



Hart & Cooley
install confidence

Hart & Cooley, Inc. 800.433.6341 toll-free
500 East Eighth Street 616.392.7855 phone
Holland, MI 49423 800.223.8461 toll-free fax
info@hartcool.com 616.392.7971 fax
www.hartandcooley.com

19078

Type B Gas Vent Installation Instructions

PLEASE READ AND UNDERSTAND THE REQUIREMENTS BEFORE PROCEEDING

Hart & Cooley Type B gas vent pipe and fittings are Underwriters Laboratories-tested and listed to Standard 441 for use with listed gas-fired appliances that have been certified for use with Type B gas vent. B-Vent is intended for neutral or negative draft applications. It is designed for vertical installations (including laterals) but may be used for horizontal applications with a draft-inducing fan located such that all indoor portions of the vent are under negative pressure.

The materials in this B-Vent have been selected to provide maximum resistance to corrosion and heat; however, their use with temperatures exceeding 550°F or in highly corrosive atmospheres, such as chlorinated hydrocarbons (i.e.: refrigerants, dry-cleaning fluids, degreasers, paint removers, etc.), may substantially reduce their life expectancy.

These installation instructions will enable the installer to make a safe and proper installation of the vent. Compliance with these instructions will ensure an installation that will meet the requirements of all National Building Codes and the National Fuel Gas Code, NFPA No. 54, and NFPA No. 211. Hart & Cooley Type B gas vents are listed under the follow-up service of Underwriters Laboratories, Inc.

CAUTION
FLUE GAS TEMPERATURES MUST NEVER EXCEED 550°F IN ANY HART & COOLEY GAS VENT SYSTEM.

Gas appliances that may be connected to Type B gas vents

Type B gas vents may be used to vent gas appliances listed for use with Type B gas vent.

These vents shall be installed in accordance with our listing as detailed in these installation instructions. The type of appliances that may be vented with these vents include:

- Unit Heaters
- Duct Furnaces
- Attic Furnaces
- Floor Furnaces
- Water Heaters
- Room (Space) Heaters
- Central Warm Air Furnaces
- Hot Water Boilers
- Steam Boilers

CAUTION

HART & COOLEY TYPE B VENTS ARE NOT TO BE USED WITH APPLIANCES BURNING SOLID OR LIQUID FUELS.

Gas appliances that must be connected to chimneys

The following appliances must be connected to chimneys:

- All incinerators in domestic applications.
- All appliances that may be converted readily to the use of solid or liquid fuels.
- Combination gas/oil-burning appliances.
- Unlisted appliances.

General instructions

- The vent should always be sized for the sea-level name-plate input rating of appliances in accordance with the procedures set forth in the *Gas Vent Capacity Tables*, which appear in the *Gas Vent Chimney Sizing and Application Guide* or in NFPA 54.
- Provide for adequate air supply for combustion air and for draft-hood dilution air. Refer to NFPA 54 or the *Application Guide* for recommended arrangements and proper size of air supply openings.
- Use only parts and fittings listed in the catalog to ensure an approved vent.
- Portions of gas vents that may pass through accessible spaces must be enclosed to prevent personal contact with and possible damage to the vent. The enclosure may have to also meet fire-resistance rating provisions. See all local and national codes that may apply.
- Unenclosed outside vents below the roofline are prohibited.
- No damper or other restriction is permitted in a gas vent.
- Single-wall connectors and stovepipes may be used with Hart & Cooley Type B vent with the following considerations: The use of single-wall materials cause higher heat loss from the flue products, which in turn reduce the draft and may cause condensation to occur.
 - (A) Since the heat loss from single-wall pipe is double that from Hart & Cooley pipe, be sure to use the capacity table for single-wall connector.



- (B) Observe the local requirements for clearance to combustibles for single-wall pipe. This distance is 6" to 9" in most areas.
- (C) Do not run single-wall connectors through unheated spaces, partitions, or in concealed areas.

Step-by-step installation procedure

Assembly of the vent

- Appliances to be vented should be placed as close as possible to the point where the vent is to run vertically up through the building.
- Install the Support Assembly (RSA).
A support assembly is recommended for all installations for the following reasons:
 - (A) It allows installation of the vent system prior to installation of appliances.
 - (B) It allows disconnection of the appliance for service at any time without disturbing or temporarily supporting the vent.
 - (C) It provides the required fire-stop as well as support.
 - (D) It is UL-listed.

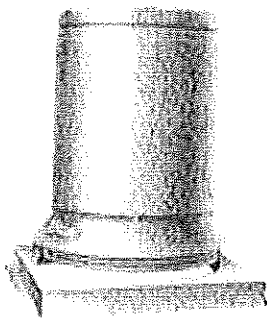


Figure 1

Figure 1 shows the installation of a support assembly.

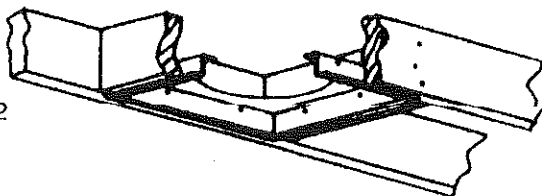


Figure 2

Figure 2 shows a vent support installation in a floor or ceiling joists or rafters of a flat roof.

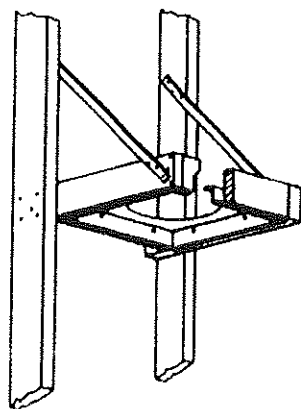


Figure 3

Figure 3 shows a vent support using a wall bracket (by others).

The support assembly shall be installed in the following manner:

Frame an opening between standard 2" joists, either on 16" or 32" centers, depending on vent dimension, with headers of the same dimension lumber as the joists (Figure 2) or on the wall studs with 2 x 4's as in Figure 3. The opening must be square and level on the bottom side. Place the support plate up into the opening with flanges tight against the underside of the framing. Nail in place with two 8d nails on each side through the holes provided.

Installation of vent pipe in the support

- Place a supporting collar in the groove at the bottom end of any standard pipe just above the locking ring. Tighten the screw so that the collar is firmly clamped into position in the groove. The pipe is now assembled properly to fit into the support plate (Figure 4). This pipe assembly will rest on the upper side of the support plate and provide the **REQUIRED 1-INCH CLEARANCE FROM COMBUSTIBLES**. The pipe will protrude below the support for connecting additional pipe from the vent to the appliance. A maximum of 60' of vent can be installed above the support before resupport is required.

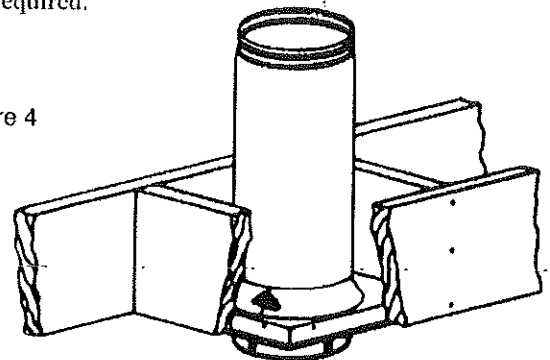


Figure 4

- Place an RDH draft hood connector on the outlet or the draft hood of the appliance. The aluminum portion of the draft hood connector should be fastened to the appliance collar with sheet metal screws. The extending aluminum portion can be readily shaped by hand to fit oval collars.
- Install vertical vent pipe and fittings.

Assembling joints

SIZES 3" THROUGH 12" (See Figures 5, 6, 7)

- Use gloves when handling vent parts.
- To assemble joints of pipe and fittings, first make sure that the lock ring is moved upward sufficiently to clear the formed tabs. Check the tabs to see that they are projecting slightly outward from the pipe so that the upper section will slide down over the top end of the lower section to which it is being joined. Look for the word "UP" with the arrow pointing in the direction of flue-gas flow.
- Slide the top pipe or fitting down over the upper end of the lower pipe until the projections on the tabs line up with the groove in the lower pipe. The joint will naturally come to a stop at this point if it is placed firmly down over the lower section.
- Using the thumbs and fingers, press the tabs into position, and slide the lock ring down to lock the tabs in place.

- If for some reason it is necessary to uncouple a joint, this may be easily done by sliding up the lock ring, and moving the top section slightly to loosen the tabs. The section can then be lifted off.

DO NOT USE SCREWS IN B-VENT UNLESS LINING A MASONRY CHIMNEY. SCREWS ARE NOT NECESSARY AND CAUSE NOISE.

3" through 12"

Figure 5

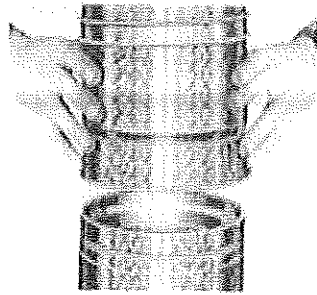


Figure 6

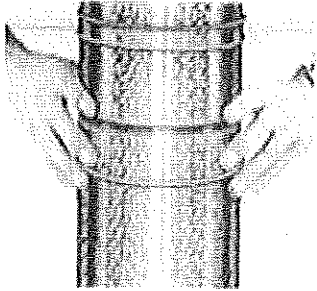
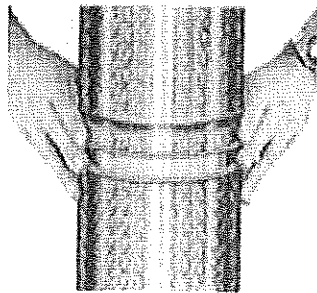


Figure 7



SIZES 14" THROUGH 24" (See Figures 8, 9, 10)

- Slide the top pipe or fitting down over the upper end of the lower pipe until the two beads come together. At this point place the "U" ring in position to enclose the two beads. Tighten the screw until the "U" ring is snug around the pipe.

Figure 8

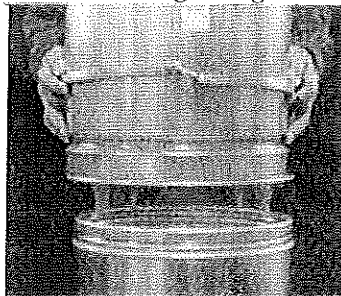


Figure 9

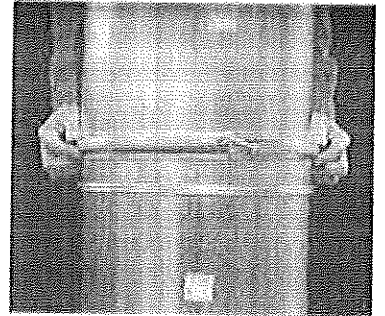
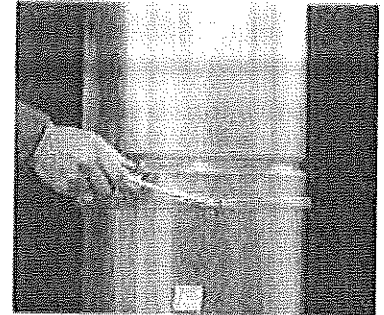


Figure 10



- (A) Whenever possible, a vertical vent should be used. This is done by simply using straight sections of pipe from the draft hood connector out through the roof. Where this is not possible, a vent connector using B-Vent is used to run laterally from the draft hood to the base of the vertical vent. The horizontal length of this vent connector should not exceed 1½ feet for each inch of connector diameter. If it is necessary for B-Vent connector to pass through a partition, an RVT thimble may be used, or the wall framed to allow 1-INCH CLEARANCE and an RPC collar used on each side of the partition. When a vent connector is used, it should have as much vertical rise as possible BEFORE the horizontal run. Vent connectors attached directly to side outlet draft hoods, such as floor furnaces, shall be pitched upward at least ¼ inch per foot. The lateral run of vent connectors attached to top outlet draft hoods may be either horizontal or pitched upward.
- (B) The necessary straight lengths of pipe should be connected to the elbow, tee, or the draft hood connector, and all joints should be securely locked together as indicated above.
- (C) Floors, ceilings, and other combustible construction should be cut away or framed as necessary to provide a MINIMUM OF 1-INCH CLEARANCE from the surface of the vent pipe. Metal straps should be used to maintain the vent pipe in position to ensure that the 1-INCH CLEARANCE to combustibles is maintained after the walls are closed (Figure 11). DO NOT SCREW INTO THE VENT.

CAUTION
DO NOT ALLOW THE OFFSET PIPE TO PUT PRESSURE ON THE ELBOW.
USE PIPE STRAP FOR SUPPORT.



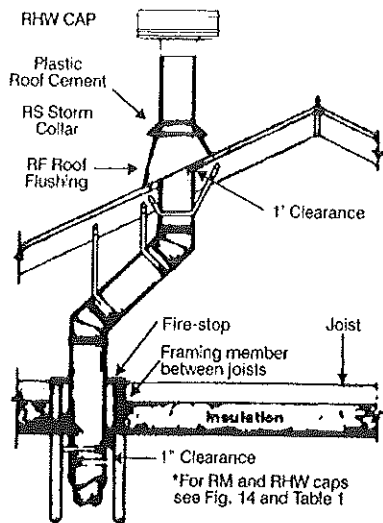


Figure 11

(D) Whenever possible, the vent should be continued straight out through the roof. If it is necessary to make offsets in the attic space, the lateral run should be sloped upward as sharply as possible, using elbows to minimize resistance. The lateral run should be supported using metal straps, and again maintaining the **MINIMUM CLEARANCE OF 1 INCH** from combustibles (Figure 11).

CAUTION
LATERALS ARE LIMITED TO 1½ FEET
FOR EACH INCH OF VENT DIAMETER.

(E) Laterals must be supported at 5-foot maximum intervals. Where vertical vents are spaced by fire-stops between floors, they need only be supported at the bottom.

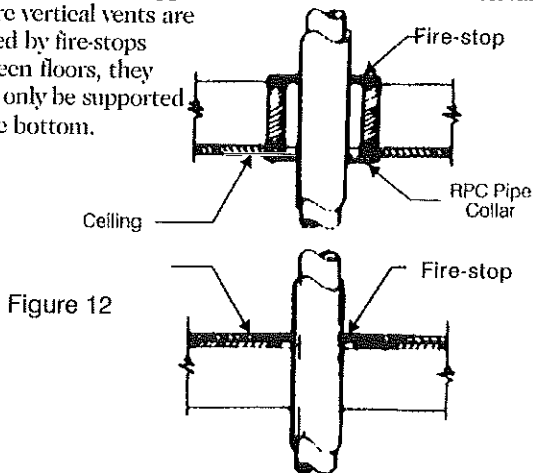


Figure 12

Framing to prevent contact with building insulation

□ In many instances, vents pass through ceilings that are insulated. In these cases, it is necessary to frame around the opening cut in the ceiling for passage of the vent pipe so that building insulation or other combustible material will not come in contact with the surface of the vent. This framing should, of course, be arranged to **PROVIDE 1-INCH MINIMUM CLEARANCE** from the surface of the vent (Figure 11).

□ Occasionally Type B vent connectors must pass through partitions that are insulated. The simplest means of preventing contact with the insulation in these cases is to use an RWT wall thimble.

Fire-stopping (except 4" round)

- In single-story, slab-floor houses having an attic space, a fire-stop must be provided where the vent passes through the ceiling, unless an RSA support is used there. The ceiling should be cut away and the opening framed to **PROVIDE 1-INCH MINIMUM CLEARANCE** from the vent pipe. A fire-stop consisting of a noncombustible material, such as ½-inch thick ceramic board or 26-gauge galvanized sheet metal, should be cut to fit the pipe and the framed opening. The fire-stop should be fastened to the top of the joists and framing members to eliminate any pockets in which combustible debris might collect. An RPC pipe collar may be used on the underside of the ceiling to finish off the opening (Figure 12).
- In single-story buildings with an attic space and with the gas appliance located in a basement or crawl space, fire-stops must be provided where the vent passes through both the floor and the ceiling. This can be done by cutting away and framing the floor and ceiling construction and installing fire-stops of noncombustible material as shown in Figure 12. All combustible construction should be cut away sufficiently to **PROVIDE THE MINIMUM CLEARANCE OF 1 INCH FROM THE VENT PIPE SURFACE.**

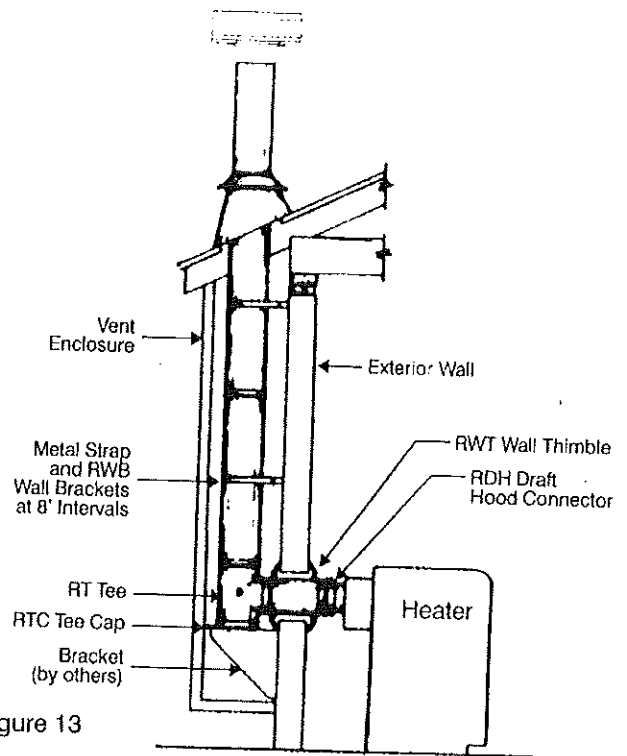


Figure 13

- In multi-story buildings, a fire-stop must be provided at every point where the vent passes through a floor or ceiling. These fire-stops may be provided as indicated in the paragraph above.
- 4-inch round vent (4RPX) may be used in a 2" x 6" stud wall. The proper clearance in a 2" x 6" wall is provided by the spacer on the pipe and by the 4RFS fire-stop spacer. All other uses of 4-inch pipe require the normal **1-INCH CLEARANCE TO COMBUSTIBLES.**

Terminations using a flashing and a cap

General Instructions

Models RHW and RM caps sizes 3" through 12" are listed for installation on gas vents terminating a sufficient distance from the roof so that no discharge opening is less than 2 feet horizontally from the roof surface. The lowest discharge opening shall be no closer than the minimum height shown in Table 1 and Figure 14. These minimum heights may be used provided that the vent is not less than 5 feet from any vertical wall. FOR A VENT CLOSER THAN 5 FEET, THE VENT TERMINATION MUST BE RAISED UNTIL 2 FEET HIGHER THAN THE STRUCTURE.

Model RC caps sizes 14" through 24" diameters are for gas vents that extend at least 2 feet above the highest point where they pass through a building AND at least 2 feet higher than any portion of the building within 10 feet. If any adjacent structures are within 10 feet of the vent and are higher, then the vent must terminate at least 2 feet above these structures. This recommendation should be followed unless local code requirements state otherwise. Offsets in the attic space should be used to minimize the amount of vent pipe that must be exposed above the roof in order to comply with the above. No gas vent should be terminated less than 5 feet in vertical height above the highest connected appliance draft hood outlet.

- If a vent extends more than 5 feet above the roof, it should be guyed with 3 wires or braced with 2 pieces of rigid conduit.

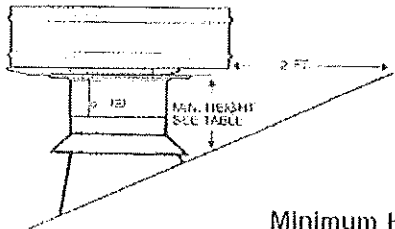


Figure 14

TABLE 1

Roof Pitch	Minimum Height from Roof to Lowest Discharge Opening, Ft.
Flat	1.0
Over 6/12 to 7/12	1.25
Over 7/12 to 8/12	1.5
Over 8/12 to 9/12	2.0
Over 9/12 to 10/12	2.5
Over 10/12 to 11/12	3.25
Over 11/12 to 12/12	4.0
Over 12/12 to 14/12	5.0
Over 14/12 to 16/12	6.0
Over 16/12 to 18/12	7.0
Over 18/12 to 20/12	7.5
Over 20/12 to 21/12	8.0

CAUTION
WHERE HEAVY SNOWFALL OCCURS,
THE CAP SHOULD BE INSTALLED TO A
HEIGHT ABOVE THE AVERAGE SNOW DEPTH.

A cap or chimney housing offers resistance to the entrance of rain, snow and debris, as well as birds, and will minimize the effect of wind on the vent. It will protect the vent from down drafts due to a wind that impinges directly upon the vent.

However, no vent cap, cover or top can overcome the adverse effect of a region of high static pressure around the vent terminal nor the effect of an interior region of low pressure.

Regions of high static pressure around the vent terminal can be avoided by following the general rule for the vent termination given previously. Low or negative interior pressures in the building may be caused by (1) failure to provide for combustion air, (2) excessive use of exhaust fans, and (3) tight construction resulting in the lack of infiltration air. Vented clothes dryers and fireplaces will also remove large amounts of air from the interior, tending to produce a low interior pressure.

WHERE THE VENT PASSES THROUGH THE ROOF, the roof sheathing should be cut away sufficiently to PROVIDE A MINIMUM OF 1-INCH CLEARANCE from the vent pipe. The vent pipe should be run up to a point where the top end is at least a foot or so above the roof. An RP roof flashing should be placed down over the upper end of the pipe, and adjusted so the base plate of the flashing fits tightly against the roof with the vent pipe held in a position, MAINTAINING THE 1-INCH CLEARANCE FROM COMBUSTIBLE CONSTRUCTION.

The flashing may be sealed to the roof. The RS storm collar may be placed immediately above the roof flashing. The storm collar may be sealed with roof cement or RTV Silicone to seal the joint between the storm collar and the vent pipe. The storm collar serves as a flashing to provide protection against the entrance of any moisture (Figure 14). Painting the exposed vent surfaces above the roof will result in longer vent life. A good grade of paint designed for use on galvanized steel should be used. RHW and RM caps push straight down and snap onto the pipe. To remove, pull straight up and rock slightly. The RC cap is attached and removed from pipe by using a lock ring. Notice concerning limitations of Hart & Cooley pipe used with gas appliances

- Gas vent systems should be plainly and permanently labeled: "This gas vent is for appliances that burn gas only. Do not connect to incinerators or solid or liquid fuel-burning appliances. Inspect the vent prior to each heating season to confirm an unrestricted vent."
- The authority having jurisdiction shall determine whether the particular locality constitutes an area where such notice must be posted.
- In those cases where the posting of such a notice is required, a label shall be placed as follows:
 - (A) Where a vertical vent is used, the label shall be placed on the ceiling near the point where the vent passes through the ceiling.
 - (B) If the vent is horizontal, the label shall be placed on the wall near the point where the vent passes through the wall, on the side of the partition on which the appliance is located.

Outside vents

Occasionally it is necessary to vent an appliance through an exterior wall and up along the outside wall to a point above the roof, as shown in Figure 13. In this case, an RDH draft hood connector and/or short length of RP pipe is used to connect the appliance to an RT tee, which is capped off on the bottom and supported on an RSA support and bracket (by others). The vertical vent is then erected from the tee, using straight lengths of RP pipe. These lengths of pipe should be securely locked together and positioned with RWB wall brackets to MAINTAIN 1-INCH MINIMUM CLEARANCE TO COMBUSTIBLE CONSTRUCTION AT ALL POINTS. The vent may be carried through the roof overhang using an RF flashing and RS storm collar, and terminated with a cap. The vent shall then be enclosed below the overhang.

Reference: American Gas Association Research Bulletin 68

Lining a masonry chimney

An unlined masonry chimney is not permitted to be used to vent gas appliances. Hart & Cooley Type B gas vent or chimney liner system may be used to line a masonry chimney. These instructions are for Type B vent.

Lining an unused masonry chimney should be done by a qualified contractor only. Contact local building or fire officials about restrictions and installation inspection in your area. The chimney liner size must not be less than that specified in the appliance manufacturer's instructions or smaller at any point than the connected appliance flue outlet size. Zero airspace clearance between the vent and the chimney interior surface is permitted. The masonry chimney may also have a zero airspace clearance (direct contact with) combustibles and the chimney exterior surface. This is permitted with nominal 4"-width brick. A masonry chimney must have a clear passageway, sound construction, and be clean before proceeding. Inspect the chimney for cracked brick and mortar, missing pieces or holes, and repair as necessary. Thoroughly clean the chimney of any residual debris, creosote, or soot that may coat the inside passageway to prevent corrosion to the B-Vent. The passageway must be at least large enough to accommodate the proper size B-Vent for the appliance(s). If there is space remaining in the chimney outside the liner, this space shall not be used to vent another appliance unless another liner is used. Minimum and maximum heights and sizing for B-Vent are in the National Fuel Gas Code. The chimney termination must meet the requirements of NFPA 211.

Installation

- A tee (RT with a tee cap, RTC) should be used at the lowest point of the liner. A welded angle iron frame (by others) mortared into the chimney walls should be used with the support assembly (Figure 18). Through-bolt the support assembly into the frame with 1/4-20 nuts and bolts (by others) in all holes. Place the supporting collar in the groove at the bottom of the tee just above the locking ring (Figure 1). Tighten the screw so that the collar is firmly clamped into position in the groove. The tee is ready to fit into the support plate.
- Sixty feet of pipe may be supported by the RSA support. If more than 60 feet is required, another support assembly may be used. An adjustable length (RPA) should be used just below the resupport to make up for odd dimensions between supports and to provide for expansion, if necessary.
- If pipe assemblies are lowered into place from above, 1/4" sheet metal screws should be used to hold the lock bands in place for sizes 3" through 12".
- Terminate the vent with a tall cone flashing (RTF), storm collar (RS), and appropriate diameter cap.

Maintenance and inspection

Gas is clean-burning fuel that typically does not require maintenance of appliance vent system. However, the liner must be inspected at least once a year by a qualified inspector or installer at the same time that the appliance is being inspected and serviced. The cap snaps off for visual inspection of the outlet area. Connector pipe should be removed to examine the inlet at the base of the chimney. Look for loose joints, debris, condensate, or corrosion and clean or repair as required.

Combined vents

- For detailed instructions for combining two or more appliances into a common vent, see the *Gas Vent Capacity Tables* section in the Application Guide.

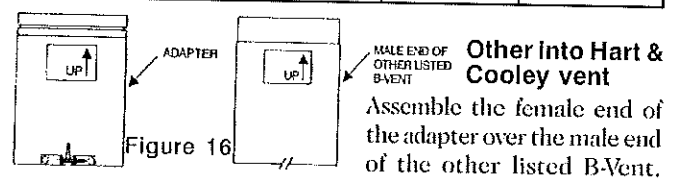
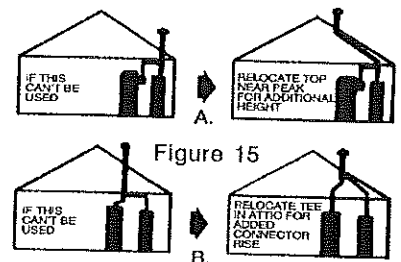
- Whenever possible, vents should be run directly from collar of the appliance vertically out through the roof in the most direct method available.
- In those cases where it is necessary or desirable to combine the vent connectors of several gas-fired appliances into a common vent, the vent connector from each individual appliance should be arranged to have as great a vertical rise as possible before starting the lateral run to the common vent. If a combined vent cannot be used because of limitations in the connector rise or total vent height, alternatives such as those illustrated (Figure 15) may be used to secure greater rise or greater total vent height. Type B-GAS VENT CONNECTOR must be used for Figure 15B.

THESE INSTRUCTIONS SHOULD REMAIN AVAILABLE TO THE HOMEOWNER AT ALL TIMES.

Installation instructions for Hart & Cooley UL-listed Type B gas vent adapters

The following table specifies the UL-listed adapters to be used when changing between Hart & Cooley and B-Vent manufactured by others.

Other Manufacturer	Pipe Diameter	Other into Hart & Cooley	Hart & Cooley Vent into Other
Selkirk Metalbestos/ Household Mfg. Co.	3" - 6" 7" - 8"	RA or RPA RA	RRA
Metal Fab, Inc.	3" - 6" 7" - 8"	RA or RPA RA	RRA
American Metal Products, Inc.	3" - 6" 7" - 8"	RA or RPA RA	RRA
General Products Company, Inc.	3" - 6" 7" - 8"	RAA RAA	RRA
Simpson Dura-Vent	3" - 6" 7" - 8"	RAA RAA	RRA



Fully seat the adapter or provide a minimum of 1-inch overlap. Tighten the screw in the slips provided. (See Figure 16 above.)

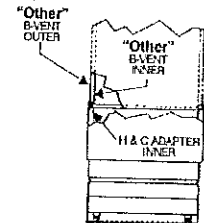


Figure 17

Hart & Cooley vent into other

Insert "Other" female end's inner and outer inside RRA's inner and outer. Slide together minimum of 1 inch to seat inner. Tighten the screw. (See Figure 17 at left.)

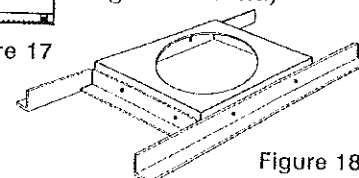


Figure 18

THAW-PAK

Snow Melting & Radiant Heating

Installation Instructions

32995 Industrial Road
Livonia, MI 48150-1617
Phone: 734.266.5300 • Fax: 734.266.5310

SNOW MELTING / FLOOR HEAT SYSTEMS

In *snow melting and floor heat systems*, we limit the outgoing water temperature to 140°F, using Vanex® tubing. The reason for this is that, there is no need to send water at any higher temperature to heat the space.

The system can be filled either with water or glycol/water solutions. Vanex® tubing is chemically inert to the corrosive effects of *uninhibited* propylene glycol or ethylene glycol. We, however, specify *inhibited* propylene glycol or ethylene glycol in our packaged snow melting systems. Though these inhibitors are known to lose their protective powers in time, with Vanex® tubing the loss of the inhibitors does not pose a problem to the tubing.

In many areas of the country, public utilities have switched from metallic piping to plastic piping for gas lines with great success, proving its ability to withstand a severe external corrosive environment. It is used extensively in farming, filtration lines in the swimming pool industry, and as plumbing waste lines in some areas.

On standard center-to-center spacing and depth bury, Vanex® tubing transfers heat as fast as concrete can absorb it. While steel piping is subject to deterioration, either due to makeup water corrosion or external galvanic action, Vanex® tubing will not be affected by such influences. When properly applied it has superior qualities; it can withstand freeze-up and has excellent hydraulic characteristics — having the same ID as Rule 40 steel pipe, but with a smooth finish.

The general practice for splicing joints within the slab is to use brass couplings with double ferule inserts, and then to insulate the coupling with heat shrink tubing. In our years of experience, this has proven to be a satisfactory method of joining the tubing.

Standard Underfloor Components Supplied with System:

- (1) Test Gauge, 2" 0-100 psi Range
- (1) Air Charging Valve
- (1) Ratchet Wrench (embedded systems only)

- (1) Tubing Cutter
- (1) Test Plugs
- Tie Wires
- Emergency Couplings, 5/8" or 7/8" Brass
- Vanex® tubing, 1/2" or 3/4" Rolls
- Manifold Box(es) or Mounting Bracket(s)
- Manifolds (Supply & Returns)

190 F8

SEP - 8 2001

THAW-PAK

Snow Melting & Radiant Heating

Installation Instructions

32995 Industrial Road
Livonia, MI 48150-1617
Phone: 734.266.5300 • Fax: 734.266.5310

If a leak develops, immediately make a splice joint as described in No. 14 above.

17. During the pouring operation, the wire mesh must be pulled into the slab so that the Vanex® tubing is 1-1/2" from the surface of the slab, or as required if the slab will have control joints saw cut.

Accurate positioning of the pipe (depth of bury) is required to insure proper distribution of heat throughout the slab, and an even surface temperature.

Wire mesh adjacent to the slabstat well must be pulled up so that the slabstat well is 1" below the surface of the slab.

18. *Observe caution* when lifting the wire mesh into the slab. Make sure that the hooks used to lift the mesh do not damage the Vanex® tubing.
19. After the slab is cured, remove air cock, pressure gauge and pipe caps from the supply and return mains.

Position boiler as shown on drawing, and connect it to supply and return mains using the size of pipe shown.

20. Air pressure test the complete system at 30 psi, and fill with a glycol-water solution (inhibited type).

For design temperatures of +10° to +25° F use:
33-1/3% propylene glycol.

For design temperatures of -20°F to +10°F use:
50% propylene glycol.

Fill to line on gauge glass of the Air-X tank. Do not fill the tank with solution. The air cushion between the red line and the top of the Air-X tank is required for expansion.

The glycol solution, with inhibitor, should be checked every year and adjusted if necessary to prevent glycol erosion.

DO NOT USE ANY SOLUTIONS CONTAINING SEALERS OR STOP LEAK COMPOUNDS OF ANY TYPE.

21. If a Slabstat is used mount the slabstat switch box on the wall near the slabstat well, and insert the capillary tube in the wall.
22. Complete wiring as per diagram supplied with the boiler. Connect gas piping, and vent piping and electrical service. Follow local codes and standards.

23. Operate the boiler circulating pump to purge air from the system. Add antifreeze solution as necessary to keep the liquid level at the red line of the gauge glass.

24. Follow lighting instructions on the boiler to place boiler in operation.

Check operation of the slabstat or other temperature control, flow switch and modulating gas valve.

Set the slabstat at 33°-36°F. Make adjustments to flow switch if necessary.

Modulating valve(s) must be set at 120°F (140°F maximum). Follow calibration instructions on the tag attached to the modulating valve — *it must not be set beyond the stop.*

The Air-X tank has been sized to handle the load. However, if for any reason the solution level rises above the top of the gauge glass when the boiler is up to temperature, an auxiliary expansion tank must be added at the relief valve fitting. (See Drawing)

25. Extreme care has been exercised to insure against splicing of Vanex® tubing in the slab, to the extent possible. Connections are made, and located, in a manifold box as shown in the Drawing (if applicable).

26. **Viscosity:** The viscosity of the propylene glycol solution declines with an increase in solution temperature. Therefore, when the system is cold the viscosity will be high.

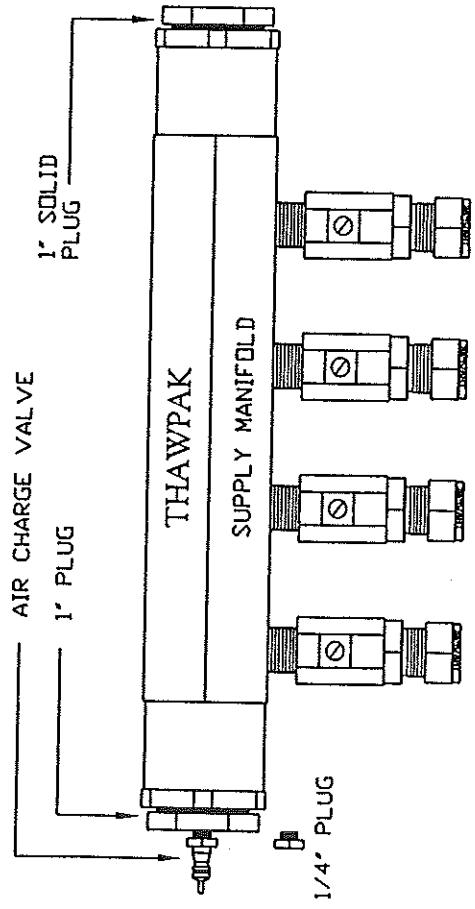
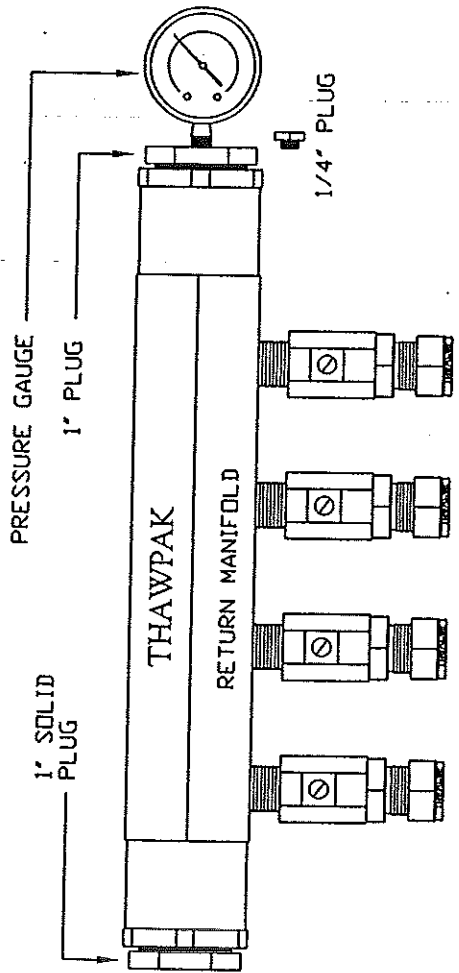
For economic reasons, the pumps have been designed to operate at elevated temperatures where the viscosity approaches that of ordinary water.

In addition to high viscosity when the system is cold, the system operates at atmospheric pressure due to the gravity feed — for no potable water connection can be made directly to the system to provide static pressure.

27. **Harmonics:** An air valve is located just above the T&P gauge on the Air-X tank in the event that harmonics develop as a result of solution stagnation within the heat exchanger of the boiler.

Check the relief valve capacity and add static pressure, either with an air compressor or a hand pump, to within a maximum of 15 pounds of relief valve discharge pressure.

This increase in static pressure will increase the vaporization temperature (saturated steam), and thereby eliminate harmonics.



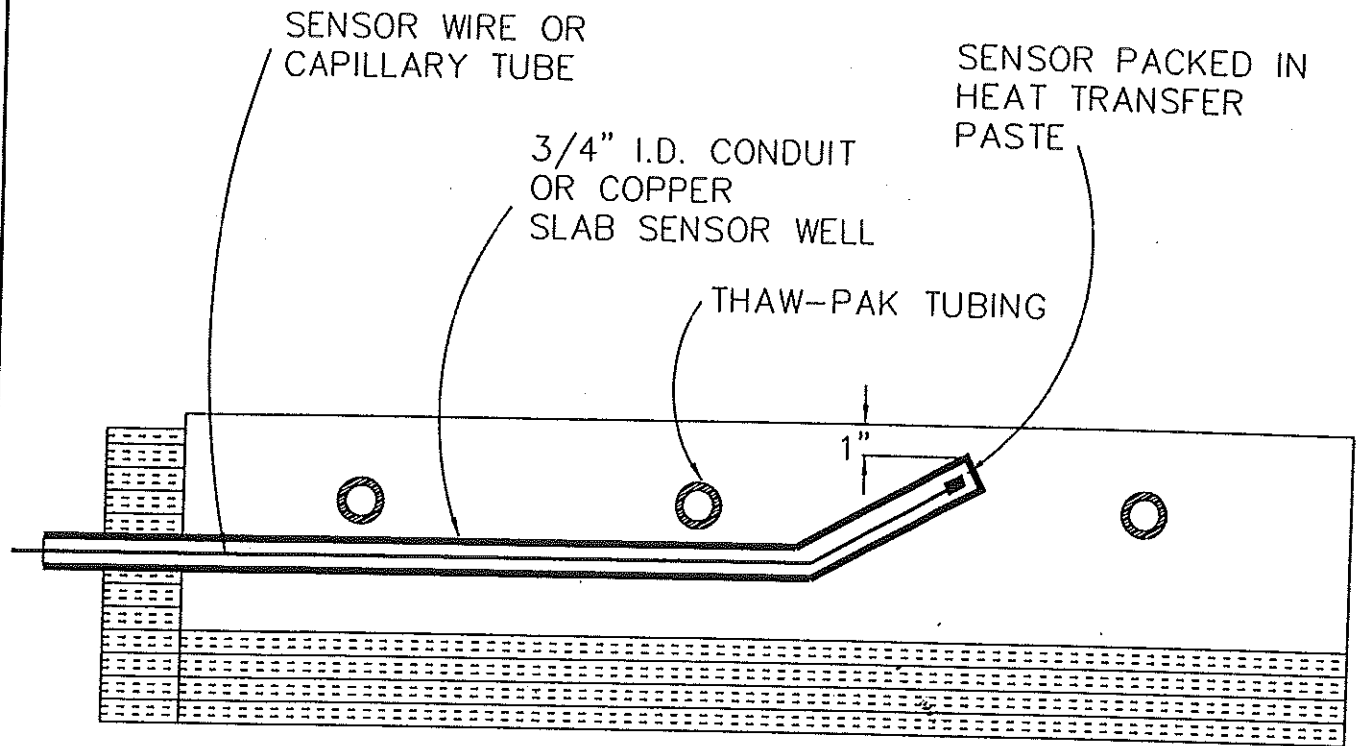
IP0006 KIT

QTY.	PART NUMBER	DESCRIPTION
2	932-16SH	1" PLUGS
2	932F-04B	1/4" PLUGS
1	ASN25L	AIR VALVE
1	AL51-4	AIR GAUGE
2	M-109M	1" SOLID PLUGS

THAW-PAK
 RADIANT HEATING & SNOW MELTING SYSTEMS
 32995 INDUSTRIAL RD., LIVONIA, MI. 48150

Date: 1/2/03
 Revisions: 1
 Drawing No:
 PEG-422A

1" MANIFOLD
 PRESSURE TEST DETAIL



NOTE:

SLAB STAT SENSOR WELL SHALL
 A HAVE RADIUS THAT WILL
 ALLOW SENSOR REMOVAL.

Date: 1/10/03

Revisions: 1

Drawing No:
 PEG-455

THAW-PAK
 RADIANT HEATING & SNOW MELTING SYSTEMS

32995 INDUSTRIAL RD., LIVONIA, MI. 48150

Slab Sensor
 Well
 Installation

Department of Planning & Development
Lee D. Urban, Director



CITY OF PORTLAND

Division Directors
Mark B. Adelson
Housing & Neighborhood Services

Alexander Q. Jaegerman, AICP
Planning

John N. Lufkin
Economic Development

June 2, 2004

Harry Blunt, President
Langdon Street Real Estate
7 Langdon St.
Concord, NH 03301

RE: Bus Wash Facility

CBL: 190 F 8-13

Dear Mr. Blunt:

On June 2, 2004, the Portland Planning Authority approved the site plan for a bus wash facility, sleeping quarters, and underground diesel tank at the Concord Trailways facility on the Thompson's Point Connector Road. The approval was granted for the project with the following conditions:

- i. That the applicant submit a letter from Public Works attesting to adequate sewer capacity to service the development; and
- ii. That the applicant receive an Industrial Pretreatment or other appropriate waste discharge permit prior to issuance of a building permit.

Please note the following provisions and requirements for all site plan approvals:

1. Where submission drawings are available in electronic form, the applicant shall submit any available electronic CADD.DXF files with seven (7) sets of the final plans.
2. A performance guarantee covering the site improvements as well as an inspection fee payment of 2.0% of the guarantee amount and 7 final sets of plans must be submitted to and approved by the Planning Division and Public Works prior to the release of the building permit. If you need to make any modifications to the approved site plan, you must submit a revised site plan for staff review and approval.

O:\PLANNING\DEVELOPMENT\WSEWALL91\APPROVAL.DOC