

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

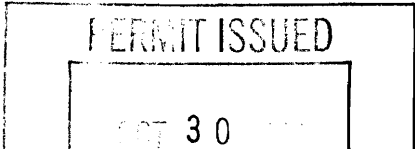
389 Congress Street, 04101 Tel: (207) 874-8703, Fax: (207) 874-8716

Permit No: 08-1387	Issue Date:	CBL: 256 B012001
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Location of Construction: 26 BUTTONWOOD LN	Owner Name: KOOCHER GARY M	Owner Address: 26 BUTTONWOOD LN	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: R3

Past Use: Single Family Home	Proposed Use: Single Family Home - install TRANE Direct Vent Gas Furnace	Permit Fee: \$70.00	Cost of Work: \$4,960.00	CEO District: 3
Proposed Project Description: install TRANE Direct Vent Gas Furnace		FIRE DEPT: <input type="checkbox"/> Approved <input type="checkbox"/> Denied	INSPECTION: Use Group: R3 Type: HVAC IRC 2003 ST ME GAS REGS	
		Signature:	Signature:	
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: ldobson	Date Applied For: 10/29/2008	<b>Zoning Approval</b>		
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<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 information may invalidate a building permit and stop all work..</p>	<p><b>Special Zone or Reviews</b></p> <input type="checkbox"/> Shoreland <input type="checkbox"/> Wetland <input type="checkbox"/> Flood Zone <input type="checkbox"/> Subdivision <input type="checkbox"/> Site Plan Maj <input type="checkbox"/> Minor <input type="checkbox"/> MM <input type="checkbox"/> Date: <i>Jm 10/30/08</i>	<p><b>Zoning Appeal</b></p> <input type="checkbox"/> Variance <input type="checkbox"/> Miscellaneous <input type="checkbox"/> Conditional Use <input type="checkbox"/> Interpretation <input type="checkbox"/> Approved <input type="checkbox"/> Denied Date: _____	<p><b>Historic Preservation</b></p> <input checked="" type="checkbox"/> Not in District or Landmark <input checked="" type="checkbox"/> Does Not Require Review <input type="checkbox"/> Requires Review <input type="checkbox"/> Approved <input type="checkbox"/> Approved w/Conditions <input type="checkbox"/> Denied Date: <i>Jm 10/30/08</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

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

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

<b>Permit No:</b> 08-1387	<b>Date Applied For:</b> 10/29/2008	<b>CBL:</b> 256 B012001
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<b>Location of Construction:</b> 26 BUTTONWOOD LN	<b>Owner Name:</b> KOOCHER GARY M	<b>Owner Address:</b> 26 BUTTONWOOD LN	<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 TRANE Direct Vent Gas Furnace	<b>Proposed Project Description:</b> install TRANE Direct Vent Gas Furnace
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<b>Dept:</b> Zoning	<b>Status:</b> Approved with Conditions	<b>Reviewer:</b> Tom Markley	<b>Approval Date:</b> 10/30/2008
<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> 10/30/2008
<b>Note:</b>			<b>Ok to Issue:</b> <input checked="" type="checkbox"/>
1) The heating appliance/stove shall be installed, maintained and operated in accordance with the terms of the listing.			
2) The installation must comply with the State of Maine Gas Regulations.			
3) Application approval based upon information provided by applicant. Any deviation from approved plans requires separate review and approval prior to work.			

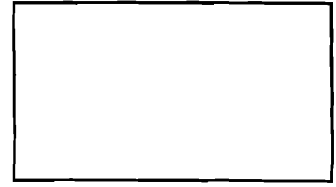
73433

256-B-012



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 26 BUTTON WOOD LANE Use of Building RESIDENTIAL Date 10/28/08  
 Name and address of owner of appliance GARY KOOCHEE, 26 BUTTON WOOD LANE, PORTLAND, ME 04102  
 Installer's name and address CARON+WALTZ, 321 LINCOLN STREET, SO. PORTLAND, ME 04106 Telephone 799-2228

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

**Type of Fuel:**  
 Gas       Oil       Solid

**Appliance Name:** TRANE XV95 T4H2D120A9V5VA  
 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 # PNT 1619  
 Other \_\_\_\_\_

**Type of Chimney:**  
 Masonry Lined  
 Factory built \_\_\_\_\_  
 Metal  
 Factory Built U.L. Listing # \_\_\_\_\_  
 Direct Vent  
 Type PVC Venting UL# \_\_\_\_\_

**Type of Fuel Tank** NONE  
 Oil  
 Gas

Size of Tank NA

Number of Tanks NA

Distance from Tank to Center of Flame NA feet.

Cost of Work: \$ 4,960.00

Permit Fee: \$ 70-

OCT 29 2008

**Approved**

**Approved with Conditions**

Fire: \_\_\_\_\_  
 Ele.: \_\_\_\_\_  
 Bldg.: \_\_\_\_\_

See attached letter or requirement

Signature of Installer [Signature]

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



**TRANE**

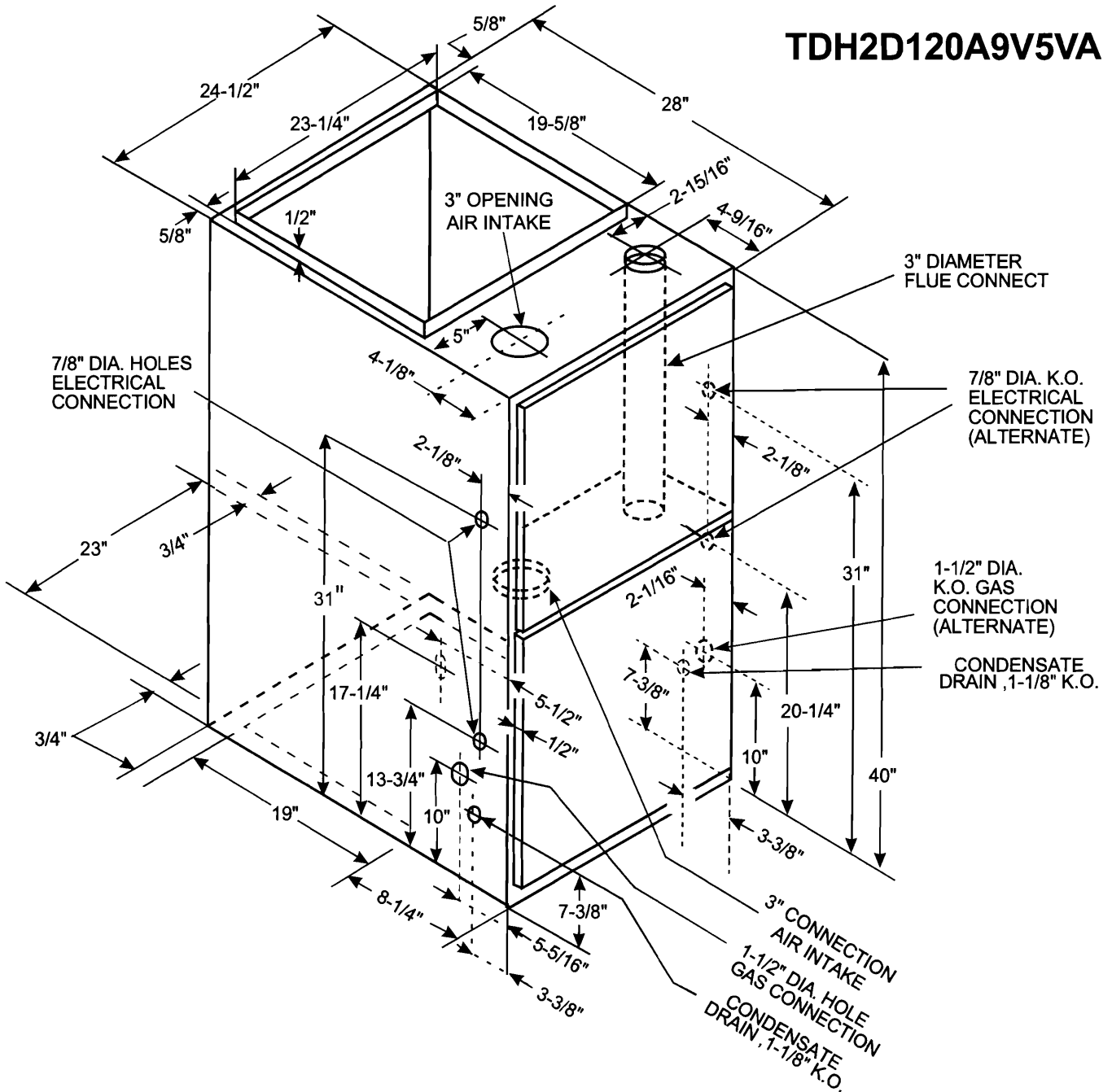
**TDH2D120-SUB-1**

TAG: \_\_\_\_\_

# SUBMITTAL

**Downflow / Horizontal  
Direct Vent Gas Furnace  
Variable Speed Inducer  
2 Stage Heat**

**TDH2D120A9V5VA**



<b>*DH2D120 - FURNACE HEATING AIRFLOW (CFM) AND POWER (WATTS) VS. EXTERNAL STATIC PRESSURE WITH FILTER</b>									
					1st STAGE CAPACITY = 74,000 2nd STAGE CAPACITY = 114,000				
	AIRFLOW SETTING	DIP SWITCH SETTING			EXTERNAL STATIC PRESSURE				
		SW 8	SW 7		0.1	0.3	0.5	0.7	0.9
HEATING 1ST STAGE	LOW	ON	ON	CFM TEMP. RISE WATTS	1025 65 150	1025 65 200	1000 67 240	1000 67 290	1000 67 340
	MEDIUM LOW	OFF	ON	CFM TEMP. RISE WATTS	1200 56 230	1200 56 270	1200 56 330	1200 56 390	1200 56 450
	NORMAL **	ON	OFF	CFM TEMP. RISE WATTS	1350 49 280	1350 49 340	1350 49 490	1350 49 470	1350 49 530
	HIGH	OFF	OFF	CFM TEMP. RISE WATTS	1550 43 400	1550 43 490	1550 43 560	1550 43 620	1450 46 600
HEATING 2ND STAGE	LOW	ON	ON	CFM TEMP. RISE WATTS	1550 66 380	1550 66 470	1550 66 540	1550 66 610	1450 71*** 690
	MEDIUM LOW	OFF	ON	CFM TEMP. RISE WATTS	1850 56 660	1850 56 750	1850 56 780	1700 60 720	1500 69 640
	NORMAL **	ON	OFF	CFM TEMP. RISE WATTS	2050 50 860	2000 51 880	1850 56 810	1700 60 750	1550 66 670
	HIGH	OFF	OFF	CFM TEMP. RISE WATTS	2105 49 1000	2050 50 940	1900 54 880	1775 58 820	1625 63 750

NOTES:  
 \* First letter may be "A" or "T"  
 \*\* Factory setting

<b>*DH2D120 - FURNACE COOLING AIRFLOW (CFM) AND POWER (WATTS) VS. EXTERNAL STATIC PRESSURE WITH FILTER</b>											
OUTDOOR UNIT SIZE (TONS)	AIRFLOW SETTING	DIP SWITCH SETTING					EXTERNAL STATIC PRESSURE				
		SW 1	SW 2	SW 3	SW 4		0.1	0.3	0.5	0.7	0.9
3.5	LOW (350 CFM/TON)	OFF	ON	OFF	ON	CFM WATTS	1225 240	1225 280	1225 340	1225 400	1225 450
	NORMAL (400 CFM/TON)	OFF	ON	OFF	OFF	CFM WATTS	1400 310	1400 390	1400 470	1400 520	1400 570
	HIGH (450 CFM/TON)	OFF	ON	ON	OFF	CFM WATTS	1600 450	1600 520	1600 590	1600 640	1450 600
4.0	LOW (350 CFM/TON)	ON	OFF	OFF	ON	CFM WATTS	1400 300	1400 380	1400 450	1400 520	1400 570
	NORMAL (400 CFM/TON)	ON	OFF	OFF	OFF	CFM WATTS	1600 460	1600 530	1600 610	1600 670	1450 600
	HIGH (450 CFM/TON)	ON	OFF	ON	OFF	CFM WATTS	1800 610	1800 700	1800 760	1650 690	1500 630
5	LOW (350 CFM/TON)	OFF	OFF	OFF	ON	CFM WATTS	1750 580	1750 640	1750 720	1650 680	1450 610
	NORMAL (400 CFM/TON)	OFF	OFF	OFF	OFF	CFM WATTS	2000 830	2000 860	1850 800	1700 740	1550 660
	HIGH (450 CFM/TON)	OFF	OFF	ON	OFF	CFM WATTS	2100 970	2000 910	1900 850	1650 780	1600 710

NOTES: \* - First letter may be "A" or "T"  
 1. At continuous fan setting: Heating or Cooling airflows are approximately 50% of selected cooling value.  
 2. LOW airflow (350 cfm/ton) is COMFORT & HUMID CLIMATE setting;  
 NORMAL airflow (400 cfm/ton) is typical setting;  
 HIGH airflow (450 cfm/ton) is DRY CLIMATE setting.

## INDOOR BLOWER TIMING

**Heating:** The ICM Fan Control controls the variable speed indoor blower. The blower "on" time is fixed at 45 seconds after ignition. The FAN-OFF period is field selectable by dip switches #2 and #3 on the Integrated Furnace Control at 60, 100, 140, or 180 seconds. The factory setting is 100 seconds, (See unit wiring diagram).

**Cooling:** The fan delay-off period is set by dip switches on the ICM Fan Control board connected to the Integrated Furnace Control. The options for cooling delay off is field selectable by dip switches #5 and #6. However, dip switch #1 on the Integrated Furnace Control must be set to "ON" for cooling mode to function properly.

The following table and graph explain the delay-off settings:

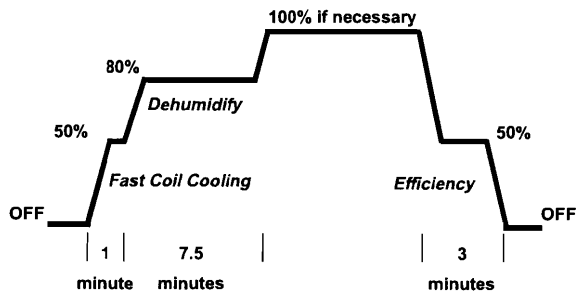
\*\* - This selection provides a ramping up and ramping down of the blower speed to provide improved comfort, quietness, and potential energy savings. The graph below shows the ramping process.

### COOLING OFF - DELAY OPTIONS

SWITCH SETTINGS		SELECTION	NOMINAL AIRFLOW
5 - OFF	6 - OFF	NONE	SAME
5 - ON	6 - OFF	1.5 MINUTES	100% *
5 - OFF	6 - ON	3 MINUTES	50%
5 - ON	6 - ON	**	50 - 100%

\* - This setting is equivalent to BAY24X045 relay benefit

\*\* - This selection provides **ENHANCED MODE**, which is a ramping up and ramping down of the blower speed to provide improved comfort, quietness, and potential energy savings. See Wiring Diagram notes on the unit or in the Service Facts for complete wiring setup for **ENHANCED MODE**. The graph which follows, shows the ramping process.



## General Data ①

MODEL	*DH2D120A9V5VA
TYPE	Downflow / Horizontal
<b>RATINGS ②</b>	
1st Stage Input BTUH	78,000
1st Stage Capacity BTUH (ICS) ③	74,000
2nd Stage Input BTUH	120,000
2nd Stage Capacity BTUH (ICS) ③	114,000
AFUE	95
Temp. rise (Min.-Max.) °F.	40 - 70
<b>BLOWER DRIVE</b>	
Drive - No. Speeds	Direct - Variable
Diameter - Width (In.)	10 x 10
No. Used	1
Speeds (No.)	Variable
CFM vs. in. w.g.	See Fan Performance Table
Motor HP	1
R.P.M.	Variable
Volts / Ph / Hz	115/1/60
<b>COMBUSTION FAN - Type</b>	
Drive - No. Speeds	Direct - Variable
Motor HP - RPM	1/50 - 5000
Volts / Ph / Hz	33 - 110/3/60 - 180
FLA	1.0
<b>FILTER — Furnished?</b>	
Type Recommended	High Velocity
Hi Vel. (No.-Size-Thk.)	2 - 16x20 - 1 in.
<b>VENT — Size (in.)</b>	
	3 Round
<b>HEAT EXCHANGER</b>	
Type - Fired	Aluminized Steel - Type I
-Unfired	
Gauge (Fired)	20
<b>ORIFICES — Main</b>	
Nat. Gas Qty. — Drill Size	6 — 45
L.P. Gas Qty. — Drill Size	6 — 56
<b>GAS VALVE</b>	
	Redundant - Two Stage
<b>PILOT SAFETY DEVICE</b>	
Type	Hot Surface Igniter
<b>BURNERS — Type</b>	
Number	Multipoint Inshot
	6
<b>POWER CONN. — V / Ph / Hz ④</b>	
Ampacity (In Amps)	15.2
Max. Overcurrent Protection (Amps)	20
<b>PIPE CONN. SIZE (IN.)</b>	
	1/2
<b>DIMENSIONS</b>	
Crated (In.)	H x W x D
	41-3/4 x 26-1/2 x 30-1/2
<b>WEIGHT</b>	
Shipping (Lbs.) / Net (Lbs)	206 / 196

① Central Furnace heating designs are certified by AGA and CSA.

② For U.S. applications, above input ratings (BTUH) are up to 2,000 feet, derate 4% per 1,000 feet for elevations above 2,000 feet above sea level. For Canadian applications, above input ratings (BTUH) are up to 4,500 feet, derate 4% per 1,000 feet for elevations above 4,500 feet above sea level.

③ Based on U.S. government standard tests.

④ The above wiring specifications are in accordance with National Electrical Code; however, installations must comply with local codes.

# Mechanical Specifications

## NATURAL GAS MODELS

Central Heating furnace designs are certified by the American Gas Association for both natural and L.P. gas. Limit setting and rating data were established and approved under standard rating conditions using American National Standards Institute standards.

## SAFE OPERATION

The Integrated System Control has solid state devices, which continuously monitor for presence of flame, when the system is in the heating mode of operation. Dual solenoid combination gas valve and regulator provide additional safety.

## QUICK HEATING

Durable, cycle tested, heavy gauge **aluminized steel heat exchanger** quickly transfers heat to provide warm conditioned air to the structure. **Low energy power vent blower**, to increase efficiency and provide a positive discharge of gas fumes to the outside.

## BURNERS

Multiport Inshot burners will give years of quiet and efficient service. All models can be converted to L.P. gas without changing burners.

## INTEGRATED SYSTEM CONTROL

Exclusively designed operational program provides total control of furnace limit sensors, blowers, gas valve, flame control and includes self diagnostics for ease of service. Also contains connection points for E.A.C./Humidifier.

## AIR DELIVERY

The variable speed blower motor has sufficient airflow for most heating and cooling requirements and will switch from heating to cooling speeds on demand from room thermostat. The blower door safety switch will prevent or terminate furnace operation when the blower door is removed.

## SECONDARY HEAT EXCHANGER

The XV95 has a special type 29-4C™ stainless steel secondary heat exchanger to reclaim heat from flue gases which would normally be lost instead.

## STYLING

**Heavy gauge steel and "wrap-around" cabinet construction** is used in the cabinet with baked-on enamel finish for strength and beauty. The heat exchanger section of the cabinet is completely lined with foil faced fiberglass insulation. This results in quiet and efficient operation due to the excellent acoustical and insulating qualities of fiberglass. Built-in bottom pan and alternate bottom, left or right side return air connection provision.

## FEATURES AND GENERAL OPERATION

The XV95 High Efficiency Gas Furnaces utilize an Adaptive Heat Up Silicon Nitride Hot Surface Ignition system, which eliminates the waste of a constant burning pilot. The integrated system control lights the main burners upon a demand for heat from the room thermostat. Complete front service access.

- a. Low energy power venter
- b. Vent proving pressure switch.

Trane has a policy of continuous product and product data improvement and it reserves the right to change specifications and design without notice.

**Trane**  
Troup Highway  
Tyler, TX 75707-9010



# Installer's Guide

## INSTALLATION INSTRUCTIONS

### ⚠ WARNING

**FIRE HAZARD. DO NOT INSTALL THE FURNACE DIRECTLY ON CARPETING, TILE OR OTHER COMBUSTIBLE MATERIAL OTHER THAN WOOD FLOORING. FOR VERTICAL DOWNFLOW APPLICATION, SUBBASE (BAYBASE205) MUST BE USED BETWEEN THE FURNACE AND COMBUSTIBLE FLOORING. WHEN THE DOWNFLOW FURNACE IS INSTALLED VERTICALLY WITH A CASED COIL, A SUB-BASE IS NOT REQUIRED.**

The bottom panel of the upflow furnace must be removed for bottom return air.

Remove the filter and lay the furnace on its back. Remove the two 5/16" hex screws securing the bottom front channel to the cabinet. Lower the front edge of the bottom front channel and pull forward to remove the channel. The bottom return air panel will now easily slide out of the cabinet. Reinstall the bottom front channel and filter for upflow bottom return installations.

### UPFLOW INSTALLATION

Standoffs and screws (See Figure 4) are included with the cased coils for attachment to the Furnace. There are clearance alignment holes near the bottom of the coil wrapper. Drill screws are used to engage the Furnace top flanges. The standoff is inserted into the cabinet alignment hole. The drill screws are inserted through the standoffs then screwed into the Furnace flange. The coil is always placed downstream of the Furnace airflow. The above instructions apply only if the coil is on top of an upflow Furnace

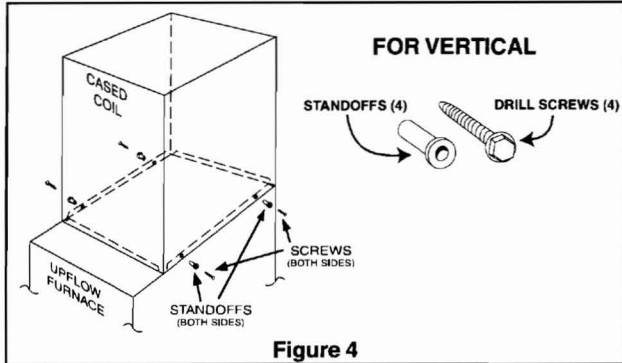


Figure 4

### DOWNFLOW INSTALLATION

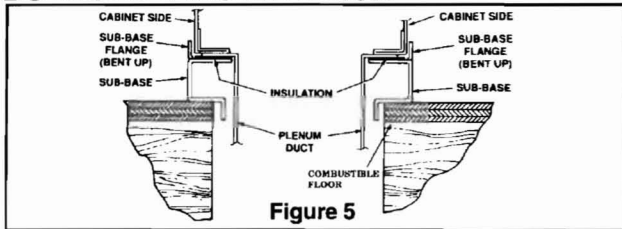


Figure 5

Table 2

MINIMUM CLEARANCE FROM COMBUSTIBLE MATERIALS FOR UPFLOW/HORIZONTAL AND DOWNFLOW/ HORIZONTAL FURNACES			
FURNACE SURFACE	UNIT LOCATION		
	VERTICAL CLOSET	HORIZONTAL CLOSET	HORIZONTAL ALCOVE / ATTIC
SIDES	0"	1"	0"
BACK	0"	3"	6"
TOP	1"	1"	1"
FRONT	3"	3"	18"
VENT	0"	0"	0"

NOTE: CLEARANCE REQUIRED AT TOP OF PLENUM IS 1"

Table 1 Required floor opening: (DOWNFLOW)

CABINET WIDTH	RETURN DUCT WIDTH	FLOOR OPENING		PLENUM OPENING	
		"A"	"B"	"C"	"D"
17-1/2"	16-1/4"	16-5/8"	20-1/8"	15-5/8"	19-3/8"
21"	19-3/4"	20-1/8"	20-1/8"	19-1/8"	19-3/8"
24-1/2"	23-1/4"	23-5/8"	20-1/8"	22-5/8"	19-3/8"

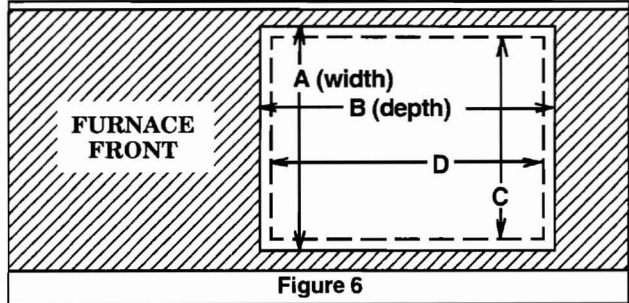


Figure 6

### HORIZONTAL INSTALLATION

The coil and Furnace must be fully supported when used in the horizontal position. It is always recommended that an auxiliary drain pan be installed under a horizontally installed evaporator coil or 90% Gas Furnace. Connect the auxiliary drain line to a separate drain line (no trap is needed in this line).

The coil is placed downstream of the Furnace, with the apex of the coil pointing in the direction of the airflow for horizontal installation.

The cased coil is secured to the Furnace. The brackets mount using the rear screws on the coil case. Use the screws provided to secure the bracket to the Furnace. The remaining bracket is placed as close as horizontal center as possible between the coil and the Furnace, converted to horizontal, aligns and attaches to the TXC coil.

The Furnace and the cased coil must be properly supported.

The Furnace may be installed in an attic or crawl space in the horizontal position by placing the Furnace on the left side (as viewed from the front in the vertical position). The horizontal Furnace installation in an attic should be on a service platform large enough to allow for proper clearances on all sides and service access to the front of the Furnace (See Figure 6 & Table 1). Line contact is only permissible between lines formed by intersections of the top and two sides of the furnace casing and building joists, studs, or framing.

The Furnace may be placed horizontally in a crawl space on a pad or other noncombustible material which will raise the unit for sufficient protection from moisture.

**The Furnace must be supported at both ends and the middle when installed horizontally. The Furnace must also be elevated approximately 4-6 inches to allow clearance for the condensate drain to exit the cabinet in the horizontal position.**

### IMPORTANT:

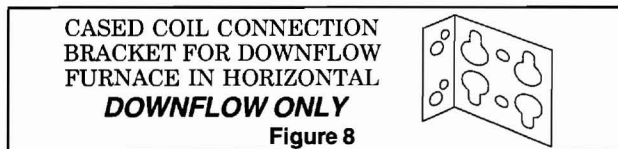
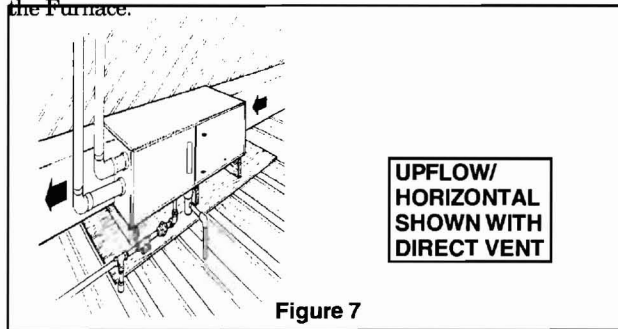
**The 2/4TXC cased coil must be placed downstream of the furnace. In horizontal installations, the apex of the coil may point either toward or away from the furnace. See the 2/4TXC coil Installer's Guide for more details.**



# Installer's Guide

The horizontal Furnace may also be suspended from the joists using all-thread rods with a substantial metal support frame that supports the entire length of the furnace. The rods need to be of sufficient length to allow for proper clearances from combustible materials. The frame needs to be at least 32" in length to allow for access to service panels.

If the Furnace is suspended using steel strap, it must be supported at all four corners and in the middle at the front of the Furnace.



## AIR FOR COMBUSTION AND VENTILATION

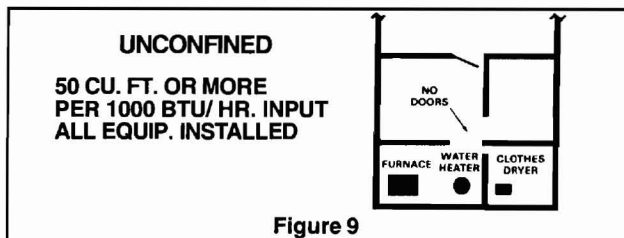
The following warning complies with State of California law, Proposition 65.

**⚠ WARNING**

**HAZARDOUS GASES!  
EXPOSURE TO FUEL SUBSTANCES OR BY-PRODUCTS  
OF INCOMPLETE FUEL COMBUSTION IS BELIEVED BY  
THE STATE OF CALIFORNIA TO CAUSE CANCER,  
BIRTH DEFECTS, OR OTHER REPRODUCTIVE HARM.**

Adequate flow of combustion and ventilating air must not be obstructed from reaching the Furnace. Air openings provided in the Furnace casing must be kept free of obstructions which restrict the flow of air. Airflow restrictions affect the efficiency and safe operation of the Furnace. Keep this in mind should you choose to remodel or change the area which contains your Furnace. Furnaces must have a free flow of air for proper performance.

Provisions for combustion and ventilation air shall be made in accordance with "latest edition" of Section 5.3, Air for Combustion and Ventilation, of the National Fuel Gas Code, ANSI Z223.1, or Sections 7.2, 7.3 or 7.4 of CSA B149.1 Installation Codes, and applicable provisions of the local building codes. Special conditions created by mechanical exhausting of air and fireplaces must be considered to avoid unsatisfactory Furnace operation.



Furnace locations may be in a confined space (see Figure 10) or an unconfined space (See Figure 9).

Table 3

MINIMUM AREA IN SQUARE FEET FOR UNCONFINED SPACE INSTALLATIONS	
FURNACE MAXIMUM BTUH INPUT RATING	WITH 8 FT. CEILING MINIMUM AREA IN SQUARE FEET OF UNCONFINED SPACE
60,000	375
80,000	500
100,000	625
120,000	750
140,000	875

Unconfined space is defined in Table 3 and Figure 9. These spaces may have adequate air by infiltration to provide air for combustion, ventilation, and dilution of flue gases. Buildings with tight construction (for example, weather stripping, heavily insulated, caulked, vapor barrier, etc.), may need additional air provided as described for confined space.

1. All air from inside the building as in Figure 11: The confined space shall be provided with two permanent openings communicating directly with an additional room(s) of sufficient volume so that the combined volume of all spaces meets the criteria for an unconfined space. The total input of all gas utilization equipment installed in the combined space shall be considered in making this determination. Refer to Table 4, for minimum open areas required.

2. All air from outdoors as in Figure 12: The confined space shall be provided with two permanent openings, one commencing within 12 inches of the top and one commencing within 12 inches of the bottom of the enclosure.

The openings shall communicate directly, or by ducts, with the outdoors or spaces (crawl or attic) that freely communicate with the outdoors. Refer to Table 4, for minimum open areas required.

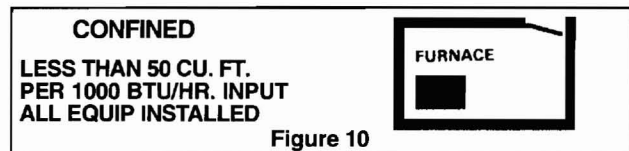


Table 4  
MINIMUM FREE AREA IN SQUARE INCHES EACH OPENING (FURNACE ONLY)

Furnace Maximum BTUH/INPUT Rating	Air From Inside	Air From Outside	
		Vertical Duct	Horizontal Duct
60,000	100	15	30
80,000	100	20	40
100,000	100	25	50
120,000	120	30	60
140,000	140	35	70

Confined spaces are installations with less than 50 cu. ft. of space per 1000 BTU/ hr input from all equipment installed. Confined space is defined in Figure 10. Air for combustion and ventilation requirements can be supplied from inside the building as in Figure 11 or from the outdoors, as in Figure 12.

3. The following types of installations will **require** use of **OUTDOOR AIR** for combustion, due to chemical exposures:

- \* Commercial buildings
- \* Buildings with indoor pools
- \* Furnaces installed in commercial laundry rooms
- \* Furnaces installed in hobby or craft rooms

## GENERAL VENTING

### 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 for each appliance connected to the venting system being placed into 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 Code* 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 deficiencies which could cause an unsafe condition.
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 Z221.1/NFPA 54 and/or CSA B149.1 *Natural Gas and Propane Installation Code*.
9. After it has been determined that each appliance connected to the venting system properly vents where when tested as outlined above, return doors, windows, exhaust fans, fireplace dampers and any other gas-fired burning appliance to their previous condition of use.

### WARNING

#### CARBON MONOXIDE POISONING HAZARD

**FAILURE TO FOLLOW THE INSTALLATION INSTRUCTIONS FOR THE VENTING SYSTEM BEING PLACED INTO OPERATION COULD RESULT IN CARBON MONOXIDE POISONING OR DEATH.**

**Do Not** install return air through the side of the furnace cabinet on horizontal applications.

**NOTE: Minimum return air temperature is 55° F.**

FURNACE EXHAUST MUST BE VENTED TO THE OUTDOORS. THESE FURNACES ARE INDUCED DRAFT VENTED AND MUST **NOT** BE CONNECTED TO ANY VENT SERVING ANOTHER APPLIANCE. PLEASE NOTE THAT THESE FURNACES USE **POSITIVE-PRESSURE VENT SYSTEMS**.

Proper venting is essential to obtain maximum efficiency from a condensing Furnace. Proper installation of the vent system is necessary to assure drainage of the condensate and prevent deterioration of the vent system.

American Gas Association has certified the design of condensing Furnaces for a minimum of 0" clearance from combustible materials with a single wall plastic vent pipe.

The recommended system is assembled from 2", 2-1/2", or 3" plastic pipe and fittings (See Table 10, page 19). Where the system is routed to the outdoors through an existing masonry chimney containing flue products from another gas appliance, or where required by local codes, then 3" venting of type 29-4C stainless steel must be used in place of PVC material.

These Furnaces have been classified as CATEGORY IV Furnaces in accordance with ANSI Z21.47 "latest edition" standards. Category IV Furnaces operate with positive vent pressure and with a vent gas temperature less than 140°F above the dewpoint. These conditions require special venting systems, which must be gas tight and water tight.

**NOTE: When an existing Furnace is removed from a venting system serving other gas appliances, the venting system is likely to be too large to properly vent the remaining attached appliances.**

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 the common venting system are not in operation.

1. Seal any unused openings in the common venting system.
2. Visually inspect the venting system for proper size and horizontal pitch and determine there is no blockage or restriction, leakage, corrosion or other deficiencies which could cause an unsafe condition.
3. In so far as is practical, close all building doors and windows and all doors between the space in which the appliances remaining connected to the common venting system are located and other spaces of 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, so they will operate at maximum speed. Do not operate a summer exhaust fan, close fireplace dampers.
4. Follow the lighting instructions. Place the appliance being inspected in operation. Adjust Comfort Control so appliance will operate continuously.
5. After it has been determined that each appliance remaining connected to the common venting system properly vents when tested as outlined above, return door, windows, exhaust fans, fireplace dampers and any other gas-burning appliance to their previous conditions of use.

If improper venting is observed during any of the above tests, the remaining common venting system must be corrected. Correction could require rerouting or resizing the remaining vent system.

**IMPORTANT:** These Furnaces may be installed as Direct Vent (sealed combustion) or as Nondirect Vent (single pipe). The Furnaces are shipped **DIRECT VENT** with sealed combustion.

# Installer's Guide

For **DIRECT VENT APPLICATION**: The Furnaces must be vented to the exterior of the house and combustion air **MUST** come through the inlet air pipe **FROM OUTSIDE AIR**.

**NOTE: BAYVENT200\* accessories can be used for inlet and outlet terminals when the pipes do not exit the structure together.**

For **NONDIRECT VENT APPLICATION**: The Furnace shall be vented to the exterior of the house, but combustion air may enter from the surrounding area as long as combustion air requirements are met. (See AIR FOR COMBUSTION AND VENTILATION)

## FURNACE VENT / INLET PIPE INSTALLATION

There are many different variations of the vent / inlet air pipe combination. The vent / inlet air combination used for installation of these Furnaces depends on the needs of the location. However, these guidelines must be followed:

1. The Furnace must vent outside the structure.
2. Furnace combustion air requirements must be met for non-direct, single pipe applications.
3. For direct vent application of these Furnaces, the vent pipe and air inlet pipe do not have to exit in the same air space or even on the same surface of the structure.

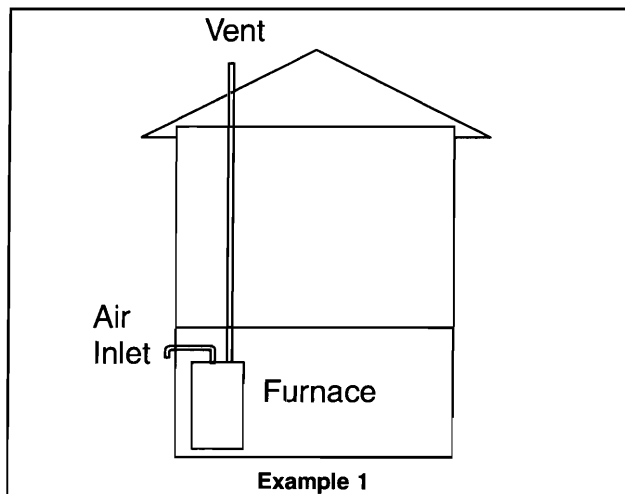
*However, the longest individual pipe will decide the value for the longest allowable equivalent vent / inlet air length as shown in the vent length table on page 19.*

**NOTE: Vent termination kit BAYAIR30AVENTA or BAYVENT200B may be used in addition to the horizontal and vertical termination options shown in the following examples.**

The following are **EXAMPLES ONLY**:

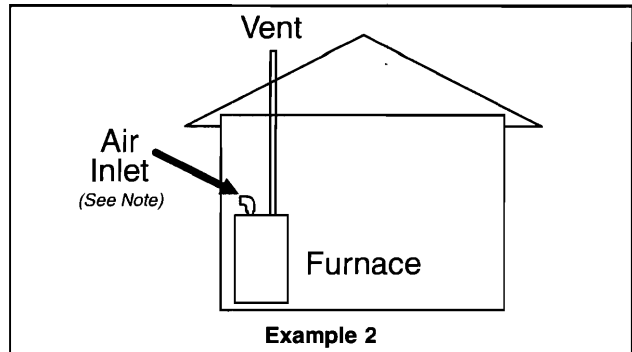
### EX. 1 —

Example 1 shows that the vent may go vertical while the inlet air may be on any side of the structure. The vent pipe would decide the maximum equivalent length for the pipe depending on the furnace and pipe size.



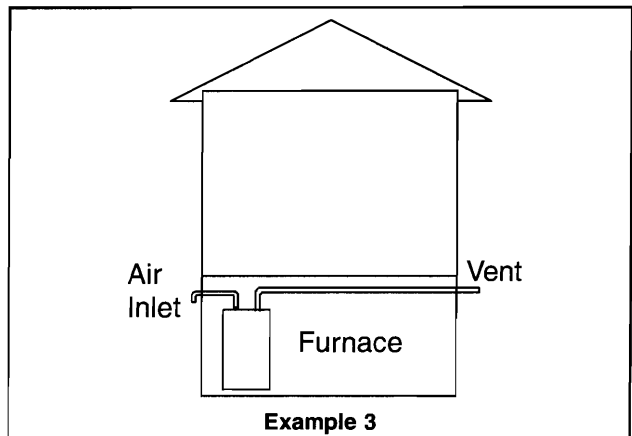
### EX. 2 —

Example 2 shows the vent pipe exhausting through the roof and the inlet air coming from the interior of the house. The inlet air coming from the interior of the house must meet combustion requirements for area, etc., as shown in the section AIR FOR COMBUSTION AND VENTILATION in this Installer's Guide.



### EX. 3 —

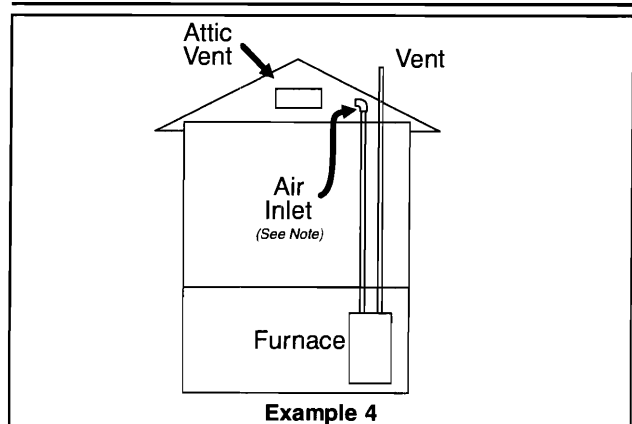
Example 3 shows the vent exiting one side of the house while the inlet air is on the opposite side of the structure. Here the vent pipe length must be within the allowable length for the size of Furnace and size of the vent pipe. This example demonstrates that the pipes do not have to exit on the same side of the structure.



### EX. 4 —

The inlet air does not have to come from outside the structure. Example 4 shows the inlet air, may come from the attic if the requirements for combustion air are met as shown in the section AIR FOR COMBUSTION AND VENTILATION.

**NOTE: If only the flue gas pipe is to the outside of the structure, a straight section of pipe (long enough to exit the Furnace cabinet) must be attached to the inlet air side with an elbow (which is 5 to 10 equiv. ft.) installed on the end to prevent dust and debris from falling directly into the Furnace.**



# Installer's Guide

## VENT FITTING MATERIAL – PLASTIC

Gas and liquid tight single wall vent fittings, designed for resistance to corrosive flue condensate, MUST be used throughout.

Listed in Table 10, page 19, are 2" and 3" size fittings that meet these requirements. The materials listed are various grades of PVC and ABS plastic.

**PIPE JOINTS:** All joints must be fastened and sealed to prevent escape of combustion products into the building.

**NOTE: It is recommended that the first joints from the Furnace be connected and sealed with high temperature RTV. This will enable the pipes to be removed later without cutting.**

*Be sure to properly support these joints.*

## BONDING OF PVC

Commercially available solvent cement for PVC must be used to join PVC pipe fittings. Follow instructions on container carefully.

Pipe and Fitting – ASTM D1785, D2466, D2661, & D2665

PVC Primer and Solvent Cement – ASTM D2564

Procedure for Cementing Joints – Ref ASTM D2855

1. Cut pipe square, remove ragged edges and burrs. Chamfer end of pipe, then clean fitting socket and pipe joint area of all dirt, grease, moisture or chips.
2. After checking pipe and socket for proper fit, wipe socket and pipe with cleaner-primer. Apply a liberal coat of primer to inside surface of socket and outside of pipe.  
**DO NOT ALLOW PRIMER TO DRY BEFORE APPLYING CEMENT.**
3. Apply a thin coat of cement evenly in the socket. Quickly apply a heavy coat of cement to the pipe end and insert pipe into fitting with a slight twisting movement until it bottoms out.
4. Hold the pipe in the fitting for 30 seconds to prevent tapered socket from pushing the pipe out of the fitting.
5. Wipe all excess cement from the joint with a rag. Allow 15 minutes before handling. Cure time varies according to fit, temperature and humidity.

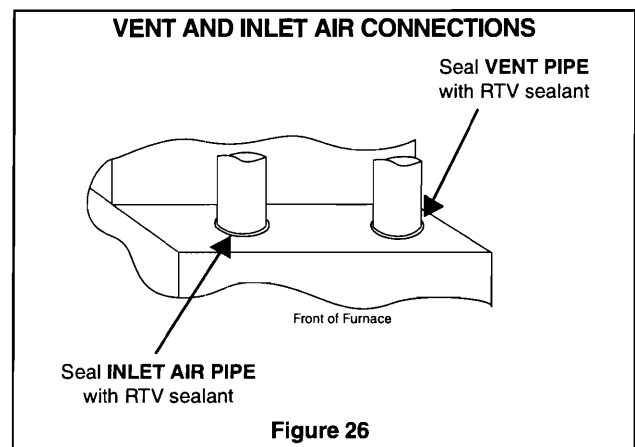
**Important: Products installed in Canada must use vent systems that are certified to the Standard for Type BH Gas Venting Systems (ULC S636) for Class II-A venting systems (up to 65°C). Components of the vent system must not be interchanged with other vent systems or unlisted pipe or fittings. Plastic components, specified primers, and glues must be from a single system manufacturer and not intermixed with other system manufacturer's vent system parts. In addition, the first three feet of the vent pipe must be visible for inspection.**

**NOTE: Follow venting instructions carefully when using PVC cement.**

**IMPORTANT: All joints must be water tight. Flue condensate is somewhat acidic, and leaks can cause equipment damage.**

Connection of the pipe and collar of the combustion air inlet should just be a friction fit. It is recommended that the inlet air joint be sealed with RTV type sealant to allow the joint to be separated for possible future service. The inlet and vent pipes must be properly supported throughout the entire length. See Figure 26.

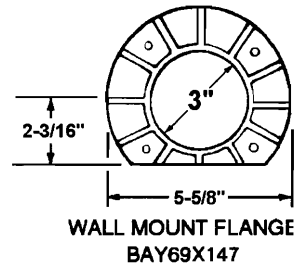
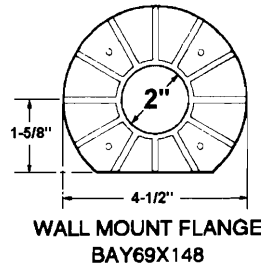
**NOTE: Vent termination kit BAYAIR30AVENTA or BAYVENT200B may be used in addition to the horizontal and vertical termination options shown in the following figures.**



# Installer's Guide

Table 9

**PVC VENT FITTING MATERIAL** These fittings are available from your Gas Furnace Distributors.



## PLASTIC PIPE DESIGNATIONS

### PVC

ASTM STANDARD	PIPE TYPE	ALLOWABLE TEMPERATURE	MARKING
F891	CELLULAR CORE	*158	ASTM F891
D2665	DWV PIPE	**158	ASTM D2665
D1785	SCH 40, 80, 120	**158	ASTM D1785
D2241	SDR SERIES	**158	ASTM D2241

### CPVC

ASTM STANDARD	PIPE TYPE	ALLOWABLE TEMPERATURE	MARKING
D2846	CPVC 41	**212	ASTM D2846
F441	SCH 40, 80	**212	ASTM F441
F442	SDR SERIES	**212	ASTM F442

### ABS

ASTM STANDARD	PIPE TYPE	ALLOWABLE TEMPERATURE	MARKING
D2661	SCH 40 DWV	***180	ASTM D2661
F628	SCH 40 DWV CELLULAR CORE	***180	ASTM F628

- \* - Allowable temperatures based on classifications covered in ASTM D4396 [Deflection Temps Under Load (264 PSI)]
- \*\* - Allowable temperatures based on classifications covered in ASTM D1784 [Deflection Temps Under Load (264 PSI)]
- \*\*\* - Allowable temperatures based on classifications covered in ASTM D3965 [Deflection Temps Under Load (264 PSI)]

Table 10

VENT LENGTH TABLE			
ALTITUDE	MAXIMUM TOTAL EQUIVALENT LENGTH IN FEET FOR VENT AND INLET AIR (SEE NOTES)		
0-7,000 Feet	2 INCH PIPE	2.5 INCH PIPE	3 INCH PIPE
*UH/DH2B060A9V3VA	200	200	200
*UH/DH2B080A9V3VA	50	120	200
*UH/DH2C100A9V4VA	Not Allowed	60	200
*UH/DH2D120A9V5VA	Not Allowed	Not Allowed	200
7,000-9,500 Feet	2 INCH PIPE	2.5 INCH PIPE	3 INCH PIPE
*UH/DH2B060A9V3VA	100	100	100
*UH/DH2B080A9V3VA	25	60	100
*UH/DH2C100A9V4VA	Not Allowed	30	100
*UH/DH2D120A9V5VA	Not Allowed	Not Allowed	100
9,500-12,000 Feet	2 INCH PIPE	2.5 INCH PIPE	3 INCH PIPE
*UH/DH2B060A9V3VA	50	50	50
*UH/DH2B080A9V3VA	Not Allowed	30	50
*UH/DH2C100A9V4VA	Not Allowed	Not Allowed	50
*UH/DH2D120A9V5VA	Not Allowed	Not Allowed	50

NOTES: \* - First letter may be "A" or "T"

1. Minimum vent length for all models: 3' horizontal or 3' vertical.
2. DO NOT MIX PIPE DIAMETERS IN THE SAME LENGTH OF PIPE OUTSIDE THE FURNACE CABINET (Except adapters at the top of the furnace). If different inlet and vent pipe sizes are used, the vent pipe must adhere to the maximum length limit shown in the table above (See note 6 below for exception). The inlet pipe can be of a larger diameter, but never smaller than the vent pipe.
3. MAXIMUM PIPE LENGTHS MUST NOT BE EXCEEDED! THE LENGTH SHOWN IS NOT A COMBINED TOTAL, IT IS THE MAXIMUM LENGTH OF EACH (Vent or Inlet air pipes).
4. One SHORT radius 90° elbow is equivalent to 10' of 3" pipe and one LONG radius elbow is equivalent to 6' of 3" pipe. One 90° elbow is equivalent to 7½' of 2½" pipe or 5' of 2" pipe. Two 45° elbows equal one 90° elbow.
5. The termination tee or bend must be included in the total number of elbows. If the BAYAIR30AVENTA termination kit is used, the equivalent length of pipe is 5 feet. BAYVENT200B equivalent length is 0 feet.
6. Pipe adapters are field supplied (except for the \*UH/DH2D120 models).

Table 11

**PART NUMBERS FOR REPLACEMENT ORIFICES**

DRILL SIZE	PART NUMBER	DRILL SIZE	PART NUMBER
44	ORF00501	54	ORF00555
45	ORF00644	55	ORF00693
46	ORF00909	56	ORF00907
47	ORF00910	57	ORF00908
48	ORF01099	58	ORF01338
49	ORF00503	59	ORF01339
50	ORF00493		

If the desired input rate cannot be achieved with a change in manifold pressure, then the orifices must be changed. LP installations will require an orifice change.

**Important:** Reinstall the propane orifices to the same depth as the orifices supplied with the equipment.

See Table 11 for help in selecting orifices if orifice change is required. Furnace input rate and temperature rise should be checked again after changing orifices to confirm the proper rate for the altitude. For information on high altitude derating, refer to page 34.

The Vent Length Table above shows the required vent lengths for installations at various altitudes. An optional high altitude kit is available for installations above 5000 feet (Installations above 12,000 feet are not allowed).

Table 12

Orifice Twist Drill Size If Installed At Sea Level	ALTITUDE ABOVE SEA LEVEL and Orifice Required At Other Elevations									
	2000	3000	4000	5000	6000	7000	8000	9000	10000	
42	42	43	43	43	44	44	45	46	47	
43	44	44	44	45	45	46	47	47	48	
44	45	45	45	46	47	47	48	48	50	
45	46	47	47	47	48	48	49	49	50	
46	47	47	47	48	48	49	49	50	51	
47	48	48	49	49	49	50	50	51	52	
48	49	49	49	50	50	50	51	51	52	
49	50	50	50	51	51	51	52	52	52	
50	51	51	51	51	52	52	52	53	53	
51	51	52	52	52	52	53	53	53	54	
52	52	53	53	53	53	53	54	54	54	
53	54	54	54	54	54	54	55	55	55	
54	54	55	55	55	55	55	56	56	56	
55	55	55	55	56	56	56	56	56	57	
56	56	56	57	57	57	58	59	59	60	
57	58	59	59	60	60	61	62	63	63	
58	59	60	60	61	62	62	63	63	64	

From National Fuel Gas Code - Table F-4

# Installer's Guide

## HORIZONTAL VENTING (Upflow/ Horizontal)

### ⚠ CAUTION

When the vent pipe is exposed to temperatures below freezing, e.g., when it passes through unheated spaces, etc., the pipe must be insulated with 1/2 inch (22.7 mm) thick Armaflex-type insulation or equal.

If the space is heated sufficiently to prevent freezing, then the insulation will not be required. If domestic water pipes are not protected from freezing then the space meets the condition of a heated space.

**NOTE:** If your furnace comes with a factory supplied 2" X 3" offset reducing coupling is used for 3" vent pipe installation, make sure the marking "TOP" is located on the top side of the pipe.

The straight side of the coupling must be on bottom for proper drainage of condensate. See Figure 27.

#### Horizontal Venting

**NOTE:**

Vent termination kit BAYAIR30AVENTA or BAYVENT200B may be used in addition to the horizontal and vertical termination options shown in the following figures.

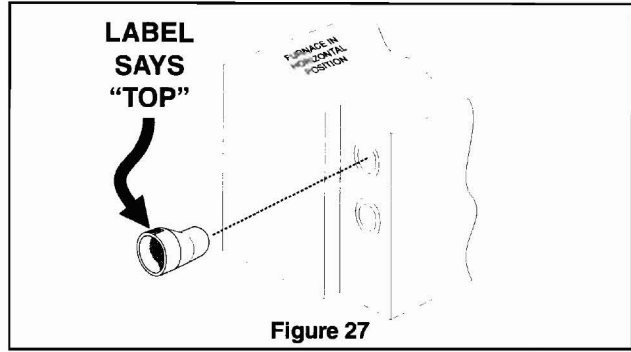


Figure 27

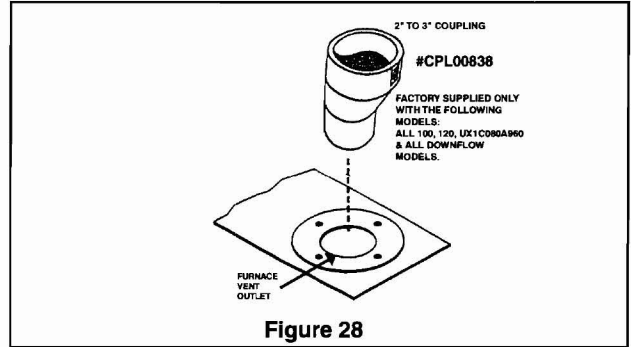
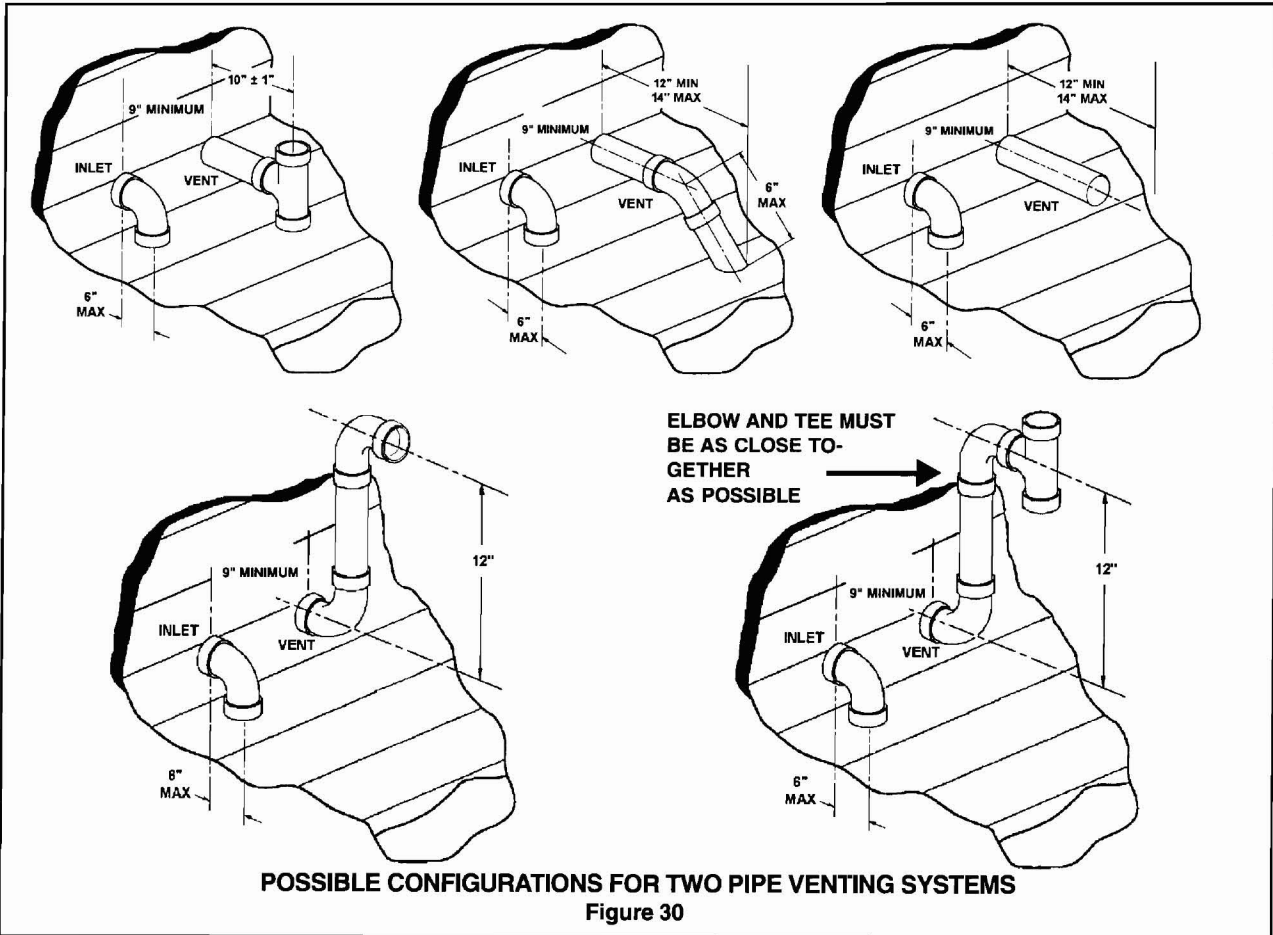


Figure 28



POSSIBLE CONFIGURATIONS FOR TWO PIPE VENTING SYSTEMS

Figure 30

# Installer's Guide

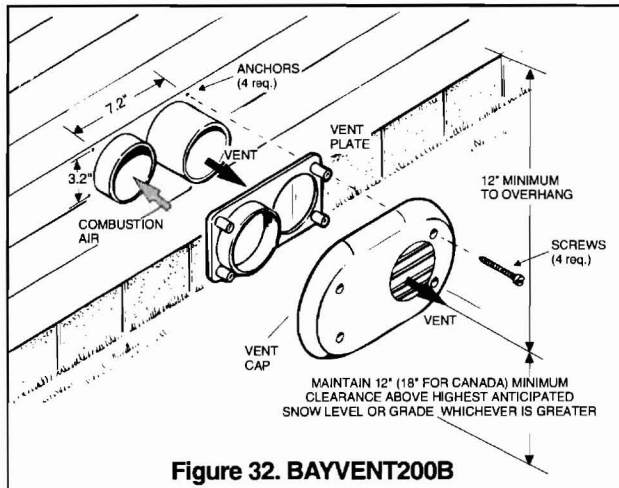


Figure 32. BAYVENT200B

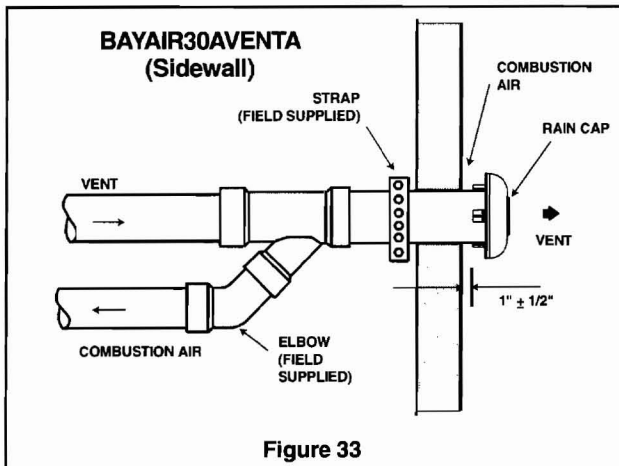


Figure 33

## HORIZONTAL VENTING THROUGH WALL

These Furnaces may be installed as direct vent (as shipped) or as nondirect vent. Installation must conform to national, state, and local codes.

The vent & inlet terminals must be located at least 12" minimum above normally expected snow accumulation level.

Avoid areas where staining or condensate drippage may be a problem.

Location of the vent/wind terminal should be chosen to meet the requirements of Figure 42 for either direct or non-direct vent applications.

**PITCH** — Venting through the wall must maintain 1/4" per foot pitched upward to insure that condensate drains back to the Furnace.

**FLUE GAS DEGRADATION** — The moisture content of the flue gas may have a detrimental effect on some building materials. This can be avoided by using the roof or chimney venting option. When wall venting is used on any surface that can be affected by this moisture, it is recommended that a corrosion resistant shield (24 inches square) be used behind the vent terminal. This shield can be wood, plastic, sheet metal, etc. Also, silicone caulk all cracks, seams and joints within 3 feet of the vent terminal.

**Important:** 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:

For all side wall horizontally vented gas fueled equipment installed in every dwelling, building or structure used in whole or in part for residential purposes, including those owned or operated by the Commonwealth and where the side wall exhaust vent termination is less than seven (7) feet above finished grade in the area of the venting, including but not limited to decks and porches, the following requirements shall be satisfied:

1. **INSTALLATION OF CARBON MONOXIDE DETECTORS.** At the time of installation of the side wall horizontal vented gas fueled equipment, the installing plumber or gasfitter shall observe that a hard wired carbon monoxide detector with an alarm and battery back-up is installed on the floor level where the gas equipment is to be installed. In addition, the installing plumber or gasfitter shall observe that a battery operated or hard wired carbon monoxide detector with an alarm is installed on each additional level of the dwelling, building or structure served by the side wall horizontal vented gas fueled equipment. It shall be the responsibility of the property owner to secure the services of qualified licensed professionals for the installation of hard wired carbon monoxide detectors

a. In the event that the side wall horizontally vented gas fueled equipment is installed in a crawl space or an attic, the hard wired carbon monoxide detector with alarm and battery back-up may be installed on the next adjacent floor level.

b. In the event that the requirements of this subdivision can not be met at the time of completion of installation, the owner shall have a period of thirty (30) days to comply with the above requirements; provided, however, that during said thirty (30) day period, a battery operated carbon monoxide detector with an alarm shall be installed.

2. **APPROVED CARBON MONOXIDE DETECTORS.** Each carbon monoxide detector as required in accordance with the above provisions shall comply with NFPA 720 and be ANSI/UL 2034 listed and IAS certified.

3. **SIGNAGE.** A metal or plastic identification plate shall be permanently mounted to the exterior of the building at a minimum height of eight (8) feet above grade directly in line with the exhaust vent terminal for the horizontally vented gas fueled heating appliance or equipment. The sign shall read, in print size no less than one-half (1/2) inch in size, "GAS VENT DIRECTLY BELOW. KEEP CLEAR OF ALL OBSTRUCTIONS".



# Installer's Guide

4. INSPECTION. The state or local gas inspector of the side wall horizontally vented gas fueled equipment shall not approve the installation unless, upon inspection, the inspector observes carbon monoxide detectors and signage installed in accordance with the provisions of 248 CMR 5.08(2)(a)1 through 4.

This appliance requires a special venting system. If BAYAIR30AVENTA or BAYVENT200B are used, a copy of the installation instructions for the kit shall remain with the appliance or equipment at the completion of installation. The venting system installation instructions can be obtained from the manufacturer by writing to the following address:

American Standard, Inc.

6200 Troup Highway

Tyler, TX 75707

Attention: Manager of Field Operations Excellence

## COMBUSTIBLE MATERIAL WALL

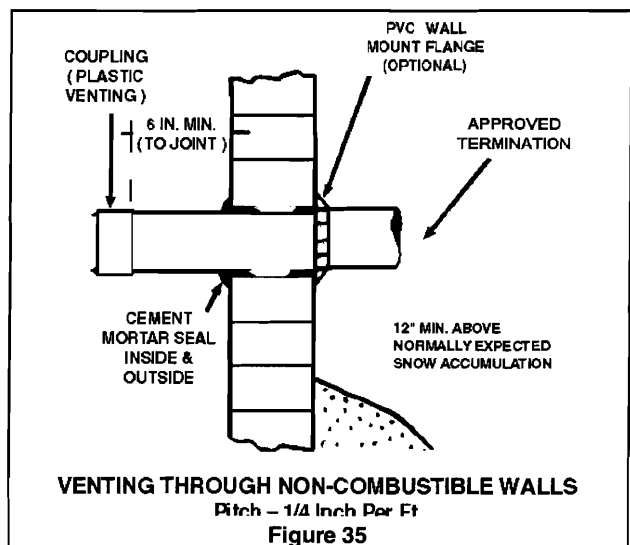
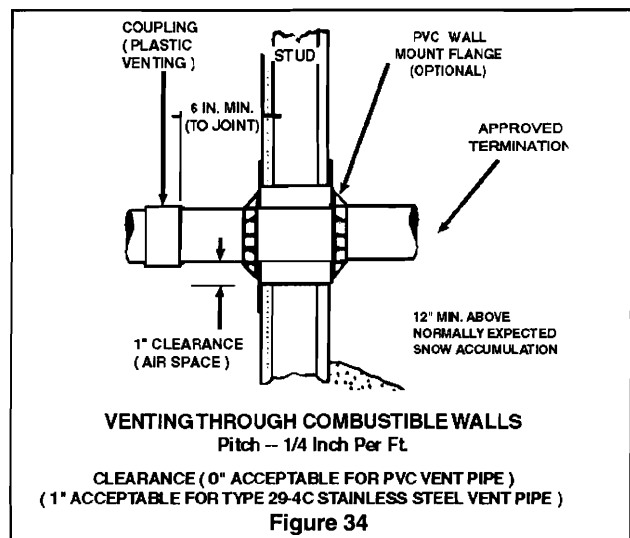
A minimum clearance of 1" to combustible materials must be maintained when using single wall stainless steel venting.

Shield material to be a minimum of 24 gauge stainless or aluminized sheet metal. Minimum dimensions are 12"x12". Shield must be fastened to both inside and outside of wall. Use screws or anchor type fasteners suited to the outside or inside wall surfaces.

## NONCOMBUSTIBLE MATERIAL WALL

The hole through the wall must be large enough to maintain pitch of vent and properly seal.

Use cement mortar seal on inside and outside of wall. See Figure 35.



SUPPORT HORIZONTAL PIPE EVERY 3' 0" WITH THE FIRST SUPPORT AS CLOSE TO THE FURNACE AS POSSIBLE. INDUCED DRAFT BLOWER, HOUSING, AND FURNACE MUST NOT SUPPORT THE WEIGHT OF THE FLUE PIPE.

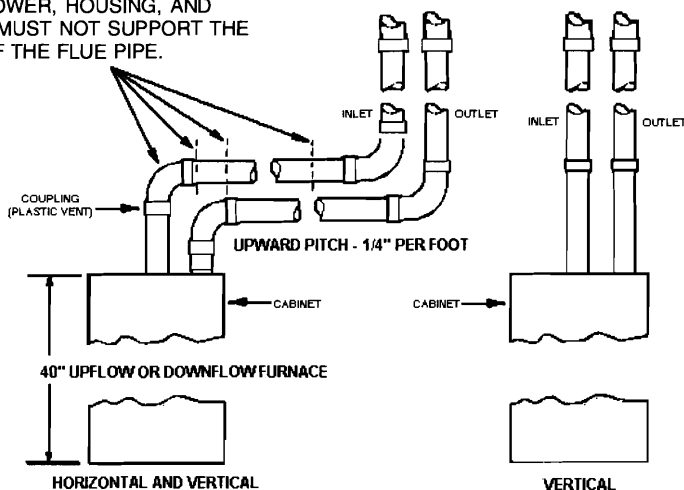


Figure 36

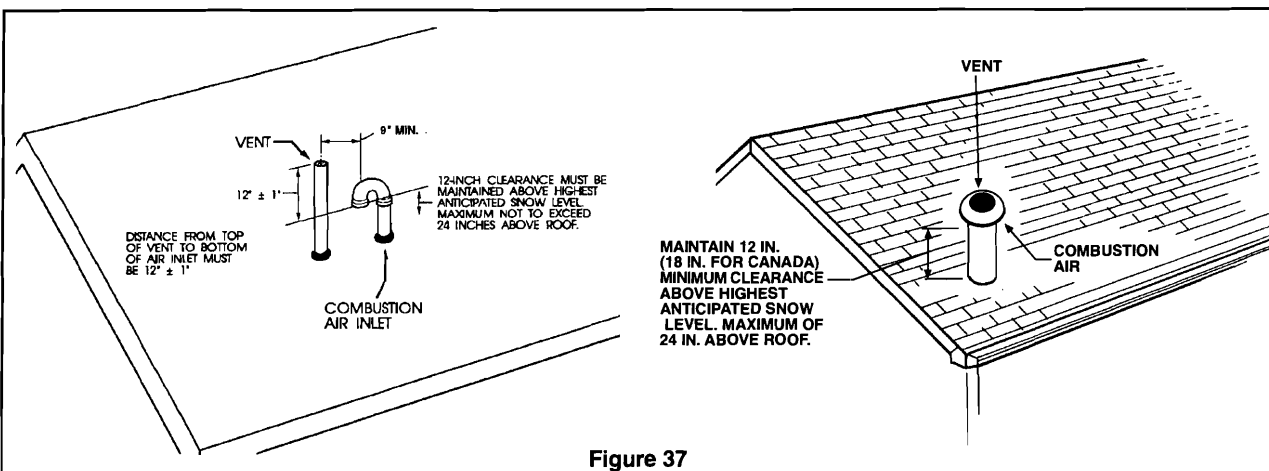


Figure 37

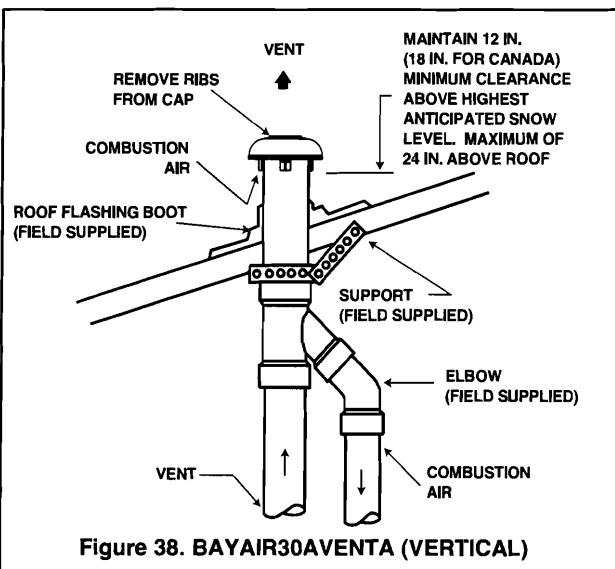
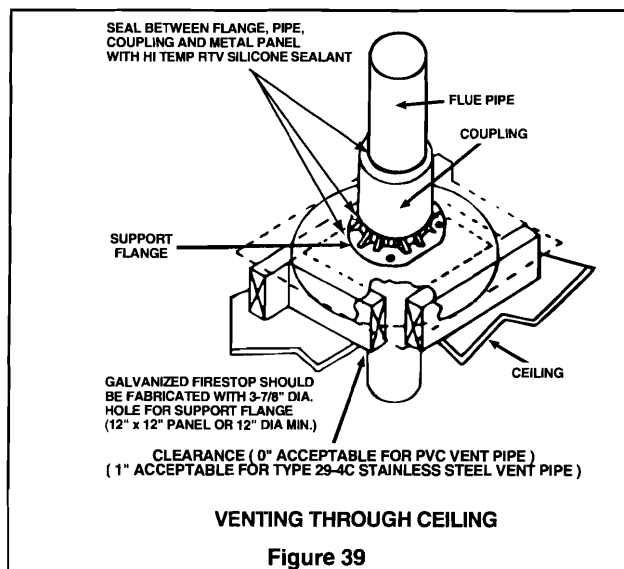


Figure 38. BAYAIR30AVENTA (VERTICAL)



VENTING THROUGH CEILING  
Figure 39

# Installer's Guide

## VENTING THROUGH THE ROOF

When penetrating roof with a 2" PVC vent pipe, a 2" electrical conduit flashing may be used for a weather tight seal. Lubricate flexible seal on flashing before PVC pipe is pushed through the seal. (Field Supplied)

**NOTE:** No vent cap as shown in Figure 37 is the preferred method for vertical vent termination in extremely cold climates.

In extreme climate conditions, insulate the exposed pipe above the roof line with Armaflex type insulation.

### VENT FITTING MATERIAL – STAINLESS STEEL

Gas and liquid tight single wall metal vent fitting, designed for resistance to corrosive flue condensate such as Type 29-4C MUST be used throughout.

These fittings and fitting accessories are to be field supplied.

### DIRECTION OF STAINLESS STEEL FITTING

All stainless steel fitting must be installed with male end towards the Furnace.

All horizontal stainless steel sections must be positioned with the seam on top.

All long horizontal sections must be supported to prevent sagging.

All pipe joints must be fastened and sealed to prevent escape of combustion products into the building.

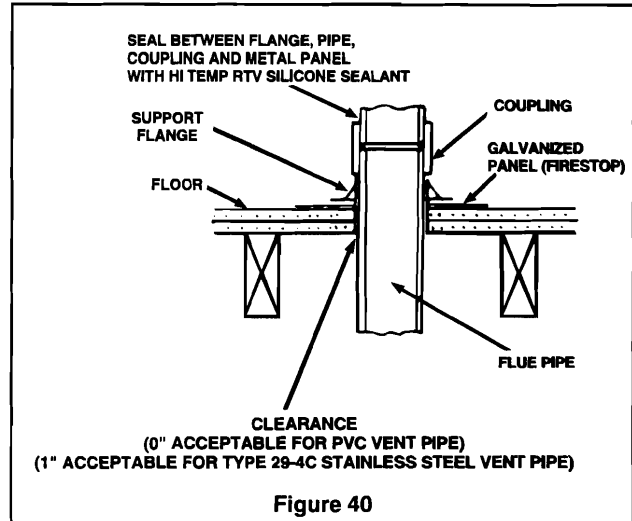
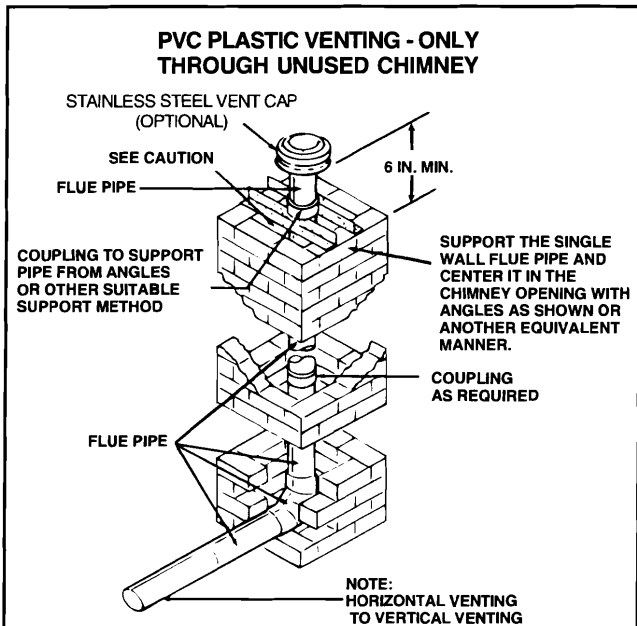


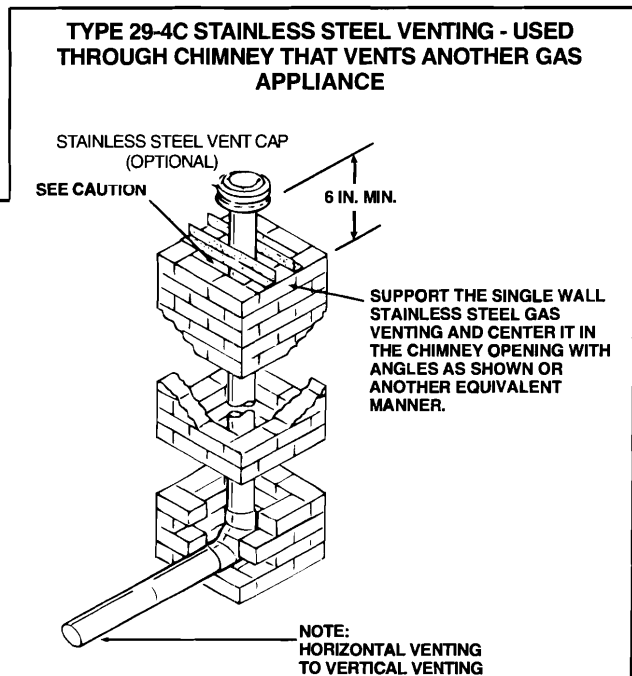
Figure 40



**CAUTION**  
Do NOT run vent through chimney for wood burning or oil Furnaces or incinerators or any other gas appliance.

### IMPORTANT –

The single wall flue pipe joints must be sealed.  
The 90° elbow connection to vertical pipe must be sealed to prevent condensate leakage to base of masonry chimney.



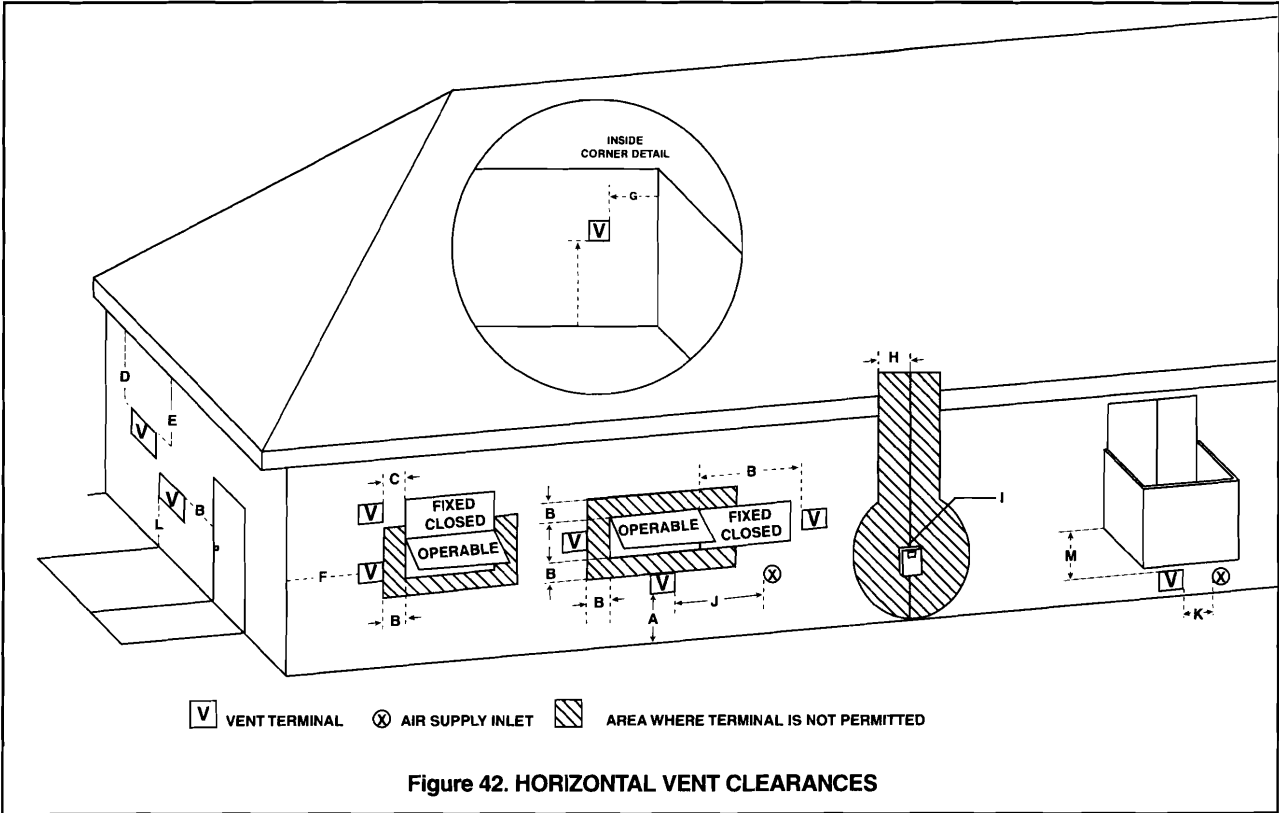
**CAUTION**  
Do NOT run vent through chimney for wood burning or oil Furnaces or incinerators.

If remaining free area between single wall flue pipe and masonry chimney is to be used for another gas appliance venting area must be sufficient to vent that appliance and that appliance must be connected to chimney with separate entry openings.

### IMPORTANT –

The single wall flue pipe joints must be sealed.  
The 90° elbow connection to vertical pipe must be sealed to prevent condensate leakage to base of masonry chimney.

Figure 41. VENTING ROUTED THROUGH A MASONRY CHIMNEY



**Table 13**

Non-Direct Vent Terminal Clearances			
	Canadian Installations	US Installations	
A=	Clearance above grade, veranda, porch, deck, or balcony	12 inches (30 cm)	12 inches (30 cm)
B=	Clearance to window or door that may be opened	6 inches (15 cm) for appliances $\leq$ 10,000 Btuh (3 kw), 12 inches (30 cm) for appliances $>$ 10,000 Btuh (3 kw) and $\leq$ 100,000 Btuh (30 kw), 36 inches (91 cm) for appliances $>$ 100,000 Btuh (30 kw)	4 feet (1.2m) below or to the side of opening; 1 foot (0.3m) above opening.
C=	Clearance to permanently closed window	*	*
D=	Vertical clearance to ventilated soffit located above the terminal within a horizontal distance of 2 feet (61 cm) 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 (91 cm) with a height 15 feet (4.5 m) above the meter/regulator assembly	*
I=	Clearance to service regulator vent outlet	3 feet (91 cm)	*
J=	Clearance to nonmechanical air supply inlet to building or the combustion air inlet to any other appliance	6 inches (15 cm) for appliances $\leq$ 10,000 Btuh (3 kw), 12 inches (30 cm) for appliances $>$ 10,000 Btuh (3 kw) and $\leq$ 100,000 Btuh (30 kw), 36 inches (91 cm) for appliances $>$ 100,000 Btuh (30 kw)	4 feet (1.2 m) below or to side of opening; 1 foot (300 m) above opening
K=	Clearance to a mechanical air supply inlet	6 feet (1.83m)	3 feet (91 cm) above if within 10 feet (3m) horizontally
L=	Clearance above a paved sidewalk or paved driveway located on public property	7 feet (2.13 m) †	7 feet (2.13 m)
M=	Clearance under veranda, porch, deck, or balcony	12 inches (30 cm) ‡	*

Notes:

- In accordance with the current CSA B149.1 Natural Gas and Propane Installation Code.
- In accordance with the current ANSI Z223.1/NFPA 54 National Fuel Gas Code.
- † A vent shall not terminate directly above a sidewalk or paved driveway that is located between two single family dwelling and serves both dwellings.
- ‡ Permitted only if veranda, porch, deck, or balcony is fully open on a minimum of two sides beneath the floor.
- \* Clearance in accordance with local installation codes and the requirements of the gas supplier and the manufacturer's Installation Instructions.