CL SERIES

TWO-STAGE INFRA-RED TUBE HEATER

OPERATION, INSTALLATION, MAINTENANCE AND PARTS MANUAL

RE-VERBER-RAY

BRANT RADIANT HEATERS LIMITED

WARNING

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

FOR YOUR SAFETY!

IF YOU SMELL GAS:
1. Open windows.
2. Do not touch electrical switches.
3. Extinguish any open flame.
4. Immediately call your gas supplier.

Do not store or use gasoline or flammable vapours and liquids in the vicinity of this or any other appliance.

CONSIGNES DE SÉCURITÉ !

SI VOUS SENTEZ UNE ODEUR DE GAZ:
1. Ouvrez les fenêtres.
2. Ne touchez pas aux interrupteurs électriques.
3. Éteignez toute flamme nue.
4. Contactez immédiatement votre compagnie de gaz.

Il est interdit d'utiliser des liquides inflammables ou dégageant des vapeurs infammables, à proximité de tout appariel fonctionnant au gaz.

Form #CL1004

FORWARD

WARNING

THIS HEATER MUST BE INSTALLED AND SERVICED BY TRAINED GAS INSTALLATION AND SERVICE PERSONNEL ONLY. READ AND UNDERSTAND THESE INSTRUCTIONS THOROUGHLY BEFORE ATTEMPTING TO INSTALL, OPERATE OR SERVICE THIS HEATER. FAILURE TO COMPLY WITH THESE WARNINGS AND INSTRUCTIONS, AND THOSE ON THE HEATER, COULD RESULT IN PERSONAL INJURY, DEATH, FIRE, ASPHYXIATION, AND/OR PROPERTY DAMAGE. RETAIN THESE INSTRUCTIONS FOR FUTURE REFERENCE.

Approval Standards and Certifications

Brant Radiant Heaters Limited heaters are design certified by the CSA International and comply with the National Standards of Canada.

Trade-mark of Canadian Standards Association

CAUTION

ANY ALTERATION OF THIS SYSTEM OR OF THE FACTORY-AUTHORIZED COMPONENTS AS SPECIFIED IN THIS MANUAL OR BY BRANT RADIANT HEATERS LIMITED VOIDS ALL CERTIFICATION AND WARRANTIES.

Brant Radiant Heaters Limited
P.O. Box 395, 34 Scott Avenue - Paris, Ontario N3L 3T5 - Telephone: (519) 442-7823
Fax: (519) 442-7321 - Customer Service: 1-800-387-4778
www.brantradiant.com

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1 SAFETY INFORMATION

WARNING

NOT FOR RESIDENTIAL USE

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

WARNING

This is not an explosion-proof heater. Where there is the possibility of exposure to flammable vapors, consult the local fire marshal, the fire insurance carrier or other authorities for approval of the proposed installation.

This infra-red heater is designed for use in industrial and commercial buildings such as warehouses, manufacturing plants, aircraft hangars, service garages, etc.

Brant Radiant Heaters Limited cannot anticipate every use which may be made of their heaters. Check with your local gas supplier if you have questions about local regulations.

The following information should be reviewed before installing this heater:

* Check the CSA rating label on the heater to verify the minimum clearances to combustibles and the proper gas to be used.
* The installation of this heater must conform with local building codes or, in the absence of local codes, with the current CAN/CSA B149.1 and 2 Codes and with the Canadian Electrical Code C22.1-latest edition.
* In public garages the heaters must be installed in accordance with the Canadian Electrical Code C22.1-latest edition when an external electrical source is utilized.
* This is not an explosion-proof heater. Where there is the possibility of exposure to flammable vapors, consult local fire marshall or other authorities for approval of the proposed installation.
* In aircraft hangars, the heater must be installed at least ten feet (3 m) above the upper surface of wings or engine enclosures of the highest aircraft which may be stored in the hangar. In areas adjoining the aircraft storage area, the heaters must not be installed less than eight feet (2.4 m) above the floor. Also, the heaters must be located to prevent damage to the sections of the aircraft, cranes, scaffolds or other movable objects.
* 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 line, electrical supply line nor sprinkler heads shall be located in or near the path of the flue products from the heater.
* If wind conditions in the space are such that visible swaying of the heater is apparent, the control box must be rigidly mounted.
* If chlorinated or fluorinated contaminants are present in the area where the heater is installed, then noncontaminated air for combustion must be ducted to the heater. Sources of contaminants are refrigerants, solvents, adhesives, paints, degreasers, paint removers, lubricants, pesticides, etc.
* If vaporized solvents are allowed to contact the heater's HOT exchanger tube, noxious fumes may result. Chemicals must be properly stored, per manufacturers instructions. Ventilation requirements, as outlined by local codes, must be maintained.
* Signs should be posted in storage areas to specify maximum stacking height allowed in order to maintain clearance to combustibles.

1 SAFETY INFORMATION

WARNING

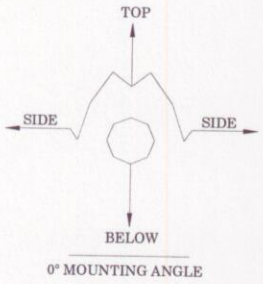
Failure to comply with the stated clearance to combustibles could result in personal injury, death and/or property damage.

WARNING

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

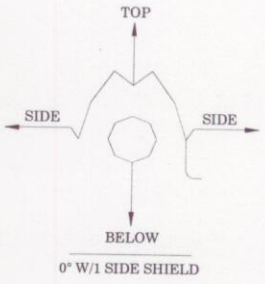
For the safe installation of this heater, the following table contains clearances that must be maintained:

CLEARANCES TO COMBUSTIBLES IN. & CM / DÉGAGEMENTS AUX MATIÈRES COMBUSTIBLES PCE & CM

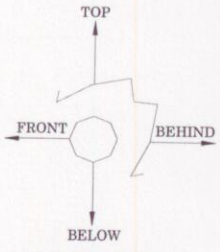


0° MOUNTING ANGLE

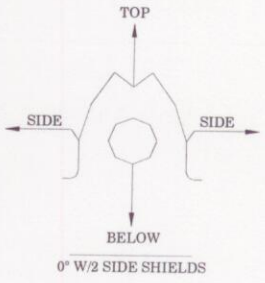
MODEL NO. / MODÈLES	MOUNTING ANGLE / ANGLE DE MONTAGE	SIDE BEHIND / CÔTE ARRIÈRE		SIDE IN FRONT / CÔTE AVANT		TOP / DESSUS		BELOW / DESSOUS	
UNITS	DEGREES	IN. PCE	CM	IN. PCE	CM	IN. PCE	CM	IN. PCE	CM
CL(30, 40)-65 (N, P)	0°	11	27.9	11	27.9	3	7.6	31	78.7
	45°	8	20.3	39	99.1	10	25.4	31	78.7
W/1 SIDE SHIELD	0°	8	20.3	29	73.7	3	7.6	31	78.7
W/2 SIDE SHIELDS	0°	9	22.7	9	22.7	3	7.6	31	78.7
20 ft. or 6.1 m from Burner	0°	7	17.8	7	17.8	3	7.6	31	78.7
CL(40, 50)-75 (N, P)	0°	11	27.9	11	27.9	3	7.6	29	73.7
	45°	8	20.3	39	99.1	10	25.4	29	73.7
W/1 SIDE SHIELD	0°	8	20.3	29	73.7	3	7.6	29	73.7
W/2 SIDE SHIELDS	0°	9	22.7	9	22.7	3	7.6	29	73.7
20 ft. or 6.1 m from Burner	0°	7	17.8	7	17.8	3	7.6	29	73.7
CL(40, 50)-80 (N, P)	0°	11	27.9	11	27.9	3	7.6	29	73.7
	45°	8	20.3	39	99.1	10	25.4	29	73.7
W/1 SIDE SHIELD	0°	8	20.3	29	73.7	3	7.6	29	73.7
W/2 SIDE SHIELDS	0°	16	40.6	16	40.6	3	7.6	29	73.7
20 ft. or 6.1 m from Burner	0°	7	17.8	7	17.8	3	7.6	29	73.7
CL(50, 60)-100 (N, P)	0°	11	27.9	11	27.9	3	7.6	34	86.4
	45°	8	20.3	39	99.1	10	25.4	34	86.4
W/1 SIDE SHIELD	0°	8	20.3	29	73.7	3	7.6	34	86.4
W/2 SIDE SHIELDS	0°	16	40.6	16	40.6	3	7.6	34	86.4
20 ft. or 6.1 m from Burner	0°	7	27.9	7	17.8	3	7.6	34	86.4



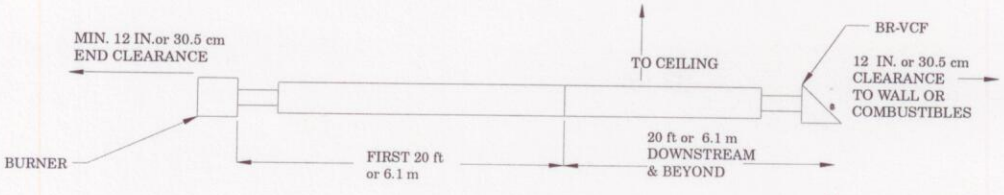
0° W/1 SIDE SHIELD



45° MOUNTING ANGLE



0° W/2 SIDE SHIELDS



Shielded Accessory Exchanger Elbows or "U" Bends do not alter clearances
Unshielded Elbow or "U" Bend Top Clearance is 18" or 45.7 cm

1 SAFETY INFORMATION

The clearance-to-combustible measurements represent an alcove or clearance box with vertical and horizontal planes. See figure 1.1.

Example: CL-40-80 clearances as stated at 0° mounting-

Top	3" or 7.6cm
Side	11" or 27.9cm
Below	29" or 73.7cm

Note: Combustible material MUST NOT be placed within the confines of the clearance box.
Observe all WARNINGS listed in installation instructions and stated on heater control box.

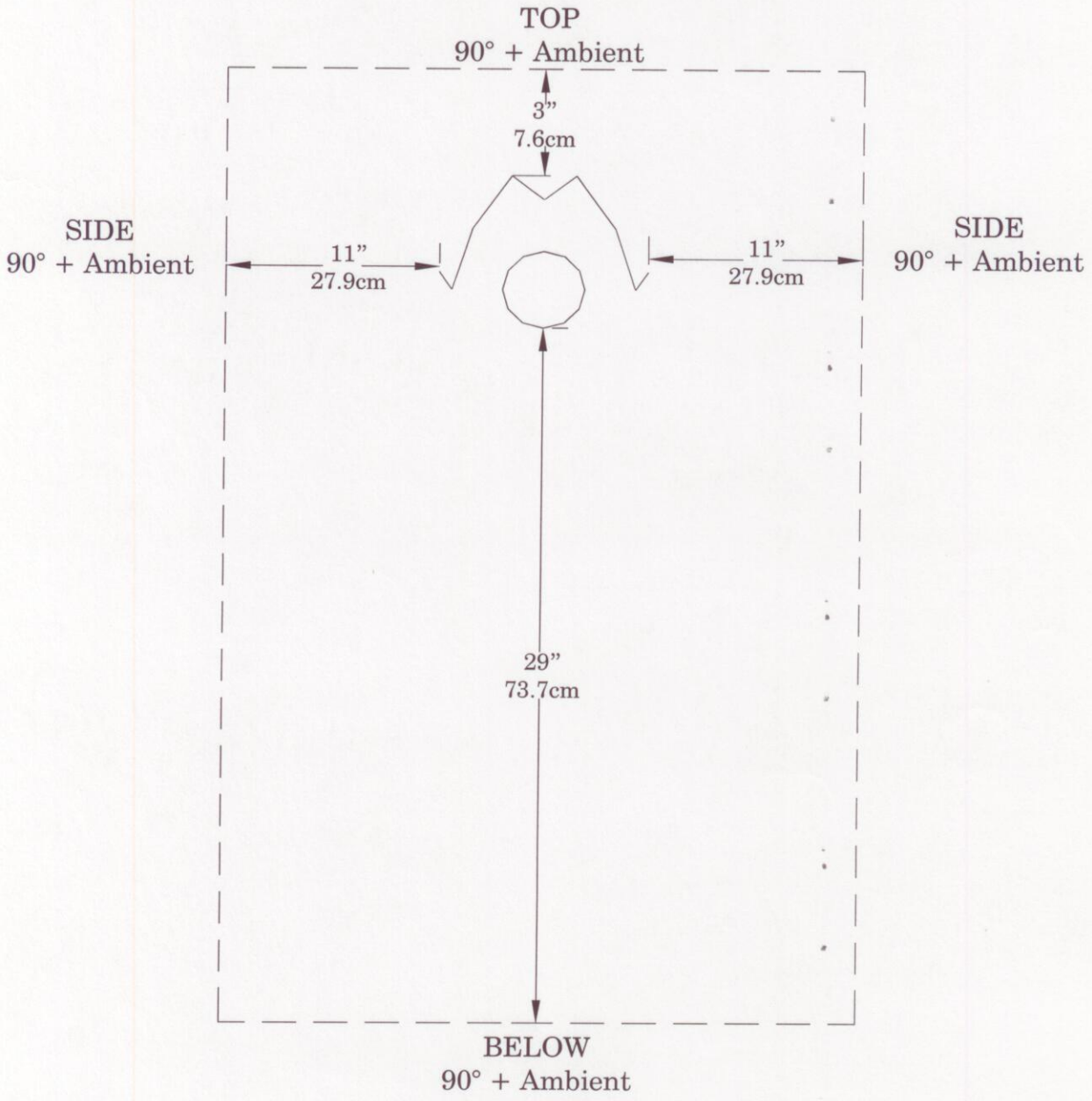


Figure 1.1

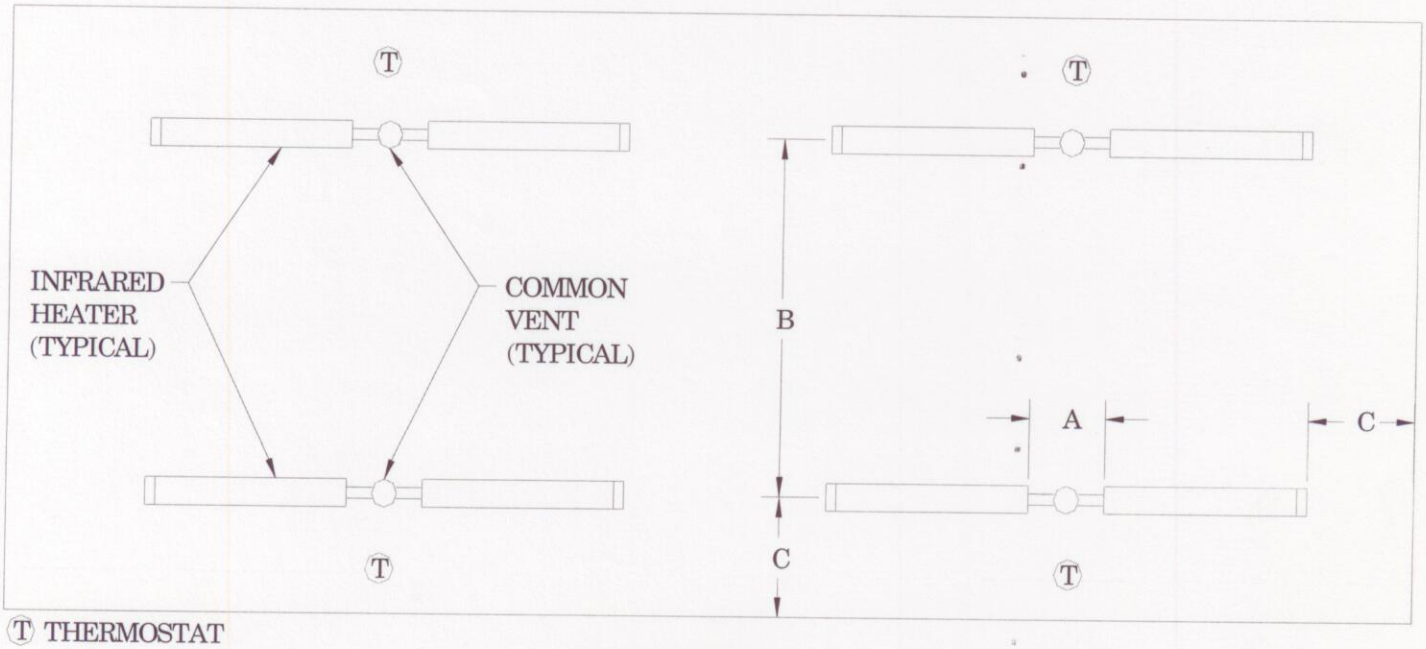
2 INSTALLATION

2.1 Design Criteria

Perimeter mounting of these infra-red heaters provides for the most efficient installation. In figure 2.1.1, the heaters are mounted at the perimeter of the space to be heated. Refer to the Heater Installation Chart for the recommended distances on the models being installed. Buildings that require the rows of heaters to be farther apart than the recommended distance in the chart may need additional heaters placed in the center of the space.

HEATER INSTALLATION CHART								
MODEL NO.	TYPICAL MOUNTING HEIGHT		DISTANCE BETWEEN HEATERS DIM "A"		DISTANCE BETWEEN HEATER ROWS DIM "B"		MAXIMUM DISTANCE BETWEEN HEATER AND WALL DIM "C"	
UNITS	FT.	METERS	FT.	METERS	FT.	METERS	FT.	METERS
CL (30, 40) 65 (N, P)	8-17	2.4-5.2	11-30	3.4-9.1	14-70	4.3-21.3	17	5.2
CL (40, 50) 75 (N, P)	9-18	2.7-5.5	12-40	3.7-12.2	15-80	4.6-24.4	20	6.1
CL (40, 50) 80 (N, P)	10-18	3.1-5.5	13-45	4.0-13.7	16-90	4.9-27.4	20	6.1
CL (50, 60) 100 (N, P)	10-20	3.1-6.1	14-50	4.3-15.2	17-100	5.2-30.5	20	6.1

Note: This chart is provided as a guideline. Actual conditions may dictate variation from this data.



T THERMOSTAT

Figure 2.1.1

TYPICAL BUILDING LAYOUT

When positioning heaters, keep in mind the clearances to combustible materials, lights, sprinkler heads, overhead doors, storage areas with stacked materials, gas and electrical lines, parked vehicles, cranes and any other possible obstructions or hazards. Refer to the Warnings, Cautions and the Clearance-To-Combustibles Chart in the Safety Information Section and on the heater to verify that a safe installation condition exists.

The following guidelines must also be met to ensure a good installation and proper heater performance:

* A maximum of two 45 degree elbows, two 90 degree elbows or one 180 degree elbow can be installed on heaters. The gas input of the heaters, as stated on the rating label, will determine the minimum length of radiant pipe from the control box to the first elbow. (See Optional 45, 90 and 180 degree Elbows section on page 14).

NOTE: Flue vent requirements do not change when elbows are installed.

* Do not exceed the maximum vent length of 20 ft./6.1m for exhausting the heater. Consult Flue Venting, Section 2.8.

* Do not combine the exhaust vents of two heaters into a straight-through tee. A Part Number BR-YA, BR-YG, or staggered-tee arrangement must be used. Heaters sharing the same vent must share the same thermostat. Common vents must have 6 in./ 15.2cm Diameter (see Figure 2.1.1).

* Outside air for combustion must be ducted to the heater if the building atmosphere where the heater is installed contains one of the following:

  - Chemicals such as chlorinated or fluorinated hydrocarbons.
  - High humidity such as car washes.
  - Contaminants such as sawdust, welding smoke, etc.
  - Negative static pressure.

Consult Combustion Air Requirements section on page 19.

* Do not exceed the maximum air intake duct length of 20 ft./6.1m. Consult Air Intake Duct Chart on page 19.

* Do not draw fresh air to the heater from an attic space. There is no guarantee that adequate air will be supplied. Prevailing winds can create negative or positive pressure in the space.

* All unvented heaters must use a vent with flapper, Part Number BR-VCF.

Once all of the safety precautions and design criteria are met, the actual installation of the heater may begin.

2 INSTALLATION

2.2 Prechecks

1. Verify that all parts have been received by checking them against the packing list. If there are questions regarding the shipment, notify the Re-Verber-Ray distributor or Brant Radiant Heaters Limited at Customer Service- 1-800-387-4778.

2. Check the CSA rating label located on the heater's control box above the inlet gas supply connection, to verify the model number, gas input and the gas to be used.

3. Locate the Clearance-To-Combustibles label affixed to the heater's access panel/cover. Using the heater's model numbers, as displayed on the rating label, make sure the finished installation will conform to the design requirements listed on the label and the Clearance-To-Combustibles Chart and the figures shown on page 3.

4. Heaters may discharge the combustion-by-products directly into the heated space when the conditions in section 2.9 Installation for Unvented operation have been met.

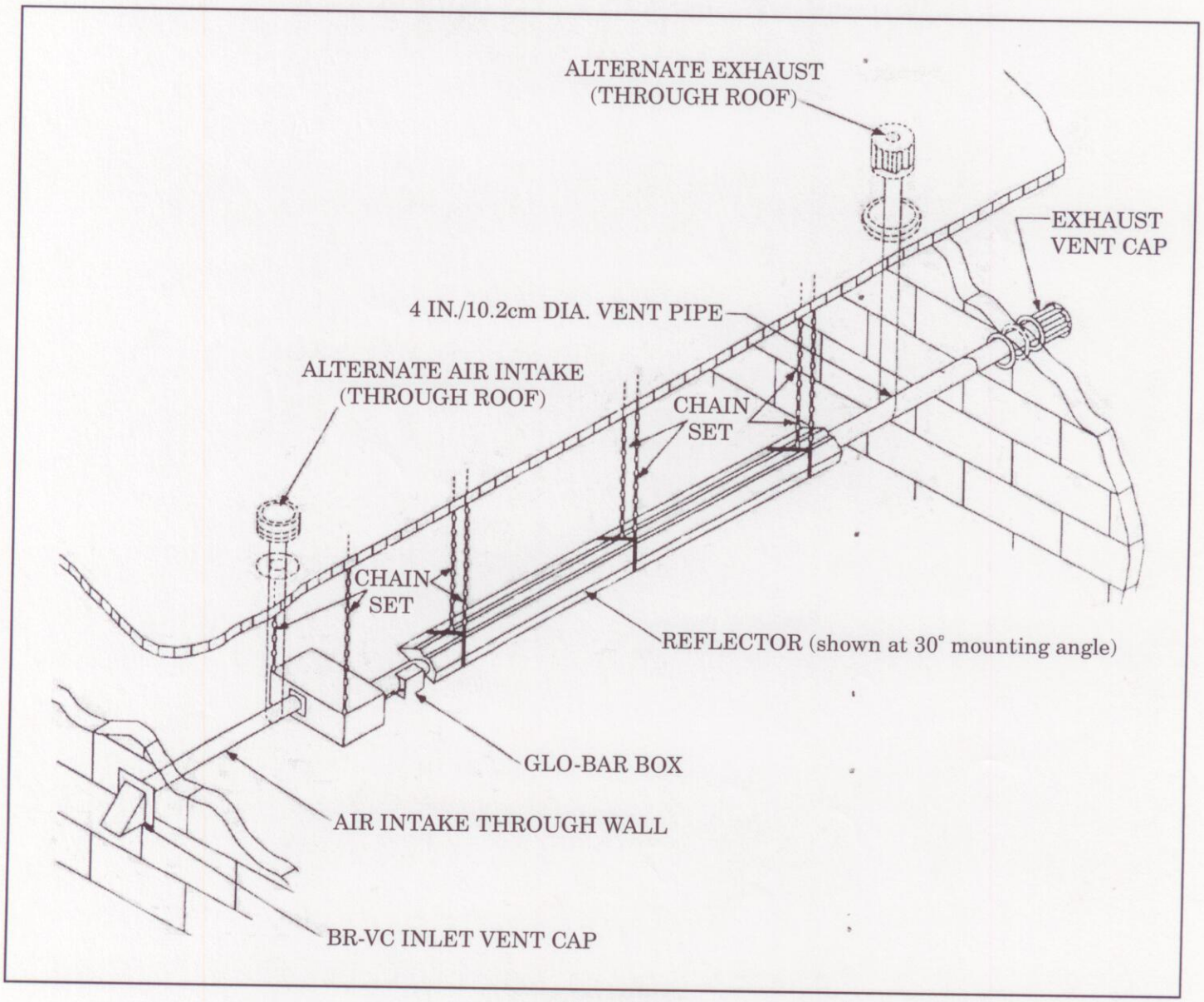
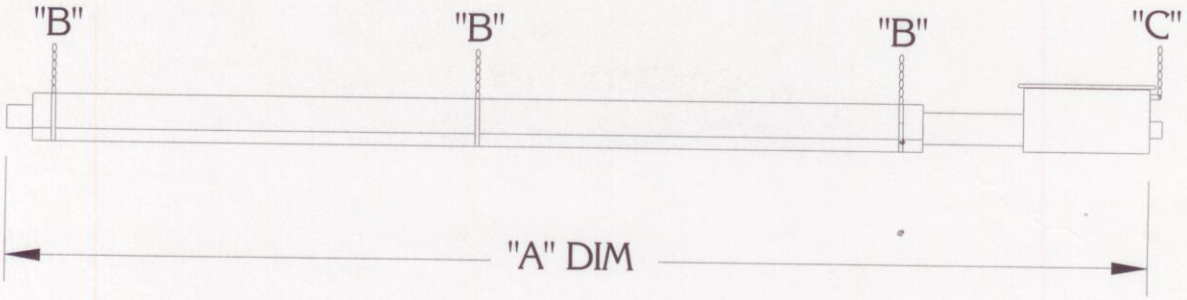


Figure 2.2.1

TYPICAL INSTALLATION DRAWING



MODEL NUMBER	DIMENSION "A"		SUSPENSION POINTS "B"	CONTROL BOX STABILIZER "C"
	IN.	M		
CL 30	375	9.5	4	2
CL 40	491	12.5	5	2
CL 50	607	15.4	6	2
CL 60	723	18.4	7	2

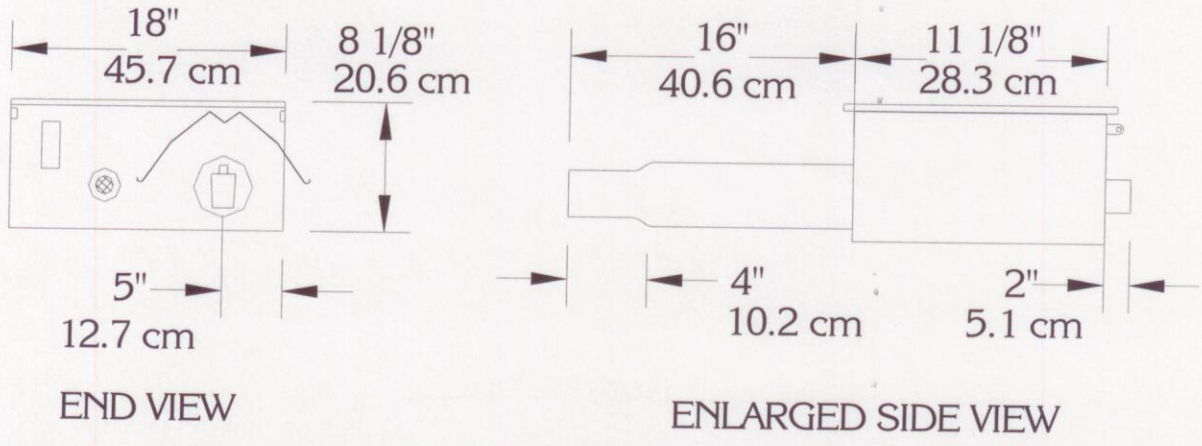


Figure 2.2.2

2 INSTALLATION

2.3 Heater Hanging

1. The combination tube/reflector suspension hangers (BR-HGR), shipped in the parts box located in the heater control box carton shall be sufficient to support the heater every 10 feet or 3 m. Figure 2.3.1

2. Install the heater so that it is independently supported from the building having adequate load characteristics. Do not support the heater by the gas or electrical supply lines.

3. The burner box must be installed so that it is level and the burner sight glass visible from the floor. Figure 2.3.2

4. The two hangers supporting the first 10 ft. or 3 m tube must be installed near the ends of the tube next to the clamps. It is recommended that the remaining hangers be installed approximately 10 ft. or 3 m apart. Figure 2.3.2

5. The suspension chains must be installed so that they are perpendicular to the heater. When mounting reflectors at 0 degrees one chain per hanger is required. When angle mounting the reflector two chains are required or one chain and a BR-MAH. Figure 2.3.3
   Optional: BR-MAH- An accessory multiple angle hanger that can be added to preselect the reflector angle at 15, 30 or 45 degrees.
   Optional: BR-CS - An accessory chain set consisting of 5 ft./1.52m of number 1 double loop chain and 2 "S" hooks.

6. Close all "S" hooks to ensure maximum load carrying capacity.

7. If wind conditions in the space are such that visible swaying of the heater is apparent, the control box must be rigidly mounted. Threaded rod can be used to stabilize the control box.

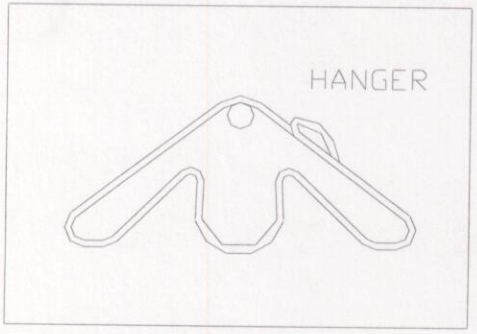


Figure 2.3.1

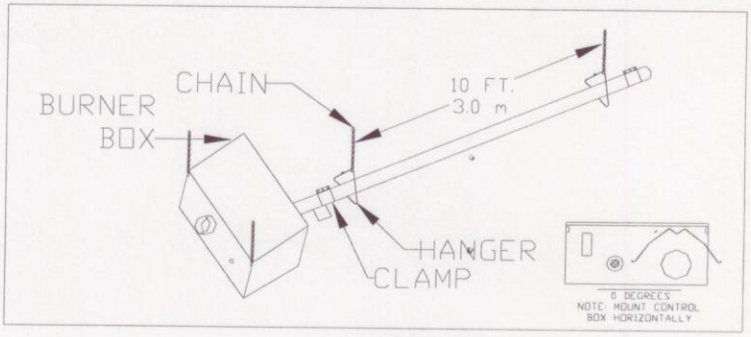


Figure 2.3.2

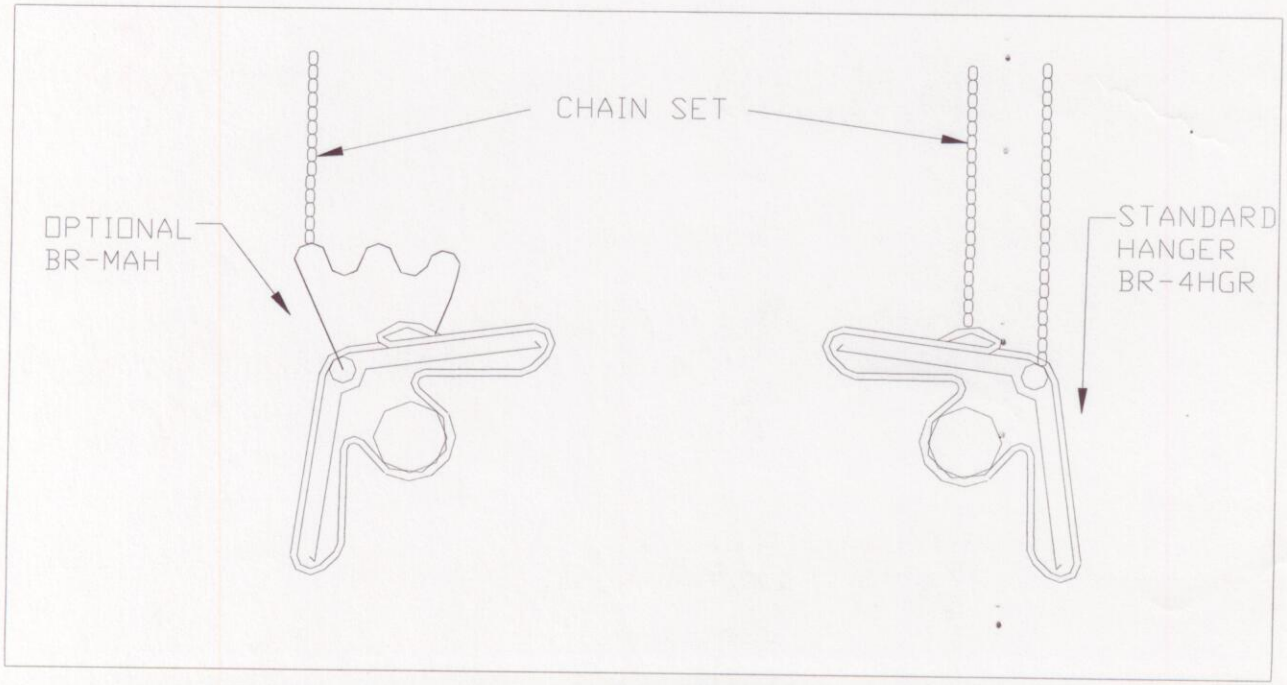
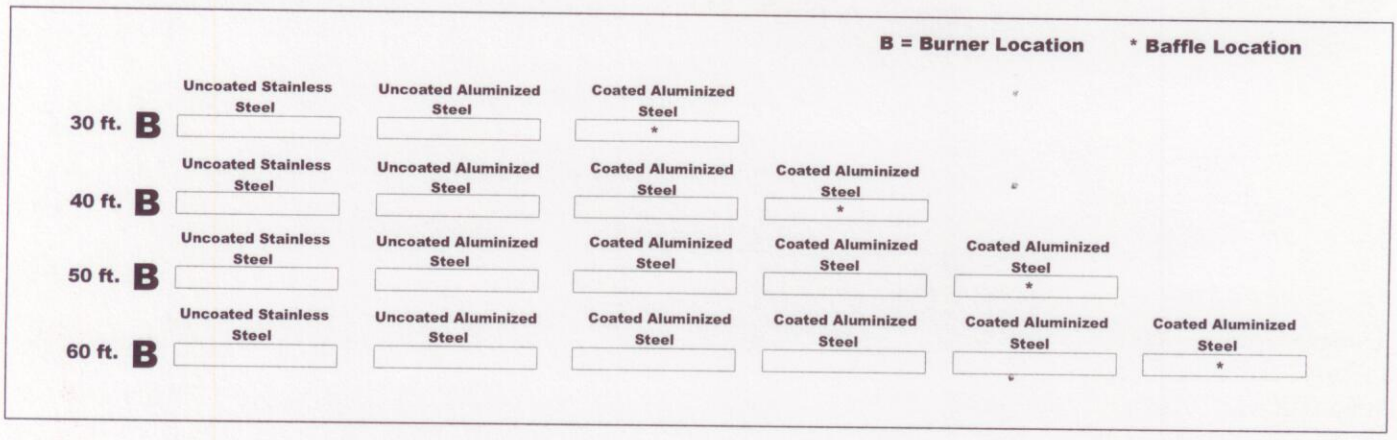


Figure 2.3.3

2.4 Tube Assembly

When installing tubes the uncoated stainless steel tube MUST go closest to the burner box (primary combustion tube) followed by the uncoated aluminized steel tube (secondary combustion tube) followed by the coated aluminized steel tubes. The Baffle MUST be placed in the last tube furthest away from the burner box (Refer to page10 Tube Assembly). The uncoated stainless steel and the uncoated aluminized steel tubes will be tagged to identify tube type.

Pipe Installation Sequence



1. Slide tubes through hangers with welded seam downwards and locate tube clamp on tube.

2. Mate tubes completely then recheck suspension hanger locations and secure. Center clamp on seam and torque clamp bolts to 50 - 60 lbs. - ft. Figure 2.4.1

3. STOP: Before final assembly of the last radiant tube verify baffle length, install baffle in the vertical position and complete final assembly. Figure 2.4.2. The Baffle Specification Chart on next page lists baffle lengths by model numbers. Heater model numbers are located on the rating label attached to the heater control box.

4. Optional: Exchanger configuration 45, 90, 180 degree. Refer to page 14.

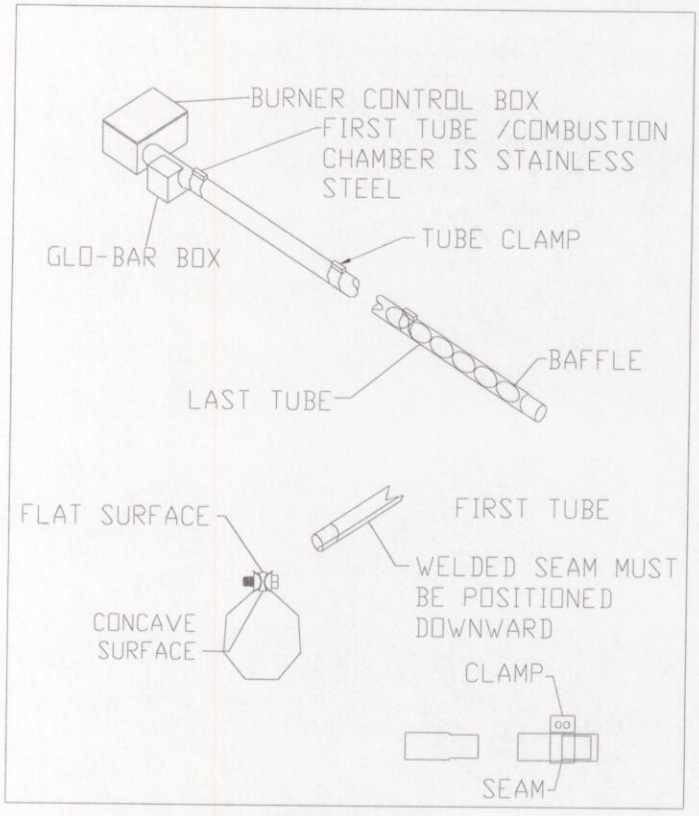


Figure 2.4.1

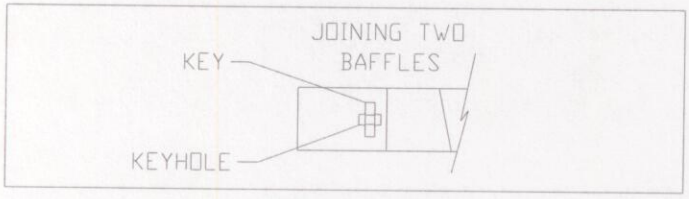


Figure 2.4.2

BAFFLE SPECIFICATION CHART	
MODEL NUMBER	STANDARD BAFFLE SECTIONS
CL-30-65 (N, P)	6
CL-40-65 (N, P	6
CL-40-75 (N, P)	6
CL-50-75 (N, P)	5
CL-40-80 (N, P)	6
CL-50-80 (N, P)	5
CL-50-100 (N, P)	5
CL-60-100 (N, P)	5

1 SECTION OF BAFFLE = 33" or 83.8cm

2.5 Reflector Assembly

1. Install reflector intermittent support BR-IH as shown in figure 2.5.1

2. Slide reflectors through wire suspension hangers and adjust the reflector positioning spring in the V-groove on top of the reflector. Figure 2.5.2

3. Overlap reflectors 4 inches/10.2cm for support and secure together with supplied clips or sheet metal screws. Make sure to leave an expansion joint as shown in Figure 2.5.3.

4. Install clips in their "A" position as shown in Figure 2.5.3 on the first and last suspension hanger. Clips are located right side front and left side back of the wire suspension hanger.

5. Optional: Side Shield Installation refer to page 13.

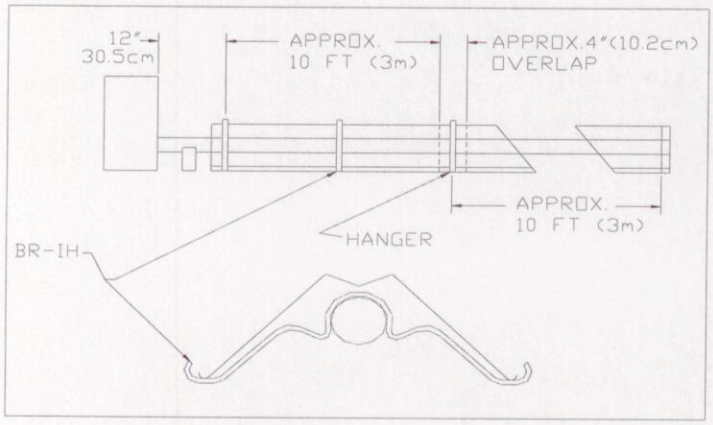


Figure 2.5.1

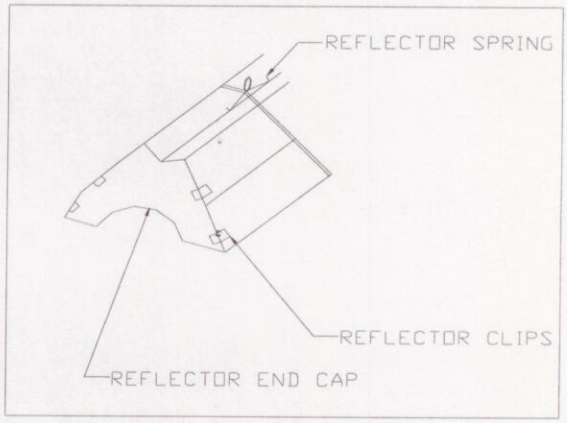


Figure 2.5.2

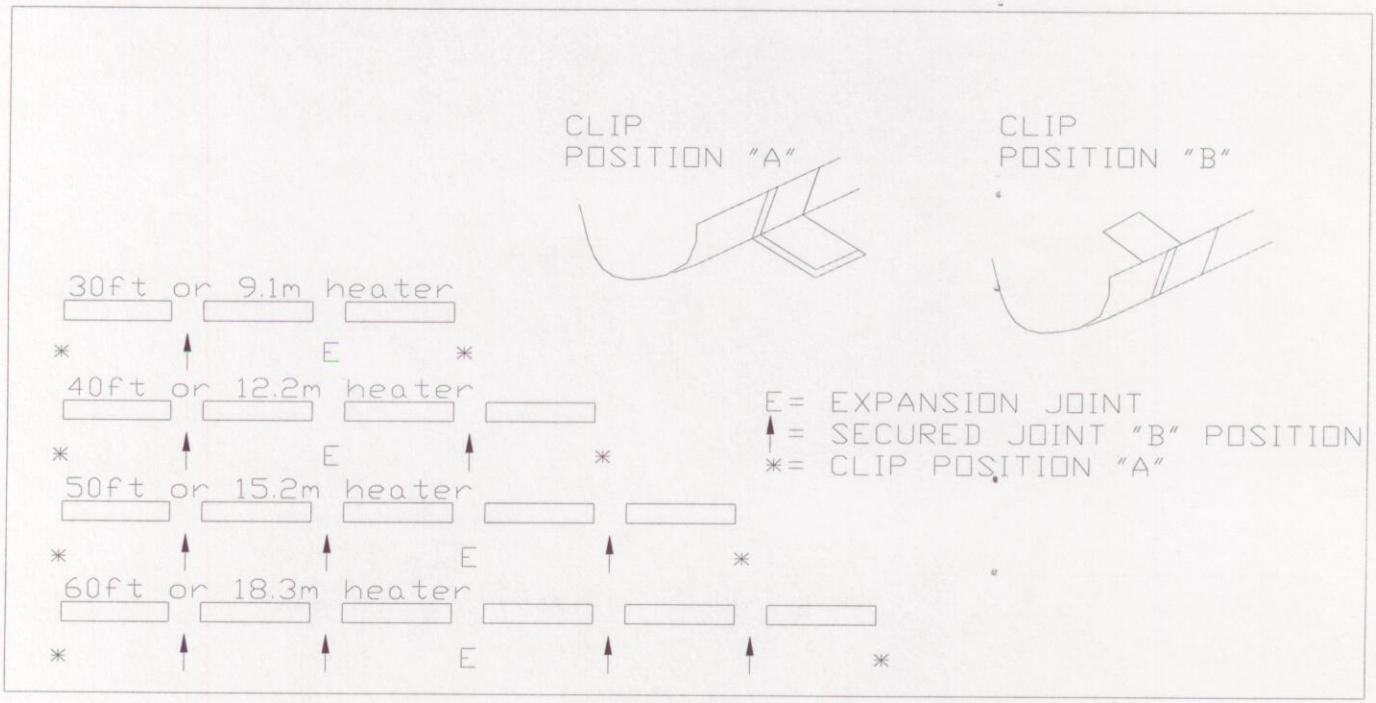


Figure 2.5.3

2 INSTALLATION

2.6 OPTIONAL
Side Shield Installation

1. Install side shields as per figure 2.6.1. The clearance to combustibles will be altered when side shields are installed. Refer to safety information on page 3.

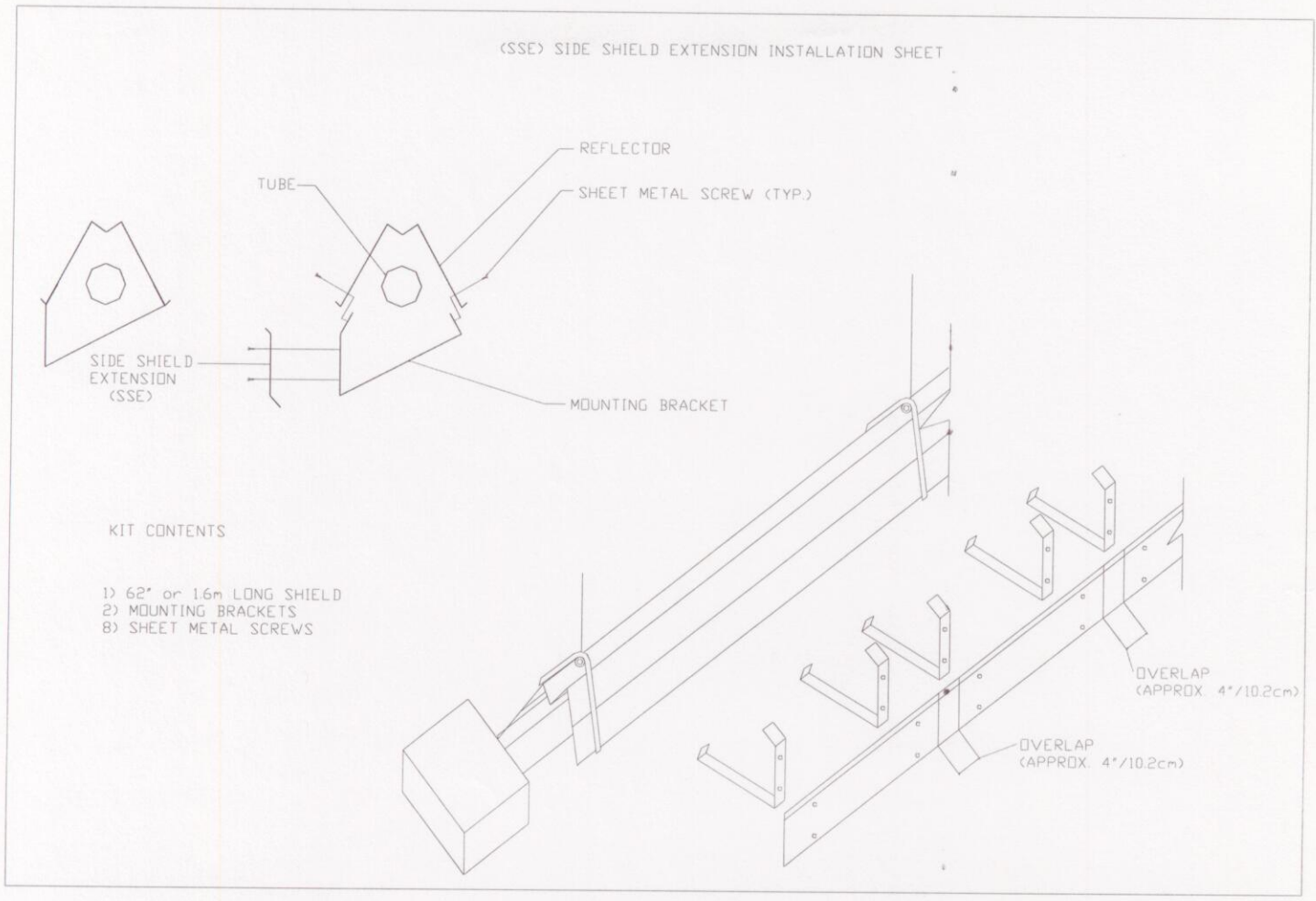


Figure 2.6.1

2 INSTALLATION

2.7 OPTIONAL

Exchanger "L" or "U" Configuration

A maximum of two 45, 90 degree "L" or one 180 degree "U" bend may be installed to alter the standard radiant tube configuration (see Figure 2.7.1). See the Baffle Specification Chart on page 15 for the minimum distance requirements, listed by model number from the burner control box to an elbow or "U".

BR-45-E consists of a 45 degree 16 Ga. Swaged elbow, tube clamp and one suspension hanger.

BR-4EA consists of a 90 degree 16 Ga. Swaged elbow, tube clamp, two piece reflector and one suspension hanger.

BR-4-UA consists of a 180 degree 16 Ga. Swaged "U", tube clamp, three piece reflector, one suspension hanger, one reflector support and one spreader bar assembly.

Figure 2.7.2 Hanging Points
Figure 2.7.3 "U" Dimensions
Figure 2.7.4 Spreader Bar
Figure 2.7.5 Angled Spreader Bar

IMPORTANT

Baffle lengths may be altered with the addition of elbows or "U" assembly. See BAFFLE SPECIFICATION CHART on page 15 for baffle lengths listed by model number.

When utilizing a "U" or "L" bend the exhaust/return leg must be equal to or higher than the burner control box. Reflector runs from burner control to elbow or "U" will require an expansion joint. See page 15.

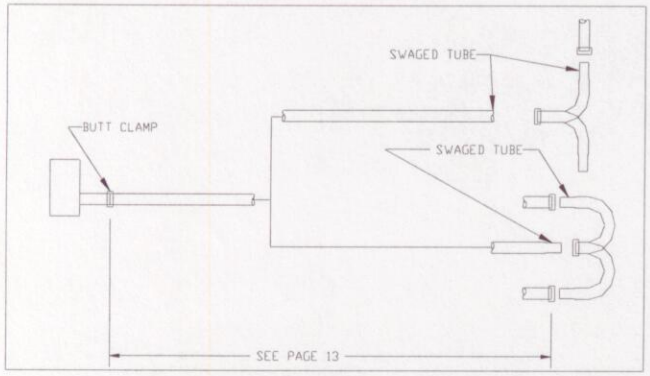


Figure 2.7.1

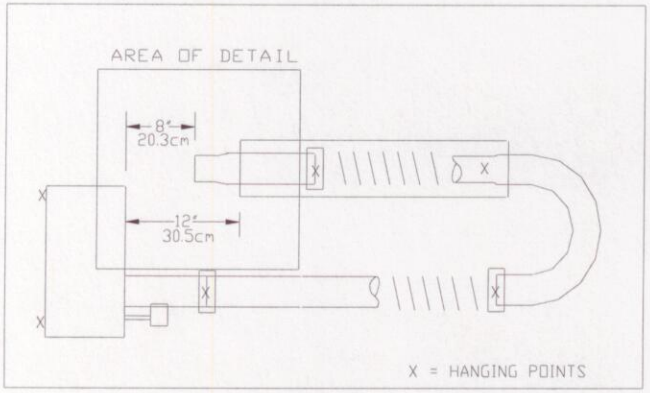


Figure 2.7.2

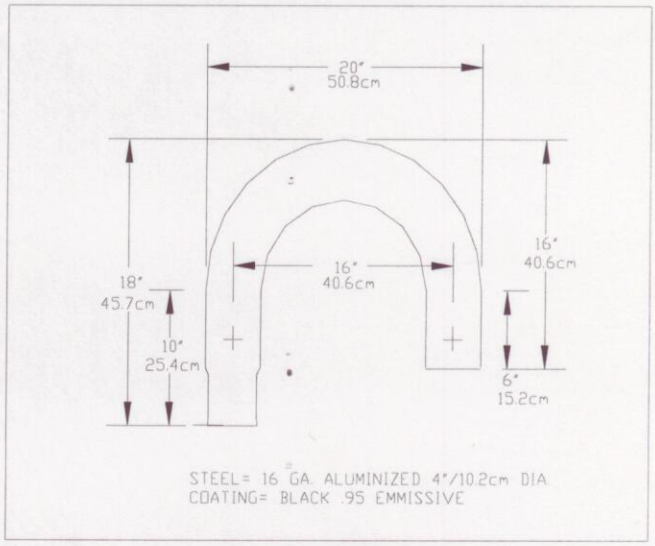


Figure 2.7.3

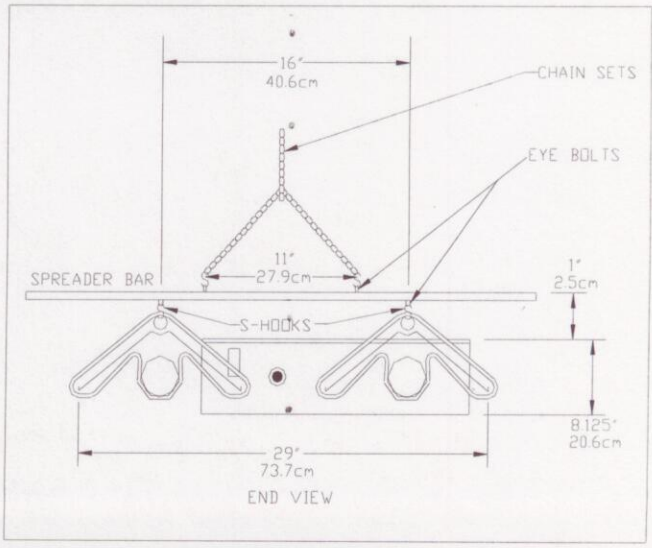


Figure 2.7.4

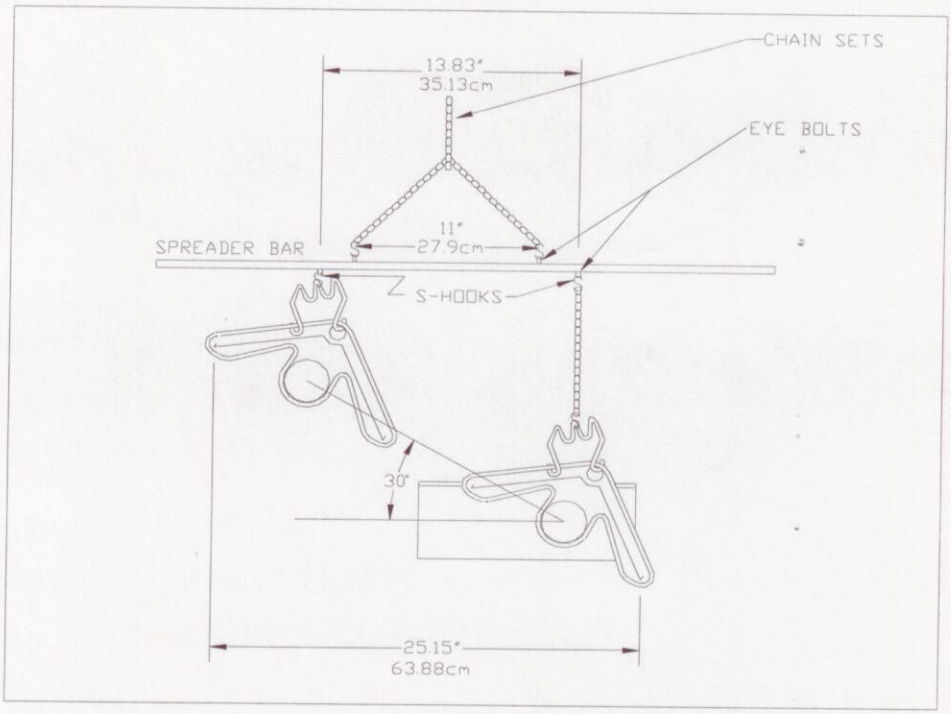


Figure 2.7.5

BAFFLE SPECIFICATION CHART				
MODEL NUMBER	STANDARD BAFFLE SECTIONS	180 DEGREE "U" SECTIONS	45, 90 DEGREE "L" SECTIONS	MIN. DISTANCE FROM BURNER TO AN ELBOW OR U FITTING
CL-30-65 (N, P)	6	5	5	20 ft. 6.1 m
CL-40-65 (N, P)	6	5	5	20 ft. 6.1 m
CL-40-75 (N, P)	5	4	4	20 ft. 6.1 m
CL-50-75 (N, P)	5	4	4	20 ft. 6.1 m
CL-40-80 (N, P)	5	4	4	20 ft. 6.1 m
CL-50-80 (N, P)	5	4	4	20 ft. 6.1 m
CL-50-100 (N, P)	5	4	4	20 ft. 6.1 m
CL-60-100 (N, P)	5	4	4	20 ft. 6.1 m

ONE BAFFLE SECTION IS APPROX. 33"/83.8cm.

2 INSTALLATION

2.8 Flue Venting

The following guidelines must be observed to ensure proper system performance and safety:

* Check the Natural Gas and Propane Installation Code, CSA B149.1 prior to installing flue stacks. Local codes may vary.
* The heater is designed to operate with a 4-in./10.2cm diameter 26 ga. minimum exhaust stack.
* Single-wall galvanized flue pipe or Dura/Connect single wall, flexible connectors must be used. The portion of the flue pipe which goes through combustible material in the building wall or roof must pass through a type "B" vent to maintain clearance (see figure 2.8.1 through 2.8.4).
* Maximum vent length for all models is 20 ft./6.1m including two 90 degree elbows.
* The venting system shall terminate at least 3 ft./0.9m above any building opening or any gas regulator.
* The venting system shall terminate at least 6 ft./1.83m from a combustion air inlet or another appliance and not above a gas utility meter or service regulator. The bottom of the vent terminal shall be located at least 7 ft./2.13m above grade.
* Uninsulated single-wall metal pipe shall not be used in cold climates for venting gas utilization equipment.
* The vent terminal of a horizontal venting system must be installed to prevent blockage by snow and protect building materials from degradation by flue gases.
* Vertical venting should be a minimum of 24 inches /61cm above the roof in an area that prevents snow blockage. See Figure 2.8.1
* Horizontal venting must maintain a minimum distance from the vent termination to the sidewall. See Figure 2.8.2 through 2.8.4
* Buildings incorporating vented soffits/overhangs must ensure that the products-of-combustion do not enter the attic space.
* A common flue of 6 in./15.2cm diameter must be used for double-venting of units. One thermostat must control both units. When common venting is used, flues should be connected so that the by-products of one heater cannot flow into the adjoining flue of the other heater. A dual-exhaust assembly is available from Brant Radiant Heaters, Part Number BR-YA or BR-RTA (see Figures 2.8.6 through 2.8.8). A Field Controls SK-6 vent cap must be used for sidewall common venting of all models.

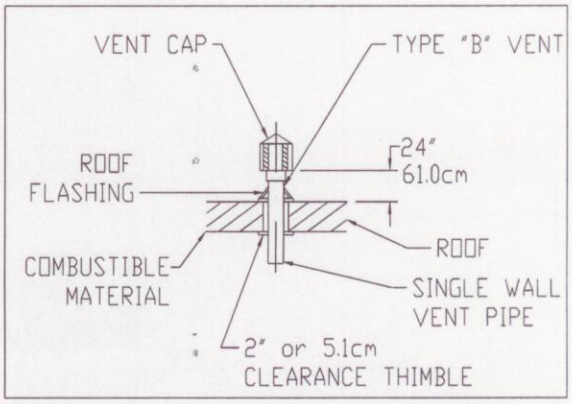


Figure 2.8.1

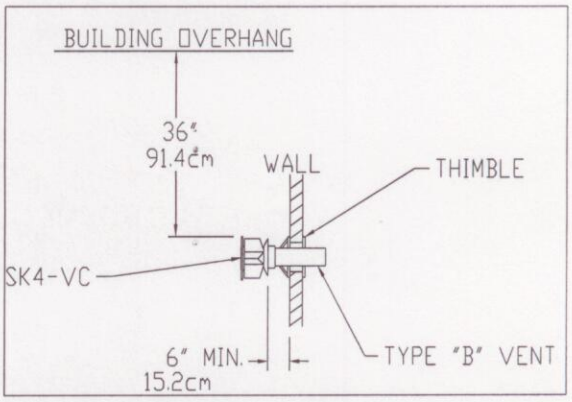


Figure 2.8.2

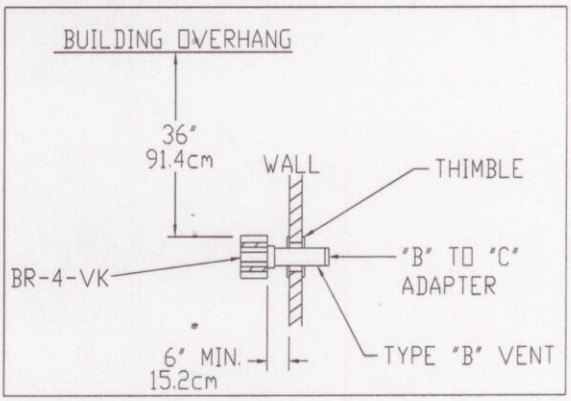


Figure 2.8.3

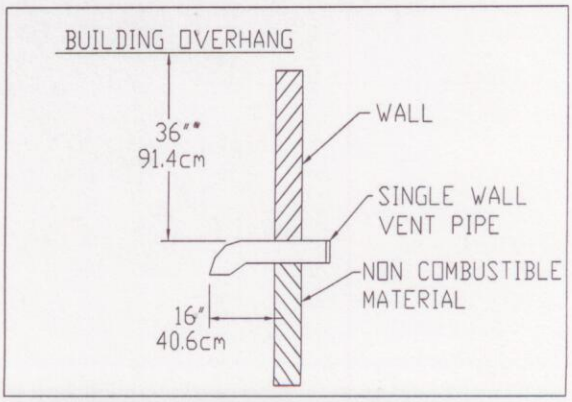


Figure 2.8.4

HORIZONTAL VENT TERMINATION	
CL MODELS	APPROVED VENT CAPS
50,000 thru 100,000	SK-4, SK-6 BR-4VK TF-9

* Vertical venting may utilize standard "B" vent caps.
* All vent pipes must be sealed with high temperature sealant and 4 No. 8 sheet metal screws to prevent leakage of flue gas into building.
* Horizontal flues should be pitched down toward outlet, ¼ in./.64cm per ft. of vent length, to prevent rain from entering the heater (see Figure 2.8.5). Do not pitch heater.
* Single wall pipe exposed to cold air must be insulated to prevent condensation.

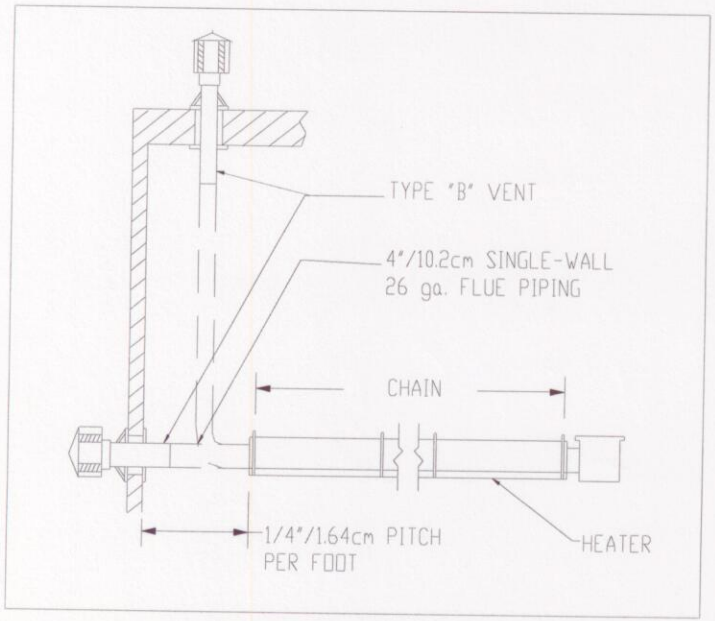


Figure 2.8.5

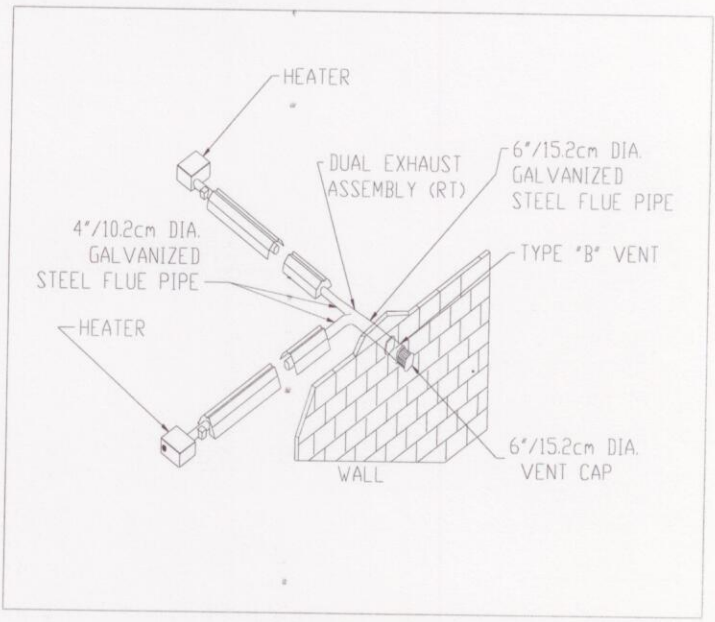


Figure 2.8.6

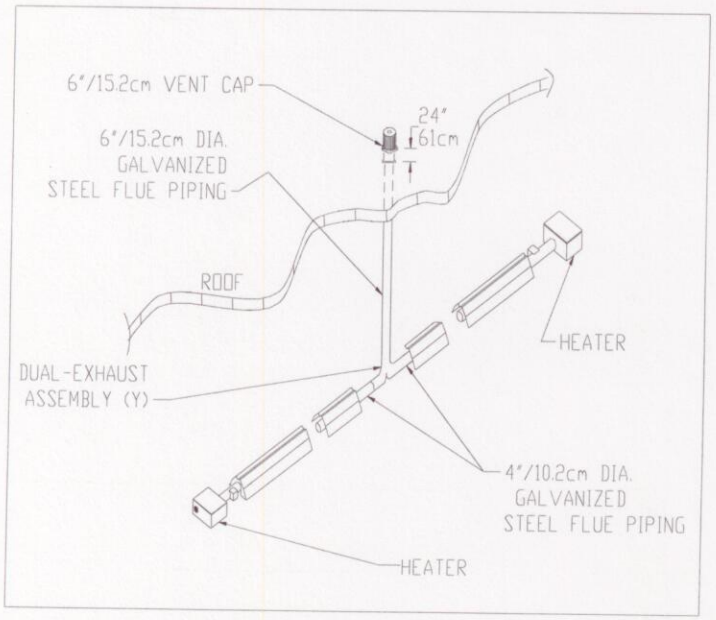


Figure 2.8.7
DUAL-EXHAUST ASSEMBLY
(THROUGH ROOF)

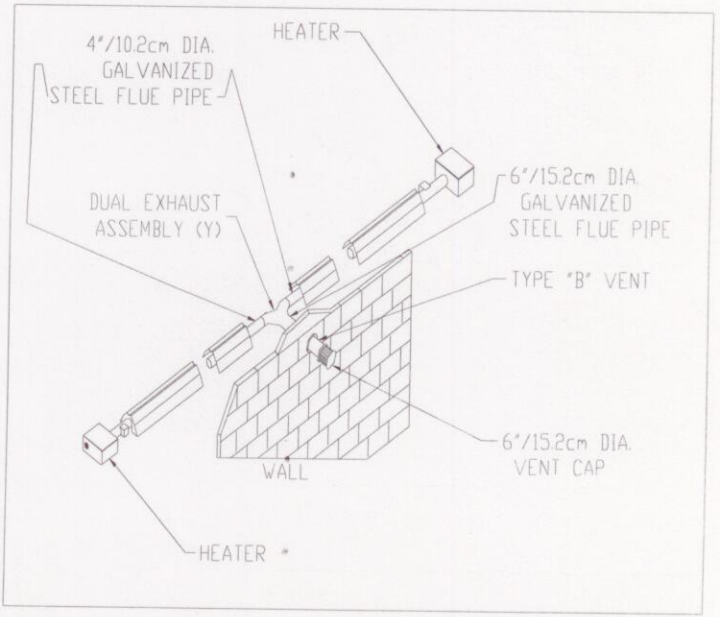


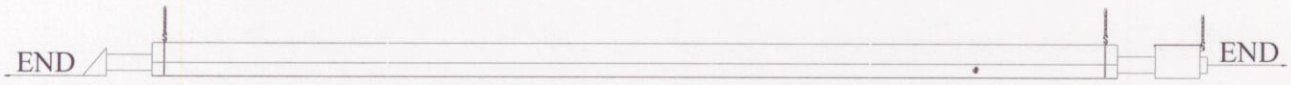
Figure 2.8.8
DUAL-EXHAUST ASSEMBLY
(THROUGH WALL)

2.9 Installation for Unvented Operation (OPTIONAL)

The heaters are approved for unvented operation when equipped with a factory-supplied end cap/diffuser. Part No. BR-VCF (see Figure 2.9.1). This allows the products of combustion to be discharged from the units into the space being heated.

Ventilation of the space is required to dilute those products of combustion sufficiently. For proper ventilation, it is recommended that a positive air displacement of at least 3.8 cfm per 1000 BTUh of natural gas input be provided.

If propane is used, a positive air displacement of at least 4.5 cfm per 1000 BTUh of gas input is recommended. This air displacement may be accomplished by either gravity or mechanical means. Provisions must be made for a sufficiently large fresh-air intake area and exhaust-air outlet area, to accomplish the 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 END CLEARANCE FOR ALL MODELS IS 12 IN. or 30.5cm

Figure 2.9.1

2.10 Combustion Air Requirements

Combustion air intake has a factory-preset air orifice. If indoor combustion air is to be supplied for a tightly closed room, one square inch of free air opening should be provided for each 5000 BTUh of heater input.

Noncontaminated air for combustion must be ducted to the heater if chlorinated or fluorinated contaminants are present in the area where the heater is installed, or if the building has a negative pressure. Typical sources of these contaminants are refrigerants, solvents, adhesives, degreasers, paint removers, paints, lubricants, pesticides, etc.

Outside combustion air may be provided by an accessory 4 in./10.2cm air duct, and directly attached over the air orifice (see Figure 2.10.1) * DO NOT REMOVE AIR INLET ORIFICE. A BR-VC wall inlet vent cap must be used with horizontal outside air intake ducts.

Do not install filters on combustion air.
The intake terminal must be installed to prevent blockage by snow.

NOTE: Use insulated duct or PVC pipe to prevent condensation on outer surface. Keep intake opening at least 3 ft. from any exhaust vent openings. For limitations of length and size, see Air Duct Chart.

When vertical roof venting the combustion air intake and exhaust, the exhaust should terminate higher than the intake.

Two 90 degree elbows are included in duct length.

The air intake terminal must be installed at least one foot above grade.

AIR INTAKE DUCT CHART				
MODEL	AIR INTAKE DUCT SIZE		MAXIMUM INTAKE LENGTH	
	IN.	CM	FT.	M
ALL MODELS	4	10.2	20	6.1
	5	12.7	30	9.14

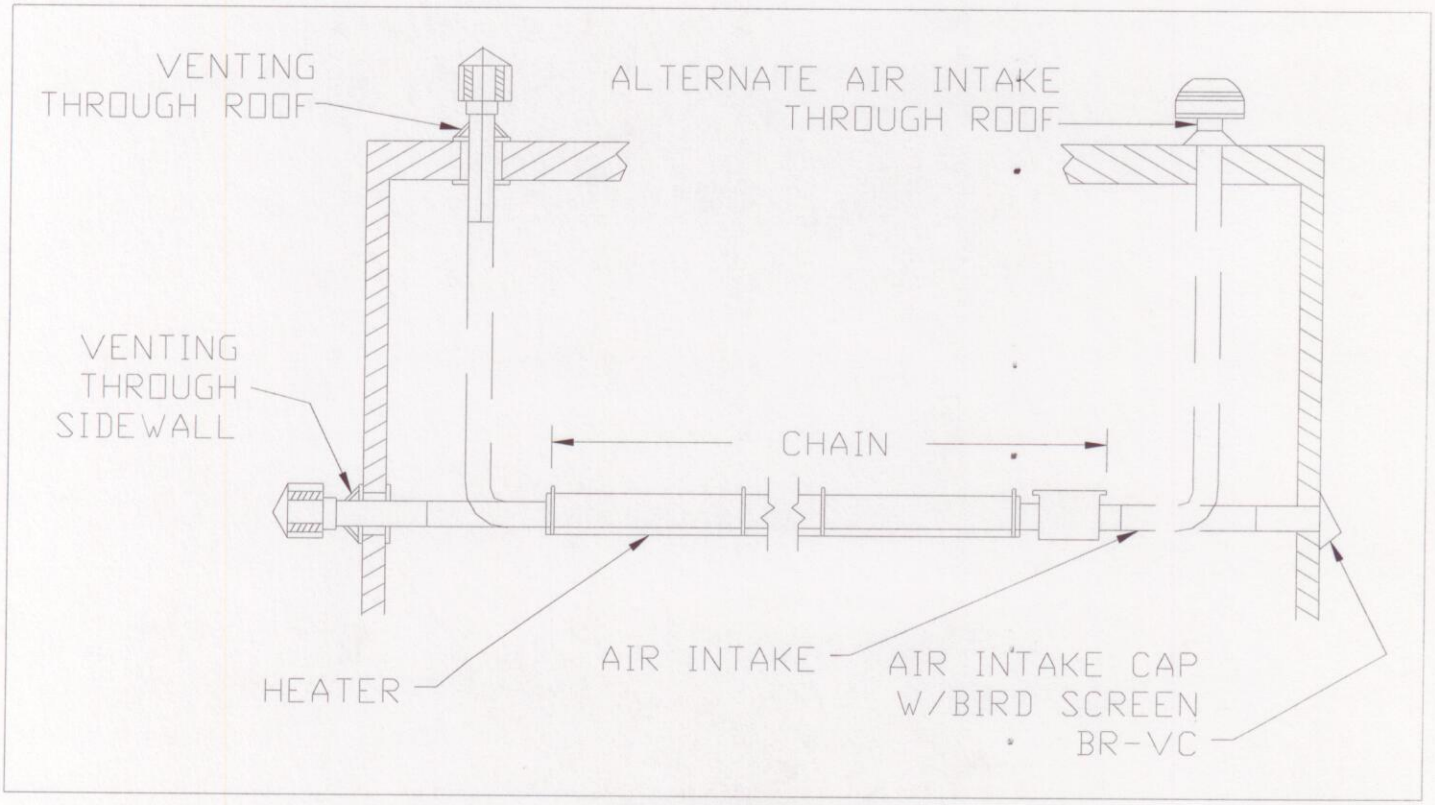


Figure 2.10.1

2.11 Gas Supply

CORRECT INLET PRESSURES ARE VITAL FOR EFFICIENT OPERATION OF HEATERS. REFER TO CSA RATING PLATE AND, IF NECESSARY, CONSULT GAS COMPANY.

If all or a portion of the gas supply line consists of used pipe, it must be cleaned and then inspected to determine its equivalency to new pipe. Test all main supply lines according to local codes. (Isolate heater gas valve and gas cock during test).

Excessive torque on manifold may misalign orifice. Always use two wrenches when tightening mating pipe connections.

> **⚠ WARNING**
>
> Never use a match or any other flame to test for gas leaks. Use soap-and-water solution to check for leaks.

If any portion of the gas supply line is located in an area that could cause an abnormal amount of condensate to occur in the pipe, a sediment trap should be installed.

NOTE: For high-pressure gas above 14 in. W.C. (Water column), a high-pressure regulator and gas cock must be use. If compressed air is used to detect leaks in the gas supply line, disconnect and cap at shutoff cock to avoid damage to regulator and gas valve.

A typical gas supply line connection is illustrated in Figure 2.11.1. The method shown will decrease the possibility of any loose scale or dirt in the supply line entering the heater's control system and causing a malfunction. The gas supply line must be of sufficient size to provide the required capacity and inlet pressure to the heater (consult gas company) as follows:

NOTE: Manifold and inlet pressures should be checked at the tap on the gas valve. Readings will be above atmospheric pressure.

* Natural Gas
  To obtain the required manifold pressure of 3.5 in. W.C., a minimum inlet pressure of 5.0 in. W.C. is necessary for purposes of input adjustment. A maximum inlet pressure of 14.0 in. W.C. is allowed for all units.

* Propane Gas
  To obtain the required manifold pressure of 10.0 in. W.C., a minimum of 11.0 in. W.C. for purposes of input adjustment to a maximum of 14.0 in. W.C. must be provided ahead of the control system on each heater. Do not exceed a manifold operating pressure of 10 in. W.C.
  Use only a pipe-joint compound that is resistant to liquified petroleum gases.

* Pressure Equivalents
  1 in. W.C. equals 0.58 oz./sq. in.

2 INSTALLATION

2.11A GAS CONNECTION

* Gas Line Connection

a. The gas outlet shall be in the same room as the appliance and the connector must not be concealed within or run through any wall, floor or partition.

b. The final assembly shall be tested for leaks. CAUTION: Matches, candles, open flame or other sources of ignition shall not be used for this purpose. Leak test solutions may cause corrosion - water rinse after test.

c. Contact with foreign objects or substances shall be avoided.

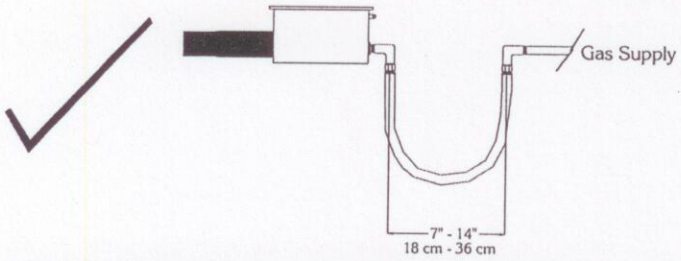
d. The connector shall not be kinked, twisted or torqued as per installation sheet (page 21 and 22).

e. If wind conditions in the space are such that visible swaying of the heater is apparent, the control box must be rigidly mounted.

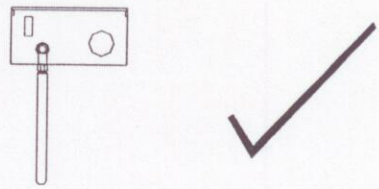
f. Connectors are for use only on piping systems having fuel gas pressures not in excess of ½ pound per square inch.

1/2" Gas Connection

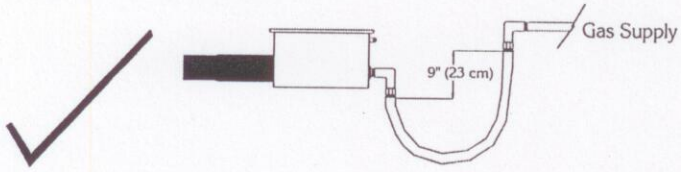
Supplied 30 inch by 1/2 inch diameter rubber hose is a certified component of the heater and is required on units having inputs of 125,000 btuh or less. Hoses must be installed in a "U" configuration, as defined in the installation diagrams, in order to accommodate heater expansion. All measurements are defined when the heater in its off or cold position.



The "U" bend distance required for gas supply connection to heater connection is 7 inches minimum to 14 inches maximum. Hose connections must be in the vertical position.

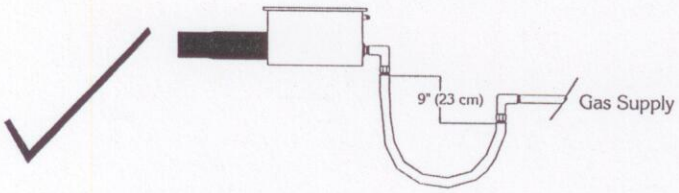


Hose connections must be installed inline in the same direction as heater expansion.

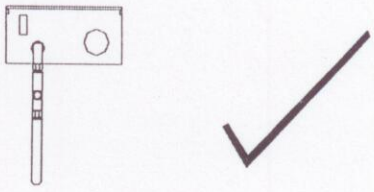


Gas line supply connection can be installed a maximum of 9 inches above heater gas connection.

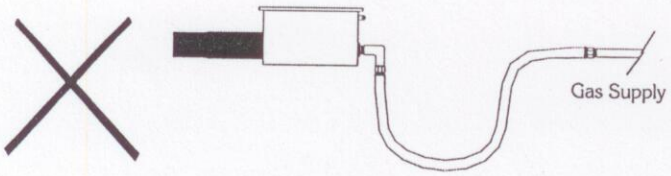
Hose connections must be installed inline in the same direction as heater expansion.



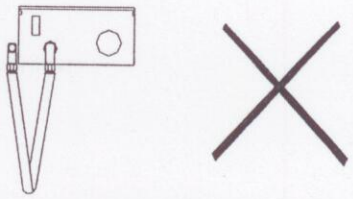
Gas line supply connection can be installed a maximum of 9 inches below heater gas connection.



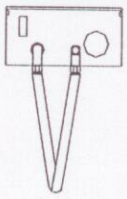
Hose connections must be installed inline in the same direction as heater expansion.



Hose must not be installed with preload on hose connector fittings.



Hose must not be installed with hose connector offset. During operating conditions a rotational loading of hose may occur.



2.12 Allowance for Expansion

Allowances must be made for the system to expand as detailed in the Heater Expansion Chart on this page. The supplied stainless-steel, flexible gas connector is recommended. If, however, local codes require rigid piping to the heater, a swing joint can be used.

HEATER EXPANSION CHART

Exchanger length and gas input will determine overall expansion. Heaters in a typical installation will expand towards both the burner and vent ends. Review for proper flexible gas connector installation.

EXCHANGER LENGTH FEET / METERS		FIXED OR HIGH-FIRE GAS INPUT BTUh	EXPANSION LENGTH INCHES	MILLIMETERS
10	3.1	25,000	1/2	12.7
15	4.6	32,000	3/4	19.1
20	6.1	40,000	1	25.4
20	6.1	50,000	1 1/4	31.8
20	6.1	60,000	1 1/2	38.1
20	6.1	75,000	1 3/4	44.5
20	6.1	100,000	1 7/8	47.6
30	9.2	50,000	1 1/4	31.8
30	9.2	60,000	1 1/2	38.1
30	9.2	75,000	1 3/4	44.5
30	9.2	100,000	1 7/8	47.6
30	9.2	125,000	2	50.8
40	12.2	75,000	1 1/2	38.1
40	12.2	100,000	1 7/8	47.6
40	12.2	125,000	2 1/8	54.0
40	12.2	150,000	2 1/2	63.5
40	12.2	175,000	2 3/4	69.9
50	15.3	100,000	2	50.8
50	15.3	125,000	2 1/8	54.0
50	15.3	150,000	2 3/8	60.3
50	15.3	175,000	2 1/2	63.5
50	15.3	200,000	2 3/4	69.9
60	18.3	125,000	2 1/2	63.5
60	18.3	150,000	2 3/4	69.9
60	18.3	175,000	3	76.2
60	18.3	200,000	3 1/4	82.6
70	21.4	175,000	3 3/8	85.7
70	21.4	200,000	3 1/2	88.9
80	24.4	200,000	3 1/2	88.9

2.13 Electrical Requirements

1. Heaters operate on 120 volts, 60 Hz, single phase. The maximum amperage requirement (starting current) is 4.8 amps per heater. The running current is 1.1 amps.

2. Heater must be grounded in accordance with the Canadian Electrical Code C22.1 (latest edition).

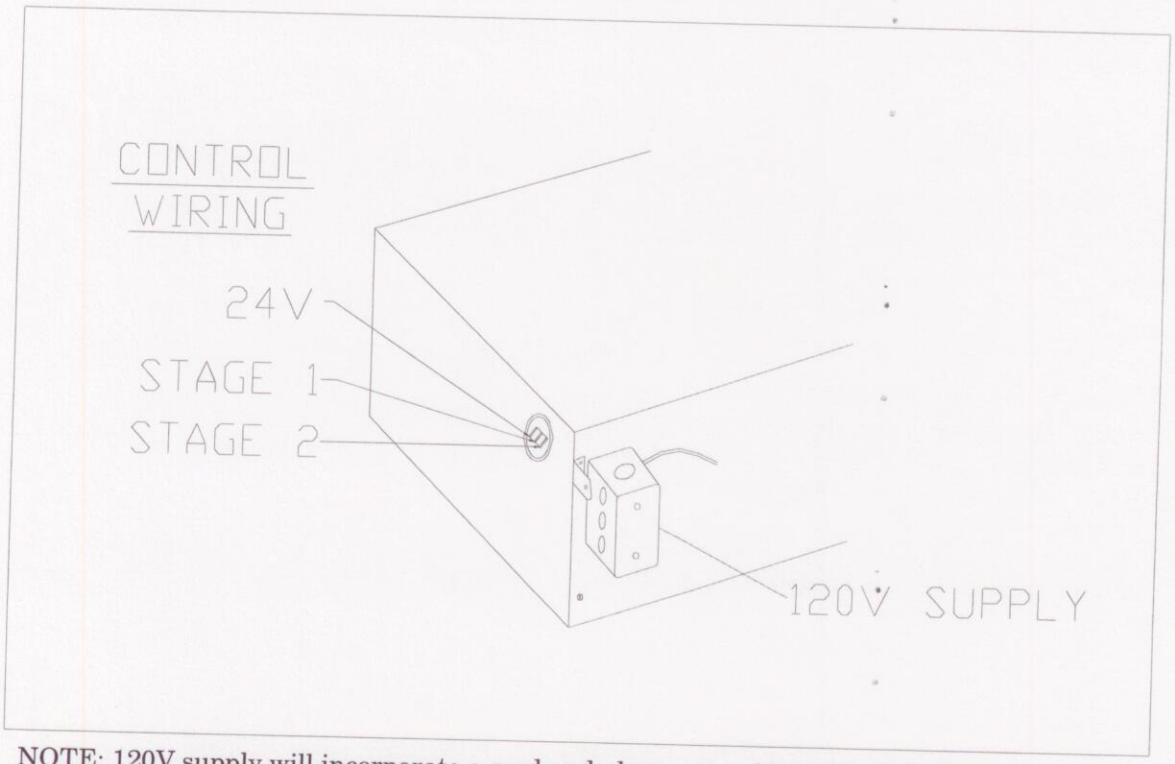
3. Wiring must not be exposed to direct radiant output.

2.14 Thermostat Wiring:
One Two-Stage Thermostat and
One Two-Stage Series Heater

The Burner box contains a 24 volt transformer that operates the control circuits. The thermostat is part of this circuit. When installing a "snap action" CE-2S or "mercury cell" 1F37-408 thermostat a three wire connection is required.

- 24 volt terminal from the heater to the thermostat terminal (R).
- 1st stage 24 volt from the thermostat (W1) to heater number 1 low.
- 2nd stage 24 volt from the thermostat (W2) to heater number 2 high.
See Figure 2.13.1.

When utilizing a thermostat that requires a constant 24 volt power supply such as the HL 201 or other programmable thermostat, a fourth wire will be required. Attach this wire to heater chassis. See Figure 2.13.1.



NOTE: 120V supply will incorporate a cord and plug, secured by a liquid-light connect when "Outdoor Use" option is supplied.
24V control wiring will incorporate 5 ft. (1.5m) cord, secured by a liquid-light connect when "Outdoor Use" option is supplied.

Figure 2.13.1

2.15 Thermostat Wiring:
One Two-Stage Thermostat and Multiple Two-Stage Series Heaters

The Burner box contains a 24 volt transformer that operates the control circuits. When more than one heater is operated with a single thermostat, the 24 volt control circuit of each heater must be isolated. A factory supplied isolation relay HL-RB must be installed. See Figure 2.15.1 for internal wiring. Heaters with factory installed relay boards are labeled "Equipped with HL-RB". See Figure 2.15.2. The thermostat is not part of the burner control circuit, therefore an external (installer-supplied) 24 volt transformer will be required to operate all HL-RB's. Each HL-RB draws .03 amps. All heaters equipped with the HL-RB will use three wires to operate the relays:

- Connect Line 24 volt from installer supplied transformer to thermostat terminal (R).
- Connect common 24 volt from installer supplied transformer to the 24 volt spade on the heater.
- 1st stage 24 volt from the thermostat (W1) to heater number 1 low.
- 2nd stage 24 volt from the thermostat (W2) to heater number 2 high.

See Figure 2.15.2.

Wiring from thermostat to heater does not change due to thermostat type. Wiring from external transformer to thermostat may change. Refer to thermostat installation instructions.

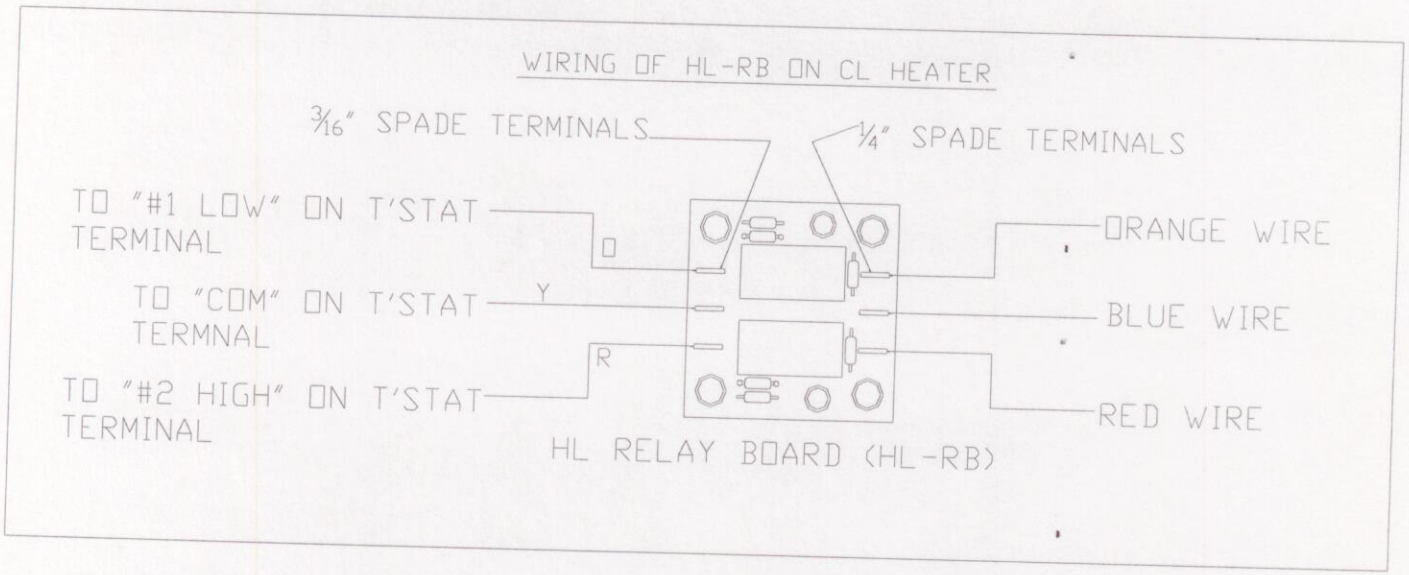


Figure 2.15.1

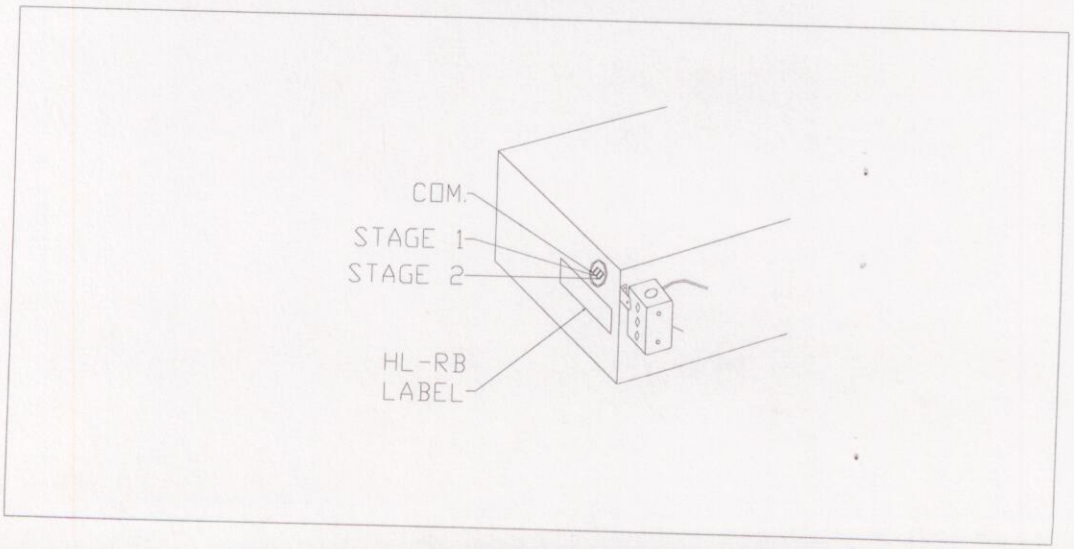


Figure 2.15.2

2.16 Lighting Instructions

1. Purge main gas supply line at start-up.
2. Rotate heater's manual gas valve knob to the "ON" position.
3. Close electrical circuit.
4. If heater fails to light, turn off gas and wait five minutes before repeating the above procedure.

Instructions pour l'allumage

1. Purger la conduite d'alimentation en gaz principale.
2. Tourner le bouton du robinet de gaz a commande manuelle jusqu'a ce qu'il se trouve en position de marche ("ON").
3. Fermer le circuit electrique.
4. Si l'appareil de chauffage ne s'allume pas, attendre 5 minutes avant de suivre de nouveau les instructions ci-dessus.

2.17 Shutdown Instructions

1. Open electrical circuit.
2. Rotate heater's manual gas valve knob to the "OFF" position.

Pour eteindre l'appareil

1. Ouvrir le circuit electrique.
2. Tourner le bouton du robinet de gaz a commande manuelle de l'appareil de chauffage jusqu'a ce qu'il se trouve en position d'arret ("OFF").

2.18 Outdoor Installations

The two-stage series heaters have been certified for outdoors installations with the following factory requirements.

* Sheet metal intake cap attached to the 4 in. combustion air intake collar pointing downward to prevent rain from entering. Factor supplied.

* Water and UV resistant cord and plug factory installed through a liquid-tight box connector.

* 5 ft./1.5m of 24 volt control wiring factory installed through a liquid-tight box connector.

* Control box will be internally silicone sealed.

* All manufactured Re-Verber-Ray outdoor approved heaters will display on the rating label "FOR OUTDOOR USE".

When installing heaters in outdoor applications the following considerations must be met-

* Locate heater away from snow load areas.

* Heaters mounted lower than 8 ft./2.44m must use an optional protective grill. Part# BR-PS60

* Ensure that the products-of-combustion dissipate without condensing on building surfaces.

* Heaters located in high wind conditions must have the reflectors secured at beginning and end of total reflector run.

3 THEORY OF OPERATION

3.1 Micro 60U24 Control

STANDBY
The Micro 60U24 circuit control continually checks for internal faults, safety circuit integrity and relay contact positioning.

STARTING CIRCUIT
Upon a call for heat, the control will verify that the burner safety pressure switch is in its proper position. The fan relay energizes the fan, an operational static pressure is achieved and the normally open burner switch will close, initiating the ignition sequence. The glo-bar is powered and after 45 seconds the main gas valve opens.

FIRST STAGE RUNNING CIRCUIT
After ignition, the flame-rod monitors the main burner flame. If flame is lost, the control acts to close the gas valve within one second and a new trial sequence identical to the start-up is initiated. If proof is not established within 8.5 seconds, the unit will retry 2 times and proceed to a hard lock-out. The control can be reset by interrupting the power source or thermostat.

SECOND STAGE RUNNING CIRCUIT
Stage two on the gas valve is powered directly from the second stage of the thermostat. The gas valve will not pass gas unless the first stage sequence of operation has been completed. The thermostat will determine which stage is required to maintain the desired comfort level.

SHUTDOWN
When the thermostat is satisfied the fan will enter into a two minute post-purge cycle.

LOCKOUT CODES
In event of a component failure, a red LED diagnostic light located on the burner box end panel will flash a code identifying the fault. Lockout codes are summarized below.

LED STATUS	FAULT CODE
Initial flash on power up, then steady off	Normal Operation
Steady On	Module Failure/ Internal Fault
1 Flash	Ignition Fault
2 Flashes	APS1 Fault
4 Flashes	Solenoid Valve Fault/ Leaky Valve/ Flame amplifier Fault
No flash upon initial 117 V power up	Transformer Fault

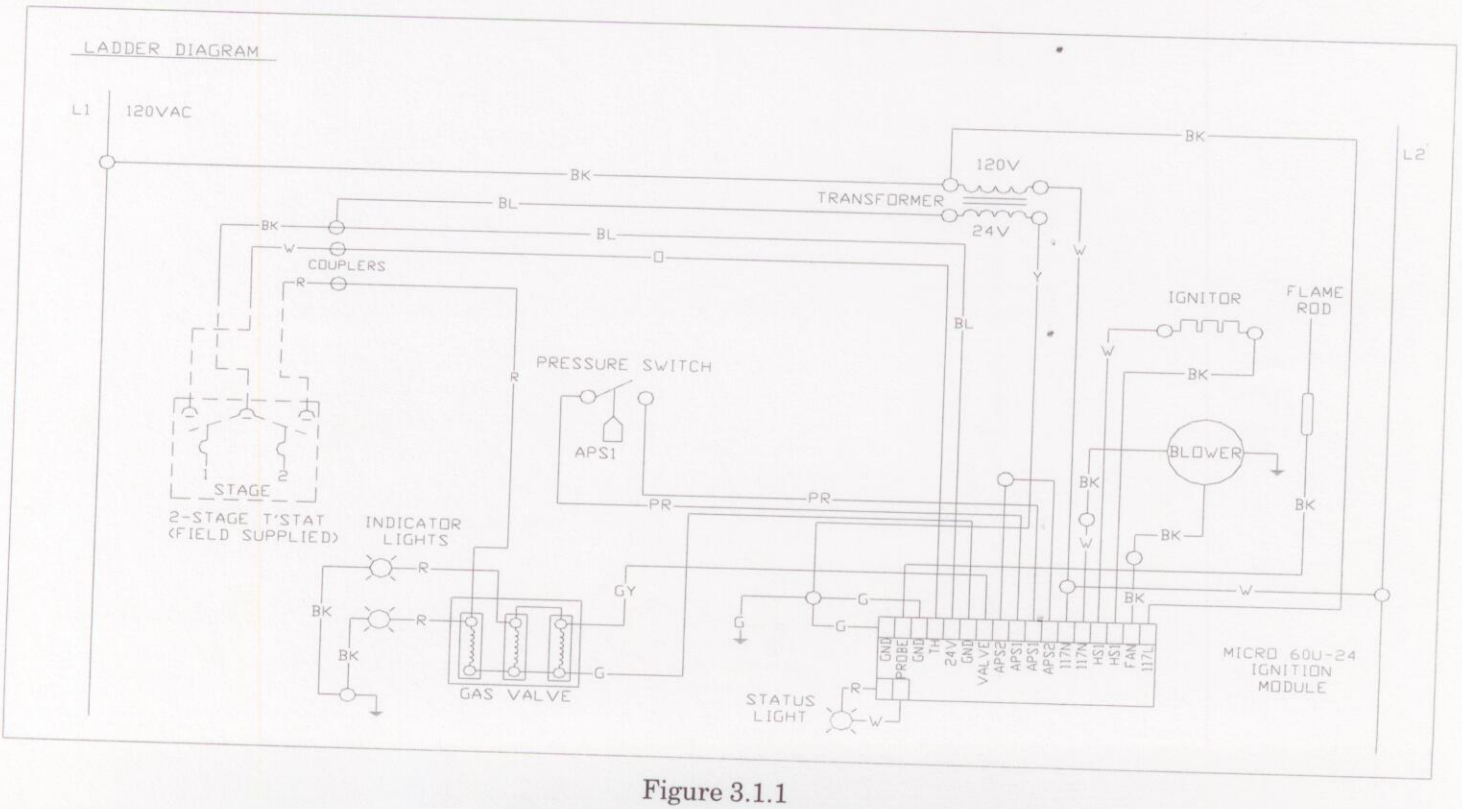


Figure 3.1.1

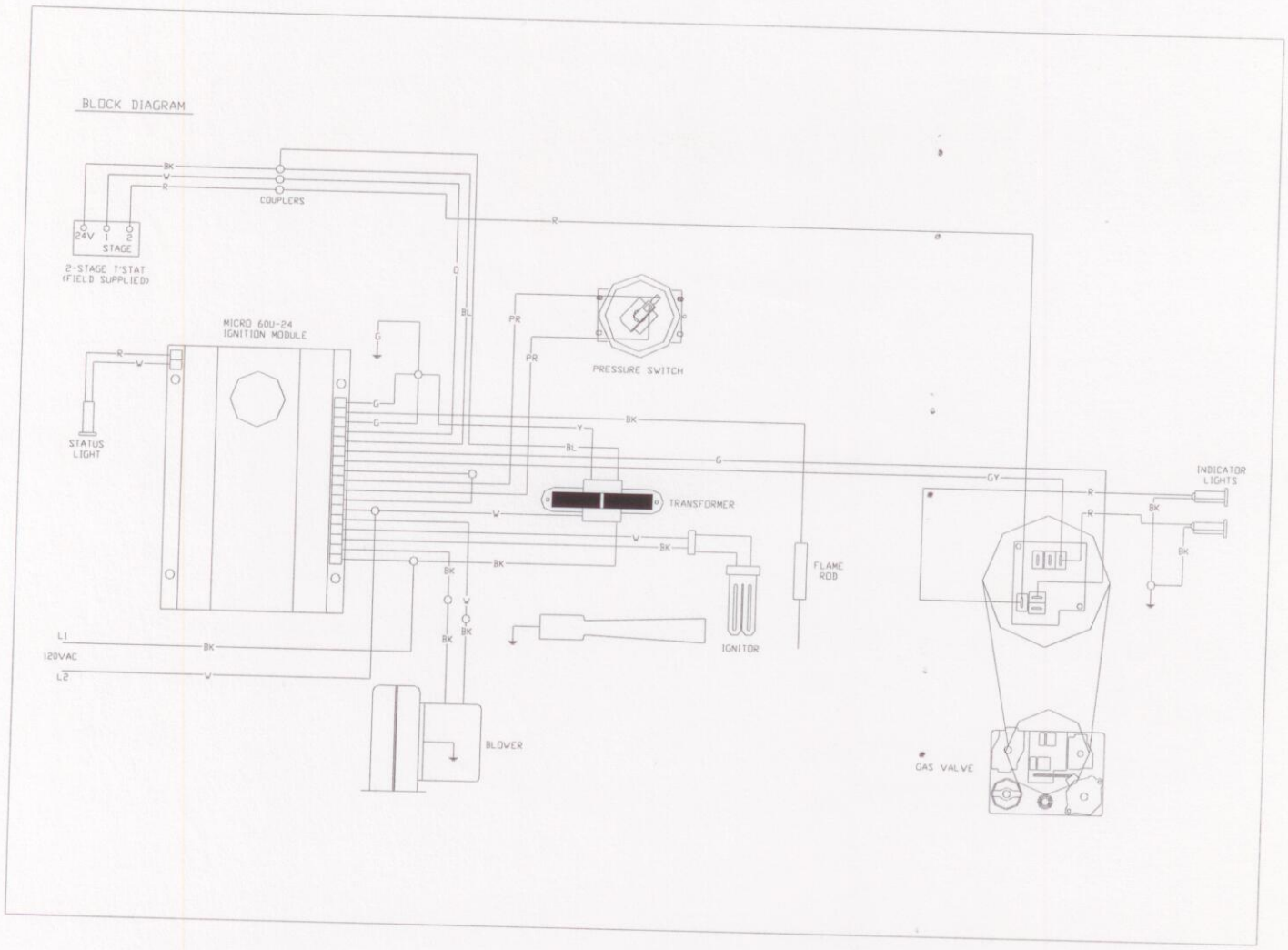

BLOCK DIAGRAM
BK
W
R
COUPLERS
24V
T
STAGE
2-STAGE T'STAT
(FIELD SUPPLIED)
MICRO 60U-24
IGNITION MODULE
R
W
STATUS
LIGHT
G
BL
PR
PRESSURE SWITCH
Y
GY
TRANSFORMER
FLAME
ROD
IGNITOR
INDICATOR
LIGHTS
L1
120VAC
L2
BLOWER
GAS VALVE

Figure 3.1.2

4 SERVICE

4.1 Maintenance

The gas fired infra-red heaters require a minimum of routine maintenance to keep them operating at peak performance.

1. Prior to the heating season heater operation must be verified by qualified service personnel.

2. Ensure that the blower impeller is kept clean. If dirt becomes a problem, installation of outside air intake duct for combustion is recommended. Oiling the blower motor will extend bearing life beyond the 30,000 hour minimum.

3. Keep the aluminum reflectors from accumulating deposited material.

> **WARNING**
>
> Use protective glasses when cleaning the heater.

4.2 GENERAL TROUBLE SHOOTING

GENERAL TROUBLESHOOTING CHART FOR 2-STAGE SERIES EQUIPPED WITH MICRO 60U24 CONTROL		
SYMPTOM	POSSIBLE CAUSE	CORRECTIVE ACTION
Thermostat closed. - NO LED FLASH CODE	1. Blown fuse. 2. Faulty thermostat. 3. Disconnected wire. 4. No 24 volt signal.	1. Replace. 2. Replace. 3. Repair. 4. Interrupt 120 volt supply, LED will flash once if 24 volt is present.
Thermostat closed. - LED CODE STEADY ON	1. Internal fault in circuit control module.	1. Replace.
Thermostat closed. - LED CODE 1 FLASH	1. Faulty glo-bar. 2. Faulty flame sensor. 3. Gas valve not opening. 4. Gas orifice plugged. 5. Restriction in main burner.	1. Replace. 2. Replace. 3. Replace. 4. Remove, clean and reinstall. 5. Remove, clean and reinstall.
Thermostat closed. - LED CODE 2 FLASHES	1. Burner pressure switch fault. 2. Burner switch bypassed.	1. Replace. 2. Remove jumper wires.
Thermostat closed. - LED CODE 4 FLASHES	1. Wire disconnected on valve. 2. Gas valve fault. 3. Flame rod fault.	1. Reconnect. 2. Replace. 3. Replace.
Heater Operating - TUBE BOWING	1. Insufficient combustion air. 2. Overfired. 3. Ensure exchangers have room to expand. 4. Heater not supported properly. 5. Reflectors not positioned properly.	1. Check intake duct for blockage and sizing. 2. Check gas pressure. 3. Re-install vent connection. 4. Re-position hangers or chains. 5. Re-position.
Heater Operating - VENT CONDENSING	1. Stack length too long. 2. Light gauge flue pipe used. 3. Uninsulated vent pipe running through cold space. 4. Negative pressure in building. 5. Common vented heaters installed with individual thermostats.	1. Shorten stack. 2. Minimum 26 Ga. Required. 3. Insulate vent. 4. Install combustion air intake. 5. Install one thermostat.
Odor or fumes in space.	1. Vaporized solvents decomposing when contacting radiant tubes. 2. Lift trucks. 3. Loose tube connections.	1. Install exhaust fan at ceiling. 2. Install exhaust fan and repair. 3. Tighten to 50-60 lb.-ft.

LIMITED
Ten Year Warranty
RE-VERBER-RAY TUBE TYPE GAS INFRA-RED HEATER

Brant Radiant Heaters Limited (hereinafter referred to as the Company) warrants to the original purchaser or original user that all Brant Radiant Heaters sold by it and all parts thereof are free from defects in material and/or workmanship under a normal use and service. The Company's sole obligation under this warranty shall be limited to furnishing replacement parts, F.O.B. Paris, Ontario, for 36 months from the date of initial installation of the heater, but not to exceed 36 months from the date of shipment by the Company to original purchaser for the heater, for any parts which the Company's examination shall disclose to its satisfaction to be defective. Defective parts to be returned to the Company, transportation charges prepaid.

TWO YEAR ADDITIONAL WARRANTY ON COMBUSTION CHAMBER/ RADIANT TUBE

In addition to the above mentioned Three-Year Warranty, the Company warrants to the original purchaser or original user of TUBE TYPE Gas Infra-Red Heater that it will at any time during the two years next following the expiration date of the Three-Year Warranty, furnish combustion chamber / radiant tube F.O.B. Paris, Ontario, for any combustion chamber / radiant tube which is proved to the satisfaction of the Company to be inoperative due to defects in material or factory workmanship. The Company's sole obligation under the warranty shall be limited to furnishing combustion chamber radiant tube.

This two-year additional warranty covers the combustion chamber / radiant tube only.

FIVE YEAR ADDITIONAL WARRANTY ON RADIANT TUBE

In addition to the above mentioned Two-Year Warranty, the Company warrants to the original purchaser or original user of TUBE TYPE Gas Infra-Red Heater that it will at anytime during the five years next following the expiration date of the Two-Year Warranty, furnish radiant tube F.O.B. Paris, Ontario, for any radiant tube which is proved to the satisfaction of the Company to be inoperative due to defects in material or factory workmanship. The Company's sole obligation under the warranty shall be limited to furnishing radiant tube.

This five-year additional warranty covers the radiant tube only.

GENERAL CONDITIONS

The warranties set out in this certificate are the exclusive remedy of the original owner or user in lieu of all other warranties written, oral and / or implied (including any warranty of merchantability or fitness for the purpose) and all other obligations and / or liabilities on the part of the Company, and the Company neither assumes nor authorizes any person to assume for it any other obligation or liability in connection with the sale, installation or use of the heater or any parts thereof.

The company will not be responsible for labour charges for the analysis of a defective condition in the heater and / or for the installation of replacement parts.

The warranties provided herein will not apply if the input of the heater exceeds the rated input, as indicated on the name plate, by more than 2%, or if the heater in the judgement of the Company has been subjected to misuse, excessive dust, negligence, accident, corrosive atmospheres, excessive thermal shock, excessive vibration, physical damage to the heater, alterations by unauthorized service, operation contrary to the Company's instructions or if the serial number has been altered, defaced or removed. The Company shall not be liable for any default and / or delay in the performance by it of these warranties caused by contingency beyond its control, including war, government restriction or restraints, strikes, fire, flood, Acts of God, 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 Company instructions and / or if the heater is not maintained and repaired according to Company instructions.

Written permission is required for the return of any part and / or equipment and any such return must be made on the basis of transportation charges prepaid. Shipments may be refused unless prior written permission is obtained and goods returned prepaid.

This warranty applies only within Canada.

RE-VERBER-RAY

BRANT RADIANT HEATERS LIMITED

5.1 BASIC PARTS LIST

Part No.	*Description*
TP-1	Control Box Cover
TP-3	#8 x 1/4" Sheet Metal Screw
TP-4	Control Box
TP-5	Flange Gasket
TP-7	1/4-20 x 1/2" Machine Screw
TP-7A	1/4-20 Hex Nut
TP-9	Conduit Coupling
TP-10	Conduit 1/2" x 4"
TP-11	Glo-Bar Box
TP-12	Glo-Bar Box Cover
TP-13	#8 x 1/2" Self-Drilling Screw
TP-14	Sight Glass Gasket
TP-15	Sight Glass
TP-16	Sight Glass Washer
TP-17	1/4-20 x 3/8" Thread-Cutting Screw
TP-19B	Tube/Reflector Hanger (BR-4HGR)
TP-19C	Reflector Center Support (BR-4IH)
TP-20	Refector (120")
TP-21	Tube Clamp
TP-26	10 ft. Radiant Tube, Straight
TP-26S	1st 10 ft. Radiant Tube, Straight (Stainless)
TP-31B	Control Box Bracket
TP-41	1/4-20 Keps Nut
TP-44	Inlet Air Orifice w/Screen
TP-50	Globar Ignitor
TP-54	Burner Box Divider
TP-55	Fan Blower
TP-56C	1/4" Atmosphere Tube (vinyl)
TP-57A	1/4 " Pressure Tube
TP-59	#8 Hex Nut/Lock Washer
TP-61K	Safety Pressure Switch (State BTU's)

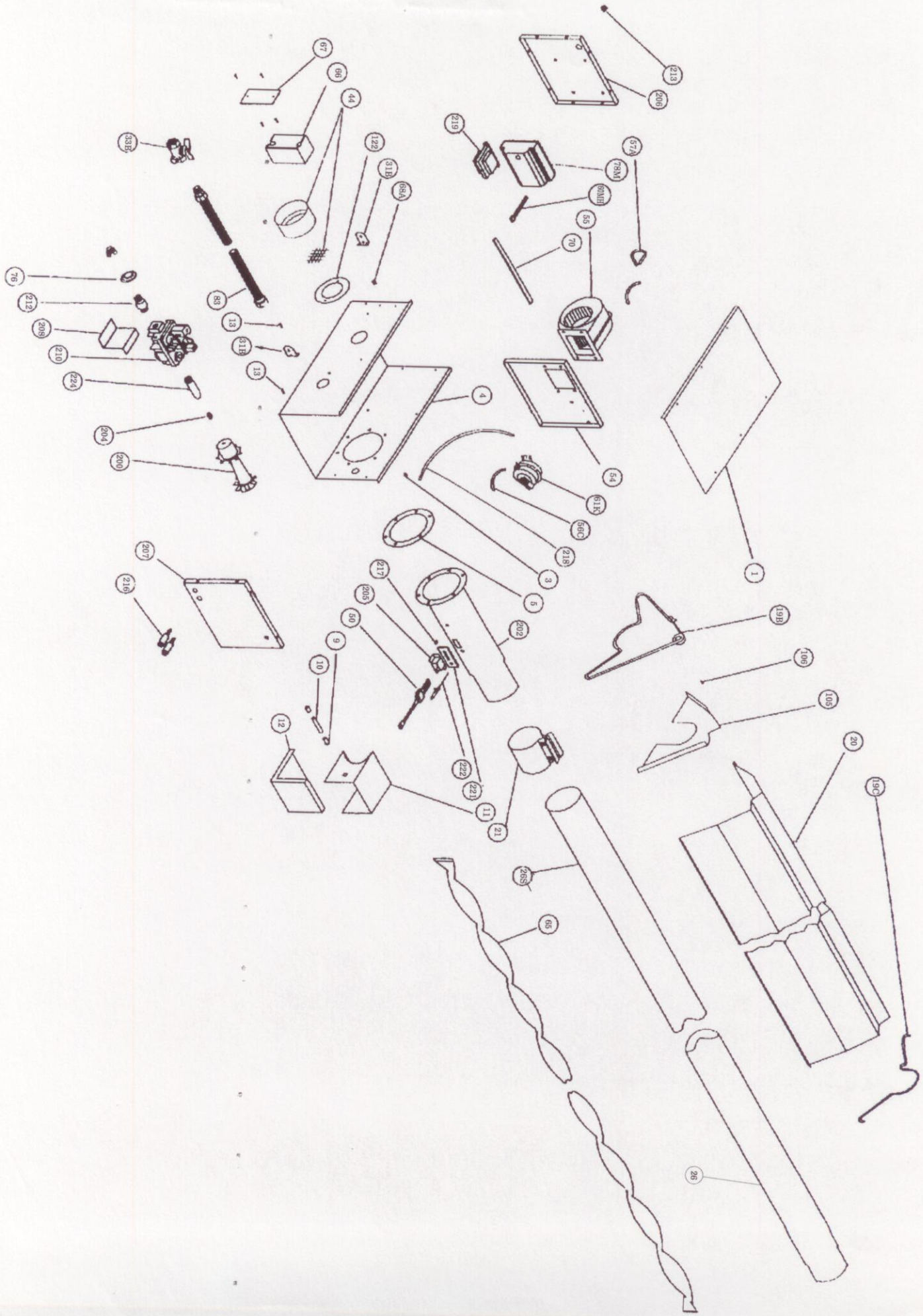
Part No.	*Description*
TP-62	#8 x 1/2" Machine Screw
TP-65	Heat Diffuser (Baffle)
TP-66	2" x 4" Outlet Box
TP-67	2" x 4" Outlet Box Cover
TP-68A	Strain Relief Bushing
TP-70	Control Box Gasket
TP-76	Rubber Grommet
TP-80	#6-32 x 1" Machine Screw
TP-81	#6-32 Hex Nut
TP-83	Flexible Gas Connector
TP-101	1/2" Adapter Fitting
TP-104	1/2" x 2" Pipe Nipple
TP-105	Reflector End Cap (BR-ECR)
TP-106	Reflector Clip (BR-ECRC)
TP-122	Air Inlet Gasket
TP-200	Burner (50,000 to 100,000 BTUH) (TP-B1P)
TP-202	16" Burner Tube (HL-16P)
TP-204	Gas Orifice (TP-46)
TP-205	Glo-Bar Holder
TP-206	End Panel-Left
TP-207	End Panel-Right
TP-208	"Z" Bracket
TP-210	36E96 2-Stage Gas Valve (State N.G. Or L.P.)(HL-75)
TP-212	3" x 1/2" Pipe Nipple
TP-213	T'Stat Plug (HL-TP)
TP-216	Indicator lights (HL-L)
TP-217	Pressure Barb Fitting

Part No.	*Description*
TP-218	Exhaust Pressure Tube (Vinyl)
TP-219	Transformer 25V (HL-T)
TP-221	Glo-Bar Gasket
TP-222	Flame Rod
TP-224	Manifold (HL-MFD)
HL-60MH	Micro-60 Harness
HL-60MIL	Diagnostic LED Lights
HL-78M	Micro-60 Self Diagnostic Board

NOTE: When ordering heater parts, please state the model and serial number of the heater.

5.2 Optional Parts

Item No.	*Description*
SK-4VC	Vent Cap (Required For Sidewall Venting on 200,000 BTU)
BR-VCF	Exhaust Vent w/Flapper (Required on Unvented Models)
BR-VC	Wall Inlet Vent w/Screen
BR-4-VK	Side Wall Venting Kit (also SK4-VK)
TF-9	Truck Exhaust Terminal for Side Wall Venting
SK-6VC	Vent Cap (Required for Dual Side Wall Vents)
BR-NIR	Side Shield Extension
TP-33B	Gas Cock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