50
	G25	5,41	3	47,6	1 7/8	17,5	50	15,0	7,5	X	X	3,35	3,35	1,68	X	
	G31	3,65	27	54,0	2 1/8	27,5	50	25,0	12,5	X	X	3,35	3,35	1,68	X	
AKHL-45 (45 kW)	G20	5,79	1	46,0	1 13/16	11,5	50	9,0	5,5	X	X	2,52	1,68	1,68	X	0,83
	G25	5,79	1	46,0	1 13/16	15,5	50	13,0	9,0	X	X	2,52	1,68	1,68	X	
	G31	3,65	27	50,8	2	27,5	50	25,0	15,0	X	X	2,52	1,68	1,68	X	
AKHL-50 (50 kW)	G20	6,14	C	57,2	2 1/4	11,5	50	9,0	5,5	X	X	2,52	1,68	1,68	0,84	1,00
	G25	6,14	C	57,2	2 1/4	15,5	50	13,0	9,0	X	X	2,52	1,68	1,68	0,84	
	G31	3,86	24	57,2	2 1/4	27,5	50	25,0	15,0	X	X	2,52	1,68	1,68	0,84	
AKHL-175 (51,5 kW)	G20	5,79	1	49,2	1 15/16	12,5	50	10,0	5,0	X	X	X	1,68	1,68	1,68	0,50
	G25	6,05	B	50,8	2	17,5	50	15,0	7,5	X	X	X	3,35	3,35	3,35	
	G31	3,86	24	57,2	2 1/4	27,5	50	25,0	12,5	X	X	X	1,68	1,68	1,68	
AKHL-55 (55 kW)	G20	6,75	H	61,9	2 7/16	11,5	50	9,0	5,5	X	X	X	1,68	0,84	0,84	1,00
	G25	6,75	H	61,9	2 7/16	15,5	50	13,0	9,0	X	X	X	1,68	0,84	0,84	
	G31	4,08	20	61,9	2 7/16	27,5	50	25,0	15,0	X	X	X	1,68	0,84	0,84	
AKHL-60 (60 kW)	G20	7,03	J	63,5	2 1/2	11,5	50	9,0	5,5	X	X	X	0,84	0,84	0,84	1,13
	G25	7,03	J	63,5	2 1/2	15,5	50	13,0	9,0	X	X	X	0,84	0,84	0,84	
	G31	4,21	19	66,7	2 5/8	27,5	50	25,0	15,0	X	X	X	0,84	0,84	0,84	

All Models:

Gas Connection: ISO – 7 BSP

Flue Diameter: 100mm

2.0 Safety

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

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 competent and authorized persons may install or service this equipment and in accordance with relevant clauses of applicable standards and recommendations.

2.1 Warning Symbols

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

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

2.2 Applications

This is not an explosion-proof heater. Consult the local Fire Marshall, fire insurance carrier and other authorities for approval if the proposed installations 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.

Warning
Not for residential use! Do not use this heater in the home, sleeping quarters, attached garages, etc.

2.3 Codes and Regulations

The following must be reviewed before installing this heater:

- Check the heater rating label on the heater to verify the proper gas to be used. Check other labels on the heater to verify proper mounting and clearance to combustibles.

- Signs must be posted in storage areas to specify maximum stacking heights allowed in order to maintain published clearances to combustibles.

- These appliances must be installed in accordance with all relevant gastechnical, electrical and ventilation requirements of the applicable local and national regulations for infra red tube heaters. Specially EN13410:2001 “Gas fired overhead radiant heaters: Ventilation requirements for non-domestic premises” should be observed.

- Under no circumstances is either the gas supply line or the electrical supply line to the heater to provide any assistance in the suspension of the heater.

- The weight of the heater must be entirely suspended from a permanent part of the building structure having adequate load characteristics.

- Neither the gas supply, electrical supply line or sprinkler heads shall be located within the minimum published clearance to combustibles as shown on page 7.

2.4 Clearance 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, consul the local fire marshall, fire insurance carrier and other authorities for approval of the proposed installation.

Warning

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

Warning

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

Hazards

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

Clearances 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
- Combustibles and explosive materials
- Chemical storage areas
- Areas of high chemical fume concentration
- Vehicle parking areas
- Vehicles lifts
- Hoists or cranes
- Storage areas with stacked materials
- Lighting
- Sprinkler heads
- Overhead doors and tracks
- Dirty, contaminated areas

If you are unsure about the proposal installation, consult your local fire marshall, 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. Local codes may 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 your distributor if replacement labels are needed.

2.4 Clearance to Combustibles

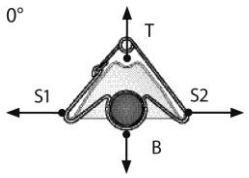
IMPORTANT:
For the safe installation of this unit, the clearance to combustibles data below contains clearances that **must** be maintained.

Check the rating plate on the heater to verify the minimum clearance to combustibles and gas type for your model heater.

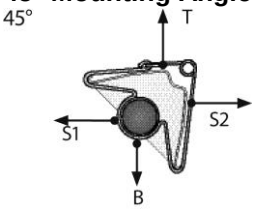
AKHL Series Clearance to Combustibles Data (cm)

Model No.	Mounting Angle	(S1) Front	(S2) Behind	(T) Top	(B) Below
AKHL 20, AKHL 75	0°	23	23	15	152
	45°	99	20	25	152
w/1 side shield	0°	74	20	15	152
w/2 side shields	0°	23	23	15	152
6.1m downstream of burner	0°	18	18	15	76
AKHL 25, AKHL 30	0°	36	36	15	168
AKHL 100	45°	99	20	25	168
w/1 side shield	0°	74	20	15	168
w/2 side shields	0°	41	41	15	168
6.1m downstream of burner	0°	18	18	15	76
AKHL 35	0°	51	51	15	193
	45°	147	20	25	193
w/1 side shield	0°	107	20	15	193
w/2 side shields	0°	51	51	15	193
6.1m downstream of burner	0°	18	18	15	76
AKHL 40, AKHL 45	0°	61	61	15	206
AKHL 150	45°	148	20	25	206
w/1 side shield	0°	107	20	15	206
w/2 side shields	0°	58	58	15	206
6.1m downstream of burner	0°	28	28	15	112
AKHL 50, AKHL 175	0°	86	86	15	234
	45°	160	20	25	234
w/1 side shield	0°	127	20	15	234
w/2 side shields	0°	76	76	15	234
6.1m downstream	0°	28	28	15	112
AKHL 55, AKHL 60	0°	104	104	15	239
	45°	160	20	25	239
w/1 side shield	0°	137	20	15	239
w/2 side shields	0°	76	76	15	239
6.1m downstream of burner	0°	28	28	15	112

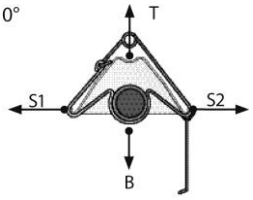
0° Mounting Angle



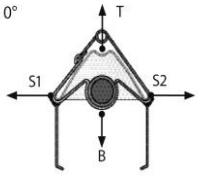
45° Mounting Angle



0° w/1 Side Shield



0° W/2 Side Shields



Heaters mounted on an angle between 0° to 45° must maintain clearances posted for 0° or 45° mountings angles; whichever is greater.

3.0 Installation

3.1 Design Consideration and Prechecks

Placement of infra-red 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. 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.

When designed an infra-red 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 clearance to combustible 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 infra-red surface temperature of a person or object may be diminished with wind above 8km/h. The use of adequate wind barrier (s) may be required.

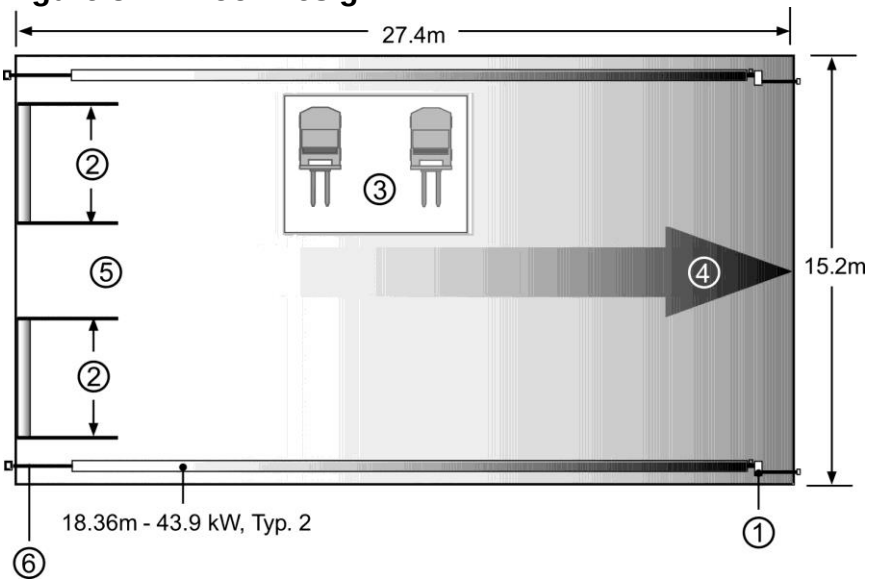
NOTE:
When heated, materials high in hydrocarbons (solvents, paint thinner, mineral spirits, formaldehydes, etc) can evaporates. This may result in odors or fumes being emitted into the environment. To correct this problem, clean the area and/or introduce additional ventilation.

Heaters installed and serviced in accordance with the installation manual do not emit odors into the environment. See notice on page 28 for additional information.

Design Scenario

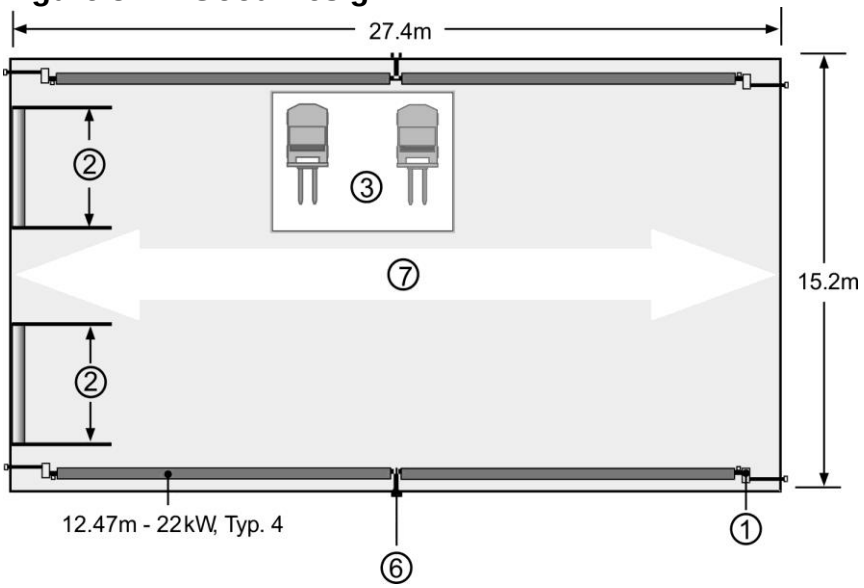
A tube heater system is being installed in 27.4m (L) x 15.2m (W) space with 4.3m ceiling. Two overhead doors are located at one end and an equipment storage area exists on one side. The calculated heat load is 88 kw.

Figure 3.1 – Poor Design



* Two burners (44 kw 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 3.2 – Good Design



* Four burners (22 kW each) are placed in each corner. Burner (hotter) ends direct to areas of highest heat demand.
* Recommended mounting heights observed.
* Distributes heat more evenly.

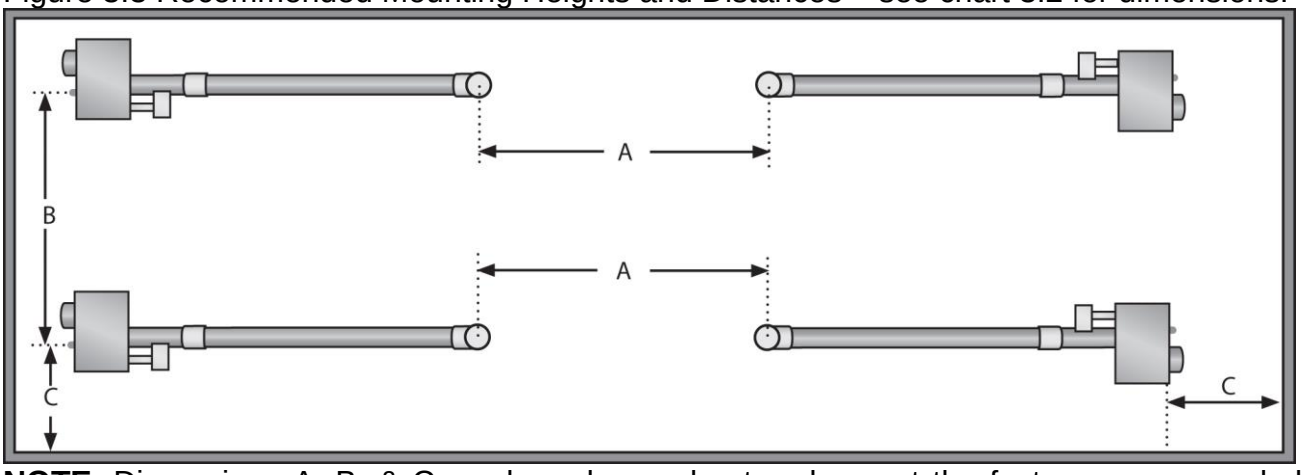
Design Criteria

3.2 Recommended Mounting Heights

AKHL Model Length (m)	kW Range	Recommended Mounting Heights (m)	Coverage Straight Config.(LxW) (m)	Coverage U-Tube Config. (LxW) (m)	Distance Between Heater Rows (m) Dim. A	Distance Between Heater Rows (m) Dim. B	Max. Distance Between Heaters and Wall (m) Dim. C
6m	15 kW	3.0 to 4.6	6.1 x 3.7	3.7 x 3.7	3.0 to 6.1	6.1 to 12.2	4.9
	20-25 kW	3.3 to 6.1	6.7 x 4.6	N/A	6.1 to 9.1	9.1 to 15.2	5.5
9m	15 kW	3.0 to 5.5	9.2 x 4.3	5.2 x 4.0	3.0 to 6.1	6.1 to 12.2	5.2
	20-35 kW	3.7 to 7.0	10.0 x 5.5	5.5 x 4.6	6.1 to 9.1	9.1 to 15.2	6.1
12m	15 kW	3.3 to 5.5	12.2 x 4.9	6.7 x 4.3	3.0 to 6.1	6.1 to 12.2	6.1
	20-35 kW	3.7 to 7.6	13.4 x 6.4	7.0 x 5.2	6.1 to 9.1	9.1 to 15.2	6.1
	40-50 kW	4.6 to 9.2	13.7 x 7.9	7.3 x 6.1	9.1 to 12.2	12.2 to 18.3	7.6
15m	30-35 kW	4.6 to 8.2	16.8 x 7.3	8.5 x 5.8	6.1 to 9.1	9.1 to 15.2	7.6
	40-60 kW	4.9 to 12.2	17.0 x 9.2	8.8 x 7.0	9.1 to 12.2	12.2 to 18.3	7.6
18m	40-60 kW	4.9 to 12.2	20.4 x 10.4	10.4 x 7.9	9.1 to 12.2	12.2 to 18.3	7.6
21m	50-60 kW	4.9 to 12.2	23.4 x 10.4	12.0 x 7.9	9.1 to 12.2	12.2 to 18.3	7.6

NOTE: Factory recommended mounting heights are listed as a guideline. If infra-red 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 3.3 Recommended Mounting Heights and Distances – see chart 3.2 for dimensions.



NOTE: Dimensions A, B, & C are based upon heaters hung at the factory recommended mounting height.

3.3 Hanger Placement and Suspension

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

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

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 3.4

   - Primary combustion chamber.
   - Radiant emitter tubes.
     IMPORTANT! 44-60 kW models must use the titanium alloy treated steel combustion chamber as the first tube connected to the burner control box. The combustion chamber has an orange identifications sticker located in the swaged end of the tube.

2. Mark locations for hanging points. Figure 3.4.

   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.

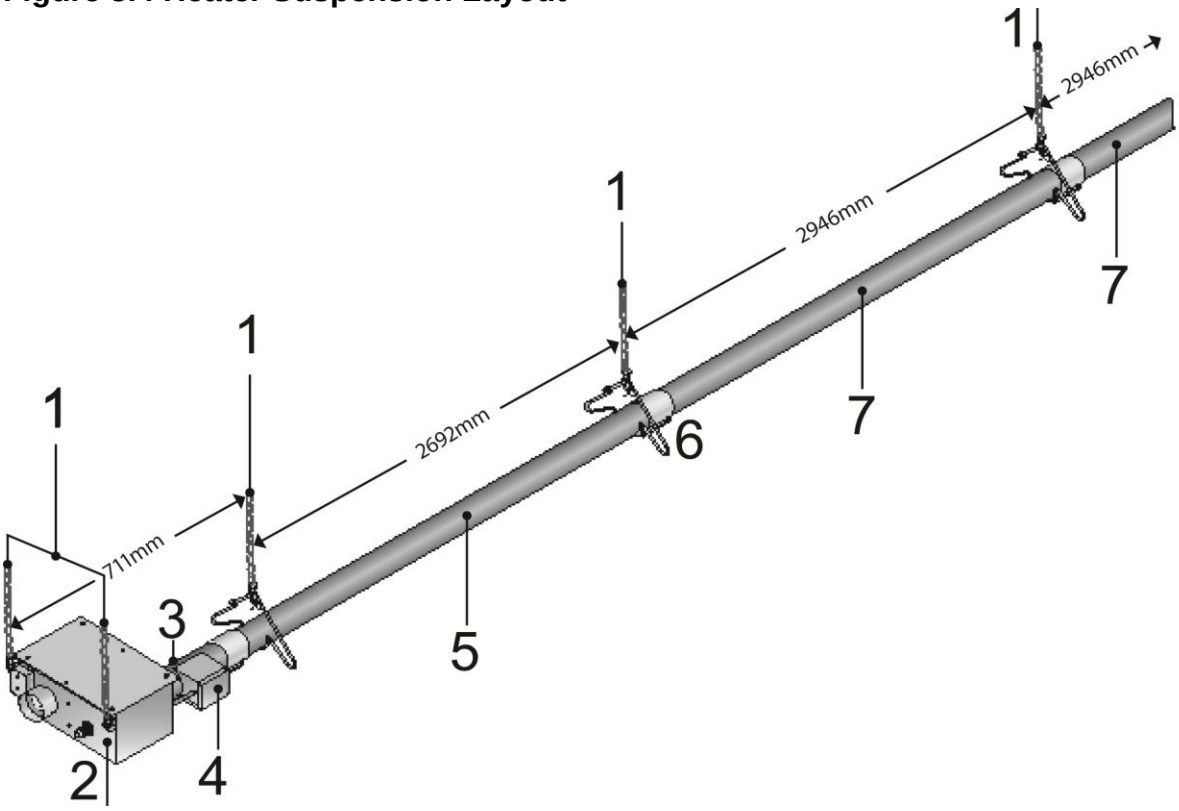
   - The spacing between the burner control box mounting brackets and the first hanger should be approximately 71 cm.
   - The space between the first two hangers placed on the first tube should be approximately 269 cm.
   - The space between hangers thereafter, one per tube, should be approximately 295 cm.

Hanger Placement and Suspension

NOTE:
A sticker identifying the combustion chamber is located in the swaged end of the tube.



Figure 3.4 Heater Suspension Layout



1 = Suspension points
2 = Burner box (shape can vary a bit depending model)
3 = Burner tube
4 = Ignitor/sensor box
5 = 3m Primary combustion chamber (material can vary depending model, see page 2)
6 = Tube clamp (on 50-60 kW models the second clamp must be Stainless Steel)
7 = Radiant Emitter Tube (On 44-60 kW models the second tube is an Aluminized secondary combustion chamber)

Heater Mounting Requirements and Weights

AKHL Model Length (m)	Dimension Straight Config. (m)	Tube and Reflector Suspension Points	Control Box Stabilizer	Shipping Weight (kg)	Stainless Steel Ship Weight (kg)	Chain Set Qty. Straight Config.	Chain Set Qty. "U" Config.	Optional Brass Knuckless (P/N:BK)	Optional Single Mount Bracket (P/N: sMB) U Config. Only
6m	6,58	3	2	54.5	66.0	5	6	3	2
9m	9,53	4	2	73.0	88.5	6	7	4	3
12m	12,47	5	2	86.5	107.0	7	8	5	3
15m	15,42	6	2	107.0	132.0	8	9	6	4
18m	18,36	7	2	125.5	150.0	9	10	7	4
21m	21,30	8	2	144.0	168.0	10	11	8	5

Hanger Placement and Suspension

Suspension of the heater must conform to applicable codes referenced in the safety sections of the applicable standards and these instructions.

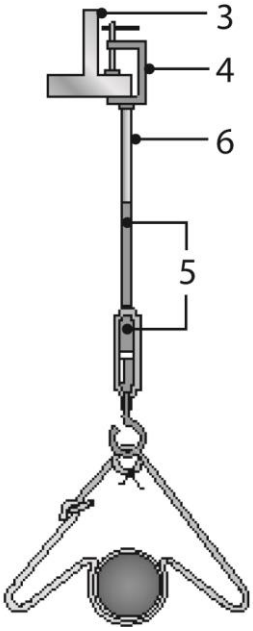
3. Prepare the mounting surface, if necessary such as: weld blocks, drill holes. Figure 3.5
   NOTE: The burner control box and the radiant tubes should be in a straight alignment and level.

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

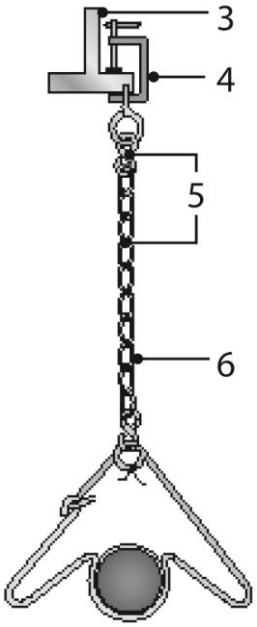
5. Attach and close S–hooks and #1 double–loop chain to anchor. Check that it is securely attached.
   NOTE: Threaded rod and turnbuckles may also be used.

6. Attach hangers to chain. 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.

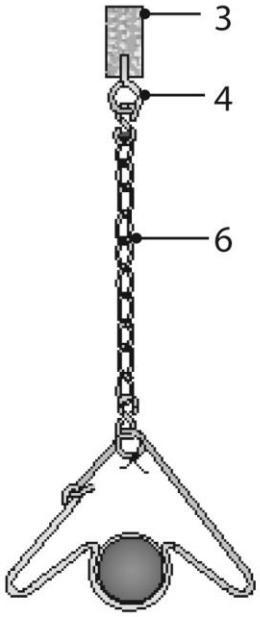
Figure 3.5 Mounting the Hangers



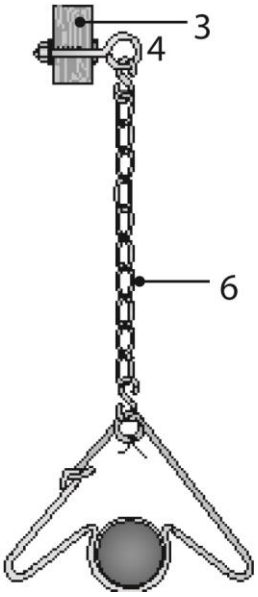
3 = I-beam
4 = beam clamp
5 = Threaded rod and turnbuckle
6 = Rod



3 = I-beam
4 = beam clamp
5 = S hook and double loop chain
6 = Chain



3 = Concrete beam
4 = Screw hook
6 = Chain

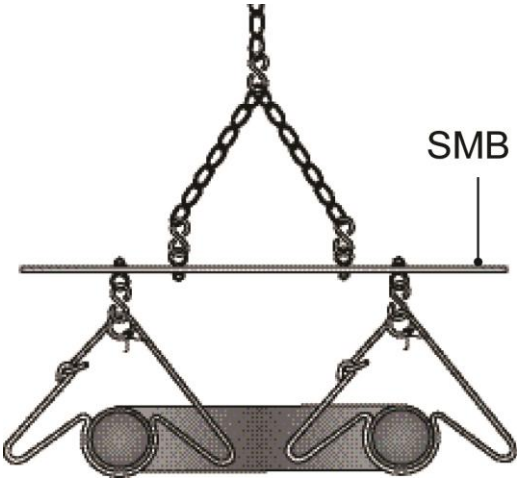


3 = Wood beam
4 = Eye bolt/nut
6 = Chain

3.4 Optional U – Bend or Elbow Accessory Configuration

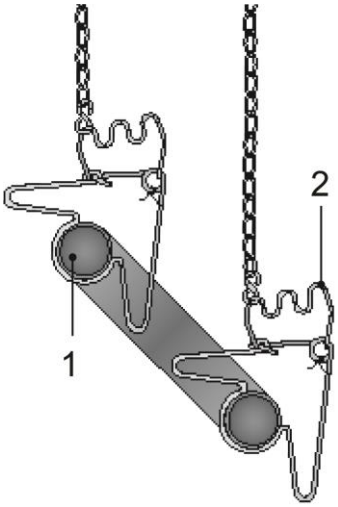
Figure 3.6 U – Tube Hanger Mounting Options

NOTE: we advice for the 9m, 15m and 21m models to use the 5 EA – SUB accessory package when installing in a "U" configuration.



SMB = Single mounting bracket

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

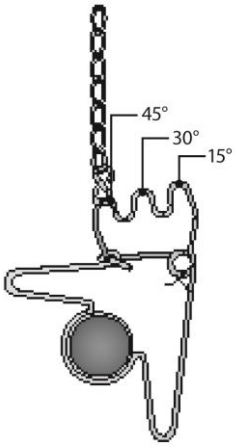


1 = Exhaust end
2 = Brass knuckle
U – Tubes can be mounted at a 15, 30 or 45 degree angle with two suspension points, using two Brass knuckle (P/N:BK)fittings, #1 double-loop chains and S-hooks.

Figure 3.7 Angled Hanger Mounting Options



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



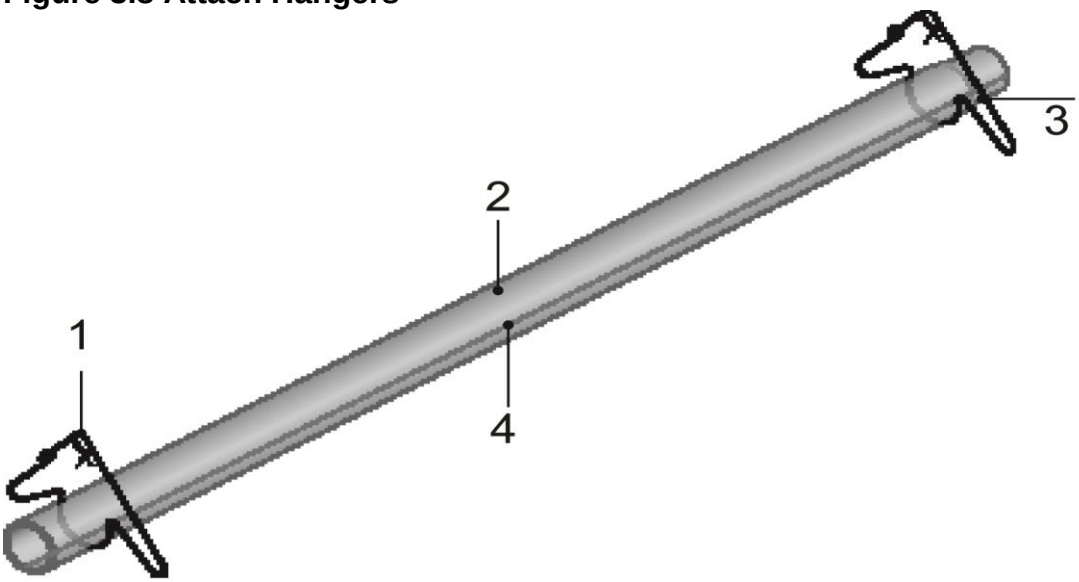
For variety of hanging angles, use the Brass Knuckle P/N:BK) fitting with a # 1 double–loop chain and S – hook

3.5 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 (see Figure 3.8)
   Refer to section 3.8 on page 21 for tube installation sequence.

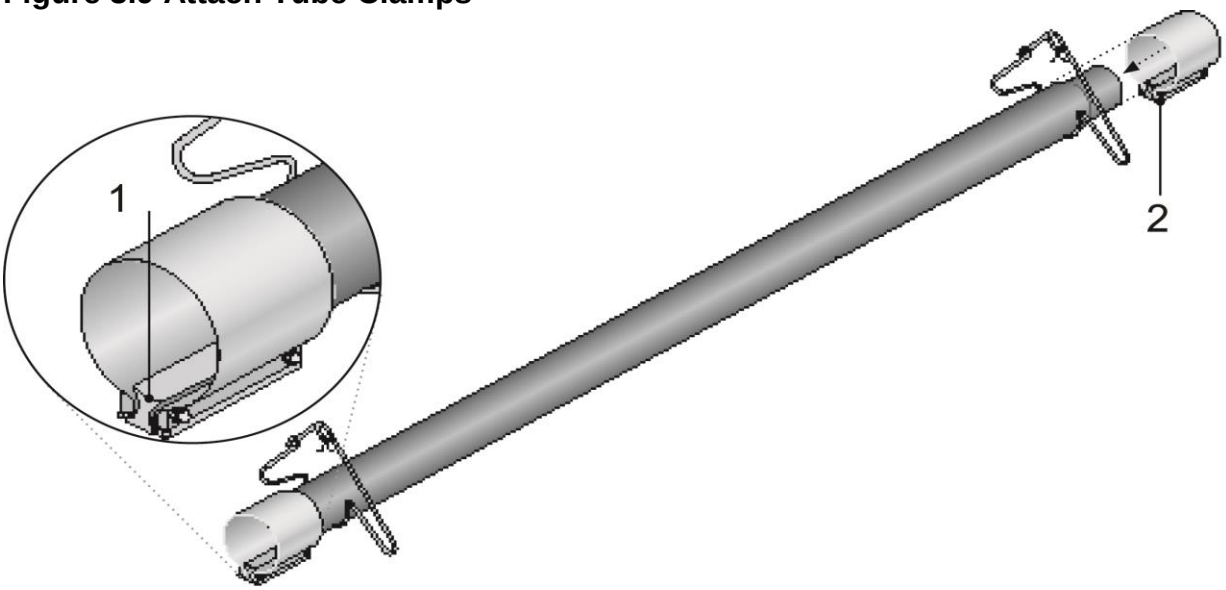
Figure 3.8 Attach Hangers



1 = Hanger
2 = Radiant tube
3 = Swaged end
4 = Welded seam faces down

2. Slide tube clamps onto radiant tubes (see Figure 3.9)

Figure 3.9 Attach Tube Clamps



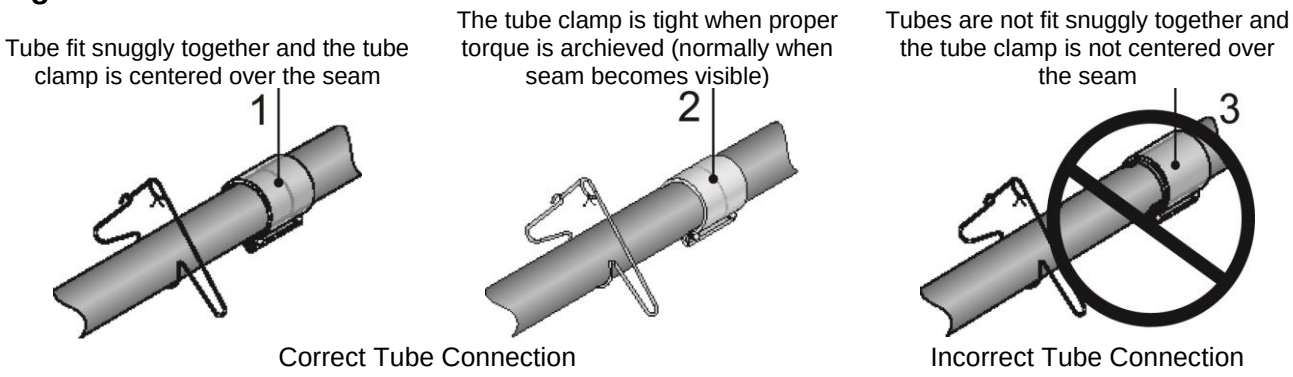
1 = Concave surface
2 = Tube clamp

NOTE: if the tube clamp comes apart, the spacer **must** be re-assembled with the spacer's concave surface facing against the radiant tube surface.

Radiant Tube Assembly

3. 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.
4. 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.
5. Tighten tube clamp bolts to secure. When proper compression is obtained (30-44 Nm), the tube seam will create a visible mark on the tube clamp. **NOTE**: Excessive torque may damage the tube clamp.
6. Determine the location of the burner control box and note the placement of the mounting chains.

Figure 3.10 tube Connections



Correct Tube Connection

Incorrect Tube Connection

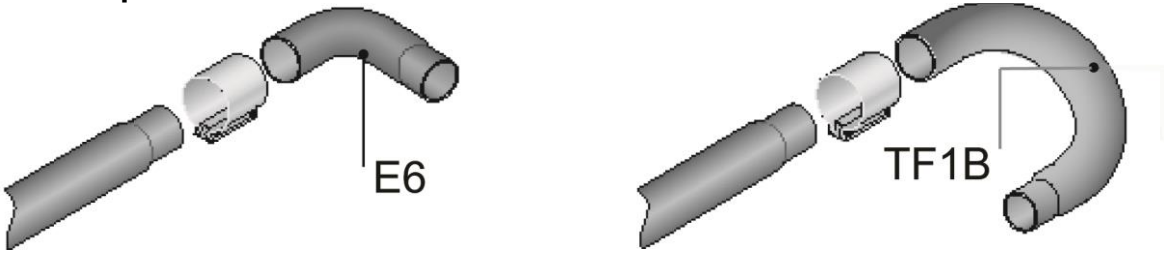
Optional U – Bend or Elbow Accessory Configurations

A 180 degree U – bend or 90 degree accessory fitting may be installed in the radiant tube heater system. Refer to page 17 for the 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 46 cm.
- If operating the heater un-vented, separate the intake air to the heater from its exhaust products a minimum of 122 cm; further separation may be necessary (see figure 3.12). Outside 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 84 cm section of turbulator baffle. Refer to Baffle Assembly on pages 21 & 22.

Figure 3.11 Optional Tube Connections

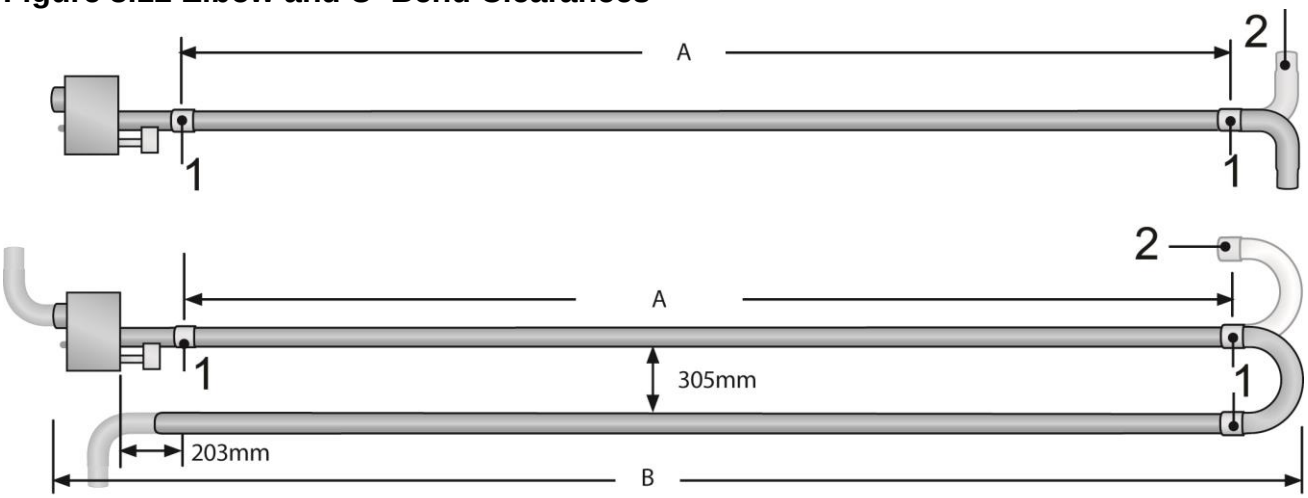


E6 = 90 degree Elbow bend

TF1B = 180 degree U-bend

Radiant Tube Assembly

Figure 3.12 Elbow and U–Bend Clearances



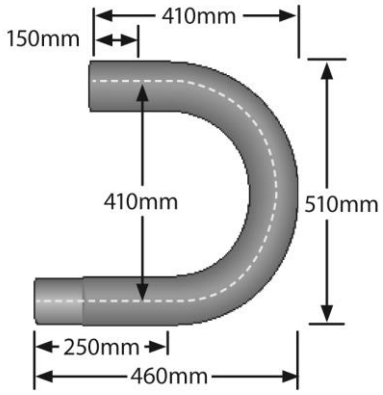
1 = Tube clamps

2 = U-bend/Elbow can be set in both directions

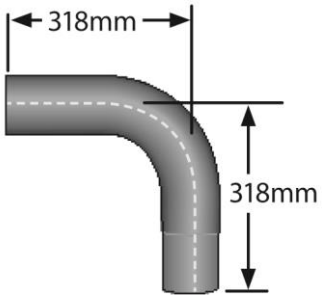
Minimum Distance from Burner Control Box to U – Bend or Elbow Accessory	
AKHL Model	**Dimension A (m)**
AKHL 20, 75	3,05
AKHL 25, 30, 100	3,05
AKHL 35, 125	4,57
AKHL 40, 45, 150	6,10
AHKL 50, 175	7,62
AKHL 55, 60	7,62

Overall Dimensions for Heaters Configured with U–Bend (P/N:TF1B)	
AKHL Model Length	**Dimension B (m)**
6m	3,96
9m	5,38
12m	6,91
15m	8,33
18m	9,86
21m	11,38

Figure 3.13 U–Bend and Elbow Dimensions



Dimensions: TF1B



Dimensions: E6

3.6 Burner Control Box Suspension

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

The burner control box must be in straight alignment with radiant tubes and level. Contact your local distributor or the factory to see if your application allows for the rotation of the burner control box.

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 S-hook and # 1 double loop chain (P/N: THCS) to anchor. Check that it 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 radiant tubes (5). Burner sight glass (6) will be visible from the floor.

Figure 3.14 Burner Control Box Assembly - Side View (old model/new model)

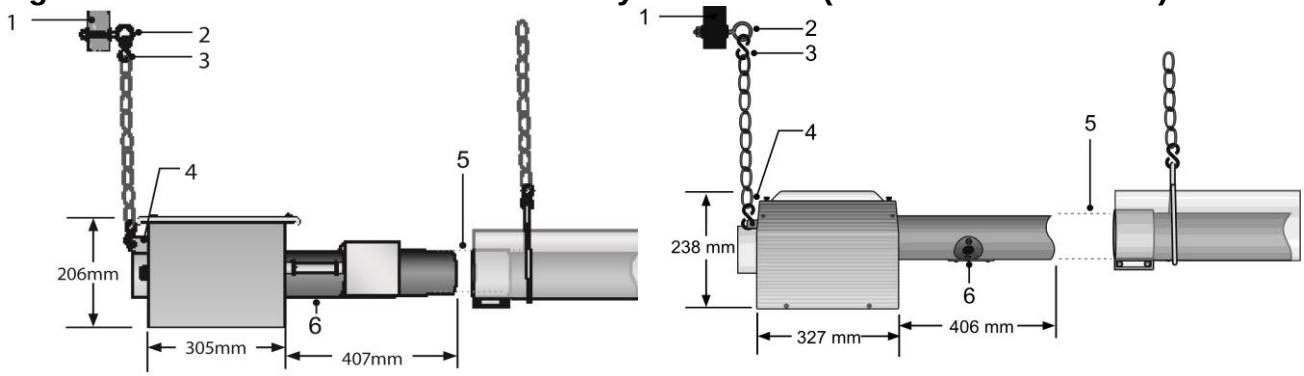
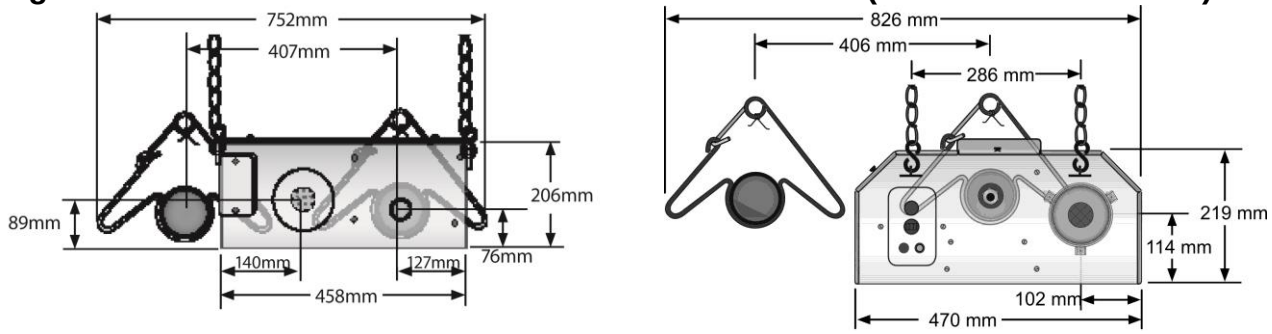


Figure 3.15 Burner Control Box with U–Bend - End View (old model/new model)



3.7 Reflector Assembly

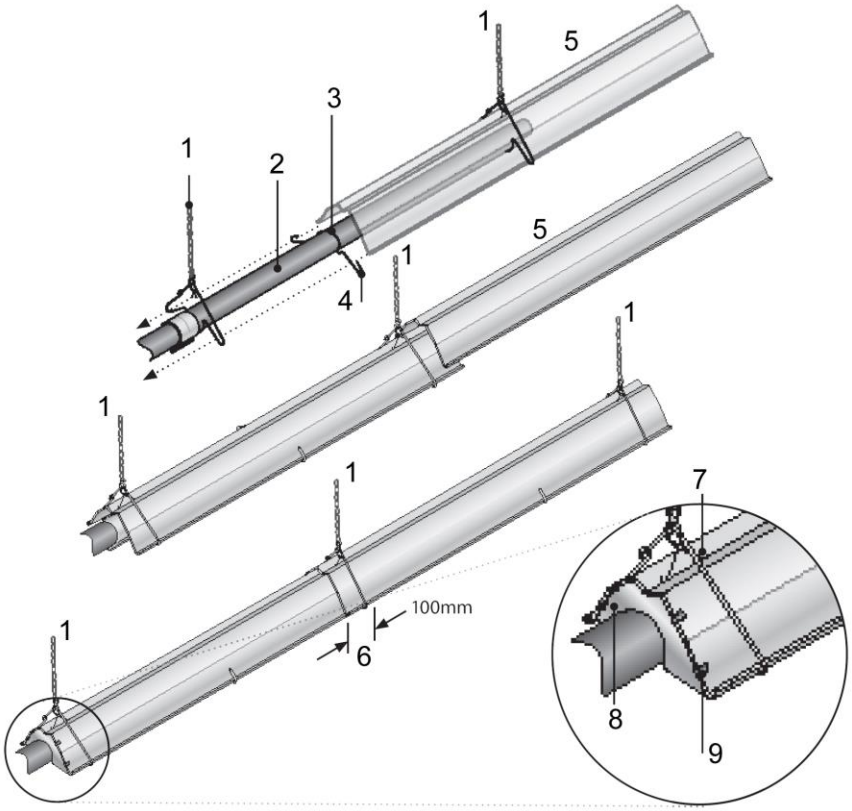
To install the reflectors:

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 10 cm.
3. To prevent the reflectors from shifting, secure the reflector sections together using sheet metal screws except at the expansion joint. (see page 21). Place the screw in the V-groove near the tension spring of the hanger.
   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 infra-red energy to the floor level. The reflector assembly depends on the heater configuration, proximity to the combustibles and the space surrounding the heater.

Before you begin assemby, determinate if the use of deflector accessories are necessary (see page 20).

Figure 3.16 Reflector Assembly



1 = Hanger and chain
2 = Radiant tube
3 = Reflector center support
4 = Position at mid-point on the tube
5 = Reflector
6 = 10 cm overlap
7 = Reflector tension spring
8 = Reflector end cap
9 = Clips

Reflector Assembly

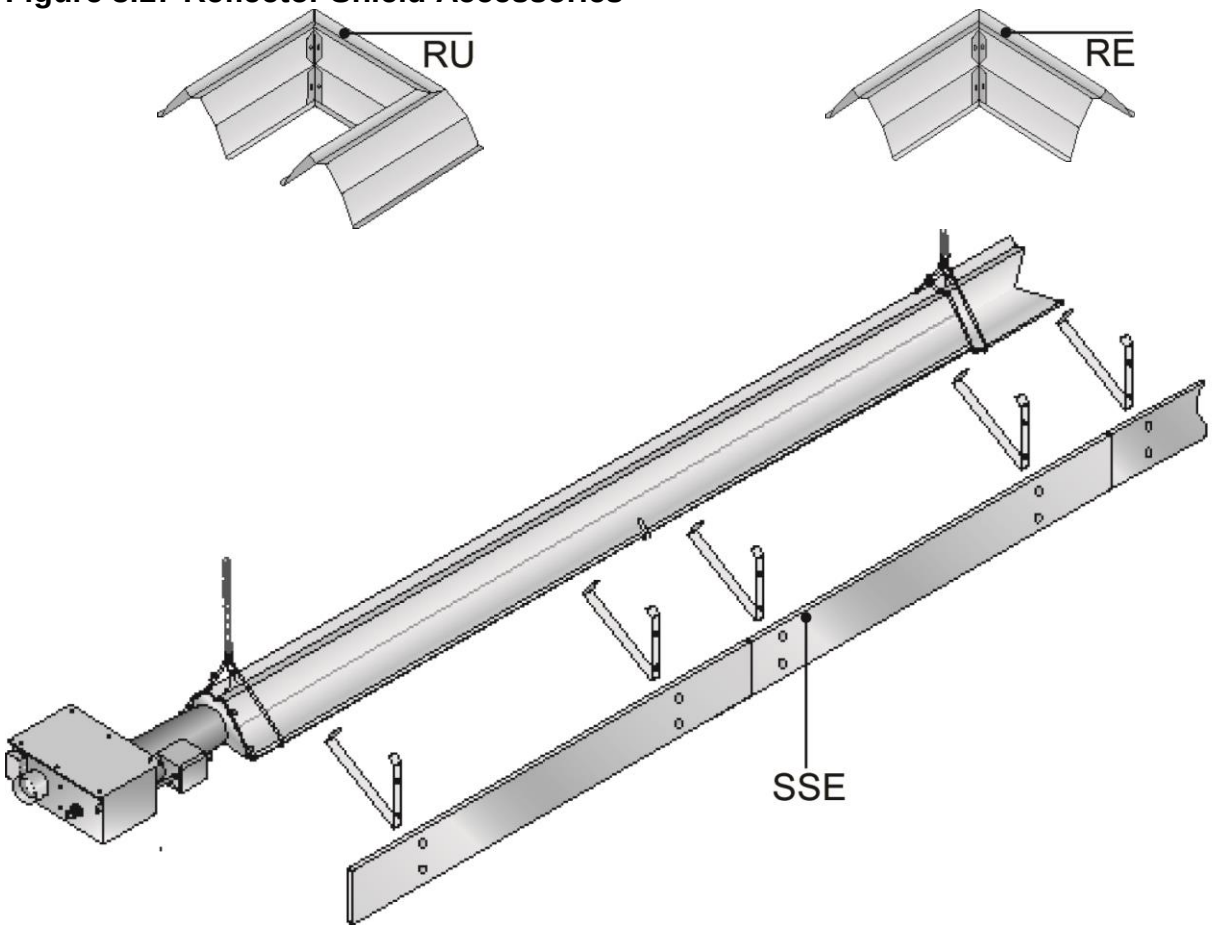
Common Optional Accessories

Reflector Accessories	Description	Part #
Elbow Reflector*	90° bend, highly polished aluminium reflector elbow. Designed to fit atop one elbow accessory fitting.	RE
U-Reflector*	180° bend, highly polished aluminium reflector U-bend. Designed to fit atop one U-bend accessory fitting.	RU
Side Shield Reflector*^	Highly polished side shield extension used to direct infra-red rays downward, away from side walls and combustibles.	SSE
Protective Guard	Used to prevent debris or objects from becoming lodged between the radiant tube and reflector. Require when mounting below 2,44 m.	PG

* Reflectors cannot be rotated when used with this accessory.

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

Figure 3.17 Reflector Shield Accessories



3.8 Baffle Assembly and Placement

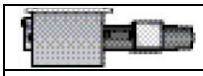
Secured Joints and Baffle Location for Reflectors

NOTICE

Different inputs and models utilize different baffle lengths. Remove all enclosed baffle sections from box and retain with applicable heater. Reference shipping label or dataplate on the heater or the table on page 3 for the proper baffle size.

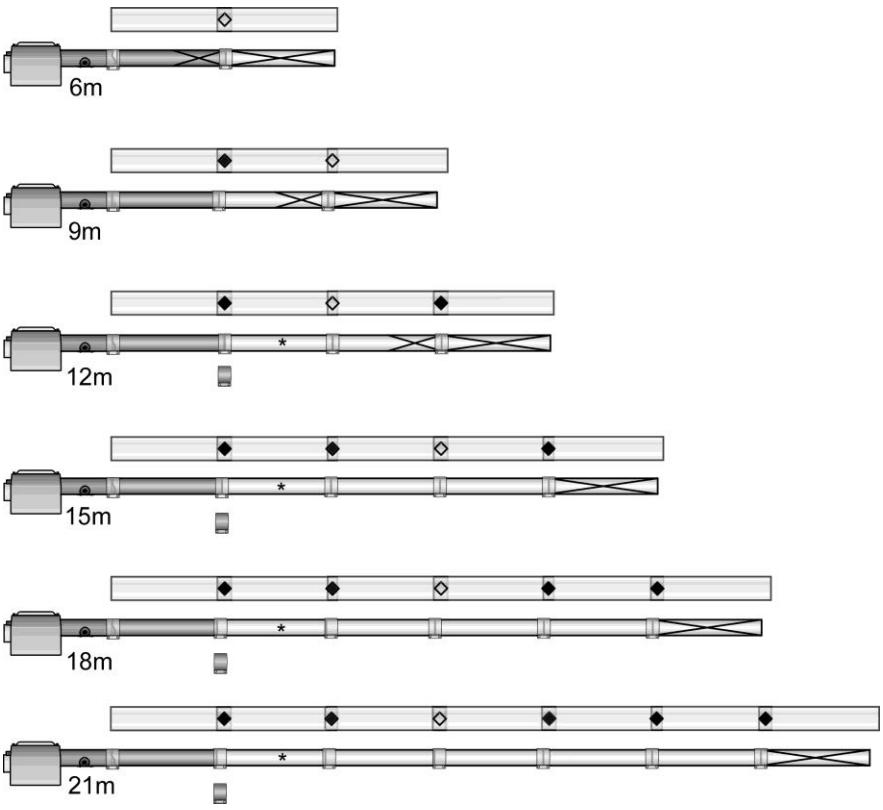
Each 84 cm baffle section must be assembled with other baffles and placed in the radiant tube section furthest from the burner.

Important: Omit one section of baffle if heater is configured with a U-bend or Elbow accessory fitting.

	Burner control box with Burner tube
	Expansion joint on Reflectors (page 19)
	Secured joint on Reflectors (^)
	Primary combustion chamber tube with clamp (see page 2)
	Radiant tube with clamp
	Baffle location
	Stainless steel clamp for 50-60kW models

(^) When heaters configured with a U-shaped accessory fitting (TF1B), the location of the reflector expansion joint differs from that shown below. Ensure allowance for expansion on the primary leg of the U-tube installation.

(*) 44 to 60 kW models utilize a secondary aluminized steel combustion chamber placed immediately downstream of the primary combustion tube.

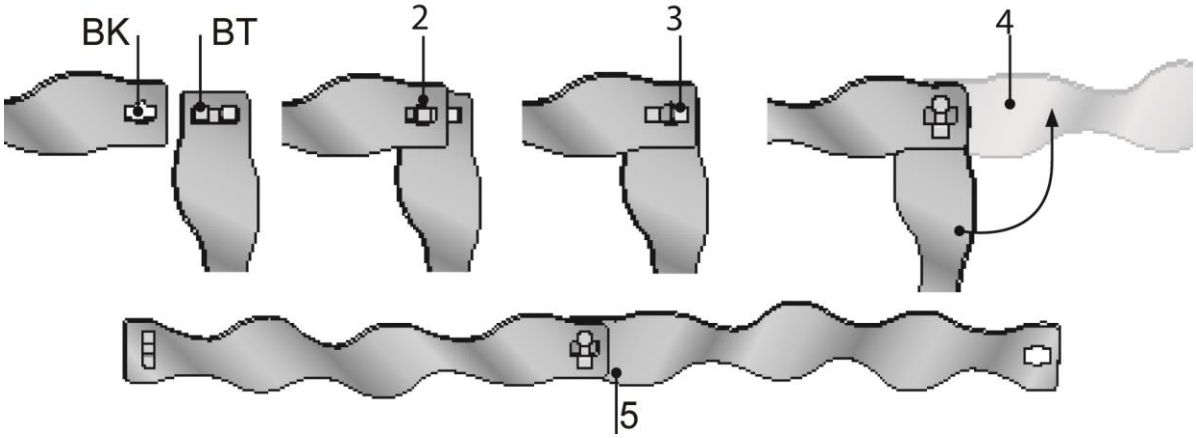


Baffle Assembly and Placement

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 84 cm baffle section if heater is installed with an elbow or U-bend accessory.
2. Install the baffle tab at a 90° angle to the baffle keyhole (see Figure 3.18).
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 3.18 Assembling the Baffles

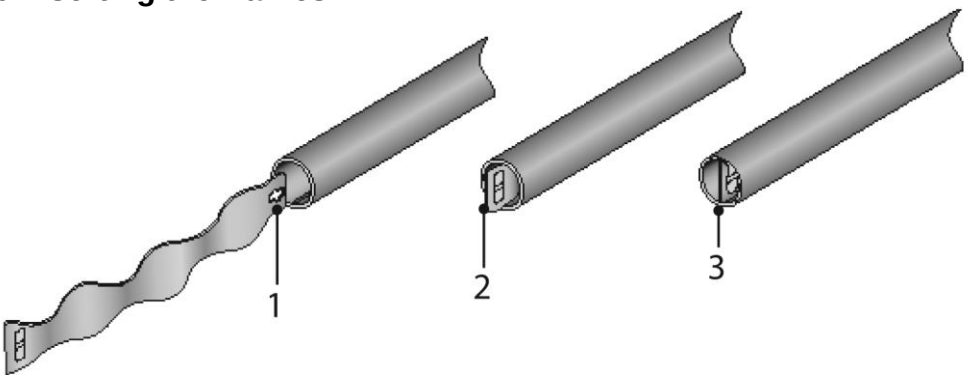


BK = Baffle keyhole BT = Baffle tab

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 that 3,04 m, will continue to be fed into next tube section.

Figure 3.19 Inserting the Baffles



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

3.9 Flueing

Warning

Insufficient flueing and/or improperly sealed flues may release gas into the building which could result in health problems, carbon monoxide poisoning or death.

Improper flueing may result in fire, explosion, injury or death.

Seal flue pipes with high temperature sealant and three (3) sheet metal screws incase the flue system does not incorporate a rigid fixing method. Flue enclosed spaces and building according to the guidelines in this manual and applicable national, state, provincial and local codes.

The heating system may operate either flued or un-flued (see page 27). Flueing can terminate through the sidewall (horizontal) or the roof (vertical) and be individually or commonly flued.

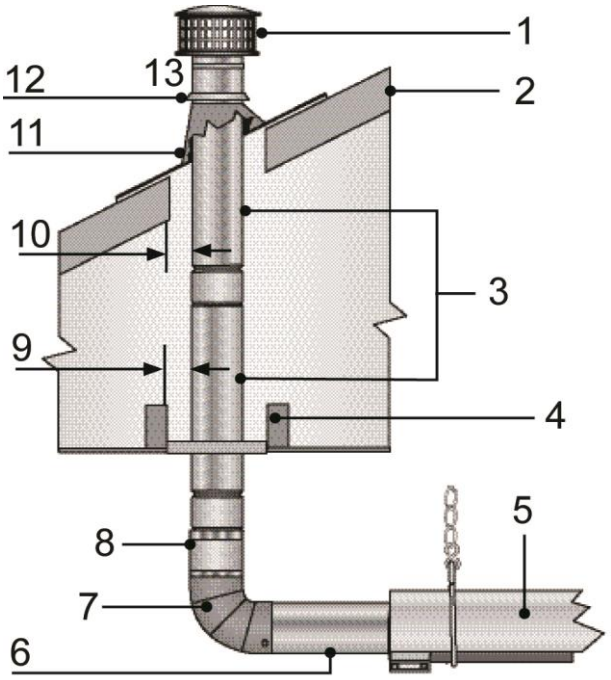
Follow these guidelines and all applicable codes for all models, prior to installing flue material. Local codes may vary. Refer to current I.E.E. Regulations and other relevant codes of practice.

Flueing Requirements

- Seal single skin flue high temperature sealant and three (3) sheet metal screws if applicable.
- Single skin galvanized flue pipe must be insulated in cold environments.
- Do not use more than two 90° elbows in the exhaust flue.
- To maintain clearance to combustibles, the use of an approved wall or roof thimble and twin skin flue is required for the portion of flue pipe that runs through combustibles material in the building wall or roof (see Figures 3.20 & 3.21)
- The maximum flue length is 6,1 m.

Flue Assembly

Figure 3.20 Flue Requirements:



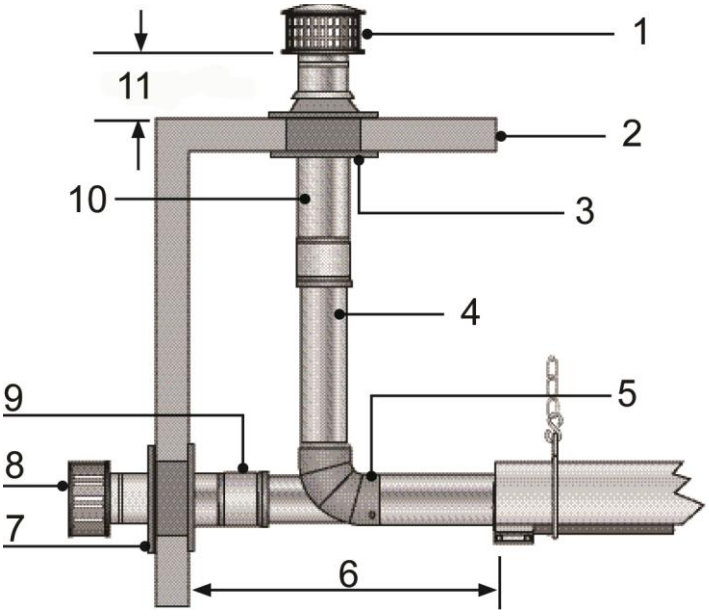
1 Rooftop flue cap
2 Roof
3 Double skin flue
4 Ceiling ring spacer
5 Heater
6 Single skin flue
7 Single skin Elbow or T-fitting
8 Adapter single skin to double skin flue
9 Minimum clearance of 2,5 cm
10 Minimum clearance of 2,5 cm
11 Adjustable roof flashing
12 Storm collar
13 Minimum height of 61 cm above roof

Sidewall (Horizontal) Flueing

Guidelines:

- To prevent moisture from entering the heater system, slope the flue pipe down toward the outlet 20mm per meter of flue length. Do **not pitch** the heater.
- Flue must extend beyond any combustibles overhang.

Figure 3.21 Vent Slope – Side View



1 Rooftop flue cap
2 Roof
3 Thimble
4 100 mm single skin flue
5 Single skin Elbow or T-fitting
6 20mm pitch per meter
7 Thimble
8 Sidewall flue cap
9 Adapter single skin to double skin flue
10 Double skin flue
11 Minimum height of 61 cm above roof

Flue Assembly

Flue Termination

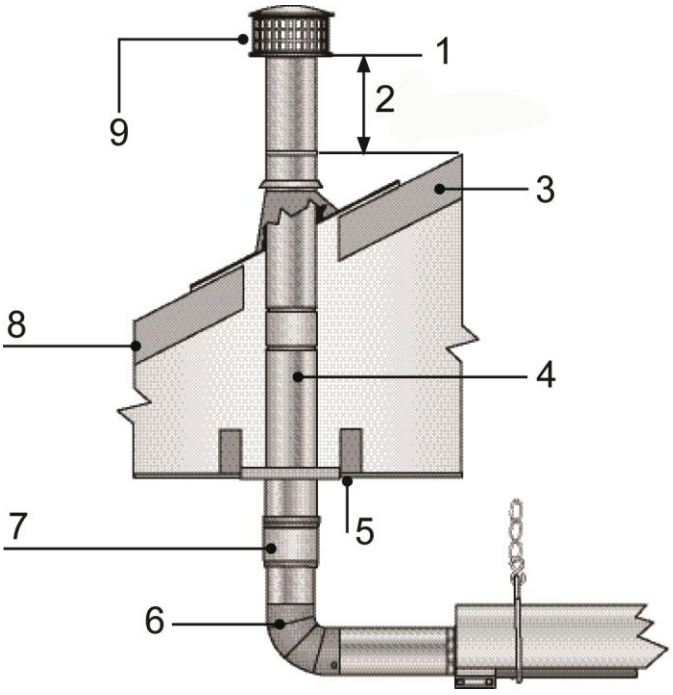
- Follow always the local requirements incase they deviate from the info below.
- Flue must terminate a minimum of 1,2m below, 1,2m horizontally from and 0,3m above any window or door that may be opened and gravity air inlet into the building.
- Flue must terminate a minimum of 0,9m above any forced air inlet that is located within 3,1m.
- The bottom of that flue terminal must be located a minimum of 0,3m above grade level and must extend beyond any combustible overhang. Flues adjacent to public walkways must terminate a minimum a 2,1m above grade level.
- The flue terminal must be installed to prevent blockage by snow and protect building materials from degradation by flue gases.
- The flue cap must be minimum of 15cm from the sidewall of the building.
- Flues must extend beyond any combustibles or be a minimum of 92cm below a combustibles overhang.

Roof (vertical) Flueing

Guidelines:

- Separate air intake duct from flue pipe a minimum of 1,2m by placing flues pipes higher than adjacent air intake duct.
- Flueing may utilize standard twin skin cap.
- The flue terminal extend a minimum of 61cm above the roof.

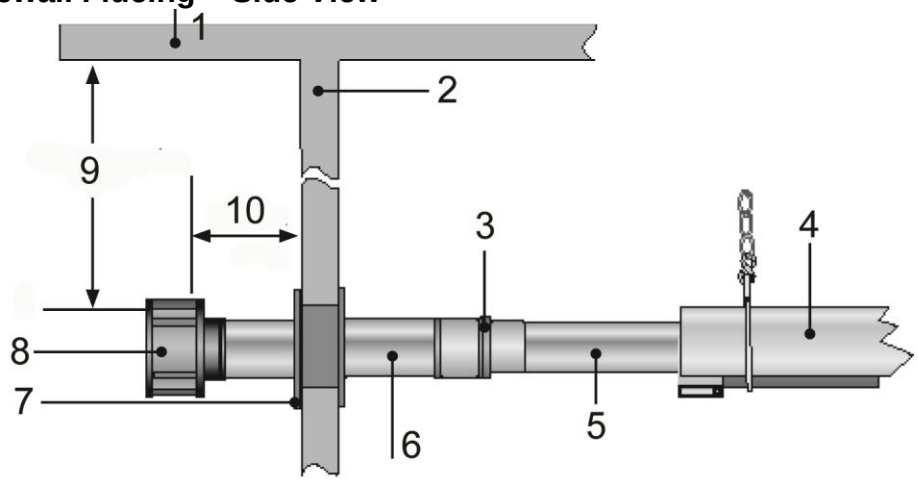
Figure 3.22 Vertical Flueing – Side View



1 Rooftop flue cap
2 Minimum height of 61 cm above roof
3 Roof
4 Double skin flue
5 Thimble
6 Single skin Elbow or T-fitting
7 Adapter single skin to double skin flue
8 Roof
9 Rooftop flue cap

Flue Requirements

Figure 3.23 Sidewall Flueing – Side View



1 Building combustible overhang
2 Sidewall
3 Adapter single skin to double skin flue
4 Heater
5 Single skin flue
6 Double skin flue
7 Wall thimble
8 Sidewall flue cap
9 Minimum 92 cm distance
10 Minimum 15 cm distance

Optional Unflued Operation

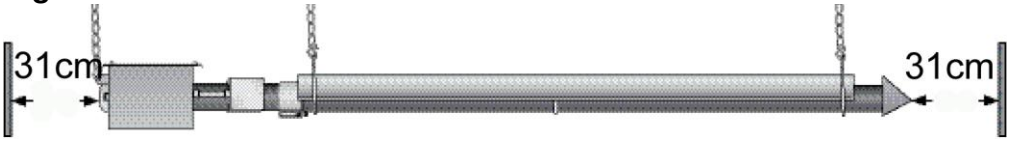
Warning

Not for residential use. The use of unflued tube heaters in residential indoor spaces may result in property damage, serious injury or death. Use unflued operation in commercial and industrial installations with proper ventilation rates only.

When installing in an un-vented configuration:

- A factory supplied flue cap/diffuser (P/N: WVE-GALV) must be used.
- Flueing of the space is required to dilute the by-products of combustion. Sufficient displacement of fresh air intake and exhaust by-product must be provided.
- The minimum clearance between air intake and the exhaust terminal is 1,2m.
  NOTE: When installing in a U-bend configuration, use caution to separate flue gases from heater intake.
- A minimum positive air displacement for I2H and I2L gas: 2m³/hr per kW is required.
- A minimum positive air displacement for I3P Gas: 2.3m³/hr per kW is required.
  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 use of outside combustion air intake is recommended.

Figure 3.24 Minimum end clearance for unflued heater



3.10 Combustion Air Requirements

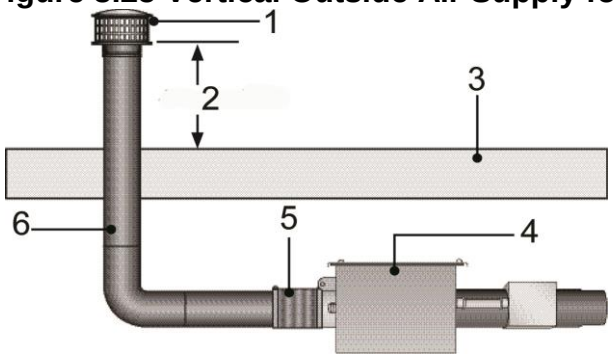
NOTICE

This heater has a factory preset air orifice for proper combustion air supply. If combustion air is to be provided for a tightly closed area, 440 mm2 of free air opening must be provided for each kW of heater input.

Non-contaminated air for combustion must be deducted 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.

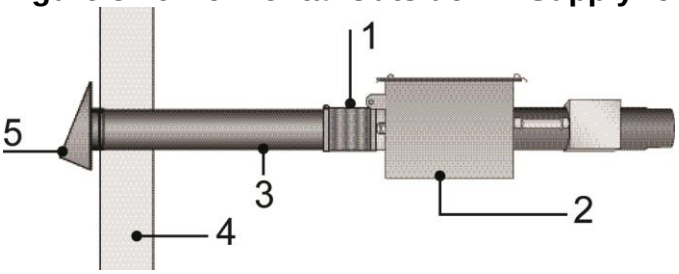
Combustion air intake may be located on either the sidewall or the roof. Figure 3.25 – 3.27.

Figure 3.25 Vertical Outside Air Supply for Single Heater - Side View



1 Roof intake cap
2 Minimum 46 cm clearance
3 Roof
4 Burner control box
5 Flexible air inlet boot
6 100mm air inlet pipe

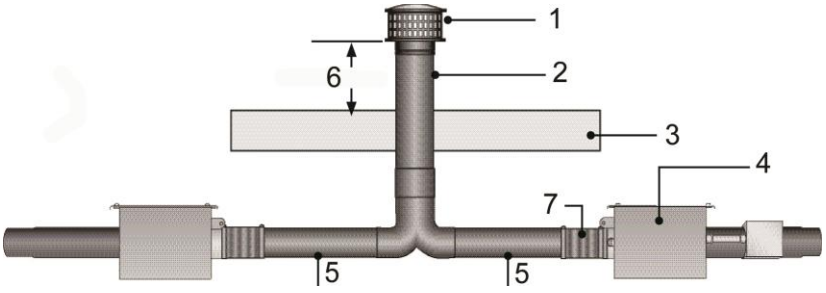
Figure 3.26 Horizontal Outside Air Supply for Single Heater - Side View



1 Flexible air inlet boot
2 Burner control box
3 100mm air inlet pipe
4 Wall
5 Air intake cap

Figure 3.27 Vertical Outside Air Supply for Double Heater - Side View

Note: Common intake Heaters **must** share the same thermostat



1 Roof intake cap
2 150mm pipe
3 Roof
4 Burner control box
5 100mm pipe
6 Minimum 46 cm clearance
7 Flexible air inlet boot

Combustion Air Requirements

Guidelines:

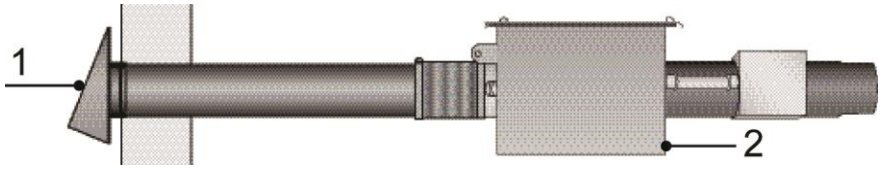
Limitations for length and size of combustion air intake duct

Single Heater Intake		Dual Heater Intake	
Air intake pipe size	**Max. Intake Length**	**Air intake pipe size**	**Max. Intake Length**
100mm	**6,1m**	**150mm**	**6,1m**
130mm	**9,2m**	**200mm**	**9,2m**
150mm	**12,2m**	**Longer length: Consult dealer for advice**	

General Requirements:

- No more than two 90° elbows are allowed.
- Allow for expansion. Use a 100 mm diameter flexible hose to connect the duct to the burner control box.
- In humid environments, use insulated duct, PVC pipe or DWV (drain waste vent) to prevent condensation on the outer surface.
- Do not draw combustion air from attic space or other negatively pressured areas.
- A factory approved wall intake cap (P/N: WIV-4) must be used with horizontal outside air intake ducts. The wall intake cap must be installed to prevent blockage. Locate the intake where dirt, steam, snow, etc. will not contaminate or clog the intake screen.
- Separate air intake duct from flue pipe a minimum of 100 mm. Also, place flue pipe higher that adjacent air intake duct.

Figure 3.28 Wall Intake Cap



1 Air intake cap 2 Burner control box

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:

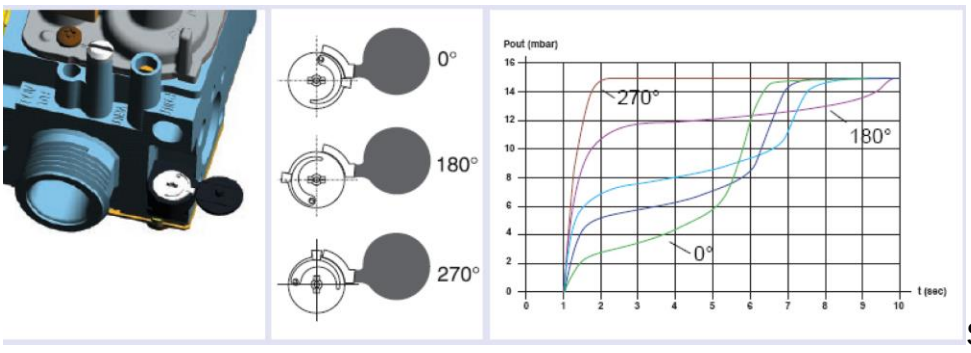
- Verify that the heater's gas type (as listed on the rating plate) matches that of your application.
- Check that the gas piping and service has the capacity to handle the total gas consumption of all heaters being installed, as well as any other gas appliances being connected to the supply line.
- Check that the main supply line is of proper diameter to supply the required fuel pressures.
- If utilizing used pipe, verify that its conditions 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. The gas supply pipe must be of sufficient size to provide the require 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.

Gas Supply and Pressure Chart

Type of Gas	Composition	Calorific Value	Required Manifold Pressure	Minimum Inlet Pressure *	Maximum Inlet Pressure	Setting valve screw
I2H (G20-Natural)	CH_4 = 100 [methane]	37.78 MJ/m3	9-10 mbar (see page 3 for your model)	11.5-12.5 mbar (see page 3 for your model)	50 mbar	0°
I2L (G25-Derated Natural)	CH_4 = 86 N_2 = 14 [methane]	32.49 MJ/m3	13-15 mbar (see page 3 for your model)	15.5-17.5 mbar (see page 3 for your model)	50 mbar	0°
I3P (G31-LPG)	C_3H_8 = 100 [propane]	95.65 MJ/m3	25 mbar	27.5 mbar	50 mbar	270°

* For purpose of adjustment

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



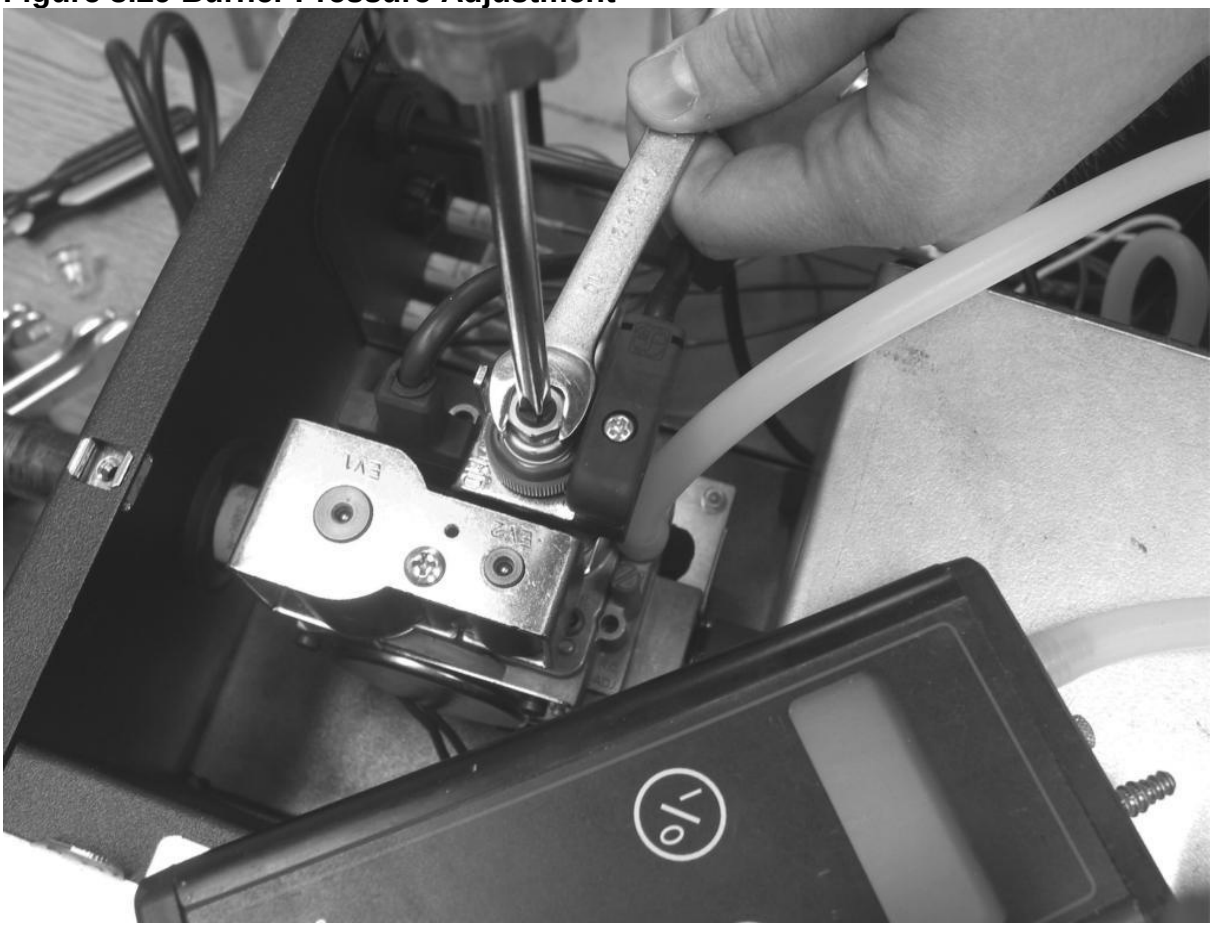
Setting valve screw

3.11 Gas Supply

Adjusting Burner Pressure

- Remove the lid to the valve compartment.
- Open the pressure nipple (Figure 3.29-A) and connect pressure meter tube.
- Remove the cap over the adjusting screws on the gas valve pressure regulator. Place a 10mm spanner (wrench) on the outer adjusting nut and a screwdriver on the black inner screw. The outer adjusting nut (Figure 3.29-C) regulates the high fire; whereas the black inner screw (Figure 3.29-B) regulates the low fire. **Note**: During adjustment of the nut (C), the screw (B) must be kept in position otherwise it will turn together with the nut (C).
- Adjust high fire by turning the nut (C). Pressure is increased by turning clockwise.
- Replace the burner control box lid, then operate the heater to check high fire burner pressure.
- Repeat this procedure from point 4 until proper burner pressure is achieved. Also, repeat this procedure to adjust low fire burner pressure by turning screw (B).
- After low fire adjustment, confirm that the high fire pressure value did not change.
- Replace all caps and plugs, close the pressure nipple carefully and secure the burner control box lid.

Figure 3.29 Burner Pressure Adjustment



Gas Connection

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.

To connect the gas:
This heater must be installed and service by trained gas installation and service personnel only. The installation must conform with local building codes and regulations.

IMPORTANT! The heating 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 connections **must** be supported independently. Do not install as supply line in a manner that bears the weight of the heater. Connect the main gas supply line with an approved flexible connector (Figure 3.30-3.31) 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 for condensation which 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 50 mbar requires a high pressure regulator and ball valve.

2) Form the stainless steel flexible connector into smooth C-shape allowing 30 cm between the flexible connector's end nuts (see Figure 3.30).

3) Attach the ball valve to the gas supply pipe. Apply pipe compound to adapter threads to seal the joint. Use only a pipe compound resistant to LPG.

   NOTE: Provide a 3.2 mm (1/8") BSP plugged tapping accessible for test gauge connection immediately upstream of gas connection to the heater (provided on ball valve). An isolation valve shall be fitted immediately adjacent to the appliance which, when closed, allows the complete burner assembly to be disconnected for maintenance or repair.

Gas Supply

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.

4) 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.
5) Final assembly must be tested for gas leaks according to current I.E.E. Regulations and other relevant codes of practice.

IMPORTANT: Before installation, check that local distribution conditions, nature of gas and pressure, and the adjustment of the appliance are compatible.

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 I.E.E and other relevant codes of practice.

Figure 3.30 Gas Connections (Flexible Gas Connection shown) - Side View

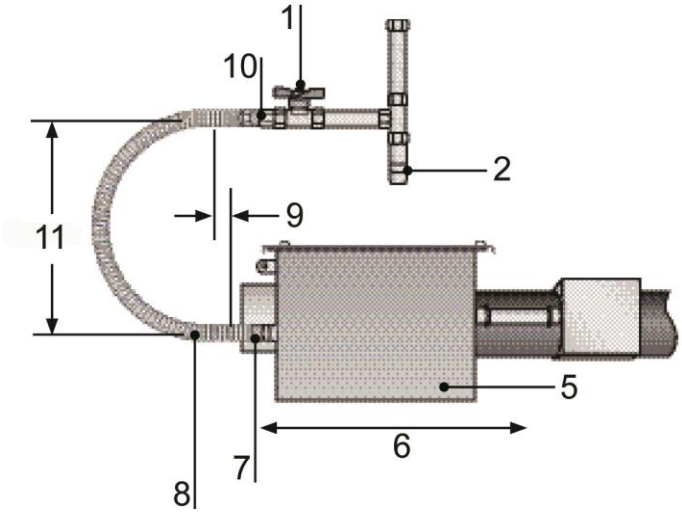
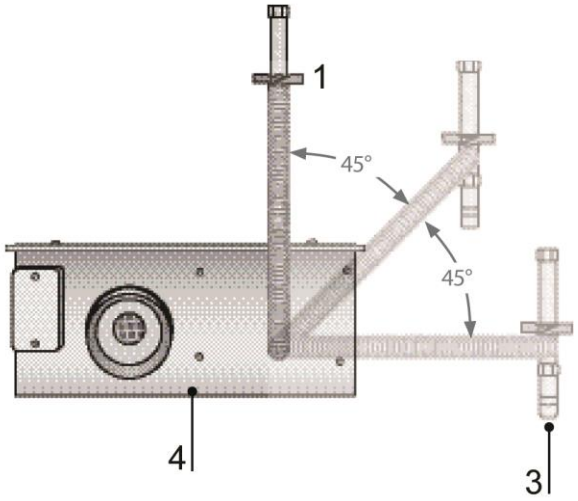


Figure 3.31 Gas Connections (Flexible Gas Connections shown) - End View

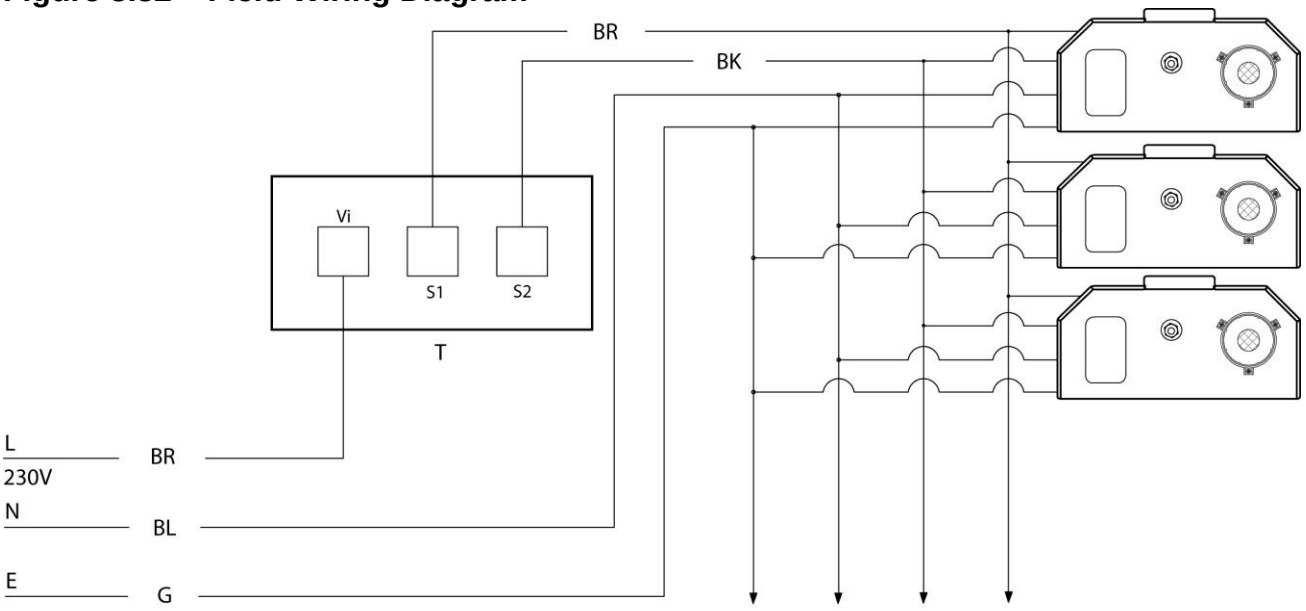


1 Ball valve or inlet tap
2 Drip leg/sediment trap
3 Cap to clean sediment trap
4 Burner control box – end view
5 Burner control box – side view
6 Direction of heater movement
7 Adapter
8 Stainless steel Gas connector formed in smooth C-shape
9 50mm maximum displacement
10 Adapter
11 Minimum 30 cm

3.12 Electrical Requirements

- Verify that the heaters voltage (as listed on the rating plate) matches that of your application.
- Heaters operate on 230 volts, 50 Hz, single phase. The amperage requirement is 0.6 Amps running current per heater.
- The heater must be grounded in accordance with the I.E.E. Regulations and local codes.
- Observe proper electrical polarity.
- The method of connections to the electrical supply must facilitate complete isolation and should preferably be made via a fuse isolator having a contact separation of at least 3mm in all poles and supplying the appliance only.
- Clearance to combustibles must be maintained between electrical apparatus and wiring (see 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 3.32 – Field Wiring Diagram



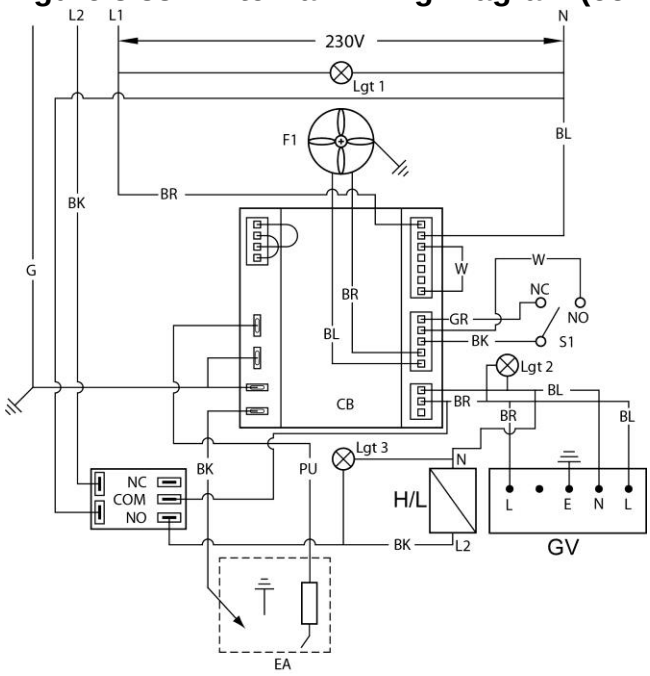
L	Phase	Vi	Voltage in
N	Neutral	S1	Stage 1 out
E	Earth	S2	Stage 2 out
BR	Brown	T	Thermostat
BK	Black		
BL	Blue		
G	Green/Yellow		

NOTE: Do not exceed maximum amp draw as specified in the thermostat

Internal Wiring Diagrams

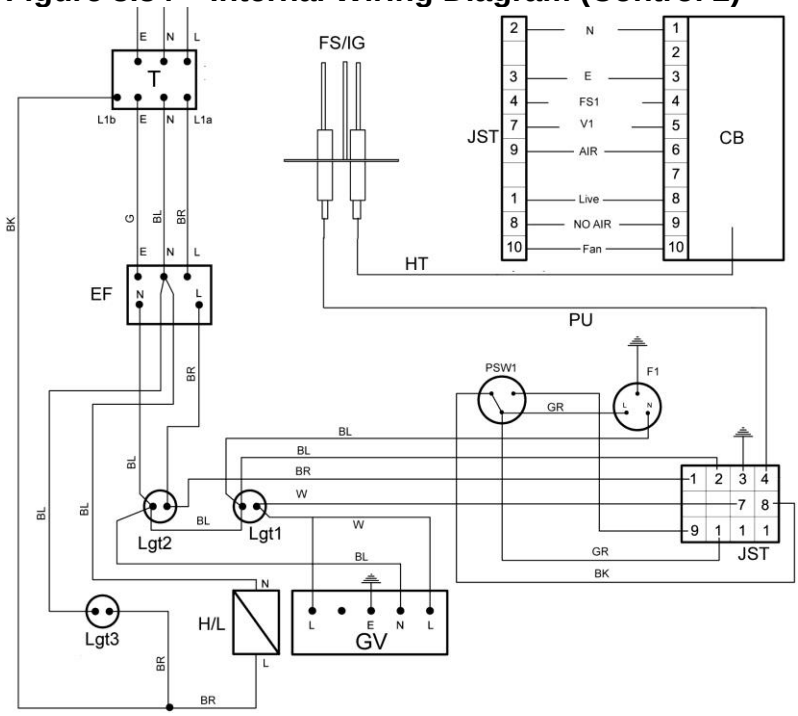
If any of the original wire as supplied with this appliance must be replaced, it must be replaced with wiring material having a temperature rating of at least 105° C.

Figure 3.33 – Internal Wiring Diagram (control 1)



L1	Phase 1
L2	Phase 2
N	Neutral
G	Green Yellow (earth)
BK	Black
BR	Brown
PU	Purple
BL	Blue
W	White
GR	Grey
GV	Gas Valve
H/L	Hi-Low actuator
Lgt1	Signal Light Red (power)
Lgt2	Signal Light Green (burner on)
Lgt3	Signal Light Amber (burner high)
CB	Circuit Board
EA	Electrode Assembly
NC	Normally Closed
NO	Normally Open
Com	Common
F1	Fan
S1	Pressure switch

Figure 3.34 – Internal Wiring Diagram (Control 2)



L1a	Phase 1
L1b	Phase 2
N	Neutral
G (E)	Green Yellow (Earth)
BK	Black
BR	Brown
PU	Purple
BL	Blue
W	White
GR	Grey
GV	Gas Valve
H/L	Hi-Low actuator
Lgt1	Signal Light Green (burner on)
Lgt2	Signal Light Red (power on)
Lgt3	Signal Light Amber (burner high)
CB	Circuit Board
FS/IG	Electrode Assembly
F1	Fan
PSW1	Pressure switch
HT	High Tension
EF	Electrical Filter
T	Thermostat 2-stage
JST	Junction

4.0 Operation

Warning
This heater is not equipped with a pilot ignition system. Do not attempt to light system manually.

Commissioning Procedures:

1. Ensure that ball valve to the heater is turned “OFF”
2. Purge air from the gas supply line and test for gas soundness in accordance with the relevant Standards.
3. Check that all electrical connections are made to the heater and that the unit has a sound earth connection.
4. Remove operating pressure test point screw and connect the pressure gauge.
5. Switch on power to the heater. After a purge period, the gas valve is energized and will attempt to ignite for 5-10 seconds. (If ignition fails, the heater will lock out). To reset the heater, briefly interrupt power to the heater.
6. With the heater running, test operating pressure. Refer to the Technical Specifications chart on page 3 for details on your particular gas type.

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).
5. 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 circuit board verifies that the pressure switch is in the proper position (open). The circuit board energizes the blower. Once operation static pressure is achieved, the differential switch will close initiating the ignition sequence. The system is purged for 10 seconds and the circuit board sends a spark through the electrode. The gas valve is open and an attempt at ignition is made for 10 seconds. If ignition fails, the heater will go into lockout until the electrical supply is interrupted for more than two seconds.

Running Circuit

After ignition, the flame rod monitors the flame. As long as flame is present, the valve is held open. If the flame is lost, the circuit board acts to close the valve within 10 seconds, the unit will lock out. If the lockout occurs, the control can be reset by briefly interrupting the power source.

5.0 Maintenance

Warning
• Only a qualified installer should conduct service and/or maintenance. • Use protective glasses when cleaning the heater. • Disconnect power to heater before servicing. • Do not operate unit if repairs are necessary. • Allow heater to cool prior to servicing.

Maintenance Checks:

AKHL Series gas fired, infra-red heaters require periodic servicing to operate at continued peak performance and to ensure the heating systems functions properly.

The inspection shall be performed annually by a trained gas installation and service personnel at the beginning of the heating season. This will insure all heater components are in proper working order and that the heating system functions appropriately. Particular attention should be paid to the following items:

- Ensure that the squirrel cage in the blower is kept clean. If dirt becomes a problem, installation of outside air intake ducts combustion is recommended.
- Annual oiling of the blower motor will extend life significantly.
- Periodically check the integrity of the combustion tube and heat exchangers. Replace if there are signs of structural failure. Contact service personnel if repairs are necessary. Do not operate unit.
- Periodically 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.
- Periodically inspect the integrity of the heater flueing system. Check for soothing, leaks, damage, fatigue or corrosion. Do not operate heater if repairs are necessary. Contact service personnel.
- To maintain effective infra-red heating, always keep reflectors clean by vacuuming or blowing off dirt and/or dust from both sides of the reflector.
- Check integrity of the electrode. If damaged, it must be replaced complete with holder.

Date	Maintenance Period	Replacement Parts Required

5.1 Troubleshooting Guide

NOTE: Contact appliance manufactured prior to replacing parts other than those specified in this manual

Chart 5.1 Troubleshooting Guide

Symptom	Possible Cause	Corrective Action
Thermostat closed, fan doesn't operate	• Blow fuse • Faulty thermostat • Loose or disconnected wire • Faulty fan, circuit board or pressure switch.	• Replace • Replace • Repair and required • Lubricate, repair or replace
Thermostat closed. Fan operates. Electrode does not spark.	• Loose or disconnected wire • Box lid or gasket not in place • Plugged pressure switch lines • Faulty electrode set • Faulty pressure switch • Faulty circuit control	• Repair as required • Put in place • Clean as necessary • Replace • Replace only. Do not adjust • Replace circuit control
Thermostat closed. Fan and electrode operates. After 10 seconds electrode stops sparking. No ignition.	• Closed gas supply • Dirty or restricted orifice • Faulty valve or disconnected valve wire	• Open all gas connections • Remove and clean with soft object • Repair or replace
Thermostat closed. Fan and electrode operate. Ignition occurs. Burner cycles off and will not recycle.	• No electrical ground • Faulty circuit control • Low gas pressure • Poor circuit control connection	• Connect electrical ground to junction box • Replace • Provide require gas pressure • Repair or replace
Thermostat closed. Fan and electrode operate. Ignition occurs. Burner cycles off. Burner cycles on.	• Low gas pressure • Baffle improperly positioned • Faulty pressure switch • Restricted flue	• Provide require gas pressure • Reposition baffle • Replace • Repair foreign matter
Loss of heater efficiency.	• Low gas pressure • Dirty or restricted orifice • Foreign matter inside burner • Unit cycles on and off • Reflector is dirty or not in place • Clogged fan blower	• Provide required gas pressure • Remove. Clean with a soft object. • Clean as necessary • Check previous symptom • Clean with aluminum cleaner and soft cloth • Clean
Radiant tube leaking burnt gases.	• Loose tube connections • Holes or cracks in radiant tubes	• Ensure that tubes are fully connected and clamped properly • Replace
Condensation	• Stack length is too long • Light gauge flue stack used • Contaminated combustion air	• Shorten stack length • Minimum of 26 ga. flue pipe required • Providefresh air inlet duct
Tube bowing	• Insufficient combustion air • Over fired • Contaminated combustion air • Heater unable to expand properly • Baffle installed incorrectly	• Provide 440 mm2 of free air per kW of input. • Check gas pressure and orifice size • Provide fresh air inlet duct • Remount with flexible inlet or flue pipe • Move to furthest tube section from burner
Tube corroding	• Contaminated combustion air	• Provide fresh air inlet duct
Visual inspection of burner operation not possible.	• Dirty or sooted sighs glass • Unit mounted upside-down	• Remove, clean or replace • Mount correctly
Stack sooting.	• Insufficient combustion air • Improper gas • Dirty fan blockage	• Provide 440 mm2 of free air per kW of input • Correct with proper gas input (or clean) • Clean and/or remove blockage
Odor or fumes in space (normal during first firing and will subside after initial burn off, approximately 20 minutes).	• Vaporized solvents decomposing when contacting radiant tubes. • Evaporation of oils, solvents at floor level. • Fork lifts • Loose tube / flue connections	• Provideproper ventilation • Provide proper ventilation • Tighten tube clamps to 30-44 Nm • Seal flue pipes

6.0 Parts

Figure 6.1 Burner Assembly Components (new design)

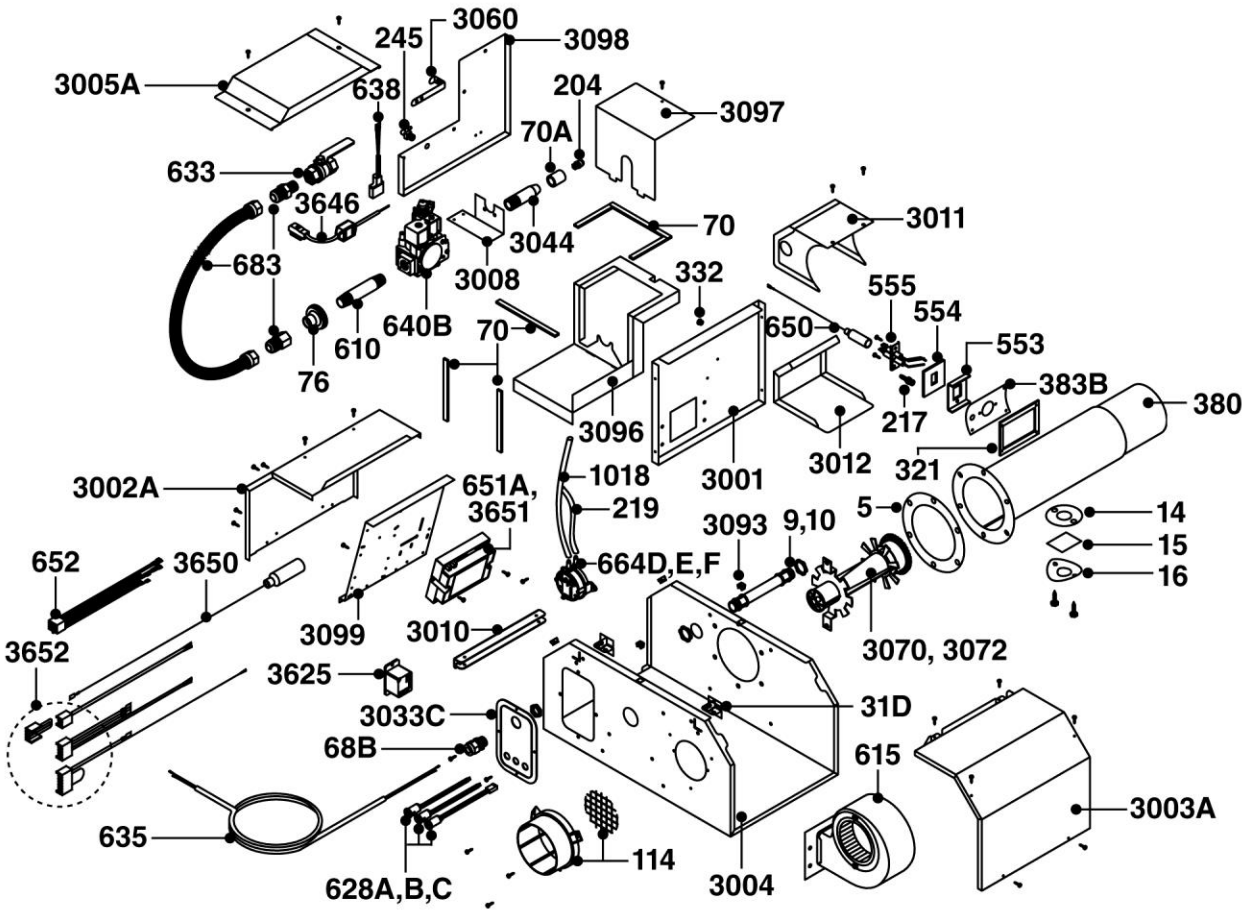
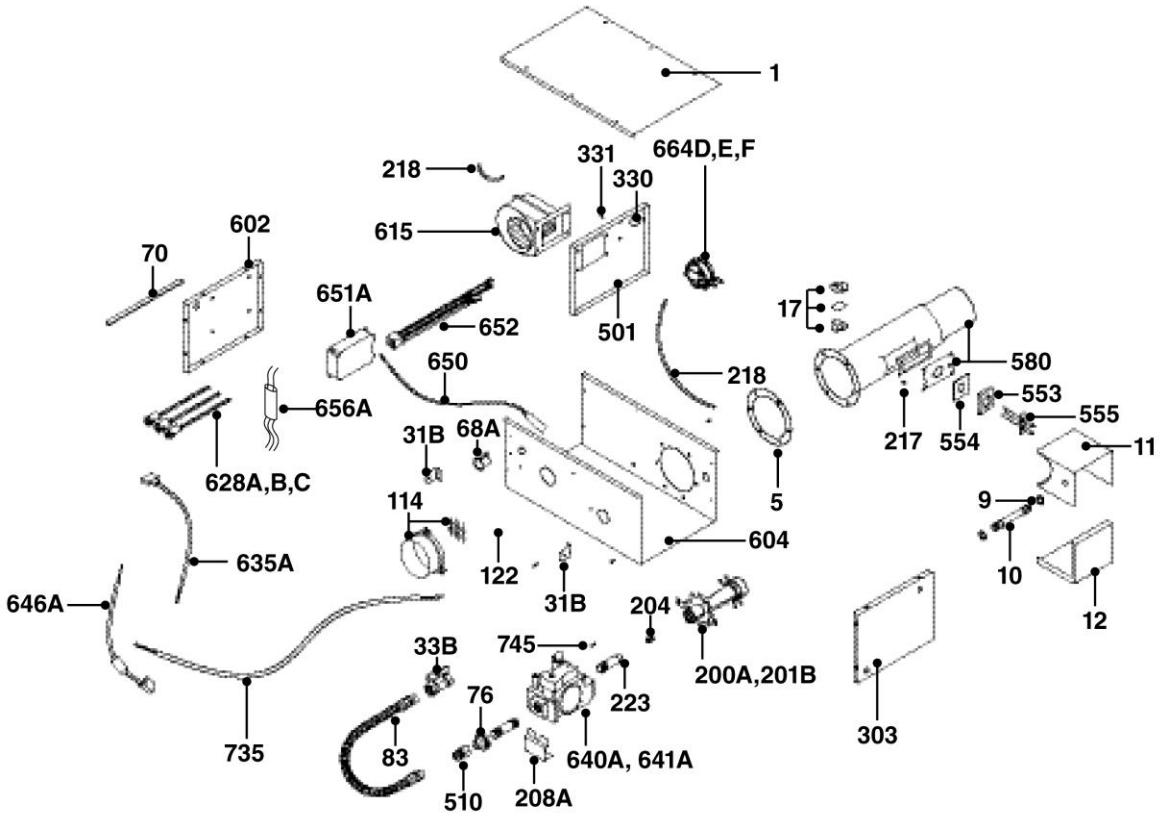


Chart 6.1 AKHL Series Parts List

Part #	Description	Part #	Description
TP-1	Control Box Cover	TP-66	Junction Box
TP-5	Flange Gasket	TP-67	Junction Box Cover
TP-9	Conduit Coupling	TP-68A	Strain Relief Bushing
TP-10	Conduit	TP-68B	Large Strain Relief Bushing
TP-11	Electrod Set Ignitor Box	TP-70	12.7mm Control Box Gasket Stripping (1m)
TP-12	Electrod Set Box Cover	TP-70A	25.4 mm Control Box Gasket Stripping (0,1m)
TP-14	Sight Glass Gasket	TP-76	Rubber Grommet
TP-15	Sight Glass	TP-82	Reflector Center Support
TP-16	Sight Glass Washer	TP-83	Stainless Steel Flex Gas Connector
TP-17	Sight Class Kit	TP-105	Reflector End Cap
TP-19B	101mm Wire Hanger with Tension Spring	TP-106	Reflector End Cap Clips (8)
TP-20C	3050 mm Aluminum Reflector	TP-108	1525mm Coated Alum-Titan Tube w/ Clamp
TP-20D	3050 mm Stainless Steel Reflector*	TP-111	1525mm Coated Aluminized Tube w/ Clamp
TP-21B	101mm Tube Clamp	TP-112	1525 Aluminium reflector
TP-26A	3050mm Alum. Combustion/Radiant tube	TP-114	Plastic Air Orifice Collar – Consult Factory
TP-26B	3050mm Titanium Combustion Tube	TP-122	Gasket for Air Orifice and Air Collar
TP-26C	3050mm Uncoated Hot Rolled Radiant Tube	TP-200A	Burner (50-100)(14,7kW-29kW
TP-26D	3050mm Stainless Steel Radiant Tube	TP-201B	Burner (125-175)(36kW-51kW)
TP-26E	3050mm Stainless Steel Combustion Tube	TP-204	Gas Orifice – Consult Factory
TP-31B	Control Box Mounting Bracket	TP-217	Pressure Barb Fitting
TP-31D	Control Box Mounting Bracket	TP-218	Vinyl Barb tube
TP-33B	Ball Valve Shut-off with plugged tap	TP-219	Differential Vinyl Sensing Tube (Burner)
TP-44	Air Orifice w/ screen - Consult factory	TP-220	101mm Stainless Steel Tube Clamp
TP-65I	Interlocking 838mm Baffle Section	TP-223	Gas Manifold

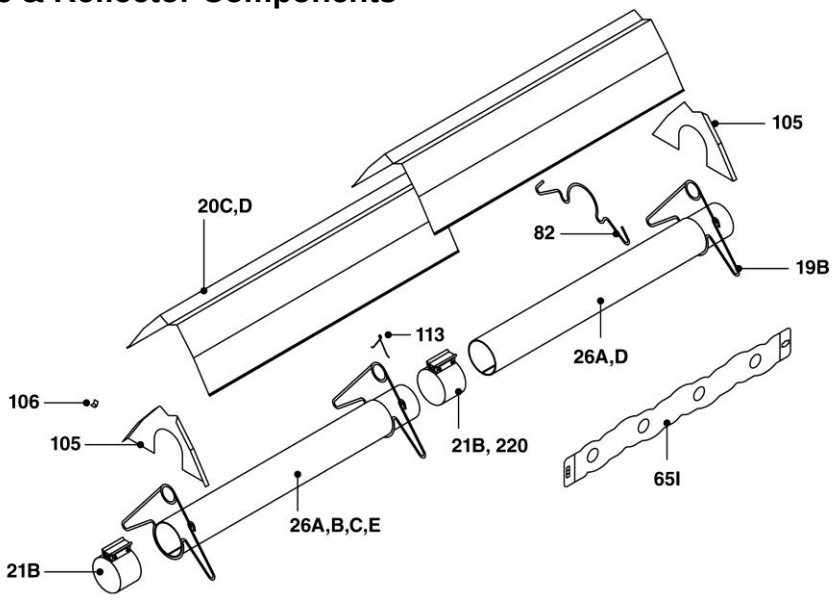
***** Stainless steel upgrade option

Figure 6.2 Burner Assembly Components (old design)



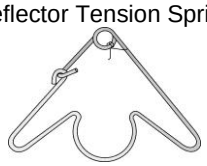
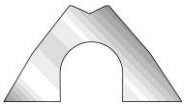
Part #	Description	Part #	Description
TP-301	Divider Panel – Specify Model	TP-675	8”x4”x4” No Swedge HRT section
TP-302	Left End Panel – Specify Model	TP-683	Stainless Steel Flexible Gas Connector
TP-303	Right End Panel – Specify Model	TP-735	3 Core Cable Wire
TP-304	Control Box Outer Shell – Specify Model	TP-740	SIT 230V Gas Valve Assembly
TP-321	Ignition Plate Gasket	TP-745	Pilot Blanking Plug
TP-330	Divider Grommet	TP-1018	Diff. Switch Vinyl Sensing Tube (Exhaust)
TP-331	Green Self tapping Ground Screw	TP-3001	Divider Panel
TP-332	Divider Grommet	TP-3002A	Left End Moulded Plastic Panel
TP-380	Spark Burner Tube with Flange	TP-3003A	Right End Moulded Plastic Panel
TP-383B	Spark Ignitor Plate	TP-3004	Main Control Box Panel
TP-510	Flexible Gas Connector Attachment Fitting	TP-3005A	Control Box Chamber Moulded Plastic Lid
TP-553	Ignitor Mounting Bracket	TP-3008	Gas Valve Mounting Bracket
TP-554	Ignitor Mounting Bracket Gasket	TP-3010	Service Panel Hinge
TP-555	Spark Ignitor Electrode	TP-3011	Electrode Set Ignitor Box
TP-580	Spark Burner Tube with Flange	TP-3012	Electrode Set Box Cover
TP-610	BSP Gas Valve Pipe Nipple	TP-3033C	AKHL Power Entry Plate
TP-615	220-240V 50/60 Hz Fan	TP-3044	Gas Manifold
TP-628A	Red Indicator Light	TP-3060	Pressure Switch Mounting Bracket
TP-628B	Green Indicator Light	TP-3070	Low kW Burner (15-30 kW)
TP-628C	Amber Indicator Light	TP-3072	High kW Burner (35-60 kW)
TP-633	Ball Valve Shut-off	TP-3093	# 8-32 Cage Nut
TP-635	4-Core Cable Wire	TP-3096	Valve Compartment Bottom Panel
TP-638	Valve Main Coil Cord	TP-3097	Valve Compartment Top Panel
TP-640B	230 V Gas Valve Assembly	TP-3098	Valve Compartment Side Panel
TP-650	12kv High Temperature Lead/w Rubber Boot	TP-3099	Controls Mounting Panel
TP-651A	Circuit Control Board 0342G15B	TP-3625	Picker Relay
TP-652	JST Wiring Harness	TP-3646	AC Rectifier Voltage Cord
TP-656	Ignition Filter	TP-3650	High Voltage Spark Wire
TP-664D	N.O. Atmospheric Pressure Switch-10 (25Pa)	TP-3651	230 VAC Pactrol Circuit Board
TP-664E	N.O. Atmospheric Pressure Switch-14 (35Pa)	TP-3652	Wiring Harness
TP-664F	N.O. Atmospheric Pressure Switch-20 (50Pa)		

Figure 6.3 Tube & Reflector Components



7.0 AKHL Series 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.

Kit Contents for AKHL Series – Reference the column for your model			
TP-19B Hanger with Reflector Tension Spring 	TP-82 Reflector Center Support (RCS) 	TP-633* Shut-Off Valve **Optional** 	TP-106 Reflector End Caps Clips 
TP-683* Stainless Steel Flexible Gas Connector **Optional** 	TP-21B Tube Clamps 	TP-105 Reflector End Caps 	Installation, Operation and Maintenance Manual 

Part #	Decription	6m	9m	12m	15m	18m	21m
TP-19B	Hanger w/ Spring	3	4	5	6	7	8
TP-21B	Tube Clamp (SS Clamp *)	2	3	4*	5*	6*	7*
TP-82	Reflector Center Support	2	3	4	5	6	7
TP-105	Reflector End Cap	2	2	2	2	2	2
TP-106	Refl. End Cap Clips	8	8	8	8	8	8
TP-633	Shut-off valve *	-	-	-	-	-	-
TP-683	SS Flex Gas Connector *	-	-	-	-	-	-
Manual	Manual	1	1	1	1	1	1
Filled in by:							

* Optional accessory