

**City of Portland, Maine - Building or Use Permit Application**

389 Congress Street, 04101 Tel: (207) 874-8703, Fax: (207) 874-8716

Permit No: 08-1365	Issue Date:	CBL: 117 B018001
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Location of Construction: 79 FESSENDEN ST	Owner Name: POTTLE MELISSA A	Owner Address: 79 FESSENDEN ST	Phone:
Business Name:	Contractor Name: Caron & Waltz	Contractor Address: 321 Lincoln Street South Portland	Phone 2077992228
Lessee/Buyer's Name	Phone:	Permit Type: HVAC	Zone: R5

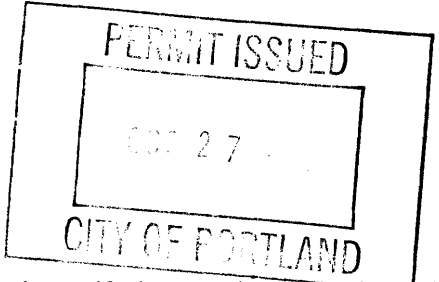
Past Use: Single Family Home	Proposed Use: Single Family Home - install a Munchkin 199 M in basement	Permit Fee: \$120.00	Cost of Work: \$9,895.00	CEO District: 2
		FIRE DEPT: <input type="checkbox"/> Approved <input type="checkbox"/> Denied	INSPECTION: Use Group: R3 Type: SB IRC 2003	

Proposed Project Description: install a Munchkin 199 M in basement	Signature:	Signature: <i>Jm 10/27/08</i>
PEDESTRIAN ACTIVITIES DISTRICT (P.A.D.)		
Action: <input type="checkbox"/> Approved <input type="checkbox"/> Approved w/Conditions <input type="checkbox"/> Denied		
Signature: _____ Date: _____		

Permit Taken By: Idobson	Date Applied For: 10/27/2008	<b>Zoning Approval</b>
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- This permit application does not preclude the Applicant(s) from meeting applicable State and Federal Rules.
- Building permits do not include plumbing, septic or electrical work.
- Building permits are void if work is not started within six (6) months of the date of issuance. False information may invalidate a building permit and stop all work..

Special Zone or Reviews	Zoning Appeal	Historic Preservation
<input type="checkbox"/> Shoreland	<input type="checkbox"/> Variance	<input checked="" type="checkbox"/> Not in District or Landmark
<input type="checkbox"/> Wetland	<input type="checkbox"/> Miscellaneous	<input checked="" type="checkbox"/> Does Not Require Review
<input type="checkbox"/> Flood Zone	<input type="checkbox"/> Conditional Use	<input type="checkbox"/> Requires Review
<input type="checkbox"/> Subdivision	<input type="checkbox"/> Interpretation	<input type="checkbox"/> Approved
<input type="checkbox"/> Site Plan	<input type="checkbox"/> Approved	<input type="checkbox"/> Approved w/Conditions
Maj <input type="checkbox"/> Minor <input type="checkbox"/> MM <input type="checkbox"/>	<input type="checkbox"/> Denied	<input type="checkbox"/> Denied
Date: <i>Jm 10/27</i>	Date: _____	Date: <i>10/27/08 Jm</i>



**CERTIFICATION**

I hereby certify that I am the owner of record of the named property, or that the proposed work is authorized by the owner of record and that I have been authorized by the owner to make this application as his authorized agent and I agree to conform to all applicable laws of this jurisdiction. In addition, if a permit for work described in the application is issued, I certify that the code official's authorized representative shall have the authority to enter all areas covered by such permit at any reasonable hour to enforce the provision of the code(s) applicable to such permit.

SIGNATURE OF APPLICANT	ADDRESS	DATE	PHONE
RESPONSIBLE PERSON IN CHARGE OF WORK, TITLE		DATE	PHONE

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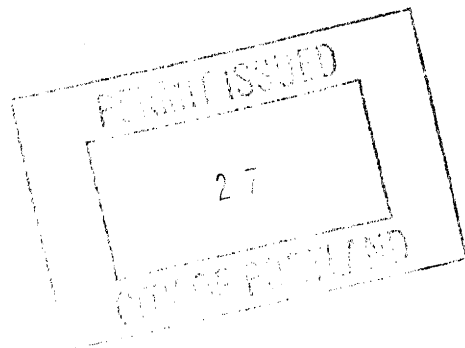
<b>Permit No:</b> 08-1365	<b>Date Applied For:</b> 10/27/2008	<b>CBL:</b> 117 B018001
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<b>Location of Construction:</b> 79 FESSENDEN ST	<b>Owner Name:</b> POTTLE MELISSA A	<b>Owner Address:</b> 79 FESSENDEN ST	<b>Phone:</b>
<b>Business Name:</b>	<b>Contractor Name:</b> Caron & Waltz	<b>Contractor Address:</b> 321 Lincoln Street South Portland	<b>Phone:</b> (207) 799-2228
<b>Lessee/Buyer's Name</b>	<b>Phone:</b>	<b>Permit Type:</b> HVAC	

<b>Proposed Use:</b> Single Family Home - install a Munchkin 199 M in basement	<b>Proposed Project Description:</b> install a Munchkin 199 M in basement
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<b>Dept:</b> Zoning	<b>Status:</b> Approved	<b>Reviewer:</b> Tom Markley	<b>Approval Date:</b> 10/27/2008
<b>Note:</b>			<b>Ok to Issue:</b> <input checked="" type="checkbox"/>
1) This property shall remain a single family dwelling. Any change of use shall require a separate permit application for review and approval.			

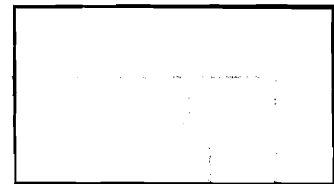
<b>Dept:</b> Building	<b>Status:</b> Approved with Conditions	<b>Reviewer:</b> Tom Markley	<b>Approval Date:</b> 10/27/2008
<b>Note:</b>			<b>Ok to Issue:</b> <input checked="" type="checkbox"/>
1) The installation must comply with the State of Maine Gas Regulations.			
2) Application approval based upon information provided by applicant. Any deviation from approved plans requires separate review and approval prior to work.			





FILL IN AND SIGN WITH INK

# APPLICATION FOR PERMIT HEATING OR POWER EQUIPMENT



To the INSPECTOR OF BUILDINGS, PORTLAND, ME.

The undersigned hereby applies for a permit to install the following heating, cooking or power equipment in accordance with the Laws of Maine, the Building Code of the City of Portland, and the following specifications:

Location / CBL 79 FESSENDEN STREET Use of Building SFH 117818 Date \_\_\_\_\_

Name and address of owner of appliance MELISSA POTTLE

Installer's name and address CAROL WALTZ, 321 LINCOLN ST, SO. PORTLAND  
ME 04106 Telephone 799-2228

**Location of appliance:**  
 Basement       Floor  
 Attic             Roof

**Type of Fuel:**  
 Gas       Oil       Solid

**Appliance Name:** MUNCHKIN 199M

U.L. Approved  Yes  No

Will appliance be installed in accordance with the manufacture's installation instructions?  Yes       No

IF NO Explain: \_\_\_\_\_

**Type of Chimney:**  
 Masonry Lined  
 Factory built \_\_\_\_\_

Metal  
 Factory Built U.L. Listing # \_\_\_\_\_

Direct Vent PVC.  
 Type OEM UL# \_\_\_\_\_

**Type of Fuel Tank**  
 Oil  
 Gas

Size of Tank \_\_\_\_\_

Number of Tanks \_\_\_\_\_

Distance from Tank to Center of Flame \_\_\_\_\_ feet.

Cost of Work: \$ 9,895

Permit Fee: \$ 120

**The Type of License of Installer:**

Master Plumber # \_\_\_\_\_

Solid Fuel # \_\_\_\_\_

Oil # \_\_\_\_\_

Gas # PNT 5151

Other \_\_\_\_\_

**Approved**

Fire: \_\_\_\_\_

Ele.: \_\_\_\_\_

Bldg.: \_\_\_\_\_

Signature of Installer [Signature]

**Approved with Conditions**

See attached letter or requirement

Inspector's Signature \_\_\_\_\_ Date Approved \_\_\_\_\_

## PART 1. GENERAL INFORMATION

### A. HOW IT OPERATES

When the room thermostat calls for heat, the Munchkin control board will start the circulator and start to monitor the return temperature of the system before the heater will begin to heat the water. Once the controller has sensed a drop in the return water temperature below the temperature set point minus the differential set point, the heater will start to heat the water. This eliminates the Munchkin starting every time the thermostat calls for heat. This feature keeps the system from short cycling.

Once the system has sensed the temperature difference, the Munchkin will activate the blower motor for 5 seconds to pre-purge the system before starting the Munchkin. The Munchkin controller will now start to modulate the pre-mix burner based on analyzing the return temperature, supply water temperature and the set point temperature. By compiling this information, the controller utilizes an algorithm to fully adjust the firing rate while maintaining the desired output temperature. The pre-mix burner fan has a direct drive current low-voltage motor with a pulse relay counting. This system allows precise control over the fan speed and combustion air volumes. Coupled with the Dungs gas valve and the swirl plate system which are set to provide a one-to-one ratio of precisely measured volumes of fuel to air, an accurate and instant burner output is achieved. This keeps the Munchkin running at the **highest efficiency**.

When the thermostat is satisfied, the Munchkin will then go through a 4 second post-purge cycle before shutting off. Every Munchkin heater is equipped with a display which will read the outlet temperature of the heater and then will illuminate a green light showing flame on. If a problem occurs, the front indicator light will turn red and the display will read a fault code; see Part 7, Section B/C.

### B. MUNCHKIN RATINGS AND DIMENSIONS

#### PERFORMANCE RATINGS

Model	Input Modulation	DOE Heating	AFUE	Shipping Weight	*IBR
T50M	18,000 to 50,000	16,000 to 46,000	92%	58 lbs.	40,000
T80M	19,000 to 80,000	17,000 to 74,000	92%	58 lbs.	64,000
80M	27,000 to 80,000	25,000 to 74,000	92%	75 lbs.	64,000
140M	46,000 to 140,000	43,000 to 129,000	92%	101 lbs.	112,000
199M	66,000 to 199,000	61,000 to 183,000	92%	111 lbs.	159,000

\*Net water

#### CONNECTION SIZES

Model	Supply/Return Connection	Gas Connection Size	Vent Dia.
T50M	1 1/4" NPT	3/4"	2"
T80M	1 1/4" NPT	3/4"	2"
80M	1 1/4" NPT	3/4"	3"
140M	1 1/4" NPT	3/4"	3"
199M	1 1/4" NPT	3/4"	3"

RECOMMENDED SERVICE CLEARANCES

80M/140M/199M

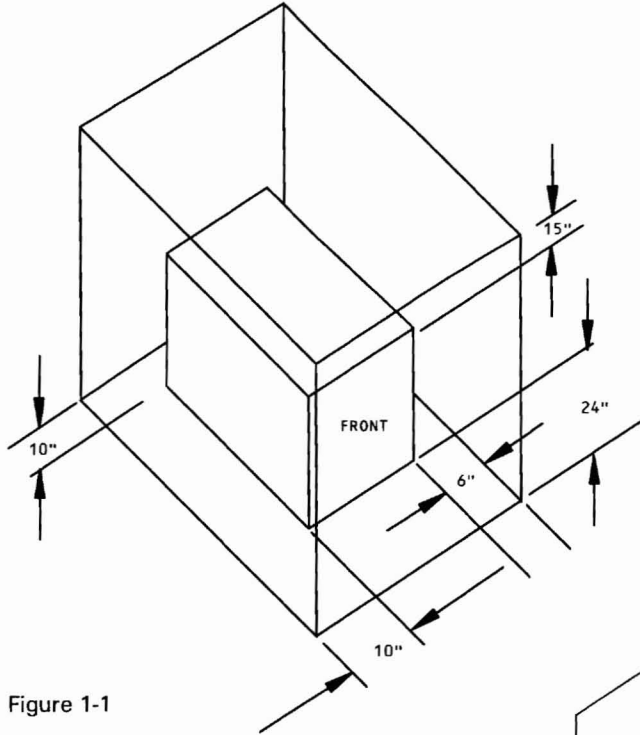


Figure 1-1

(NOTE: The Munchkin is rated at zero clearance to combustibles.)

T50M/T80M

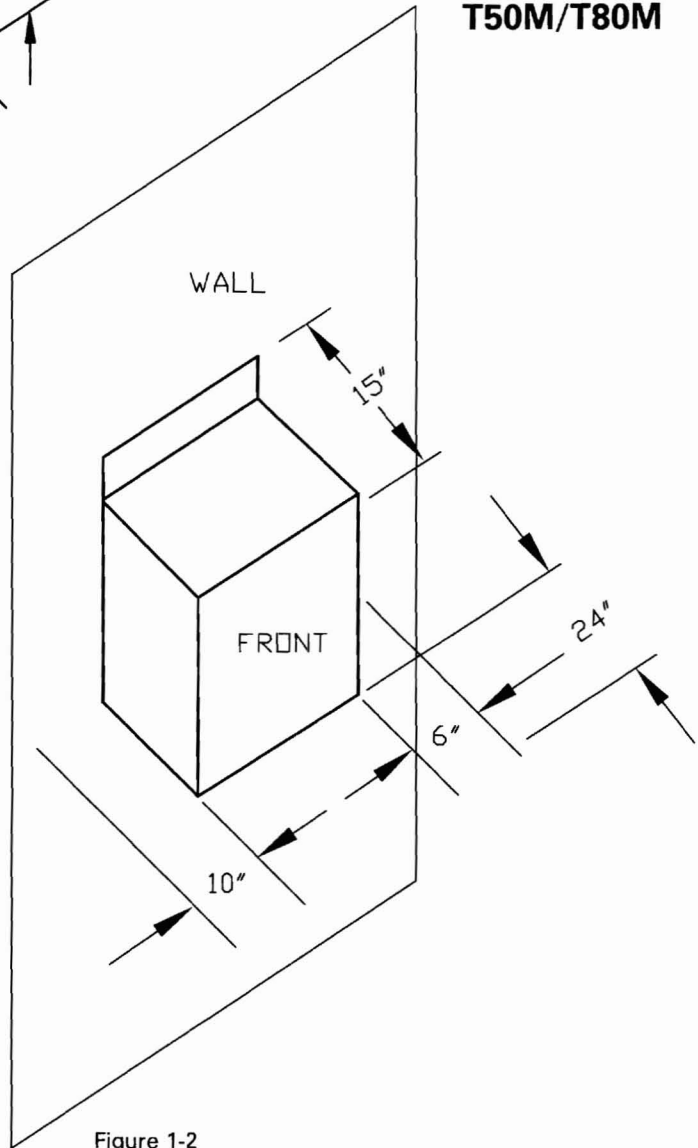


Figure 1-2

## PART 4. VENTING

### A. GENERAL

1. Install the boiler venting system in accordance with these instructions and with the National Fuel Gas Code, ANSI Z223.1/NFPA 54, CAN/CGA B149, and/or applicable provisions of local building codes.
2. This boiler is a direct vent appliance and is listed as a Category IV appliance with Underwriters Laboratories, Inc. VENT AND INTAKE AIR PIPE

#### WARNING

This vent system will operate with a positive pressure in the pipe. Do not connect vent connectors serving appliances vented by natural draft into any portion of mechanical draft systems operating under positive pressure.

#### WARNING

Follow these venting instructions carefully. Failure to do so may result in severe personal injury, death, or substantial property damage.

### B. APPROVED MATERIALS FOR EXHAUST VENT AND INTAKE AIR PIPE

1. Use only Non Foam Core venting material. The following materials are approved for use as vent pipe for this boiler:
  - a. Non Foam Core PVC (Polyvinyl Chloride) Pipe conforming to ASTM D-1784 Class 12454-B (formerly designated Type 1, Grade 1).
  - b. Non Foam Core CPVC (Chlorinated Polyvinyl Chloride) Pipe conforming to ASTM D-1784 Class 23447-B (formerly designated Type IV, Grade 1).
  - c. Non Foam Core ABS (Acrylonitrile-Butadiene- Styrene) Pipe conforming to ASTM D3965 Class 3-2-2-2.

#### WARNING

Do not use Foam Core Pipe in any portion of the exhaust piping from this boiler. Use of Foam Core Pipe may result in severe personal injury, death, or substantial property damage.

2. Cellular foam core piping may be used on air inlet piping only. Never use cellular foam core material for exhaust piping.

### C. EXHAUST/VENT / AIR INTAKE PIPE LOCATION

1. Determine exhaust vent location:
  - a. The vent piping for this boiler is approved for zero clearance to combustible construction.
  - b. See Figure 4.1 for an illustration of clearances for location of exit terminals of direct-vent venting systems.
  - c. This boiler vent system shall terminate at least 3 feet (0.9 m) above any forced air intake located within 10 ft (3 m). Note: this does not apply to the combustion air intake of a direct-vent appliance.
  - d. Provide a minimum of 1 foot distance from any door, operable window, or gravity intake into any building.
  - e. Provide a minimum of 1 foot clearance from the bottom of the exit terminal above the expected snow accumulation level. Snow removal may be necessary to maintain clearance.
  - f. Provide 4 feet horizontal clearance from electrical meters, gas meters, gas regulators, and relief equipment. In no case shall the exit terminal be above or below the aforementioned equipment unless the 4 foot horizontal distance is maintained.
  - g. Do not locate the exit terminal over public walkways where condensate could drip and/or freeze and create a nuisance or hazard.
  - h. When adjacent to a public walkway, locate exit terminal at least 7 feet above grade.
  - i. Do not locate the exit termination directly under roof overhangs to prevent icicles from forming.
  - j. Provide 3 feet clearance from the inside corner of adjacent walls.
2. Determine air intake pipe location.
  - a. Provide 1 foot clearance from the bottom of the air inlet pipe and the level of maximum snow accumulation. Snow removal may be necessary to maintain clearances.
  - b. Do not locate air intake pipe in a parking area where machinery may damage the pipe.
  - c. When venting with a two pipe system, maximum distance between air intake and exhaust vent is 6 feet (1.8 m). Minimum distance between exhaust vent and air intake on single boiler is 8" (0.2 m) center-to-center. Minimum distance between vents and intakes on multiple boilers is 8" (0.2 m) center-to-center. See Figure 4.2.

**Location of exit terminals of mechanical draft and direct-vent venting systems.**  
 (Reference: National Fuel Gas Code ANSI Z223.1/NFPA 54 2002).

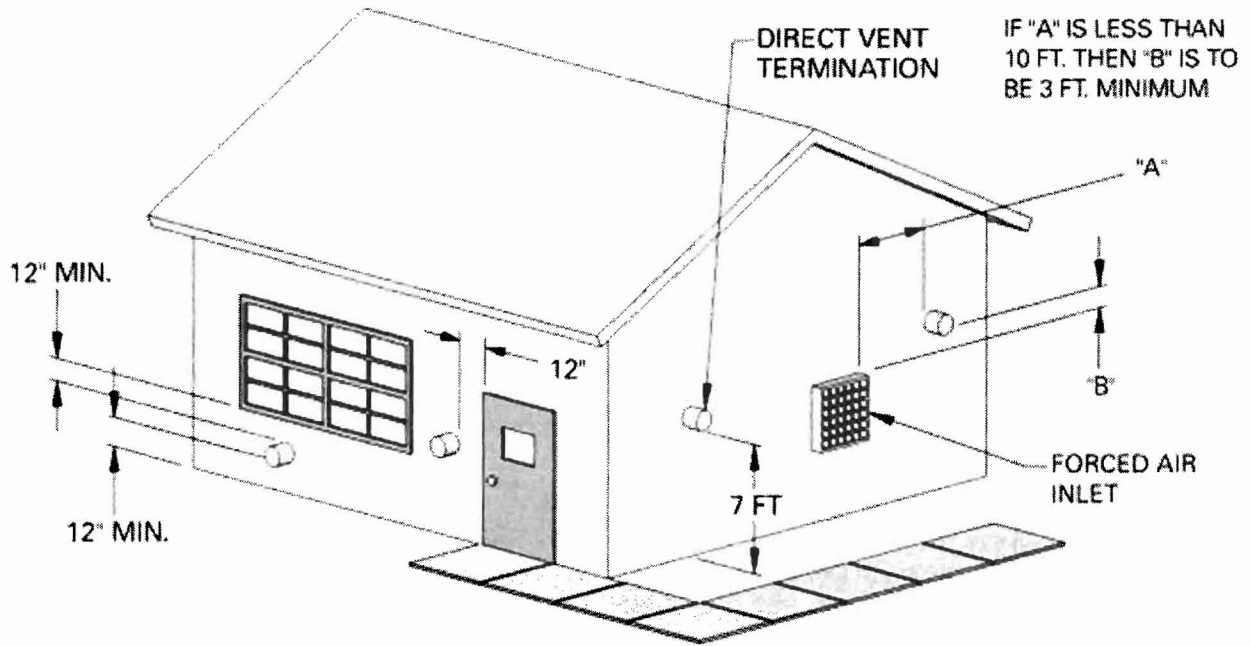


Fig. 4.1

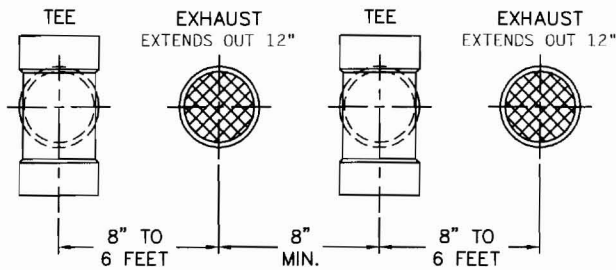


Fig. 4.2 Multiple Vent Spacing\*

\*Note: Exhaust must extend out 1 foot

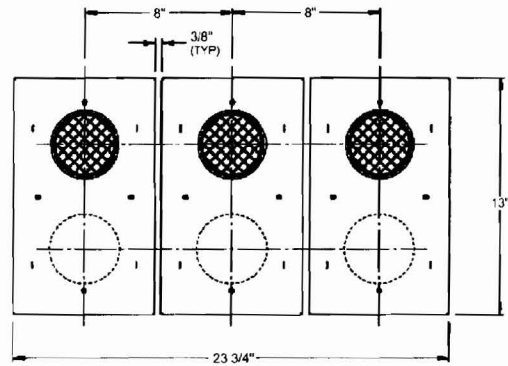


Fig. 4.3 Multiple Stainless Steel Vertical Vent Kit Installation – Front View

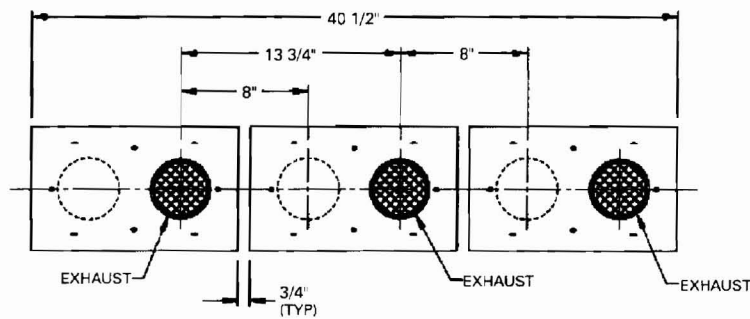


Fig. 4.4 Multiple Stainless Steel Horizontal Vent Kit Installation – Front View

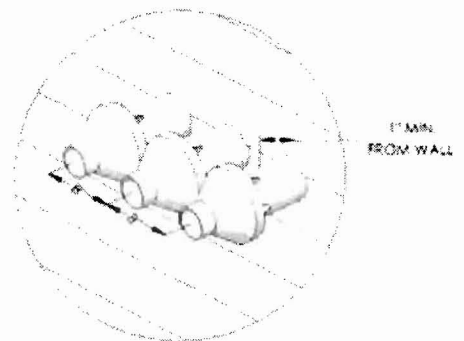


Figure 4.5: Multiple Boiler Installations

**D. EXHAUST VENT AND INTAKE AIR PIPE SIZING**

1. For the T50 and T80 Boilers the exhaust vent and air intake pipes should be 2" Schedule 40 or 80.
2. For the 80M, 140M, 199M the exhaust vent and air intake pipes should be 3" Schedule 40 or 80.
3. The total combined equivalent length of exhaust vent and intake air pipe should not exceed 85 feet.
  - a. The equivalent length of elbows, tees, and other fittings are listed in the Friction Loss Table 4.1.

**Table 4.1**

FRICTION LOSS EQUIVALENT IN PIPING AND FITTINGS				
FITTINGS OR PIPING	EQUIVALENT FEET			
	2"	3"	4"	6"
90 DEGREE ELBOW*	5'	5'	3'	1'
45 DEGREE ELBOW	3'	3'	1'	1'
COUPLING	0'	0'	0'	0'
AIR INLET TEE	0'	0'	0'	0'
STRAIGHT PIPE	1'	1'	1'	0.5
CONCENTRIC VENT KIT	3'	3'	N/A	N/A
V500 2" VENT KIT	1'	N/A	N/A	N/A
V1000 3" VENT KIT	N/A	1'	N/A	N/A
V2000 4" VENT KIT	N/A	N/A	1'	N/A

\*Friction loss for long radius elbow is 1 foot less.

- b. For example: If the exhaust vent has two 90° elbows and 10 feet of PVC pipe we will calculate:

Exhaust Vent Pipe Equivalent Length =  $(2 \times 5) + 10 = 20$  feet  
 Further, if the intake air pipe has two 90° elbows, one 45° elbow and 10 feet of PVC pipe, the following calculation applies:

Air Intake Pipe Equivalent Length =  $(2 \times 5) + 3 + 10 = 23$  feet  
 Finally, if a concentric vent kit is used we find:

Total Combined Equivalent Length =  $20 + 23 + 3 = 46$  feet  
 Therefore, the total combined equivalent length is 46 feet which is well below the maximum of 85 feet.

- c. The intake air pipe and the exhaust vent are intended to penetrate the same wall or roof of the building.
- d. Effort should be made to keep a minimum difference in equivalent length between the air intake pipe and the exhaust vent.

4. The minimum combined equivalent length is 16 equivalent feet.
5. The maximum combined equivalent length can be extended by increasing the diameter of the vent pipe. However, the transitions should begin a minimum of 15 equivalent feet from the boiler.
  - a. Transitions should always be made in vertical sections of pipe to prevent the condensate from pooling in the vent pipe.
  - b. Use a 3" x 2" reducing coupling to transition from the T50 and T80 boiler connections to a 3" vent.
  - c. Use a 4" x 3" reducing coupling to transition from the 80M, 140M, and 199M boiler connections to 4" vent.
  - d. The maximum equivalent length for the increased diameter vent pipes is 125 feet.
  - e. If the transition occurs at a distance greater than 15 equivalent feet from the boiler, the maximum equivalent length will be reduced. See Table 4.2. Standard Vent Pipe is 2" and Oversized Vent Pipe is 3" for T50 and T80. Standard Vent Pipe is 3" and Oversized Vent Pipe is 4" for 80M through 199M.

**Table 4.2: Vent Termination Kits**

Transition Point (ft from boiler)	TEL of Standard 2" or 3" Vent Pipe (ft)	TEL of Oversized 3" or 4" Vent Pipe (ft)	Maximum TEL of all Vent Pipe (ft)
15	30	95	125
20	40	77-1/2	117-1/2
25	50	60-1/2	110-1/2
30	60	43	103
35	70	26	96
40	80	8-1/2	88-1/2
None	85	0	85

TEL = Total Equivalent Length

**E. EXHAUST VENT AND AIR INTAKE PIPE INSTALLATION**

1. On the T50 and T80 the 2" exhaust vent connection is located on the top, right side of the boiler and the air intake is on the top, left side. See Figure 10.1. The air intake connection is intended for a slip fit. No sealant or adhesive is required.
2. On the 80M, 140M, and 199M Boilers the 3" exhaust vent connection is located on the rear of the boiler and the air intake is higher and toward the left side when the boiler is viewed from the front. The air intake connection is intended for a slip fit. No sealant or adhesive is required.



3. Use only solid PVC, CPVC, or ABS schedule 40 or 80 pipe. FOAM CORE PIPING IS NOT APPROVED.
4. Remove all burrs and debris from joints and fittings.
5. All joints must be properly cleaned, primed, and cemented. Use only cement and primer approved for use with the pipe material. Cement must conform to ASTM D2564 for PVC or CPVC pipe and ASTM D2235 for ABS pipe.

**⚠ WARNING**

**All joints of positive pressure vent systems must be sealed completely to prevent leakage of flue products into the living space.**

6. Horizontal lengths of exhaust vent must slope back towards the boiler not less than 1/4" per

- foot to allow condensate to drain from the vent pipe. If the vent pipe must be piped around an obstacle that causes a low point in the pipe, a drain pipe must be connected to allow condensate to drain.
7. All piping must be fully supported. Use pipe hangers at a minimum of 4 foot intervals to prevent sagging of the pipe where condensate may form.
8. Do not use the boiler to support any piping.
9. A screened straight coupling is provided with the boiler for use as an outside exhaust termination.
10. A screened inlet air tee is provided with the boiler to be used as an outside intake termination.
11. The following information on Table 4.3 are optional intake air/exhaust vent terminations available from Heat Transfer Products, Inc.

**Table 4.3: Vent Termination Kits**

Description	Stock Code
2" PVC Concentric Vent Termination Kit	KGAVT0601CVT
3" PVC Concentric Vent Termination Kit	KGAVT0501CVT
2" Stainless Steel Vent Termination Kit	V500
3" Stainless Steel Vent Termination Kit	V1000
4" Stainless Steel Vent Termination Kit	V2000

**⚠ DANGER**

**The Munchkin is not intended to be common vented with any other existing appliance!**

**F. HEATER REMOVAL FROM A COMMON VENT SYSTEM**

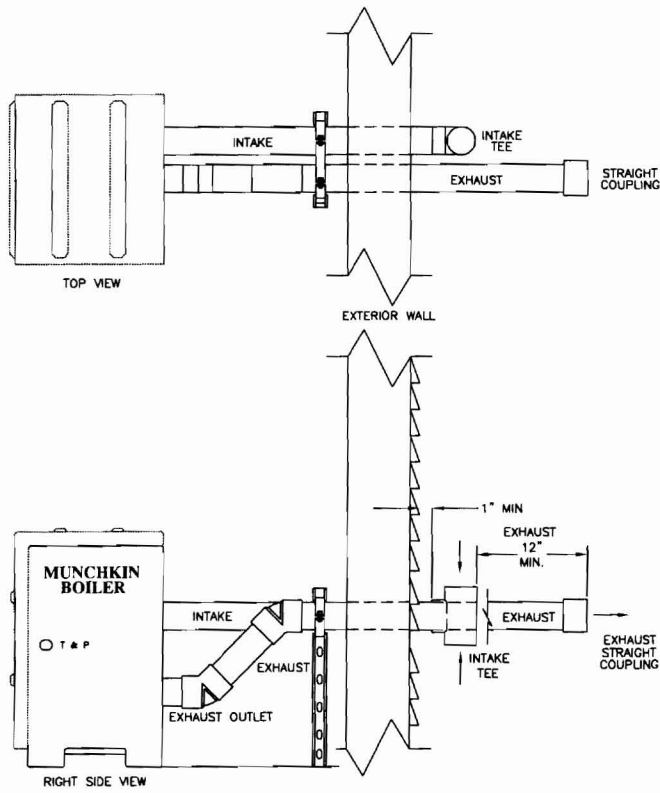
At the time of removal of an existing heater, the following steps shall be followed with each appliance remaining connected to the common venting system placed in operation, while the other appliances remaining connected to common venting system are not operating.

1. Seal any unused openings in the common venting system.
2. Visually inspect the venting system for proper size and horizontal pitch to determine if there is blockage, leakage, corrosion or other deficiencies that could cause an unsafe condition.
3. If practical, close all building doors, windows and all doors between the space in which the appliance remains connected to the common venting system located and other spaces in the building. Turn on clothes dryers and any appliances not connected to the common venting system. Turn on any exhaust fans, such as range hoods and bathroom exhausts, at maximum speed. Do not operate a summer exhaust fan. Close all fireplace dampers.
4. Place in operation the appliance being inspected. Follow the lighting instructions. Adjust the thermostat so the appliance will operate continuously.
5. Test for spillage at the draft hood relief opening after 5 minutes of main burner operation. Use the flame of a match or candle or smoke from a cigarette.
6. After it has been determined that each appliance remaining connected to common venting system properly vents when tested as outlined, return doors, windows, exhaust fans, fireplace dampers and any other gas burning appliance to their previous condition of use.
7. Any improper operation of the common venting system should be corrected so the installation conforms with the National Fuel Gas Code, ANSI Z223.1. When resizing any portion of the common venting system, the common venting system should be resized to approach the minimum size as determined using the appropriate tables in Appendix G in the National Fuel Gas Code, ANSI Z 223.1

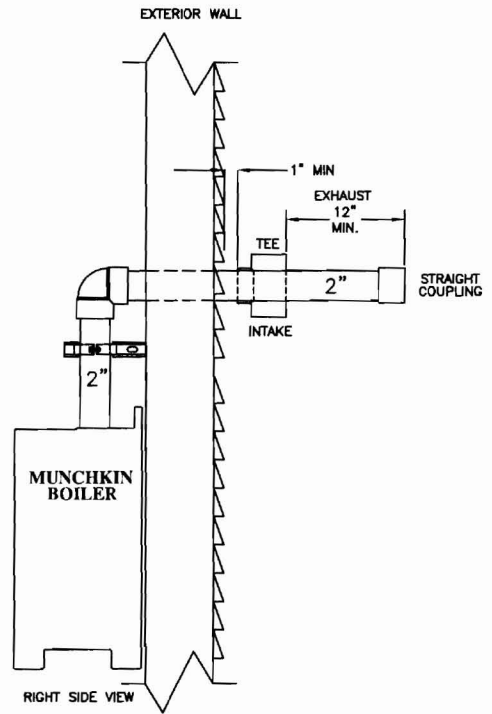
**G. CONDENSATE REMOVAL**

This is a condensing high efficiency appliance, therefore this unit has a condensate removal system. Condensate is nothing more than water vapor, derived from the combustion products, similar to an automobile when it is initially started. It is very important that the condensate line is sloped away from and down to a suitable inside drain, if the condensate outlet on the Munchkin is lower than the drain, you must use a condensate removal pump (kit available from Heat Transfer Products, Inc.) A condensate filter, if required by local authorities can be made up of lime crystals, marble or phosphate chips will neutralize the condensate. This can be done in the field by the installer or you may purchase one from Heat Transfer Products, Inc. It is also very important that the condensate line is not exposed to freezing temperatures, or any other type of blockage. Plastic tubing should be the only material used for the condensate line. Steel, brass, copper or others will be subject to corrosion or deterioration. A second vent may be necessary to prevent condensate line vacuum lock if a long horizontal run is used. Also, an increase in pipe size may be necessary to drain properly. Support of the condensation line may be necessary to avoid blockage of the condensate flow.

**DIAGRAMS FOR SIDEWALL VENTING**



**Figure 4-1a**



**2" SIDEWALL VENT WITH TEE (INTAKE) & COUPLING (EXHAUST) FOR T50M/T80M WALL MOUNTED UNITS**

**Figure 4-2a**

**GENERAL NOTE:** All vent pipes must be glued, properly supported and the exhaust must be pitched a minimum of a 1/4" per foot back to the heater (to allow drainage of condensate).

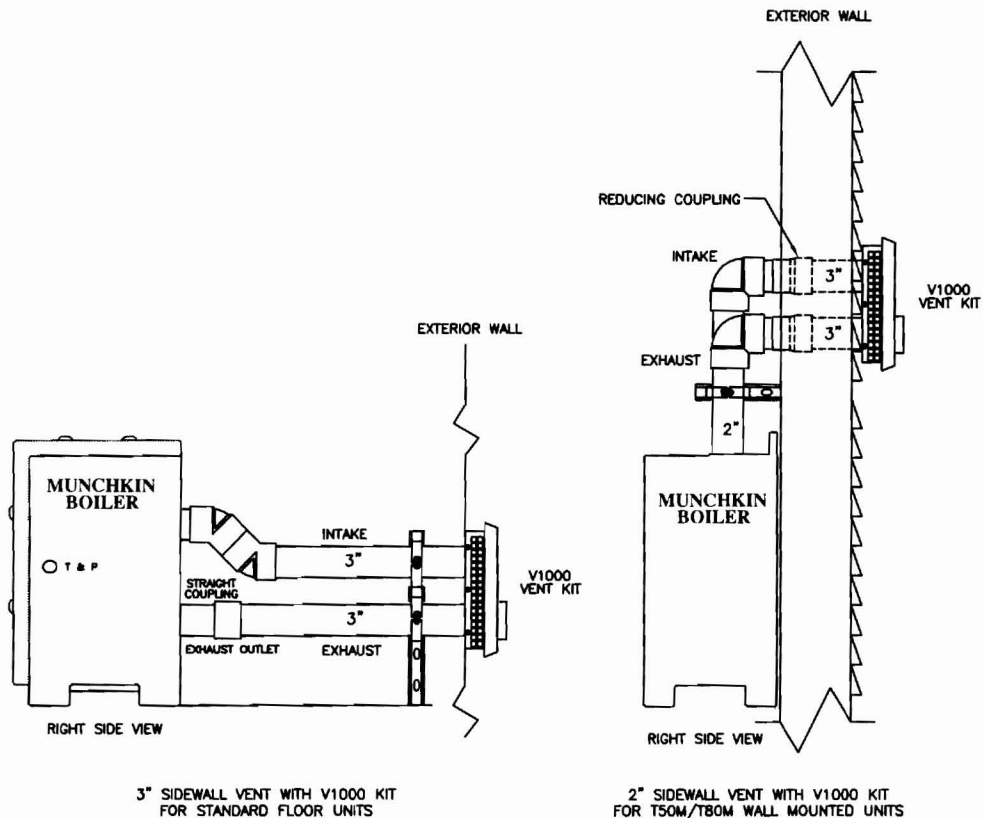
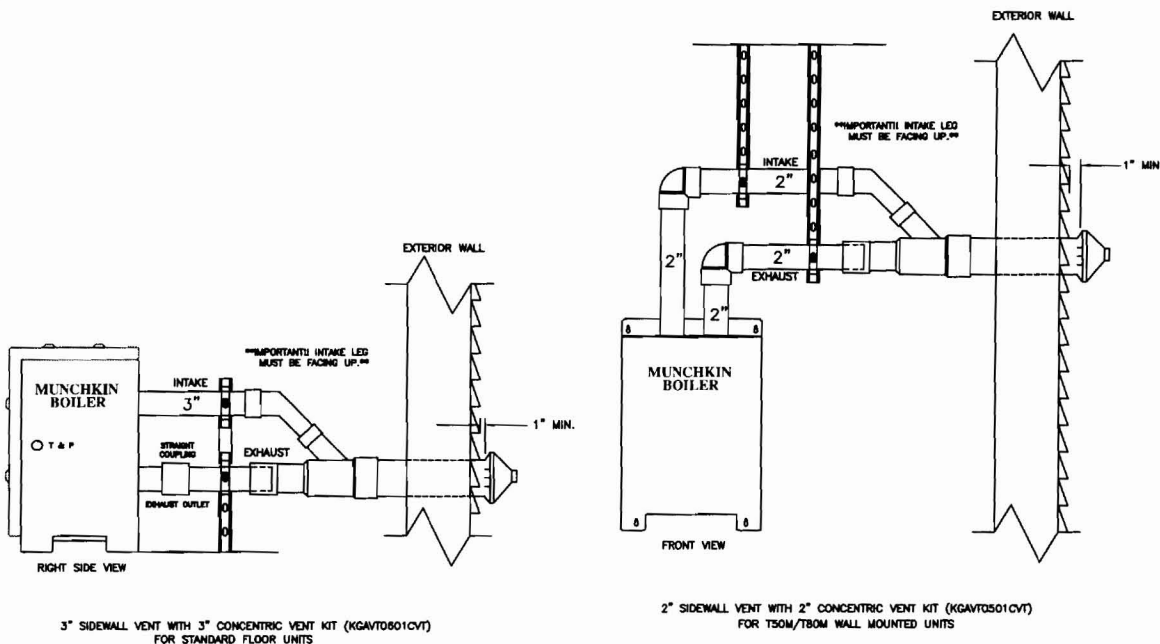


Figure 4-3a



\*\*\*IMPORTANT NOTE: ALL VENT PIPES MUST BE GLUED, PROPERLY SUPPORTED, AND THE EXHAUST MUST BE PITCHED A MINIMUM OF A 1/4" PER FOOT BACK TO THE BOILER (TO ALLOW FOR DRAINAGE OF CONDENSATE).

Figure 4-4a

**GENERAL NOTE:** All vent pipes must be glued, properly supported and the exhaust must be pitched a minimum of a 1/4" per foot back to the heater (to allow drainage of condensate).

DIAGRAMS FOR VERTICAL VENTING

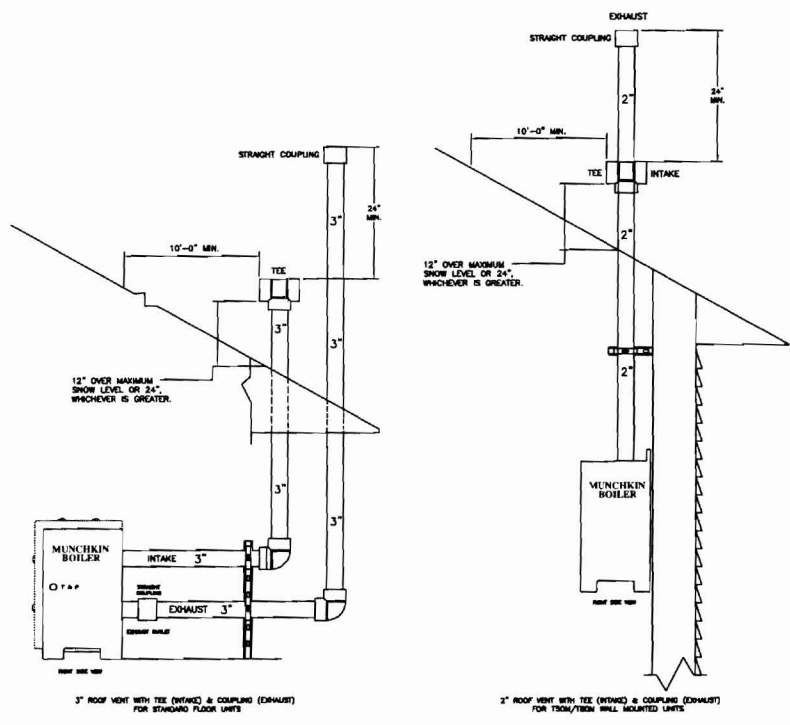


Figure 4-5a

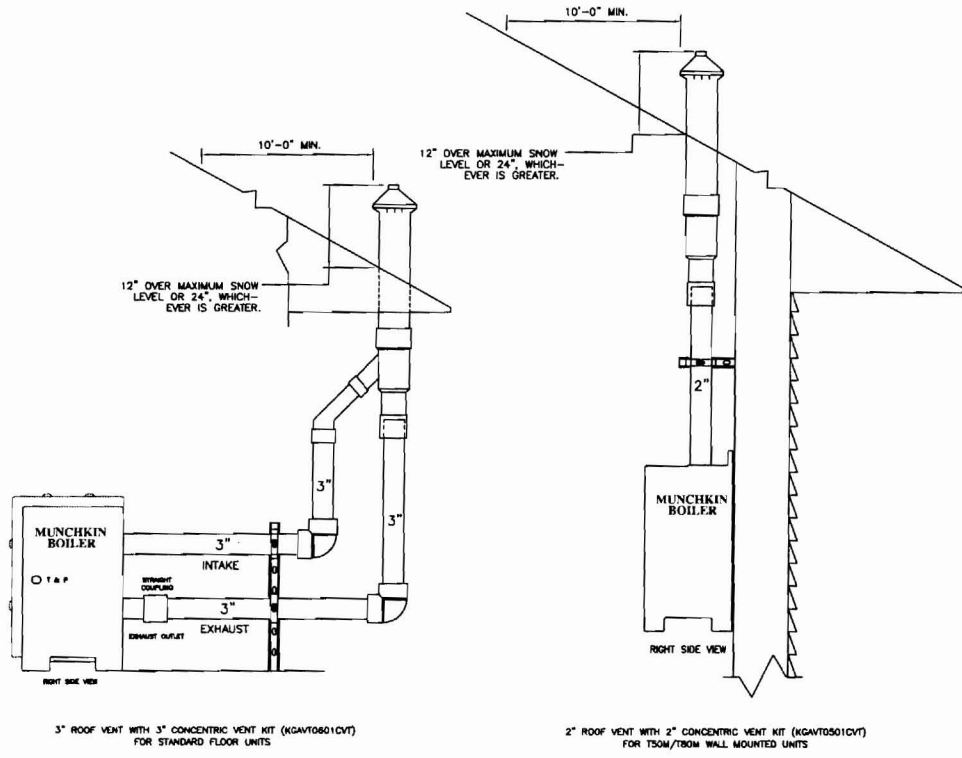


Figure 4-6a

**GENERAL NOTE:** All vent pipes must be glued, properly supported and the exhaust must be pitched a minimum of a 1/4" per foot back to the heater (to allow drainage of condensate).

## PART 5. PIPING

### A. HYDRONIC PIPING WITH CIRCULATORS OR ZONE VALVES

The Munchkin is designed to function in a closed loop 15 PSI System. To assure you that you have adequate pressure in the system, we have installed in the outlet manifold, a pressure switch that will not let the Munchkin operate without a minimum of 10 PSI water pressure. This assures you that if the system does have leak, the Munchkin will lock out (PRO on the display) before it damages the Stainless Steel Heat Exchanger. We have also included a Temperature and Pressure gauge which should be located on the Munchkin outlet to monitor the system pressure and outlet temperature from the Munchkin. It is important to note that the Munchkin has a minimal amount of pressure drop and must be figured in when sizing the circulators. Each Munchkin installation must have an Air Elimination device which will remove air from the system. Install the Munchkin so the gas ignition system components are protected from water (dripping, spraying, etc.) during appliance operation for basic service of circulator replacement, valves and other. Observe minimum 1" clearance around all uninsulated hot water pipes when openings around pipes are not protected by non-combustible materials. On a Munchkin installed above radiation level, some states and local codes require a low water cut off device at the time of installation. If the Munchkin supplies hot water to heating coils in air handler units, flow control valves or other devices must be installed to prevent gravity circulation of heater water in the coils during the cooling cycle. Chilled Water Medium must be piped in parallel with the heater. Freeze Protection for new or existing systems must use glycol that is specially formulated for this purpose. It includes inhibitors, which prevent the glycol from attacking the metallic system components. Make certain that the system fluid is checked for the correct glycol concentration and inhibitor level. The system should be tested at least once a year and as recommend by the producer of the glycol solution. Allowance should be made for the expansion of the glycol solution in the system piping. Example 50% by volume solution expands 4.8% in volume for the temperature increase from 32 F to 180 F, while water expands 3% with the same temperature rise.

### CAUTION

**The Munchkin should not be operated as a potable Hot Water Heater. It should not be used as a direct Hot Water Heating Device.**

Basic steps are listed below, with Illustration, which will guide you through the installation of the Munchkin.

1. Connect the system return marked "Heater In", make sure to install with pipe sealant compound. Threaded connections are 1 ¼" NPT Brass nipples located on the left hand side of unit.
2. Connect the system supply marked "Heater Out", make sure to install with pipe sealant compound. Threaded connections are 1 ¼" NPT Brass nipples located on the left hand side of the unit.
3. Install Purge and Balance Valve or shut off valve and drain on system return to purge air out of each zone.
4. Install a Back Flow preventor on the Cold Feed Make-Up Water line.
5. Install a Pressure Reducing Valve on the Cold Feed Make-Up Water line, (15 PSI nominal on the system return). Check Temperature and Pressure Gauge which should read minimum pressure of 12 PSI.
6. Install a circulator on system supply. Make sure the circulator is properly sized for the system and friction loss.
7. Install an Expansion Tank on the system supply. Consult the tank manufacturer's instruction for specific information relating to tank installation. Size the expansion tank for the required system volume and capacity.