

DISPLAY THIS CARD ON PRINCIPAL FRONTAGE OF WORK



CITY OF PORTLAND

BUILDING PERMIT

This is to certify that LYNN G STERMER

Located At 180 FRANCES ST

Job ID: 2012-06-4183-HVAC

CBL: 120-E-018-001

has permission to Replace Oil heat to Gas

provided that the person or persons, firm or corporation accepting this permit shall comply with all of the provisions of the Statutes of Maine and of the Ordinances of the City of Portland regulating the construction, maintenance and use of the buildings and structures, and of the application on file in the department.

Notification of inspection and written permission procured before this building or part thereof is lathed or otherwise closed-in. 48 HOUR NOTICE IS REQUIRED.

A final inspection must be completed by owner before this building or part thereof is occupied. If a certificate of occupancy is required, it must be

Fire Prevention Officer

Code Enforcement Officer / Plan Reviewer

**THIS CARD MUST BE POSTED ON THE STREET SIDE OF THE PROPERTY
PENALTY FOR REMOVING THIS CARD**

BUILDING PERMIT INSPECTION PROCEDURES

Please call 874-8703 or 874-8693 (ONLY)

or email: buildinginspections@portlandmaine.gov

With the issuance of this permit, the owner, builder or their designee is required to provide adequate notice to the city of Portland Inspections Services for the following inspections. Appointments must be requested 48 to 72 hours in advance of the required inspection. The inspection date will need to be confirmed by this office.

- **Please read the conditions of approval that is attached to this permit!! Contact this office if you have any questions.**
- **Permits expire in 6 months. If the project is not started or ceases for 6 months.**
- **If the inspection requirements are not followed as stated below additional fees may be incurred due to the issuance of a "Stop Work Order" and subsequent release to continue.**

The project cannot move to the next phase prior to the required inspection and approval to continue, REGARDLESS OF THE NOTICE OF CIRCUMSTANCES.

IF THE PERMIT REQUIRES A CERTIFICATE OF OCCUPANCY, IT MUST BE PAID FOR AND ISSUED TO THE OWNER OR DESIGNEE BEFORE THE SPACE MAY BE OCCUPIED.



PORTLAND MAINE

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Acting Director of Planning and Urban Development
Gregory Mitchell

Job ID: 2012-06-4183-HVAC

Located At: 180 FRANCES ST

CBL: 120- E-018-001

Conditions of Approval:

Building

The installation must comply with the State of Maine gas regulations.

City of Portland, Maine - Building or Use Permit Application

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

Job No: 2012-06-4183-HVAC	Date Applied: 6/8/2012	CBL: 120- E-018-001	
Location of Construction: 180 FRANCES ST	Owner Name: LYNN G STERMER & HERMAN STEGEMAN	Owner Address: 180 FRANCES ST PORTLAND, ME 04102	Phone:
Business Name:	Contractor Name: William W Gelinas	Contractor Address: 2 WASHINGTON AVE SCARBOROUGH MAINE 04074	Phone: (207) 885-0771
Lessee/Buyer's Name:	Phone:	Permit Type: HVAC	Zone: R-3
Past Use: Single Family Dwelling	Proposed Use: Same: Single Family dwelling - to install Maytag heating system	Cost of Work: \$6,000.00	CEO District:
		Fire Dept: <input type="checkbox"/> Approved <input type="checkbox"/> Denied <input type="checkbox"/> N/A	Inspection: Use Group: R3 Type: WIDE
Proposed Project Description: Replace Oil heat to Gas		Pedestrian Activities District (P.A.D.)	
Permit Taken By: Brad		Zoning Approval	

<p>1. This permit application does not preclude the Applicant(s) from meeting applicable State and Federal Rules.</p> <p>2. Building Permits do not include plumbing, septic or electrical work.</p> <p>3. Building permits are void if work is not started within six (6) months of the date of issuance. False informatin may invalidate a building permit and stop all work.</p>	<p>Special Zone or Reviews</p> <p><input type="checkbox"/> Shoreland</p> <p><input type="checkbox"/> Wetlands</p> <p><input type="checkbox"/> Flood Zone</p> <p><input type="checkbox"/> Subdivision</p> <p><input type="checkbox"/> Site Plan</p> <p>___ Maj ___ Min ___ MM</p> <p>Date: 6/8/12</p>	<p>Zoning Appeal</p> <p><input type="checkbox"/> Variance</p> <p><input type="checkbox"/> Miscellaneous</p> <p><input type="checkbox"/> Conditional Use</p> <p><input type="checkbox"/> Interpretation</p> <p><input type="checkbox"/> Approved</p> <p><input type="checkbox"/> Denied</p> <p>Date:</p>	<p>Historic Preservation</p> <p><input checked="" type="checkbox"/> Not in Dist or Landmark</p> <p><input type="checkbox"/> Does not Require Review</p> <p><input type="checkbox"/> Requires Review</p> <p><input type="checkbox"/> Approved</p> <p><input type="checkbox"/> Approved w/Conditions</p> <p><input type="checkbox"/> Denied</p> <p>Date:</p>
	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 appication 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



FILL IN AND SIGN WITH INK

APPLICATION FOR PERMIT HEATING OR POWER EQUIPMENT

Entail
6/8/12
R-3
Ⓟ

120 E018

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 180 Frances street Portland Use of Building Res Date 6/6/12'
Name and address of owner of appliance Herman Stegeman
180 Frances Street Portland, Me.
Installer's name and address Gelinas HVAC Services INC 2 Washington Ave ~~Portland~~ Scarborough
Telephone (207) 885-0771

Location of appliance:

- Basement
- Attic
- Floor
- Roof

Type of Fuel:

- Gas
- Oil
- Solid

Appliance Name:

MAYTAG

U.L. Approved Yes No

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

IF NO Explain: _____

The Type of License of Installer:

- Master Plumber # _____
- Solid Fuel # _____
- Oil # _____
- Gas # PNT1078
- Other _____

RECEIVED
JUN 08 2012
Dept. of Building Inspections
City of Portland Maine

Type of Chimney:

- Masonry Lined
- Factory built _____

- Metal
- Factory Built U.L. Listing # _____

- Direct Vent
- Type PVC UL# Concentric Termination

Type of Fuel Tank

- Oil
- Gas

Size of Tank NATURAL

Number of Tanks NIA

Distance from Tank to Center of Flame NIA feet.

Cost of Work: \$ ~~5,350~~ ^{6,000}

Permit Fee: \$ 80.00

Approved

Fire: _____
Ele.: _____
Bldg.: _____

Approved with Conditions

- See attached letter or requirement

Inspector's Signature

Date Approved

Signature of Installer

William W. Nelson



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Receipts Details:

Tender Information: Check , Check Number: 19878

Tender Amount: 80.00

Receipt Header:

Cashier Id: bsaucier

Receipt Date: 6/8/2012

Receipt Number: 44752

Receipt Details:

Referance ID:	6812	Fee Type:	BP-Constr
Receipt Number:	0	Payment Date:	
Transaction Amount:	80.00	Charge Amount:	80.00
Job ID: Job ID: 2012-06-4183-HVAC - Replace Oil heat to Gas			
Additional Comments: 180 Frances			

Thank You for your Payment!

Gelinas HVAC Services Inc.
2 Washington ave.
Scarborough, Me. 04074
(207)885-0771

Date: March 15, 2012

Herman Stegeman
180 Frances Street
Portland, Me. 04102

Re: Installation of high efficiency gas furnace **with options.

Gelinas HVAC Services, Inc. is pleased to have this opportunity to offer our services to you. We appreciate your business and the confidence you have placed in us. We propose to: Remove and properly dispose of existing oil fired furnace, oil tank and oil lines. Fully install one (1) Central high efficiency natural gas furnace, variable speed blower and IQ control. Proposal below reflects a complete replacement of furnace, exhaust venting and thermostat. **see options below

Furnish and Install the following:

- a. One (1) High efficiency natural gas furnace with variable speed blower.
- b. All PVC vent piping with concentric termination. *on left hand side of home.
- c. All exterior penetration to be sealed weather tight.
- d. One (1) 1inch pleated air filter.
- e. All additional low voltage control wiring needed.
- f. All condensate drain piping needed with condensate pump. (to terminate in basement washing machine drain pipe)
- g. One (1) condensate neutralizer kit.
- h. All gas piping for a complete installation. 3 circuit manifold included.
- i. All additional sheet metal transitions needed to tie back into existing plenums.
- j. Start, test and adjust newly installed system.
- k. Proper clean up of work areas daily.
- l. Permit: City of Portland new gas appliance.
- m. Warranty; Gelinas HVAC Services Inc., shall support all manufacture parts/labor warranties. *See manufacture warranty

Notes:

- 1) Proposal reflects that all existing ductwork, floor grills and electrical circuit are in good working order and to be re-utilized.

OPTION I: Nordyne/Gibson m/n GIBKG7SC090D35C 1-stage burner 92%AFUE high efficiency condensing furnace. Warranty; 10yr all parts/ 10yr Quality pledge. **\$3,675.00 Dollars.**

OPTION II: Bryant m/n 987MA42100V17 evolution pkg with modulating burner 97+%AFUE high efficiency condensing furnace with variable speed blower. Warranty; 10 yr limited on heat exchanger/5yr all other parts. **\$5,150.00 Dollars.**

OPTION III: Maytag m/n PGC2MQ100DVC modulating burner 97+%AFUE high efficiency condensing furnace with IQ drive/ variable speed blower. Warranty; 12yr all parts warranty, 12 yr Quality pledge all parts/all labor. **\$5,350.00 Dollars**

OPTION IV: Please add **\$590.00 Dollars** for Roto-brush duct cleaning and anti-bacterial fog injection. *includes all returns having air filters installed afterwards.

OPTION V: Please add **\$555.00 Dollars** for by-pass type humidification to be added to furnace.

Payment terms:

30% upfront with signed agreement.

40 % roughed in stage.

30% billed at completion

Note:

- a. Installation to begin within two (2) weeks of receipt of the signed contract and deposit given materials are available.
- b. Work to be performed Monday through Friday, 8:30 A.M – 4:30 P.M.
- c. Should installation be stopped for any reason, Gelinac HVAC Services, Inc. shall be paid in full for all labor and materials provided up to point of interruption.
- d. There shall be a one (1) year warranty on labor once installation has been completed.

Installation Instructions

Modulating Condensing Furnaces With Variable Speed Blowers



*MQ Upflow/Horizontal Model

⚠ WARNING:

- **PROPOSITION 65 WARNING:** This product contains chemicals known to the state of California to cause cancer, birth defects or other reproductive harm.
- **This furnace is not approved for installation in mobile homes. Installing this furnace in a mobile home could cause fire, property damage, and/or personal injury.**

ATTENTION INSTALLERS:

It is your responsibility to know this product better than your customer. This includes being able to install the product according to strict safety guidelines and instructing the customer on how to operate and maintain the equipment for the life of the product. Safety should always be the deciding factor when installing this product and using common sense plays an important role as well. Pay attention to all safety warnings and any other special notes highlighted in the manual. Improper installation of the furnace or failure to follow safety warnings could result in serious injury, death, or property damage.

These instructions are primarily intended to assist qualified individuals experienced in the proper installation of this appliance. Some local codes require licensed installation/service personnel for this type of equipment. Please read all instructions carefully before starting the installation. Return these instructions to the customer's package for future reference.

⚠ WARNING:

FIRE OR EXPLOSION HAZARD

- Failure to follow safety warnings exactly could result in serious injury or property damage.
- Installation and service must be performed by a qualified installer, service agency or the gas supplier.
- Do not store or use gasoline or other flammable vapors and liquids in the vicinity of this or any other appliance.

WHAT TO DO IF YOU SMELL GAS

- Do not try to light any appliance.
- Do not touch any electrical switch; do not use any phone in your building.
- Leave the building immediately.
- Immediately call your gas supplier from a neighbors phone. Follow the gas suppliers instructions.
- If you cannot reach your gas supplier, call the fire department.

DO NOT DESTROY.

KEEP IN A SAFE PLACE FOR FUTURE REFERENCE.

SAFETY INFORMATION

Safety markings are used frequently throughout this manual to designate a degree or level of seriousness and should not be ignored. **WARNING** indicates a potentially hazardous situation that if not avoided, could result in personal injury or death. **CAUTION** indicates a potentially hazardous situation that if not avoided, may result in minor or moderate injury or property damage.

WARNING:

The safety information listed below must be followed during the installation, service, and operation of this furnace. Failure to follow safety recommendations could result in possible damage to the equipment, serious personal injury or death.

- Use only with type of gas approved for this furnace. Refer to the furnace rating plate.
- Install this furnace only in a location and position as specified in Table 1 (page 7).
- Provide adequate combustion and ventilation air to the furnace space as specified on pages 8 - 10.
- Provide adequate clearances around the vent air intake terminal as specified in Figures 6 - 9 (pages 12 - 13)
- Combustion products must be discharged outdoors. Connect this furnace to an approved vent system only, as specified on pages 10 - 14.
- Never test for gas leaks with an open flame. Use a commercially available soap solution to check all connections. See page 20.
- This furnace is designed to operate with a maximum external pressure rise of 0.5 inches of water column. Consult Table 8 (page 31), and the rating plate for the proper circulating air flow and temperature rise. It is important that the duct system be designed to provide the correct flow rates and external pressure rise. An improperly designed duct system can result in nuisance shutdowns, and comfort or noise issues.
- When supply ducts carry air circulated by the furnace to areas outside the space containing the furnace, the return air shall also be handled by duct(s) sealed to the furnace casing and terminating in the conditioned space. See page 14.
- A gas-fired furnace for installation in a residential garage must be installed as specified on page 6.
- This furnace may be used for temporary heating of buildings or structures under construction. See the guidelines listed on page 5.

REQUIREMENTS and CODES

This furnace must be installed in accordance with these instructions, all applicable local building codes and the current revision of the National Fuel Gas Code (NFPA54/ANSI Z223.1) or the Natural Gas and Propane Installation Code, CAN/CGA B149.1.

The Commonwealth of Massachusetts requires compliance with regulation 248 CMR 4.00 and 5.00 for installation of through – the – wall vented gas appliances as follows:

1. For direct-vent appliances, mechanical-vent heating appliances or domestic hot water equipment, where the bottom of the vent terminal and the air intake is installed below four feet above grade the following requirements must be satisfied:
 - a.) A carbon monoxide (CO) detector and alarm shall be placed on each floor level where there are bedrooms. The detector shall comply with NFPA 720 (2005 Edition) and be mounted in the living area outside the bedroom(s).
 - b.) A (CO) detector shall be located in the room that houses the appliance or equipment and shall:
 - Be powered by the same electrical circuit as the appliance or equipment. Only one service switch shall power the appliance and the (CO) detector;
 - Have battery back-up power;
 - Meet ANSI/UL 2034 Standards and comply with NFPA 720 (2005 Edition); and Approved and listed by a Nationally Recognized Testing Laboratory as recognized under 527 CMR.
 - c.) A Product-approved vent terminal must be used, and if applicable, a product-approved air intake must be used. Installation shall be in strict compliance with the manufacturer's instructions. A copy of the installation instructions shall remain with the appliance or equipment at the completion of the installation.
 - d.) A metal or plastic identification plate shall be mounted at the exterior of the building, four feet directly above the location of vent terminal. The plate shall be of sufficient size, easily read from a distance of eight feet away, and read "Gas Vent Directly Below".
2. For direct-vent appliances, mechanical-vent heating appliances or domestic hot water equipment where the bottom of the vent terminal and the air intake is installed above four feet above grade the following requirements must be satisfied:
 - a.) A (CO) detector and alarm shall be placed on each floor level where there are bedrooms. The detector shall comply with NFPA 720 (2005 Edition) and be mounted in the living area outside the bedroom(s).

- b.) The (CO) detector shall:
- Be located in the room that houses the appliance or equipment;
 - Be hard-wired or battery powered or both.
 - Shall comply with NFPA 720 (2005 Edition).
- c.) A product-approved vent terminal must be used, and if applicable, a product-approved air intake must be used. Installation shall be in strict compliance with the manufacturer's instructions. A copy of the installation instructions shall remain with the appliance or equipment at the completion of the installation.

Additional information listed below is for reference purposes only and does not necessarily have jurisdiction over local or state codes. Always consult with local authorities before installing any gas appliance.

Combustion and Ventilation Air

- US: National Fuel Gas Code (NFGC), Air for Combustion and Ventilation
- CANADA: Natural Gas and Propane Installation Codes (NSCNGPIC), Venting Systems and Air Supply for Appliances

Duct Systems

- US and CANADA: Air Conditioning Contractors Association (ACCA) Manual D, Sheet Metal and Air Conditioning Contractors National Association (SMACNA), or American Society of Heating, Refrigeration, and Air Conditioning Engineers (ASHRAE) Fundamentals Handbook

Electrical Connections

- US: National Electrical Code (NEC) ANSI/NFPA 70
- CANADA: Canadian Electrical Code CSA C22.1

Gas Piping and Gas Pipe Pressure Testing

- US: NFGC and National Plumbing Codes
- CANADA: NSCNGPIC

General Installation

- US: Current edition of the NFGC and the NFPA 90B. For copies, contact the National Fire Protection Association Inc., Batterymarch Park, Quincy, MA 02269; or American Gas Association, 400 N. Capitol, N.W., Washington DC 20001 or www.NFPA.org
- CANADA: NSCNGPIC. For a copy, contact Standard Sales, CSA International, 178 Rexdale Boulevard, Etobicoke (Toronto), Ontario, M9W 1R3 Canada

Safety

- US: (NFGC) NFPA 54-1999/ANSI Z223.1 and the Installation Standards, Warm Air Heating and Air Conditioning Systems ANSI/NFPA 90B.
- CANADA: CAN/CGA-B149.1 and .2-M00 National Standard of Canada. (NSCNGPIC)

GENERAL INSTRUCTIONS

Combustion Air Quality



CAUTION:

Combustion air must not be drawn from a corrosive atmosphere.

To maximize heat exchanger life, the combustion air must be free of chemicals that can form corrosive acidic compounds in the combustion gases. The recommended source of combustion air is to use outdoor air. However, the use of indoor air in most applications is acceptable except as listed:

- If the furnace is installed as a single pipe installation in a confined space, it is required that the necessary combustion air come from the outdoors by way of attic, crawl space, air duct, or direct opening. For installations in confined spaces see pages 8 - 10 for combustion air requirements.
- Installations in these locations may require outdoor air for combustion, due to chemical exposures:
 - Commercial buildings
 - Buildings with indoor pools
 - Furnaces installed in laundry rooms
 - Furnaces installed in hobby or craft rooms
 - Furnaces installed near chemical storage areas
- Exposure to the following substances in the combustion air supply may require outdoor air for combustion:
 - Permanent wave solutions
 - Chlorinated waxes and cleaners
 - Chlorine based swimming pool chemicals
 - Water softening chemicals
 - De-icing salts or chemicals
 - Carbon Tetrachloride
 - Halogen type refrigerants
 - Cleaning solvents (perchloroethylene)
 - Printing inks, paint removers, varnishes, etc.
 - Hydrochloric Acid
 - Cements and glues
 - Antistatic fabric softeners
 - Masonry acid washing materials

Operation of Furnace During Construction



CAUTION:

Failure to follow these instructions will void the factory warranty and may significantly reduce the life or the performance of the furnace, and/or result in other unsafe conditions. It is the responsibility of the installing contractor to insure these provisions are met.

Operating gas furnaces in construction environments can cause a variety of problems with the furnace. Proper use of commercial portable space heating equipment during construction is recommended. This gas furnace may be used during construction if it is not in violation of any applicable codes and the following criteria are met:

- The installation must meet all applicable codes. The furnace must be permanently installed according to the instructions supplied with the furnace including electrical supply, gas supply, duct work and venting. The furnace must be controlled by a thermostat properly installed according to the instructions supplied with the furnace and thermostat. The installation must include a properly installed filter in the return air system with no by-pass air. The filter must be inspected frequently and replaced when necessary.
- Combustion air must be supplied from outside the structure and located such that dust and gases from construction activity are not introduced into the combustion system.
- Provisions must be made to insure that condensate does not freeze in the furnace or condensate drain lines during operation and during idle times; for example, overnight if turned off.
- Before occupying the structure: The filter must be replaced or cleaned, the duct work must be inspected and cleaned of any construction debris, and the furnace must be cleaned and/or repaired if found to be dirty, damaged, or malfunctioning in any way by a qualified HVAC technician. The furnace shall be inspected and approved by applicable local authority even if this requires redundant inspections.
- Serial numbers for furnaces used during construction must be submitted in writing (fax and email also acceptable). This information will be used to track the long-term affects of the use during construction on furnaces. Proof of this submittal shall be available for the final inspection of the furnace prior to occupancy.
- This furnace is designed to operate with return air temperatures in ranges normally found in occupied residences, including setbacks. Minimum continuous return temperature must not be below 60° F (15° C). Occasionally a temporary return temperature of 55° F (12° C) is acceptable. However, operation with a return temperature below 55° F (12° C) is not allowed.

Heating Load

This furnace should be sized to provide the design heating load requirement. Heating load estimates can be made using approved methods available from Air Conditioning Contractors of America (Manual J); American Society of Heating, Refrigerating, and Air Conditioning Engineers; or other approved engineering methods. **Excessive oversizing of the furnace could cause the furnace and/or vent to fail prematurely.** The ductwork should be appropriately sized to the capacity of the furnace to ensure its proper airflow rating.

For installations above 2,000 ft., the furnace should have a sea level input rating large enough that it will meet the heating load after deration for altitude.

The *MQ modulating furnace is capable of controlling its heat output to meet different heating loads. With 11 available continuous heat outputs (or “steps”), the MQ furnace can act like 11 different furnaces.

A step defines the gas input rate, an inducer blower speed, and circulating air flow. Steps 1 -11 cover input rates from 50% to 100% of the furnaces maximum input rate. The furnace begins at step 6 (or 75% of full rate) for 30 seconds and then goes to step 1 (or 50%). Afterwards, the iQ Drive® thermostat periodically reevaluates the heat output needed and changes the step accordingly.

If the heating load is less than 50% of maximum, the furnace turns off and on to a fixed 15 minute cycle. There are 5 additional steps that use different on and off times. The iQ Drive® thermostat automatically adjusts how long the furnace is on during each cycle. Overall, the iQ Drive® thermostat can control the heat delivered to the residence down to 1/7th of the maximum input rate.

Installation in a Garage



WARNING:

FIRE AND EXPLOSION HAZARD

Can result in serious injury or death.

Do not store or use gasoline or other flammable vapors and liquids in the vicinity of this or any other appliance. Storage of or use of gasoline or other flammable vapors or liquids in the vicinity of this or any appliance can result in serious injury or death.

The *MQ Gas-fired furnace may be installed in a residential garage with the provision that the burners and igniter are located no less than 18 inches (457mm) above the floor. The furnace must be located or protected to prevent physical damage by vehicles.

Clearances to Combustible Materials

This furnace is Design Certified in the U.S. and Canada by CSA International for the minimum clearances to combustible material listed in Table 1 (page 7). To obtain model number and specific clearance information, refer to the furnace rating plate, located inside of the furnace cabinet.

Access for positioning and servicing the unit must be considered when locating unit. The need to provide clearance for access to panels or doors may require clearance distances over and above the requirements. **Allow 24 inches minimum clearance from the front of the unit. However 36 inches is strongly recommended.**



INSTALLATION CLEARANCES to COMBUSTIBLE MATERIALS For UPFLOW, HORIZONTAL & DOWNFLOW FURNACES		
Left Side.....0 Inches	Vent..... 1 Inch	Top.....1 Inches
Right Side0 Inches	Back.....0 Inches	Front.....4 Inches [†]
<p style="text-align: center;">UPFLOW APPLICATION</p>  <p style="text-align: center;">HORIZONTAL APPLICATION</p> 		
[†] Allow 24 in. minimum clearance for servicing. Recommended clearance is 36 in.		
NOTE: The furnace is listed for installation on combustible or non-combustible flooring. However, wood is the only combustible flooring allowed for installation.		

Table 1. Minimum Clearances to Combustible Materials

⚠ WARNING:

CARBON MONOXIDE POISONING HAZARD

Failure to follow the steps outlined below for each appliance connected to the venting system being placed into operation could result in carbon monoxide poisoning or death. The following steps shall be followed with each individual appliance connected to the venting system being placed in operation, while all other appliances connected to the venting system are not in operation:

1. Seal any unused openings in the venting system.
2. Inspect the venting system for proper size and horizontal pitch, as required in the *National Fuel Gas Code, ANSI Z223.1/NFPA 54 or the CSA B149.1, Natural Gas and Propane Installation Codes* and these instructions. Determine that there is no blockage or restriction, leakage, corrosion and other deficiencies which could cause an unsafe condition.
3. As far as practical, close all building doors and windows and all doors between the space in which the appliance(s) connected to the venting system are located and other spaces of the building.
4. Close fireplace dampers.
5. Turn on clothes dryers and any appliance not connected to the venting system. Turn on any exhaust fans, such as range hoods and bathroom exhausts, so they are operating at maximum speed. Do not operate a summer exhaust fan.
6. Follow the lighting instructions. Place the appliance being inspected into operation. Adjust the thermostat so appliance is operating continuously.
7. Test for spillage from draft hood equipped appliances at the draft hood relief opening after 5 minutes of main burner operation. Use the flame of a match or candle.
8. If improper venting is observed during any of the above tests, the venting system must be corrected in accordance with the *National Fuel Gas Code, ANSI Z223.1/NFPA 54 and/or CSA B149.1, Natural Gas and Propane Installation Codes*.
9. After it has been determined that each appliance connected to the venting system properly vents when tested as outlined above, return doors, windows, exhaust fans, fireplace dampers and any other gas-fired burning appliance to their previous conditions of use.

COMBUSTION AIR REQUIREMENTS

General Information

 **WARNING:**

Furnace installation using methods other than those described in the following sections must comply with the National Fuel Gas Code (NFGC) and all applicable local codes.

- Instructions for determining the adequacy of combustion air for an installation can be found in the current revision of the NFGC (ANSI Z223.1 / NFPA54). **Consult local codes for special requirements.** These requirements are for US installations as found in the NFGC.
- The requirements in Canada (B149.1) are structured differently. Consult with B149.1 and local code officials for Canadian installations.

This condensing furnace is certified for installation either as a Direct Vent (2-pipe) or Conventional (1-pipe) appliance. Direct Vent appliances draw combustion air from the outdoors and vent combustion products back outside. Installation with air taken from around the furnace is often referred to as Conventional installation - i.e. only the vent (exhaust) pipe is used.

Provisions must be made during the installation of this furnace that provide an adequate supply of air for combustion. The combustion air from the outside needs to be clear of chemicals that can cause corrosion. The inlet pipe should not be placed near corrosive chemicals such as those listed on page 5.

Another important consideration when selecting one or two pipe installation is the quality of the indoor air which can sometimes be contaminated with various household chemicals. These chemicals can cause severe corrosion in the furnace combustion system. A 2-pipe installation has the additional advantage that it isolates the system from the effects of negative pressure in the house.

 **CAUTION:**

Exhaust fans, clothes dryers, fireplaces and other appliances that force air from the house to the outdoors can create a negative pressure inside the house, resulting in improper furnace operation or unsafe conditions such as flame roll out. It is imperative that sufficient air exchange with the outdoors is provided to prevent depressurization. Additional information about how to test for negative pressure problems can be found in the NFGC.

NOTE: Air openings on top of the furnace and openings in closet doors or walls must never be restricted. If the

furnace is operated without adequate air for combustion, the flame roll-out switch will open, turning off the gas supply to the burners. This safety device is a manually reset switch. **DO NOT install jumper wires across these switches to defeat their function or reset a switch without identifying and correcting the fault condition.** If a switch must be replaced, use only the correct sized part specified in the Replacement Parts List provided online.

Direct Vent Furnaces

Direct Vent (2-pipe) furnaces draw combustion air directly from the outdoors and then vent the combustion products back outside, isolating the entire system from the indoor space. It is important to make sure that the whole system is sealed and clearances to combustibles are maintained regardless of the installation being in a confined or unconfined space.

Conventional Furnaces - Confined Spaces

A confined space is an area with volume less than 50 cubic feet per 1,000 Btuh of the combined input rates of all appliances drawing combustion air from that space. Furnace closets, small equipment rooms and garages are confined spaces. Furnaces installed in a confined space which supply heated air to areas outside the space must draw return air from outside the space and must have the return air ducts tightly sealed to the furnace. Ducts must have cross-sectional area at least as large as the free area of their respective openings to the furnace space. Attics or crawl spaces must connect freely with the outdoors if they are the source of air for combustion and ventilation.

The required sizing of these openings is determined by whether inside or outside air is used to support combustion, the method by which the air is brought to the space, and by the total input rate of all appliances in the space. In all cases, the minimum dimension of any combustion air opening is 3 inches.

Air From Inside

If combustion air is taken from the heated space, the two openings must each have a free area of at least one square inch per 1,000 Btuh of total input of all appliances in the confined space, but **not less than** 100 square inches of free area (Figure 1, page 9).

Example:

If the combined input rate of all appliances is less than or equal to 100,000 Btuh, each opening must have a free area of at least 100 square inches. If the combined input rate of all appliances is 120,000 Btuh, each opening must have a free area of at least 120 square inches.

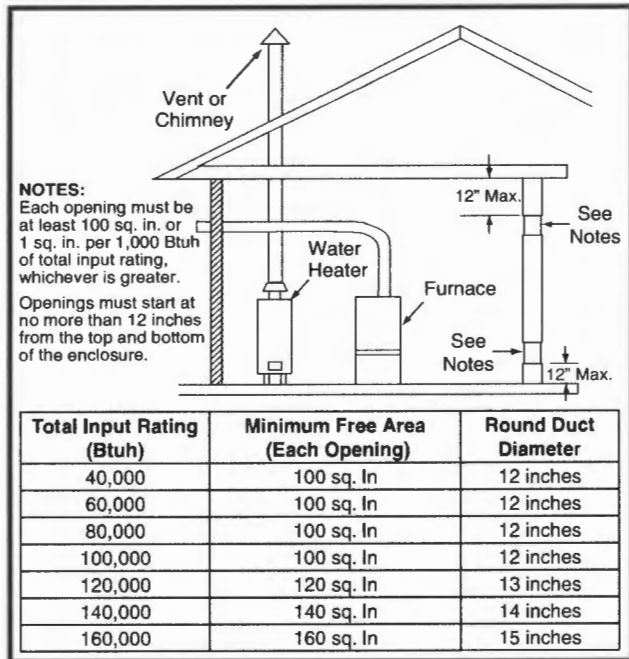


Figure 1. Combustion Air Drawn from Inside

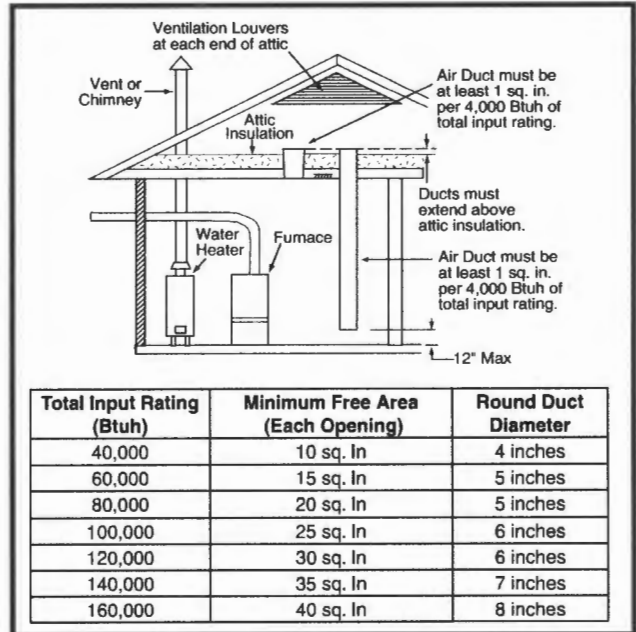


Figure 3. Combustion Air Drawn from Outside Through Vertical Ducts

Outdoor Air from a Crawl Space or Vented Attic

When the openings can freely exchange air with the outdoors, each opening shall have a minimum free area of 1 square inch per 4,000 Btuh of total appliance input. The openings shall exchange directly, or by ducts, with the outdoor spaces (crawl or attic) that freely exchange with the outdoors (Figure 2).

Outdoor Air Using Vertical Ducts

If combustion air is taken from outdoors through vertical ducts, the openings and ducts must have a minimum free area of one square inch per 4,000 Btuh of total appliance input (Figure 3).

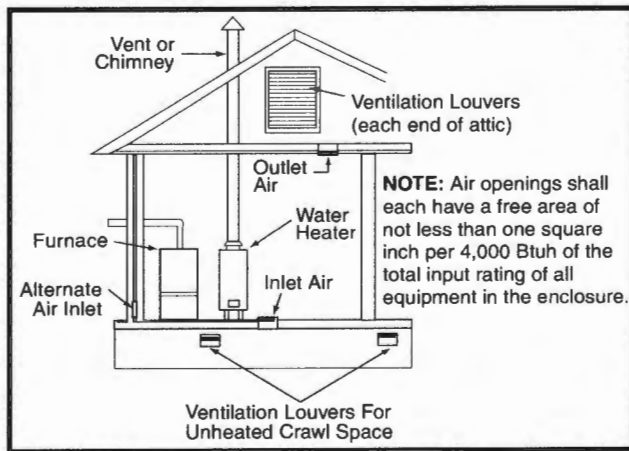


Figure 2. Combustion Air Drawn from a Crawl Space or Vented Attic

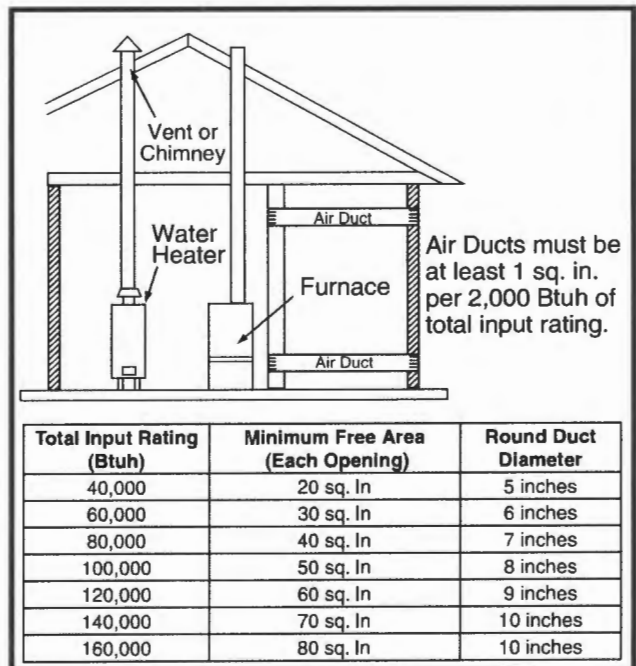


Figure 4. Combustion Air Drawn from Outside Through Horizontal Ducts

Air Directly Through an Exterior Wall

If combustion air is provided directly through an exterior wall, the two openings must each have free area of at least one square inch per 4,000 Btuh of total appliance input (Figure 5).

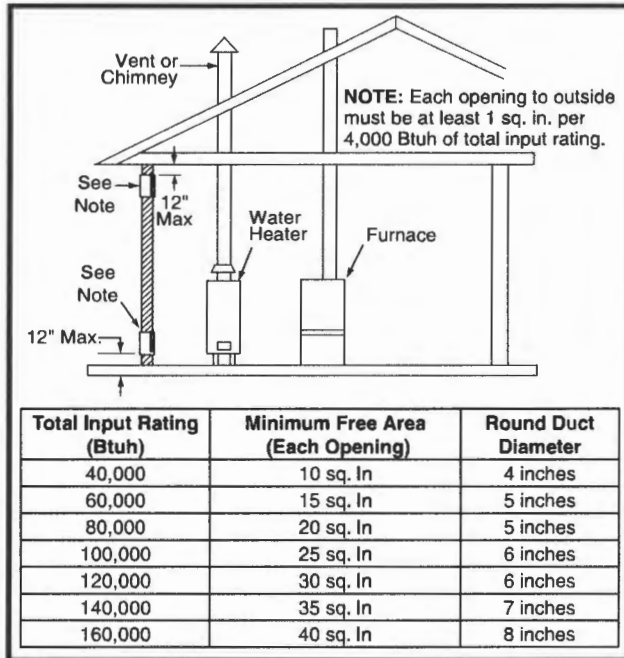


Figure 5. Combustion Air Drawn from Outside Through an Exterior Wall

Alternate Method of Providing Air from Outside:

If acceptable under local Codes, it is permitted to provide outside air using one opening (See NFGC).

Generally, confined spaces must have two openings in the space for combustion air. One opening must be within 12 inches of the ceiling, and the other must be within 12 inches of the floor. However, an alternative method recently adopted by the NFGC uses one opening within 12 inches of the top of the space. This method may be used if it is acceptable to the local codes.

The following conditions must be met:

1. The opening must start within 12" of the top of the structure and connect with the out of doors through vertical or horizontal ducts or be ducted to a crawl or attic space that connects with the out of doors.
2. The opening must have a minimum free area of 1 sq. in. per 3,000 Btu per hour of the total input rating of all equipment located in the enclosure.
3. The free area must not be less than the sum of all the areas of the vent connectors in the enclosure.

Conventional Furnaces - Unconfined Spaces

An unconfined space is an area including all rooms not separated by doors with a volume greater than 50 cubic feet per 1,000 Btuh of the combined input rates of all appliances which draw combustion air from that space.

In general, a furnace installed in an unconfined space will not require outside air for combustion. However, in homes built for energy efficiency (low air change rates), it may be necessary to provide outside air to ensure adequate combustion and venting, even though the furnace is located in an unconfined space. See example.

Example:

A space with a water heater rated at 45,000 Btuh input and a furnace rated at 75,000 Btuh requires a volume of 6,000 cubic feet [$50 \times (45 + 75) = 6,000$] to be considered unconfined. If the space has an 8 foot ceiling, the floor area of the space must be 750 square feet ($6,000 / 8 = 750$).

VENTING REQUIREMENTS

- This furnace must be vented in compliance with the current revision of the National Fuel Gas Code (ANSI-Z223.1/NFPA54) and the instructions provided below. **Consult local codes for special requirements.**
- In Canada, venting shall conform to the requirements of the current (CAN/CGA B149.1 or .2) installation codes. **Consult local codes for special requirements.**

WARNING:

This furnace must not be vented with other appliances, even if that appliance is of the condensing type. Common venting can result in severe corrosion of other appliances or their venting and can allow combustion gases to escape through such appliances or vents. Do not vent the furnace to a fireplace chimney or building chase.

WARNING:

Upon completion of the furnace installation, carefully inspect the entire flue system both inside and outside the furnace to assure it is properly sealed. Leaks in the flue system can result in serious personal injury or death due to exposure of flue products, including carbon monoxide.

This furnace is classified as a "Category IV" appliance, which requires special venting materials and installation procedures.

This section specifies installation requirements for Conventional (1-pipe) and Direct Vent (2-pipe) piping. For 1- pipe installations, install vent piping as described in this section and provide air for combustion and ventilation according to pages 8 - 10. Table 2 contains the maximum length of vent and combustion air piping for either type of installation.

Category IV appliances operate with positive vent pressure and therefore require vent systems which are thoroughly sealed. They also produce liquid condensate, which is slightly acidic and can cause severe corrosion of ordinary venting materials. Furnace operation can be adversely affected by restrictive vent and combustion air piping.

The inducer assembly on this furnace can be rotated to vent the flue products out of the left or right side of the furnace. This increases the flexibility of which direction the vent pipe can exit the furnace.

Vent Pipe Material

Vent and combustion air pipe and fittings must be one of the following materials in the list and must conform to the indicated ANSI/ASTM standards. Cement must conform to ASTM Standard D2564 for PVC and Standard D2235 for ABS. PVC primer must meet standard ASTM F656. When joining PVC piping to ABS, use PVC solvent cement (See procedure specified in ASTM Standard D3138).

Material	Standard
Schedule 40PVC	D1785
PVC-DWV	D2665
SDR-21 & SDR-26	D2241
ABS-DWV	D2661
Schedule 40 ABS	F628
Foam/Cellular Core PVC	F891

In Canada, all plastic vent pipes and fittings including any cement, cleaners, or primers must be certified as a system to ULC S636. However this requirement does not apply to the finish flanges or piping internal to the furnace.

Vent Pipe Length and Diameter

In order for the furnace to operate properly, the combustion air and vent piping must not be excessively restrictive.

- The venting system should be designed to have the minimum number of elbows or turns.
- All horizontal runs must slope upwards from the furnace at 1/4 inch minimum per running foot of vent.
- Transition to the final vent diameter should be done as close to the furnace outlet as practical.
- Always use the same size or a larger pipe for combustion air that is used for the exhaust vent.

Table 2 indicates the maximum allowable pipe length for a furnace of known input rate, when installed with piping

FURNACE MODELS (BTU)	FURNACE INSTALLATION	SINGLE VENT PIPE LENGTH (FT.) with 1 long radius elbow*		DUAL VENT PIPE LENGTH (ft.) with 1 long radius elbow on each pipe*	
		OUTLET 2" Diameter	OUTLET 3" Diameter	INLET/OUTLET 2" Diameter	INLET/OUTLET 3" Diameter
60,000	Upflow	50	80	50	80
	Horizontal	40	80	40	80
80,000	Upflow	60	90	60	90
	Horizontal	50	90	50	90
100,000	Upflow	50	90	50	90
	Horizontal	40	90	40	90
120,000	Upflow	N/A	90	N/A	90
	Horizontal	N/A	70	N/A	70

***NOTES:**

- 1 Subtract 2.5 ft. for each additional 2 inch long radius elbow, 5 ft. for each additional 2 inch short radius elbow, 3.5 ft. for each additional 3 inch long radius elbow, and 7 ft. for each additional 3 inch short radius elbow. Two 45° elbows are equivalent to one 90° elbow.
2. Subtract 5ft for each 2" tee and 8ft for each 3" tee.
3. This table applies for elevations from sea level to 2,000 ft. For higher elevations, decrease pipe lengths by 8% per 1,000 ft of altitude.
4. The minimum length for 2" or 3" diameter vent pipe is 5 ft.

Table 2. Vent Pipe Lengths

of selected diameter and number of elbows. To use the table, the furnace input rate, the centerline length and the number of elbows on each pipe must be known.

When estimating the length of vent runs, consideration must be made to the effect of elbows and other fittings. This is conveniently handled using the idea of “equivalent length”. This means the fittings are assigned a linear length that accounts for the pressure drop they will cause. For example: a 2” diameter, long radius elbow is worth the equivalent of 2.5 feet of linear run. A 90 degree tee is worth 7 ft.

The equivalent lengths of tees and various elbows are listed in Table 2. Measure the linear length of the vent run and then add in the equivalent length of each fitting. The total length, including the equivalent fitting lengths, must be less than the maximum length specified in Table 2.

Condensing furnace combustion products have very little buoyancy, so Table 2 is to be used without consideration of any vertical rise in the piping.

Vent Pipe Installation

CAUTION:

Combustion air must not be drawn from a corrosive atmosphere.

This furnace has been certified for installation with zero clearance between vent piping and combustible surfaces. However, it is good practice to allow space for convenience in installation and service.

- The quality of outdoor air must also be considered. Be sure that the combustion air intake is not located near a source of solvent fumes or other chemicals which can cause corrosion of the furnace combustion system. (See list of substances on page 5).
- Route piping as direct as possible between the furnace and the outdoors. Longer vent runs require larger diameters. Vent piping must be sloped upwards 1/4” per foot in the direction from the furnace to the terminal. This is to ensure that any condensate flows back to the condensate disposal system.
- If a Direct Vent (2-pipe) system is used, the combustion air intake and the vent exhaust must be located in the same atmospheric pressure zone. This means both pipes must exit the building through the same portion of exterior wall or roof as shown in Figures 6 - 9 (pages 12 & 13) and Figure 32 (page 38).
- Piping must be mechanically supported so that its weight does not bear on the furnace. Pipe supports must be installed a minimum of every 5 feet along the vent run to ensure no displacement after installation. Supports may be at shorter intervals if necessary to ensure that there are no sagging sections that can trap condensate. It is recommended to install couplings along the vent pipe,

on either side of the exterior wall (Figure 32). These couplings may be required by local code.

- If breakable connections are required in the combustion air inlet pipe (if present) and exhaust vent piping, then straight neoprene couplings for 2” or 3” piping with hose clamps can be used. These couplings can be ordered through your local furnace distributor. To install a coupling:

1. Slide the rubber coupling over the end of the pipe that is attached to the furnace and secure it with one of the hose clamps.
2. Slide the other end of the rubber coupling onto the other pipe from the vent.
3. Secure the coupling with the second hose clamp, ensuring that the connection is tight and leak free.

Outdoor Terminations - Horizontal Venting

Vent and combustion air intake terminations shall be installed as depicted in Figures 6 & 7 (page 13) and in accordance with these instructions:

- Vent termination clearances must be consistent with the NFGC, ANSI 2223.1/NFPA 54 and/or the CSA B149.1, Natural Gas and Propane Installation Code. Table 12 (page 35) lists the necessary distances from the vent termination to windows and building air intakes.
- All minimum clearances must be maintained to protect building materials from degradation by flue gases as shown in Figure 7.
- Vent and combustion air intake terminations must be located to ensure proper furnace operation and conformance to applicable codes. A vent terminal must be located at least 3 feet above any forced air inlet located within 10 feet. This does not apply to the combustion air inlet of a direct vent (two pipe) appliance. In Canada, CSA B149.1, takes precedence over these instructions. See Table 12 (page 35).
- For optimal performance, vent the furnace through a wall that experiences the least exposure to winter winds.
- The vent termination shall be located at least 3 ft. horizontally from any electric meter, gas meter, regulator and any relief equipment. These distances apply ONLY

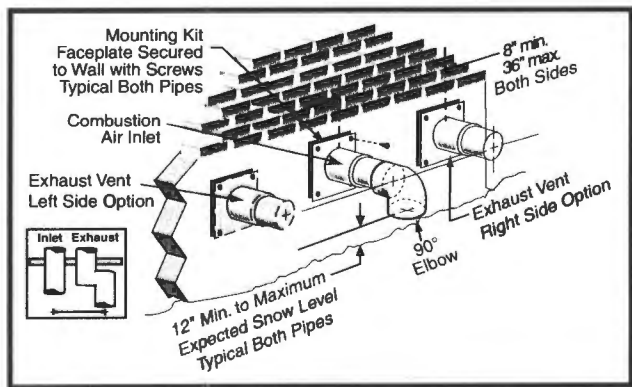


Figure 6. Inlet and Exhaust Pipe Clearances

to U.S. installations. In Canada, CSA B149.1, takes precedence over these instructions.

- Do not install the vent terminal such that exhaust is directed into window wells, stairwells, under decks or into alcoves or similar recessed areas, and do not terminate above any public walkways.
- If venting horizontally, a side wall vent kit is available according to the pipe diameter size of the installation. For 2 inch pipe use side wall vent kit #904617, and for 3 inch pipe use kit #904347. **Please follow the instructions provided with the kit.**
- Concentric vent termination kits are available for use with these furnaces. For 2 Inch pipe use kit #904177 and for 3 inch pipe use kit # 904176. **Please follow the instructions provided with the kit.**
- When the vent pipe must exit an exterior wall close to the grade or expected snow level where it is not possible to obtain clearances shown in Figure 6, a riser may be used as shown in Figure 8. Insulation is required to prevent freezing of this section of pipe. See Table 3.

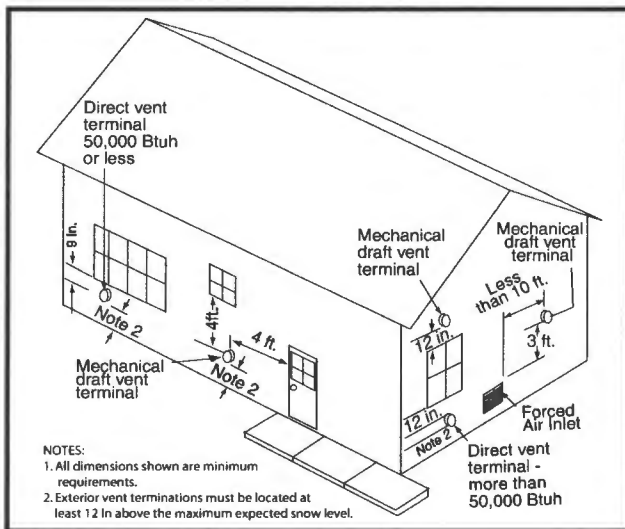


Figure 7 Vent Locations

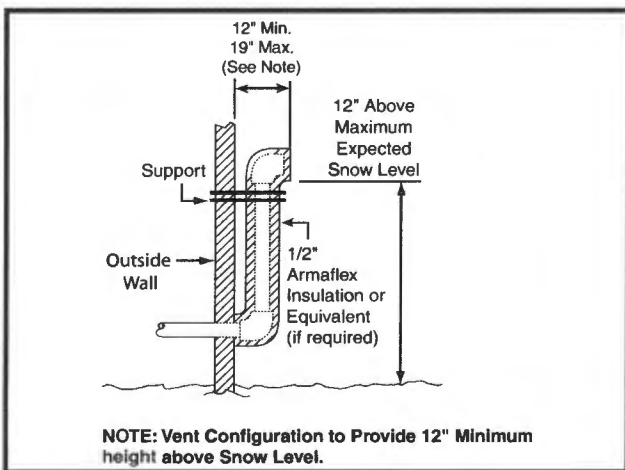


Figure 8. Alternate Horizontal Vent Installation

Outdoor Terminations - Vertical Venting

Termination spacing requirements from the roof and from each other are shown in Figure 9. The roof penetration must be properly flashed and waterproofed with a plumbing roof boot or equivalent flashing. Vent and combustion air piping may be installed in an existing chimney which is not in use provided that:

- Both the exhaust vent and air intake run the length of the chimney.
- The top of the chimney is sealed and weatherproofed.
- The termination clearances shown in Figure 9 are maintained.
- No other gas fired or fuel-burning equipment is vented through the chimney.

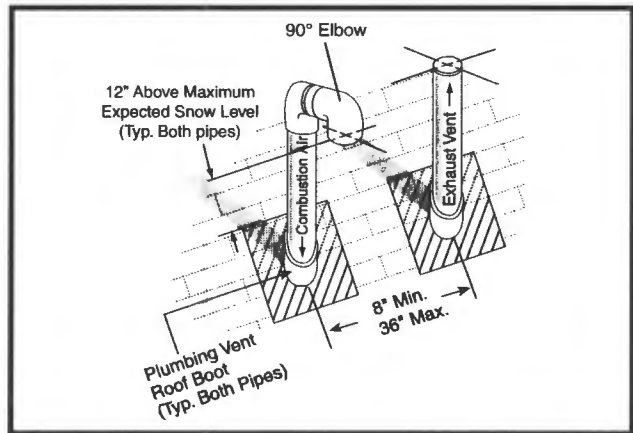


Figure 9. Vertical Vent Termination

Vent Freezing Protection

- When the vent pipe is exposed to temperatures below freezing (i.e., when it passes through unheated spaces, chimneys, etc.) the pipe must be insulated with 1/2 inch thick sponge rubber insulation, Armaflex-type insulation or equivalent. Insulating pipe is important to avoid condensate icing.
- Table 3 lists the maximum length of flue pipe that can travel through an unconditioned space or an exterior space. The total vent length must not exceed the lengths noted in Table 2 (page 11). For Canadian installations, please refer to the Canadian Installation Code (CAN/CGA-B149.1 or 2) and/or local codes.

Winter Design Temperature	Maximum Flue Pipe Length in Unconditioned and Exterior Spaces	
	Without Insulation (feet)	With Insulation (feet)*
20	45	70
0	20	70
-20	10	60

* = Insulation thickness greater than 3/8 inch, based on an R value of 3.5 (ft x F x hr) / (BTU x in.)

Table 3. Vent Protection

- For extremely cold climates or for conditions of short furnace cycles (i.e. set back thermostat conditions) the last 18 inches of vent pipe can be reduced. It is acceptable to reduce from 3" to 2-1/2", 3" to 2", or 2" to 1-1/2" if the total vent length is at least 15 feet in length, and the vent length is within the parameters specified in Table 2. The restriction should be counted as 3 equivalent feet. Smaller vent pipes are less susceptible to freezing, but must not be excessively restrictive. The length of the 2 inch pipe must not be longer than 18 inches.
- To prevent debris or creatures from entering the combustion system, a protective screen may be installed over the combustion air intake opening. The screens hole size must be large enough to prevent air restriction.

Condensate Disposal

The method for disposing of condensate varies according to local codes. Consult your local code or authority having jurisdiction.

Each of the condensate drain lines must be J-trapped using field supplied parts. After the condensate lines are J-trapped, they may be combined together into a single run to the drain. The drain lines must be routed downward to ensure proper drainage from furnace.

Neutralizer kit P/N 902377 is available for use with this furnace. **Please follow the instructions provided with the kit.**

Existing Installations

When an existing furnace is removed from a vent system serving other appliances, the existing vent system may not be sized properly to vent the remaining appliances (For example: water heater). An improperly sized venting system can result in the formation of condensate, leakage, or spillage. The existing vent system should be checked to make sure it is in compliance with NFPA and must be brought into compliance before installing the furnace.

NOTE: If replacing an existing furnace, it is possible you will encounter an existing plastic venting system that is subject to a Consumer Product Safety Commission recall. The pipes involved in the recall are High Temperature Plastic Vent (HTPV). **If your venting system contains these pipes DO NOT reuse this venting system!** This recall does not apply to other plastic vent pipes, such as white PVC or CPVC. Check for details on the CPSC website or call their toll-free number (800) 758-3688.

CIRCULATING AIR REQUIREMENTS



WARNING:

Do not allow combustion products to enter the circulating air supply. Failure to prevent the circulation of combustion products into the living space can create potentially hazardous conditions including carbon monoxide poisoning that could result in personal injury or death.

All return ductwork must be secured to the furnace with sheet metal screws. For installations in confined spaces, all return ductwork must be adequately sealed. When return air is provided through the bottom of the furnace, the joint between the furnace and the return air plenum must be air tight.

The surface that the furnace is mounted on must provide sound physical support of the furnace with no gaps, cracks or sagging between the furnace and the floor or platform.

Return air and circulating air ductwork must not be connected to any other heat producing device such as a fireplace insert, stove, etc. This may result in fire, explosion, carbon monoxide poisoning, personal injury, or property damage.

Plenums and Air Ducts

- Plenums and air ducts must be installed in accordance with the Standard for the Installation of Air Conditioning and Ventilating Systems (NFPA No. 90A) or the Standard for the Installation of Warm Air Heating and Air Conditioning Systems (NFPA No. 90B).
- Table 8 (page 31) lists the High and Low target CFMs for each maximum input rate and temperature rise. If the maximum airflow is greater than 1,600 cfm, two returns are recommended. **NOTE:** The motor speed of *MQ furnaces cannot be changed manually by resetting the dipswitches on the motor control board.
- It is recommended that the outlet duct contain a removable access panel. The opening should be accessible when the furnace is installed in service and shall be of a size that smoke or reflected light may be observed inside the casing to indicate the presence of leaks in the heat exchanger. The cover for the opening shall be attached in such a way as to prevent leaks.
- If outside air is used as return air to the furnace for ventilation or to improve indoor air quality, the system must be designed so that the return air is not less than 60° F (15° C) during operation. If a combination of indoor and outdoor air is used, the ducts and damper system must be designed so that the return air supply to the

furnace is equal to the return air supply under normal, indoor return air applications.

- When a cooling system is installed which uses the furnace blower to provide airflow over the indoor coil, the coil must be installed downstream (on the outlet side) of the furnace or in parallel with the furnace.
- If a cooling system is installed in parallel with the furnace, a damper must be installed to prevent chilled air from entering the furnace and condensing on the heat exchanger. If a manually operated damper is installed, it must be designed so that operation of the furnace is prevented when the damper is in the cooling position and operation of the cooling system is prevented when the damper is in the heating position.
- It is good practice to seal all connections and joints with industrial grade sealing tape or liquid sealant. Requirements for sealing ductwork vary from region to region. Consult with local codes for requirements specific to your area.

Supply Air Connections

The supply air must be delivered to the heated space by duct(s) secured to the furnace casing, running full size and without interruption.

Upflow and Horizontal Furnaces

To attach the supply air duct to the furnace, bend the furnace flanges (Figure 26, page 31) upward 90° with a pair of wide duct pliers. Position the duct on top of the furnace and secure together with sheet metal screws. The screws must penetrate the sheet metal casing and furnace flange. Tape or seal all seams if required by local code.

Return Air Connections

In applications where the supply ducts carry heated air to areas outside the space where the furnace is installed, the return air must be delivered to the furnace by duct(s) secured to the furnace casing, running full size and without interruption.

Upflow Horizontal Furnaces

For upflow installations, the return air ductwork may be connected to the left side, right side, or bottom. The bottom panel (Figure 26) must be installed for left or right return air. **NOTE: Do not use the back of the furnace for return air.**

Side Return Installations

To attach the return air duct to the left or right side of the furnace, punch out the four knockouts (Figure 26) from the preferred side of the furnace. Using sharp metal cutters, cut an opening between all four knockouts to expose the blower assembly. Position the return air duct over the opening in the side and secure together with sheet metal screws. The screws must penetrate the duct and furnace cabinet.



WARNING:

The solid base of the furnace must be in position when the furnace is installed with side return air ducts. Removal of all or part of the base could cause circulation of combustible products into the living space and create potentially hazardous conditions, including carbon monoxide poisoning that could result in personal injury or death.

Bottom Return Installations

The bottom panel (Figure 26) must be removed from the bottom of the furnace for bottom return air. If bottom panel is installed, go to page 17 for removal instructions. Position the furnace over the return air duct and secure together with sheet metal screws. The screws must penetrate the duct and furnace cabinet.

Acoustical Treatments

Damping ducts, flexible vibration isolators, or pleated media-style filters on the return air inlet of the furnace may be used to reduce the transmission of equipment noise emanating from the furnace. These treatments can produce a quieter installation, particularly in the heated space. However, they can increase the pressure drop in the duct system. Care must be taken to maintain the proper maximum pressure rise across the furnace, temperature rise and flow rate. This may mean increasing the duct size and/or reducing the blower speed. These treatments must be constructed and installed in accordance with NFPA and SMACNA construction standards. Consult with local codes for special requirements. For best sound performance, be sure to install all the needed gaskets and grommets around penetrations into the furnace, such as for electrical wiring

FURNACE INSTALLATION

*MQ series gas furnaces may be installed in the upflow or horizontal right or left positions with either right, left, or upflow return air.

General Requirements

- The furnace must be leveled at installation and attached to a properly installed duct system. See Table 1 (page 7) for the required clearances needed to move the furnace to its installation point (hallways, doorways, stairs, etc).
- The furnace must be installed so that all electrical components are protected from water.
- The furnace must be installed upstream from a refrigeration system. (If applicable)
- The cabinet plug must always be used to close the hole in the side of the furnace when rotating the inducer.
- The furnace requires special venting materials and installation procedures. See pages 10 -14 for venting guidelines and specifications.

Direct Vent (2-Pipe) Applications

It is important that Direct Vent (2-pipe) systems maintain an airtight flow path from the air inlet to the flue gas outlet. The *MQ furnace is shipped from the factory with two holes in the cabinet for the flue gas outlet. In certain configurations, it is necessary to remove and relocate a plastic cap in the furnace cabinet. If changing the position of the flue gas outlet, it is required that the previous hole be closed off with the plastic cap to maintain air tightness in the furnace. The hole locations for *MQ series upflow/horizontal furnaces are indicated in Figure 26 (page 31).

Upflow Installation

WARNING:

The *MQ series gas furnace must not be installed directly on carpeting, tile, or any combustible material other than wood flooring.

Side Return Air Inlet

*MQ series gas furnaces are shipped with the bottom panel installed (Figure 26). If the upflow furnace is installed using both side return air inlets, the bottom panel must not be removed. The bottom panel must be in place if the bottom of the furnace is not being used as a return.

Bottom Return Air Inlet

If the *MQ series gas furnace is installed using the bottom as a return air inlet and 1 side return, the bottom panel (Figure 26) must be removed.

Horizontal Installation

WARNING:

The *MQ series gas furnace must not be installed directly on carpeting, tile, or any combustible material other than wood flooring.

The *MQ series gas furnace can be installed horizontally in an attic, basement, crawl space or alcove (Figure 10). It can also be suspended from a ceiling in a basement or utility room in either a right to left airflow or left to right airflow as shown in Figure 11.

- Access for positioning and servicing must be considered when locating the unit. See Table 1 For clearance specifications.
- Furnace must be level front to back and side to side.
- Consult your local authority for horizontal installation requirements.

*MQ series furnaces are shipped with the bottom panel installed. If furnace is installed horizontally, remove the bottom panel from the furnace before attaching the duct system. See Bottom Panel Removal on page 17.

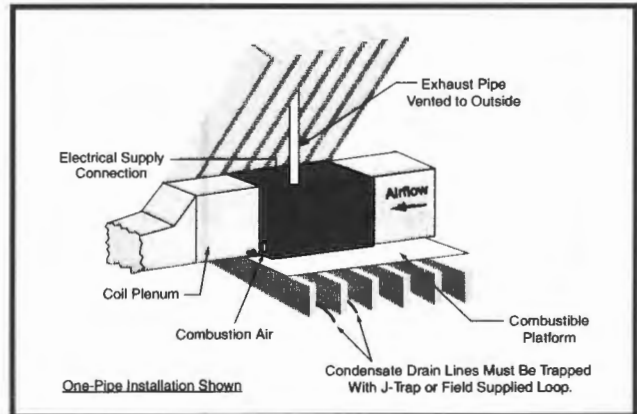


Figure 10. Horizontal installation on a Platform

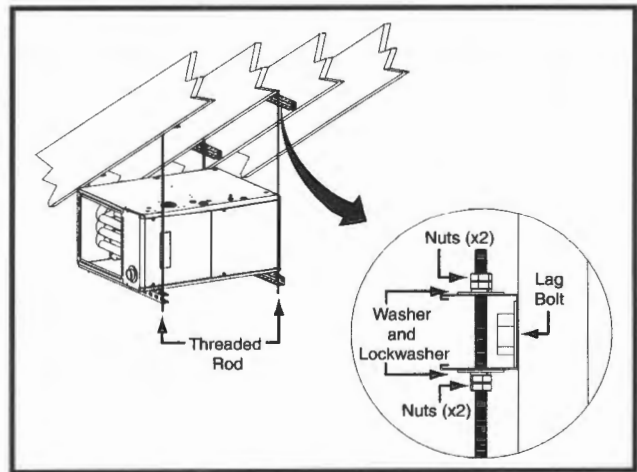


Figure 11. *MQ Suspended Horizontally

If installing the furnace in an attic, it is required that a drip pan be placed under the furnace. If the installation is on a combustible platform (Figure 10), it is recommended that the drip pan extend at least 12 inches past the top and front of the furnace.

If the furnace will be suspended from the ceiling, assemble a support frame (Figure 11) using slotted iron channel and full thread rod. Fasten the frame together with nuts, washers, and lockwashers. Secure the support frame to the rafters with lag bolts. The furnace can also be suspended using steel straps around each end of the furnace. The straps should be attached to the furnace with sheet metal screws and to the rafters with bolts.

It is recommended for further reduction of fire hazard that cement board or sheet metal be placed between the furnace and the combustible floor and extend 12 inches beyond the front of the door and top of the furnace.

Bottom Panel Removal

The steps listed below describe how to remove the bottom panel from the furnace. See Figure 12.

1. Remove the door (1) from the blower compartment.
2. Disconnect the blower motor wiring harness (2) from the control board.
3. Remove two screws (3) securing the blower assembly (4) to the furnace.
4. Carefully pull the blower assembly (4) out thru the front of the furnace.
5. Remove all screws (5) securing bottom panel (6) to bottom of furnace and front brace (7).
6. Lift up and slide bottom panel (6) out through front of furnace.
7. Reinstall the blower assembly (4) in reverse order.

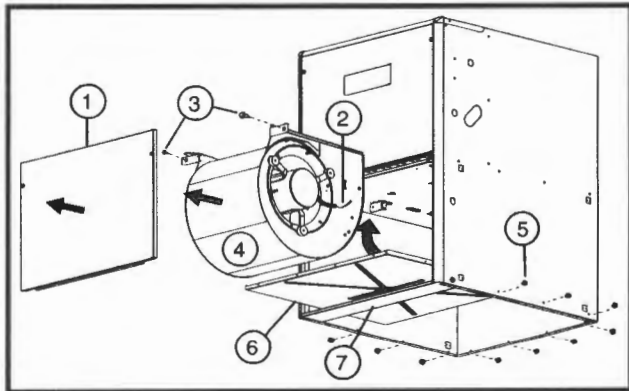


Figure 12. Bottom Panel Removal

Alternate Bottom Panel Removal

If the bottom panel cannot be removed using the previous instructions, the steps below are an alternate method for removing the bottom panel. (See Figure 13).

1. Remove the door (1) from the blower compartment
2. Remove all screws securing the bottom panel (2) to the front brace (3).
3. Remove two screws (4) securing the furnace cabinet to the blower deck (5).
4. Remove all screws (6) securing the furnace cabinet to the bottom panel (2).
5. Remove the screw (7) securing the bottom corner of the furnace cabinet to the front brace (3).
6. Carefully spread the bottom corner of the furnace cabinet outwards while sliding the bottom panel (2) out through the front of the furnace.
7. Reassemble the furnace in reverse order.

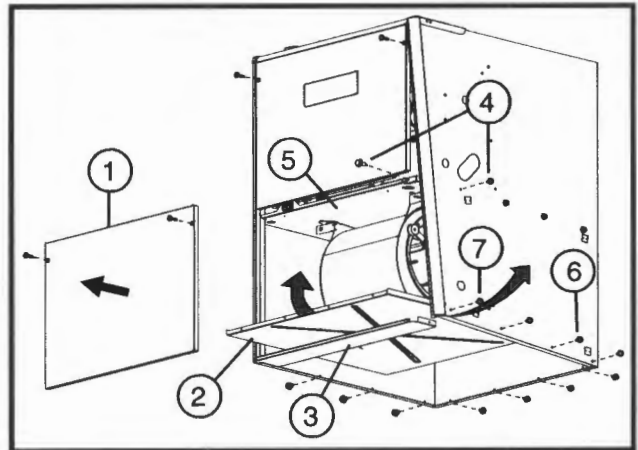


Figure 13. Alternate Removal Method

Vent and Inducer Assembly Options

To increase installation flexibility, the inducer assembly can be rotated to 2 different positions. Each variation has slightly different requirements with regard to condensate disposal and, in some cases, the need to seal the furnace cabinet.

IMPORTANT NOTE: The Inducer Assembly must never be positioned to vent downwards on horizontal installs.

Before using Table 4 (page 18), the number of pipes (1-pipe or 2-pipe) connected to the furnace must be known. Find the proper furnace style (upflow or horizontal) and then the side that the pipes will exit from the furnace. Finally select the option that properly matches your installation type from Figures 30 & 31 (pages 36 & 37).

1 - Pipe Installations			
Vent	Upflow	Horizontal Right	Horizontal Left
Right	Option 1	N/A	Option 6
Left	Option 2	Option 5	N/A
2 - pipe Installations			
Vent	Upflow	Horizontal Right	Horizontal Left
Right	Option 3	N/A	Option 8
Left	Option 4	Option 7	N/A

Table 4. Vent and Inducer Blower Options

Inducer Assembly Rotation

WARNING:

Inducer rotation must be completed before the furnace is connected to gas and electric. If both utilities have been connected, follow the shutdown procedures printed on the furnace label and disconnect the electrical supply.

CAUTION:

It is good practice to label all wires prior to disconnection. Wiring errors can cause improper and dangerous operation.

1. Disconnect both electrical harnesses (1) from the inducer assembly (2) (Figure 14).
2. Disconnect two wires from the inducer assembly limit switch (3).

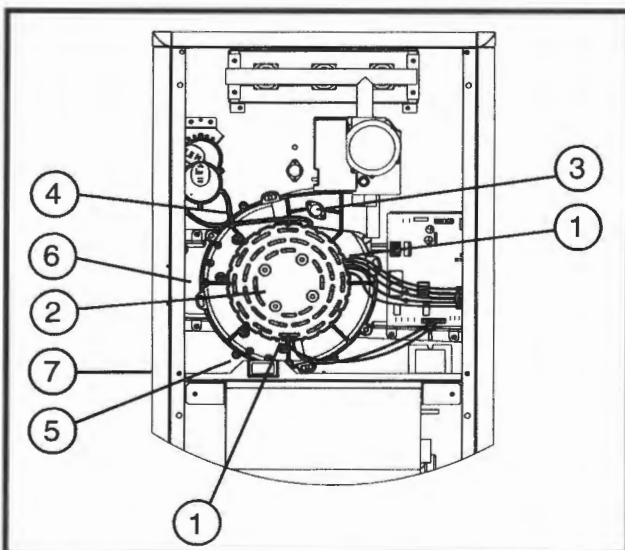


Figure 14. Inducer Assembly Rotation

3. Disconnect the pressure switch vacuum tube (4) from the inducer assembly (2).
4. Remove four screws (5) securing the inducer assembly (2) to the header box (6).
5. Rotate the inducer assembly (2) to its new position. **NOTE:** Verify the screw holes in the inducer assembly (2) are aligned with the mounting holes in the header box (6).
6. Secure the inducer assembly (2) to the header box (6) by reinstalling the four screws (5).
7. Move the cabinet plug (7) from side of furnace and reinstall in hole on opposite side of cabinet.
8. Reconnect the electrical harness (1) to the inducer assembly (2).

Accessories

The components below are included in the extra parts bag that is supplied with the purchase of your furnace. Depending on your particular installation, some of these components are optional and may not be used. Please refer to the descriptions and accompanying figures when installing these items.

Finish Flange (Fig. 15)

The Finish Flange must be installed to vent the combustion air pipe through the top of the furnace. **NOTE:** For proper installation, it is important that the pipe and screw holes in the finish flange, gasket, and cabinet are aligned.

1. Position flange gasket over hole in the furnace cabinet.
2. Position finish flange on top of the flange gasket.
3. Secure flange and gasket to cabinet with three field supplied sheet metal screws.

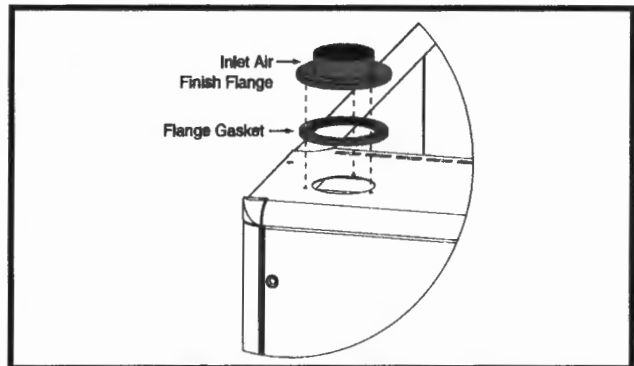


Figure 15. Finish Flange

Rubber Grommets (Fig. 16, page 19)

The 2 1/4" rubber grommet is used to seal the opening between the furnace cabinet and the 2" PVC vent pipe. The rubber grommet should be installed in the 3" hole prior to running the vent pipe out of cabinet. No sealants are required.

The 7/8" rubber grommet is used to seal the opening between the furnace cabinet and the gas pipe. The

rubber grommet should be installed in the 1 5/8" hole prior to running the gas pipe into the cabinet. No sealants are required.

The 3/4" rubber grommet is used if venting out the left side of the cabinet and the drain tube is routed through the blower deck. Remove the plastic plug from the hole and install the grommet before routing the drain tube.

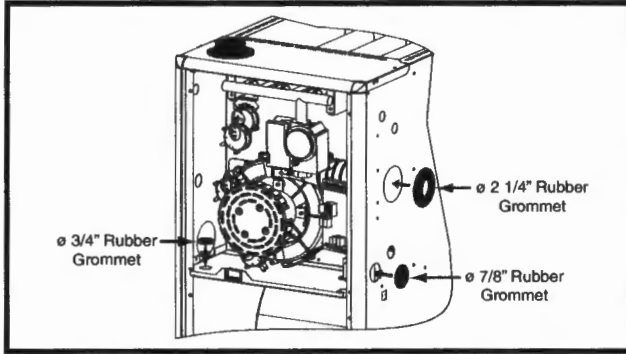


Figure 16. Rubber Grommets

PVC TEE, Reducer and Hose Barbs (Fig. 17)

IMPORTANT NOTE: Before permanently installing these components, it is recommended you dry-fit them first to ensure proper fit and alignment with other vent pipes.

The 2" PVC tee, reducer, and hose barb are used when the inducer is rotated to vent out thru the left or right side of the furnace cabinet.

The 1/2" x 3/4" hose barb can be used to route the condensate drain to the outside of the cabinet. It must be installed from inside the cabinet with the threaded end inserted thru the 1 1/16" hole. The condensate drain should be connected to the barbed end. Attach 1" PVC drain line to the threaded end.

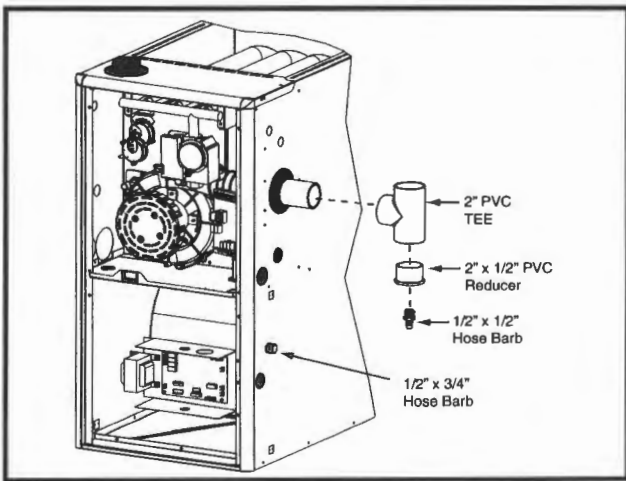


Figure 17. 2" PVC Tee, Reducer and Hose Barb

1. Install the 1/2" x 1/2" hose barb on the 2" PVC reducer with an adequate amount of approved sealant on the threads. **NOTE:** Do not over tighten the hose barb!
2. Install the tee on the 2" vent pipe that is extending out the side of the cabinet. Use appropriate primer and cement to permanently bond the tee to the 2" PVC pipe.
3. Install the reducer on the lowest end of the PVC tee. Use appropriate primer and cement to permanently bond the reducer and tee together.
4. Verify all connections and joints for tight fit and proper alignment with other vent pipes.

Condensate Drain Lines

The placement of the condensate drain lines will depend on the configuration selected in Table 4 (page 18). The drain lines can be routed out the left or right side of the furnace, but must maintain a downward slope to ensure proper condensate drainage. The J-trap may need to be rotated to the side that matches your setup in Figures 30 - 31 (pages 36 - 37). To rotate the J-trap, loosen the clamp on the drain tube, rotate the J-trap to either side, and retighten the clamp.

Four general principles apply:

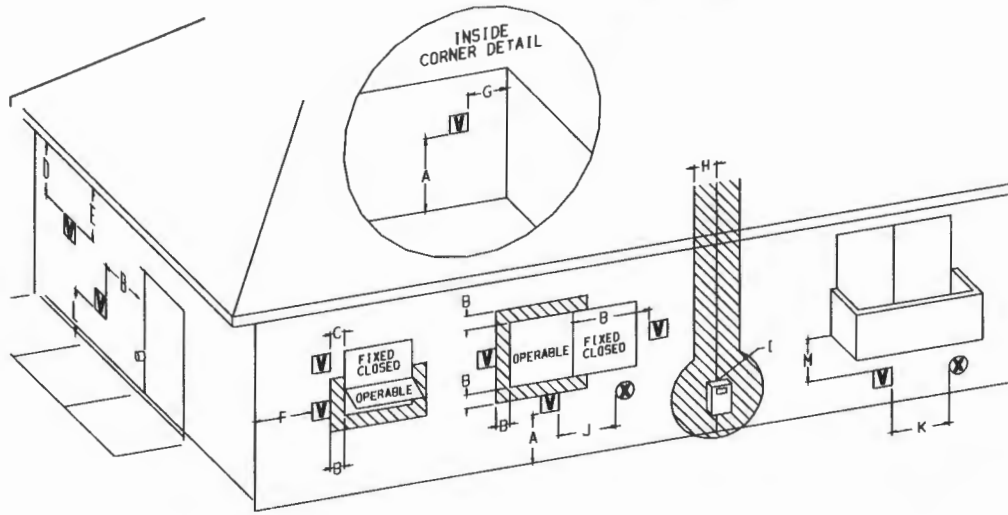
- Each condensate drain line must be separately trapped using a J-Trap or field supplied loop.
- There must always be a drain attached to the collector at the outlet of the secondary heat exchanger.
- There must always be a drain at the outlet of the inducer assembly.
- There must always be a drain at the lowest point of the venting system.

Exceptions and clarifications to the general rules:

- In some cases, the lowest point in the vent system is where it connects to the inducer (Options 2 & 4). In this case one drain at this location is sufficient.
- If the vent exits the furnace horizontally, the vent may be turned vertically with a tee. The drip leg formed by the tee must include a drain (Options 1, 2, 3, & 4).
- In certain cases, it is permitted to drain the inducer back into the top drain of the collector (Options 1, 3, 5, & 7). More importantly, make sure this drain does not sag or become twisted in the middle. The drain tube supplied with the furnace may need to be trimmed.

IMPORTANT NOTE: If the furnace is installed in an area where temperatures fall below freezing, special precautions must be made for insulating condensate drain lines that drain to the outdoors. If condensate freezes in the lines, this will cause improper operation or damage to the furnace. It is recommended that all drain lines on the outside of the residence be wrapped with an industry approved insulation or material allowed by local code.

VENTING INFORMATION



V VENT TERMINAL

X AIR SUPPLY INLET

▨ AREA WHERE TERMINAL IS NOT PERMITTED

Clearance Location	CANADIAN INSTALLATIONS ^a		US INSTALLATIONS ^b	
	Direct Vent (2-pipe) & Conventional Vent (1-pipe) Furnaces	Direct Vent (2-pipe) Furnaces	Direct Vent (2-pipe) Furnaces	Conventional Vent (1-pipe) Furnaces
A = Clearance above grade, veranda, porch, deck, balcony, or maximum expected snow level.	12 inches (30cm)	12 inches (30cm)	12 inches (30cm)	12 inches (30cm)
B = Clearance to window or door that may be opened.	6 inches (15cm) for appliances < 10,000 Btuh (3kW)	6 inches (15cm) for appliances < 10,000 Btuh (3kW)	6 inches (15cm) for appliances < 10,000 Btuh (3kW)	4 ft. (1.2m) below or to side of opening; 1 ft. (300mm) above opening
	12 inches (30cm) for appliances 10,000 Btuh - 100,000 Btuh (30kW)	9 inches (23cm) for appliances 10,000 Btuh - 50,000 Btuh (30kW)	9 inches (23cm) for appliances 10,000 Btuh - 50,000 Btuh (30kW)	
	36 inches (91cm) for appliances > 100,000 Btuh (30Kw)	12 inches (30cm) for appliances > 50,000 Btuh (30Kw)	12 inches (30cm) for appliances > 50,000 Btuh (30Kw)	
C = Clearance to permanently closed window	*	*	*	*
D = Vertical clearance to ventilated soffit located above the terminal within a horizontal distance of 2 feet (61cm) from the center line of the terminal.	*	*	*	*
E = Clearance to unventilated soffit.	*	*	*	*
F = Clearance to outside corner.	*	*	*	*
G = Clearance to inside corner.	*	*	*	*
H = Clearance to each side of center line extended above meter/regulator assembly.	3 feet (91cm) within a height 15 feet above the meter/regulator assembly	*	*	*
I = Clearance to service regulator vent outlet.	3 feet (1.83m)	*	*	*
J = Clearance to non-mechanical air supply inlet to building or the combustion air inlet to any other appliance.	6 inches (15cm) for appliances < 10,000 Btuh (3kW)	6 inches (15cm) for appliances < 10,000 Btuh (3kW)	6 inches (15cm) for appliances < 10,000 Btuh (3kW)	4 ft. (1.2m) below or to side of opening; 1 ft. (300mm) above opening
	12 inches (30cm) for appliances 10,000 Btuh - 100,000 Btuh (30kW)	9 inches (23cm) for appliances 10,000 Btuh - 50,000 Btuh (30kW)	9 inches (23cm) for appliances 10,000 Btuh - 50,000 Btuh (30kW)	
	36 inches (91cm) for appliances > 100,000 Btuh (30Kw)	12 inches (30cm) for appliances > 50,000 Btuh (30Kw)	12 inches (30cm) for appliances > 50,000 Btuh (30Kw)	
K = Clearance to mechanical air supply inlet.	6 feet (1.83m)	*	*	3 ft. (91cm) above if within 10 feet (3m) horizontally
L = Clearance above paved sidewalk or driveway located on public property.	7 feet (2.13m) ^c	*	*	*
M = Clearance under veranda, porch, deck, or balcony.	12 inches (30cm) ^d	*	*	*
NOTES:				
a	In accordance with the current CSA B149.1 Natural Gas and Propane Installation Guide Code			
b	In accordance with the current ANSI Z223.1 / NFPA 54 Natural Fuel Gas Code			
c	A vent shall not terminate directly above a sidewalk or paved driveway that is located between two single family dwellings and serves both dwellings.			
d	Permitted only if veranda, porch, deck, or balcony is fully open on a minimum of two sides beneath the floor.			
*	For clearances not specified in ANSI Z223.1 / NFPA 54 or CSA B149.1, the following statement shall be included: "Clearance in accordance with local installation codes, and the requirements of the gas supplier and the manufacturers installation instructions"			

Table 12. Vent Termination Clearances

INSTALLATION/PERFORMANCE CHECK LIST

INSTALLER NAME:	
CITY _____	STATE _____

INSTALLATION ADDRESS:	
CITY _____	STATE _____
UNIT MODEL # _____	
UNIT SERIAL # _____	

Minimum clearances per Table 1 (page 7)?	YES	NO
--	-----	----

Has the owner's information been reviewed with the home-owner?	YES	NO
--	-----	----

Has the literature package been left near the furnace?	YES	NO
--	-----	----

ELECTRICAL SYSTEM:		
Electrical connections tight?	YES	NO
Line voltage polarity correct?	YES	NO
Supply Voltage: _____ VOLTS		
Has the thermostat been calibrated?	YES	NO
Is the thermostat level?	YES	NO
	YES	NO

GAS SYSTEM:		
Gas Type: (circle one)	Natural Gas	Propane
Gas pipe connections leak-tested?	YES	NO
Gas Line Pressure: _____ (in - W.C.)		
Is there adequate fresh air supply for combustion and ventilation?	YES	NO
Installation Altitude: _____ (FT.)		
Deration Percentage: _____ (%)		
Furnace Input: _____ (Btuh)		
Supply Air Temperature: _____ (° F)		
Return Air Temperature: _____ (° F)		
Temperature Rise: _____ (° F)		

VENTING SYSTEM:		
Vent free from restrictions?	YES	NO
Filter(s) secured in place?	YES	NO
Filter(s) clean?	YES	NO
Flue connections tight?	YES	NO
Is there proper draft?	YES	NO



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