



29495 Airport Road, Eugene, Oregon 97402 Telephone (541)-461-6020 FAX (541)-461-6023

I've enclosed the sections of the UMC & National Fuel Code that apply to venting the PowerMax™ Booster heater through a type II (ventilating) hood system. The key thing here is that the hood system fan is roof-mounted (outside the building) and so the hood and ducting operate under a negative pressure (suction), the hood fan is much more powerful than the PowerMax™ fan and thus, if there are any leaks in the ducting, air will be drawn into the duct and not forced out into the conditioned area. Additionally, the connection between the PowerMax™ vent and the hood system (or pant-leg vent on dishwasher) is an indirect connection and so all exhaust is diluted by the much larger volume of exhausted steam, air and heat from the dishwasher. The PowerMax™ vent is sealed from the outlet of the appliance to its termination at the hood or pant-leg vent, so exhaust can not escape until it is in the "capture zone" of the ventilating system. The PowerMax™'s exhaust is 200° or less which is approximately the temperature of the steam coming off of the dishwasher. Also per section 7.3.5, a proving switch is installed in the ventilating duct system, to "prove" the existence of draft (suction) in the vent system before allowing the PowerMax™ Booster to be powered. No draft, no booster operation, no exhaust gas.

There is actually another provision in the code that will sometimes allow a single booster heater at the dishwasher to be "free-vented" into the dish room. However, we do not recommend that this be done.

We have hundreds of the PowerMax™ Boosters vented through type II hoods according to our approved specification across the country. Another advantage of this system is that kitchen air balance is affected much less because the PowerMax™ is only intercepting make-up air supplied to the kitchen and on its way out the ventilation hood. No additional make-up air is needed as would be necessary with dedicated outside venting. It also means at least one less roof (or wall) penetration for builders and owners to deal with. I hope this satisfies your concerns. If you have any other questions, please call.

Best Regards,

A handwritten signature in black ink, appearing to read "Stephen Kujawa", written over a light circular stamp or watermark.

Stephen Kujawa  
President

encl



## VENTING OPTIONS

The PowerMax Booster Heater is classified as a category III appliance (partially condensing) and may be vented in several convenient ways:

1. Through the dishwasher ventilation system, either open canopy or cowl-vent pantleg style. (See following details)
2. Through the ceiling/roof. (See following details)
3. Through the wall.

Approved materials include:

1. AL29-4C S.S. gasket-sealed venting
2. 316ti Titanium stabilized S.S., gasket-sealed or flexible corrugated (one piece &/or sealed at any joints)
3. Polypropylene, either heat fused or gasket-sealed
4. Double-wall venting materials with 316 S.S. or AL29-4C S.S. inner wall
5. Sch 40 pressure PVC or ABS are **NOT** to be used for venting the PowerMax without specific written approval from factory.
6. "B" vent materials, with aluminum liner and galvanized or S.S. outer wall are **NOT** to be used as a primary vent material. Existing Type "B" vent may be used as a chase for sealed 3" or 4" S.S. venting, 3" or 4" polypropylene vent, or in some limited situations, Sch 40 PVC pressure pipe. PVC or ABS pipe is generally not recommended. Use of cellular core PVC (ASTM F891), cellular core CPVC, or Radel® (polyphenylsulfone) in nonmetallic venting systems **IS SPECIFICALLY PROHIBITED**. Covering non-metallic vent pipe and fittings with thermal insulation **IS PROHIBITED**.
7. Galvanized Sheet Metal ducting is **NOT** to be used as a primary venting material.

Any questions may be answered by the factory at 800-624-4809 8:00am-4:30pm PST.

### **COMBUSTION AIR / VENTILATION**

The POWERMAX™ must be provided with an adequate supply of air for proper combustion and ventilation as required by the National Fuel Gas Code, ANSI Z 223.1 or any local codes that supercede the National Code. Do not obstruct the combustion and/or ventilation air supply openings.

**IMPORTANT:** Combustion air must not be contaminated by corrosive vapors or fumes, i.e. salt, chlorine, refrigerant gases, detergents, paints, cleaners, etc.. Any damage caused by insufficient or contaminated combustion air or improper venting will not be covered under the warranty.

**IMPORTANT:** L'air de combustion ne doit pas être contaminé par des vapeurs ou des fumées corrosives, à savoir le sel, le chlore, les gaz réfrigérants, les détergents, les peintures, les nettoyants, etc. Tout dommage causé par l'air de combustion insuffisant ou contaminé ou l'évacuation incorrecte ne sera pas couvert par la garantie .

## EXHAUST VENTING

The POWERMAX™ Booster Heater is classified as a category III appliance (positive flue pressure, flue gas temperature of approximately 190 degrees Fahrenheit, possible condensate) and requires a special venting system. Vent piping must be one of the types detailed in this manual or a factory approved (in writing) alternate and must be installed according to the vent pipe manufacturer's instructions. All joints must be properly sealed and secured to maintain joint integrity. All vent piping must slope toward the appliance a minimum of 1/4 inch per foot of length. The National Fuel Gas Code, ANSI Z223.1 requires that the booster heater be vented in one of the following three ways:

1. Into the dishwasher exhaust system. (See fig. 1). The vent pipe must not penetrate any grease filter, but should terminate within the hood "capture zone". In cases of a "pantleg" type of vent (see fig. 2), the vent pipe may terminate below an approved "eyebrow" hood with a 2" diameter hole through the duct wall under the "eyebrow". See "E-Z-Vent" detail. When vented into the dishwasher exhaust system, an electrical interlock must be provided (by factory or others) and installed to prevent the appliance from firing if the exhaust system is not providing sufficient draft for any reason. (refer to National Fuel Gas Code)

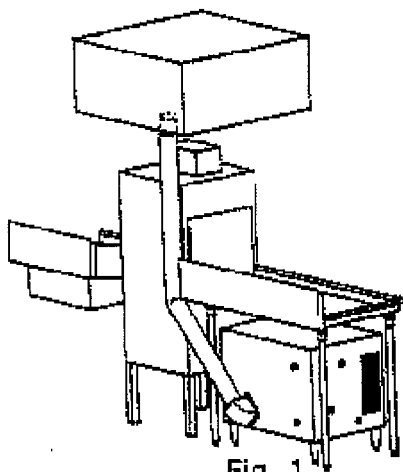


Fig. 1

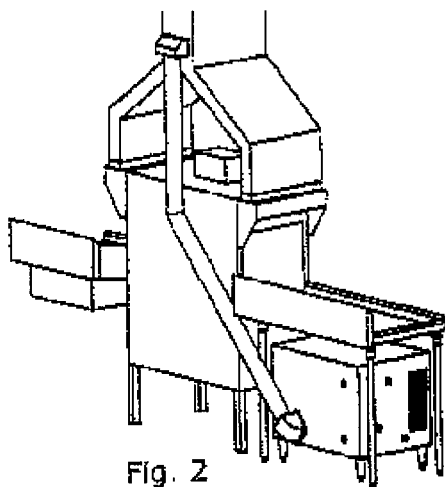


Fig. 2

2. Through the ceiling/roof (see fig. 3) or through a sidewall (see fig. 4). Although not recommended, Type B-1 vent pipe (3 inch min. diameter) may be used only when venting vertically through the roof, with no horizontal piping, provided a one inch minimum clearance to combustible material is maintained throughout and the vent terminates into a listed wind cap above the roof. Contact the factory for approval and important details. The PowerMax™ **MUST NOT** be common-vented with any other appliance. In most cases, the factory recommends using AL29-4C S.S. or 316Ti (titanium stabilized) S.S. or polypropylene sealed venting materials for corrosion protection of the venting system. Use of cellular core PVC (ASTM F891), cellular core CPVC, or Radel® (polyphenylsulfone) in nonmetallic venting systems is prohibited. Covering non-metallic vent pipe and fittings with thermal insulation is prohibited. **SOLID-CORE PRESSURE PVC** pipe may be used beyond any possible impact areas in certain specific circumstances. Call Factory for approval and important details.

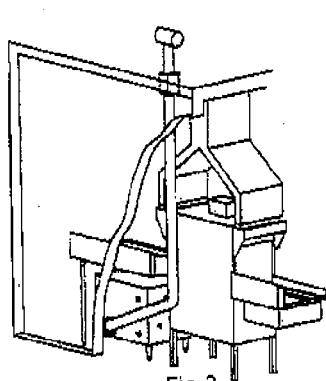


Fig. 3.

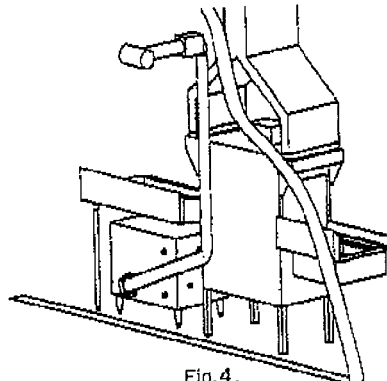


Fig. 4.

For **sidewall** venting, the booster heater should be located as close as possible to the wall being used. The minimum and maximum wall thickness and clearance is determined by the wall thimble available from the vent manufacturer. Refer to the vent manufacturer's installation instructions. In all cases, sidewall venting material must be AL29-4C S.S. or 316Ti S.S. or polypropylene. All horizontal runs of vent pipe must have a minimum rise of 1/4 inch per foot of length and must be supported every 5 feet or less (3 feet in Canada) and at every elbow.

For **horizontal** venting: The total length of approved 4 inch diameter vent pipe can be a maximum of 60 feet, including two 90 degree elbows and one termination vent. For each elbow above two, reduce the total allowable vent length by five feet. Minimum horizontal vent length is 2 feet.

For **vertical** venting: The maximum length of approved 4 inch diameter vent pipe is the same as above; the same requirements for elbows and termination vent apply; the minimum length for vertical venting is 5 feet. An auxiliary power vent kit is available for installations where the maximum vent length must exceed 50 feet. Call the factory for assistance.

-The vent termination shall be located at least three feet **above** any forced air inlet located within ten feet; at least four feet **below and** four feet horizontally from, or one foot above any door, opening window or gravity air inlet into any building. It shall also have a minimum horizontal clearance of four feet from any electric meter, gas meter, regulator, relief valve or other equipment.

-The vent termination shall be located not less than seven feet above grade when it is adjacent to public walkways.

-The bottom of the vent termination shall be located at least twelve inches above grade or ground or the normally expected snow accumulation level. The snow level may be higher on walls exposed to prevailing winds.

-Avoid areas where local experience indicates that condensate drippage may cause problems, such as above planters, patios, public walkways or areas where condensate or vapor could cause a nuisance or hazard, or where its discharge could be detrimental to the operation of regulators, relief valves, meters or other equipment.

3. Vented freely into the room or space where it is installed, provided that:

- a) A Mechanical exhaust system is present in the space where the booster heater is installed.
- b) An electrical interlock is provided (by others) so that the booster will not fire if the exhaust system is not providing adequate ventilation to the area.
- c) The total BTU input rating of all the unvented gas appliances installed divided by the total cubic foot volume of the room area (including any adjacent areas that cannot be physically closed off from the installation area) does not exceed 20 BTU's per hour per cubic foot of space.

**Examples of ACCEPTABLE VENT PIPING/ See Appendix A**

MANUFACTURER	MODEL	MATL SPEC	Part Name	3" Part Nbr	4" Part Nbr
Heat-Fab Inc. 38 Haywood St. Greenfield, MA 01301	Saf-T-Vent®	AL 29-4C® Or 316Ti Stainless Steel	Tee Rain Cap Mitre / Straight	7390TEE 5300C1 7390GC	7490TEE 5400C1 -
Z-Flex US, Inc. 20 Commerce Park North Bedford, NH 03110	Z-Vent®	AL 29-4C® Or 316Ti Stainless Steel	Tee Rain Cap Termination Box	#02SVSTTX-3 #02VRSRCX03 #02SVSRTX-3	#02SVSTTX-4 #02VRSRCX04 #02SVSRTX-4
Pro Tech Systems 400 S Pearl St Albany, NY 12202	FasNSeal® Or FasNSealW2®	AL 29-4C® Or 316Ti Stainless Steel	Termination Tee Wall Thimble Rain Cap	FSTT3 FSNT3 FSRC3	FSTT4 FSWT4 FSRC4
National Chimney 211 Winsor Dr Mt. Sterling, KY 40353		AL 29-4C® Or 316Ti Stainless Steel	Rain Cap	03SSDRC000	04SSDRC000
Polyflue/Selkirk 5030 Corp Exchange Blvd Grand Rapids, MI 49512	Polyflue	Flame- retardant Polypropylene	Tee 90° elbow Nominal to Poly Adapter	833011 833008 833041	834011 834008 834041
Z-Flex US, Inc. 20 Commerce Park North Bedford, NH 03110	Z-DENS	Polypropylene	90° elbow Nominal to Poly Adapter Vertical Termination	2ZDE387 2Z0ZY3 2Z0VK3	2ZDE487UV 2ZDZV4 2ZDCTV46
Centrotherm Eco Systems, LLC 400 S Pearl St Albany, NY 12202	InnoFlue	Polypropylene	90° elbow S.S. to Poly Adapter Termination	ISELL0387UV ISSA0303 ICRT3539	ISELL0487UV ISSA0404 ICRT4679

**Or Factory approved alternative**

**GAS PIPING**

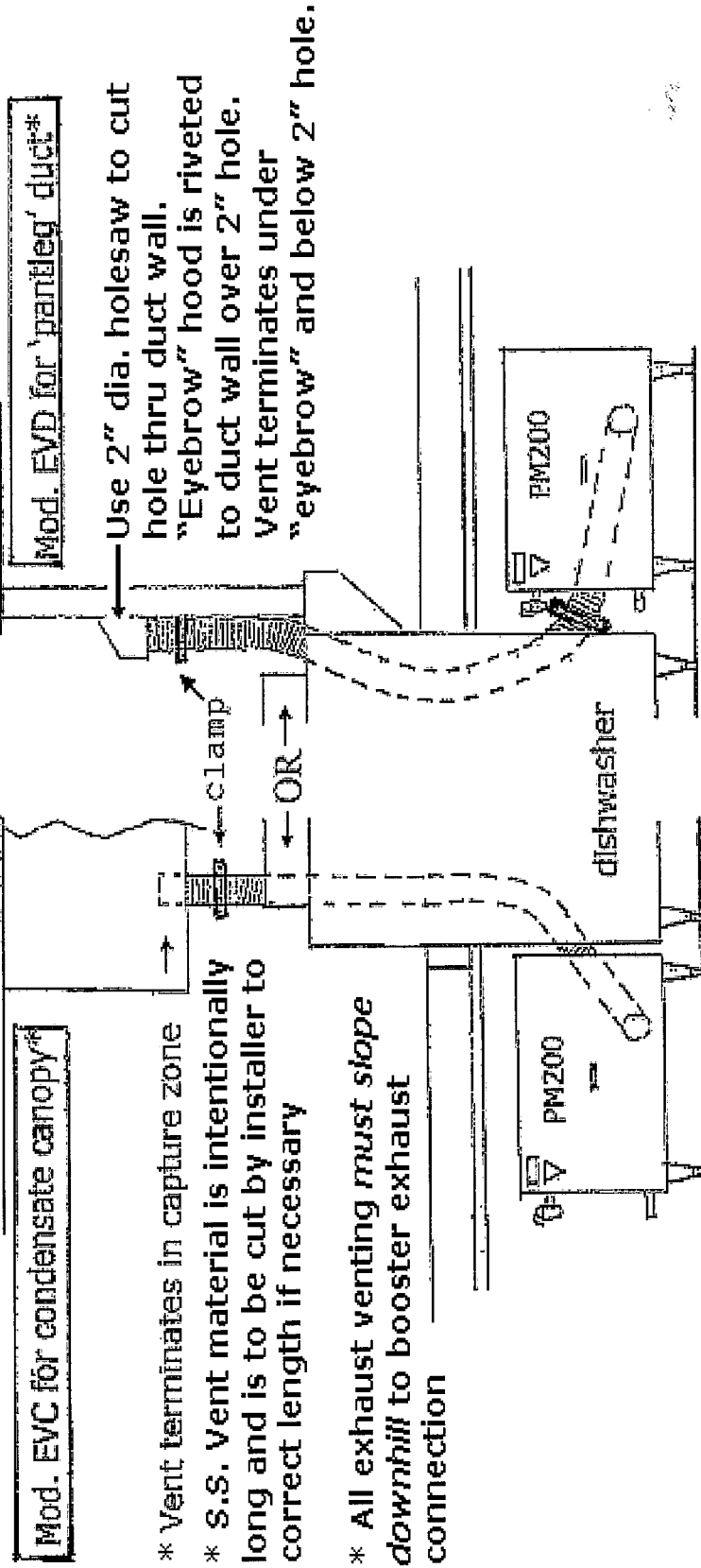
The PowerMax™ Gas Booster Heater is designed to operate connected to a ½ p.s.i.g. gas supply system. A gas pressure regulator (not supplied with booster) may be required to reduce higher gas pressure (i.e. 2 p.s.i.; 5 p.s.i.) systems to the required pressure. A “trimming regulator” such as a “Maxitrol 48L”; (5”-12” w.c.) (supplied with booster) must also be installed in the gas supply line to the PowerMax™ following the supply piping regulator to protect the Honeywell gas valve from momentary excessive pressure. The gas inlet pipe size is ¾ inch NPT, male thread, located at the lower right front corner of the appliance. The gas supply piping must be sized to adequately provide the input BTU/hr rate for the appliance at the specified flowing pressure (see table 1). The maximum inlet gas pressure must not exceed the maximum value shown in table 1. The minimum gas pressure shown in Table 1 is for purposes of input adjustment. Damage to the booster heater caused by excessive or insufficient gas pressure or volume or fluctuations in pressure or volume will not be covered under warranty.

**FLOWING Gas Pressure Requirement (not static)**

Inches W.C. (Water Column)			
Natural Gas/LP	Incoming Line Pressure (W.C.)		Manifold Pressure (W.C.)
	Minimum	Maximum	
PM200™	4.5” NG 10” LP	10.5” NG 14” LP	2.75”- 3.5” NG approx. 6.5”- 8” LP approx.

TABLE 1

# PowerMax200™ E-Z Vent Kit Models EVC and EVD



Mod. EVD for 'pantleg' duct\*

Use 2" dia. holesaw to cut hole thru duct wall.  
 "Eye-brow" hood is riveted to duct wall over 2" hole. Vent terminates under "eye-brow" and below 2" hole.

Mod. EVC for condensate canopy\*

\* Vent terminates in capture zone  
 \* S.S. Vent material is intentionally long and is to be cut by installer to correct length if necessary  
 \* All exhaust venting *must slope downhill* to booster exhaust connection

left or right booster location

## Model EVC includes:

- 10 feet of 3" stainless steel flex duct
- 1-Stainless steel flue collar adaptor
- 1-Stainless steel duct attachment clamps
- 1-Draft proving switch
- 2-Stainless steel wall standoff (1" clearance) bracket

## Model EVD includes:

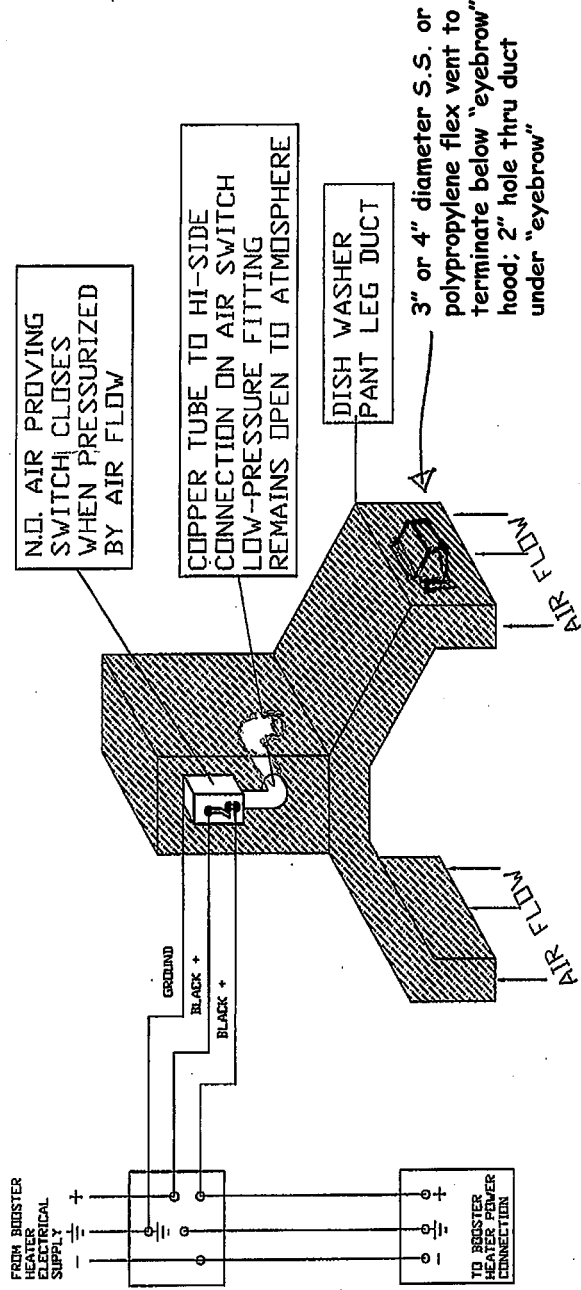
- 10 feet of 3" stainless steel flex duct
- 1-Stainless steel flue collar adaptor
- 1-Stainless steel duct attachment clamps
- 1-Draft proving switch
- 1-Stainless steel eye-brow hood and s/s rivets.
- 2-Stainless steel wall standoff (1" clearance) bracket

\*Conforms to Uniform Mechanical Code Sec. 916 & 917 and National Fuel Gas Code Sec. 7.3.4 & 7.3.5.  
 Confirm acceptance with local authority



**Vanguard Technology Inc., Eugene, OR 97402 - 800-624-4809**

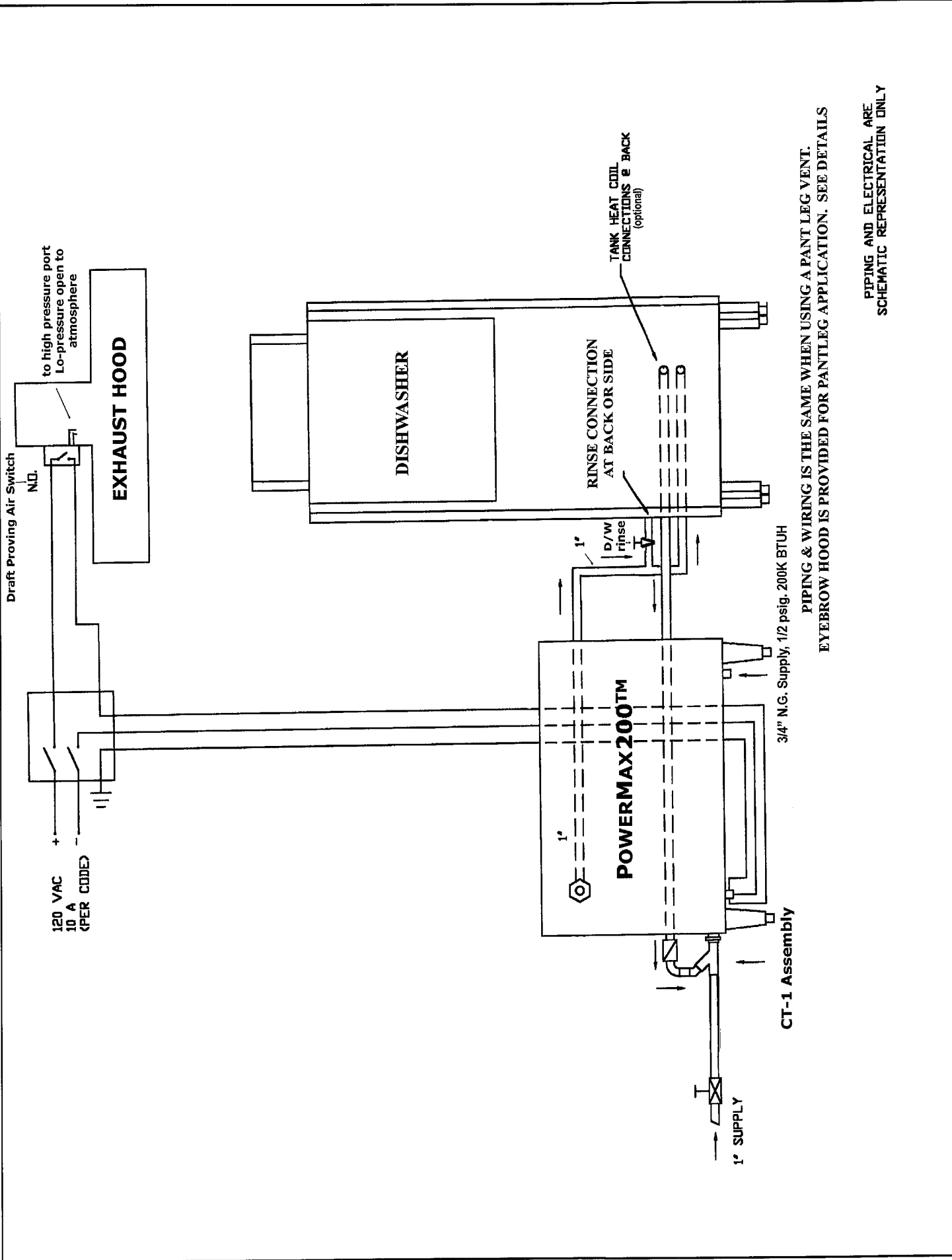
REVISIONS				
ZONE	REV	DESCRIPTION	DATE	APPROVED



VANGUARD TECHNOLOGY

SIZE	FSCM NO.	DWG NO.	REV
SCALE	SHEET		





120 VAC  
10 A  
(PER CODE)

Draft Proving Air Switch

N.O.  
to high pressure port  
Lo-pressure open to  
atmosphere

**EXHAUST HOOD**

**DISHWASHER**

RINSE CONNECTION  
AT BACK OR SIDE

TANK HEAT COIL  
CONNECTIONS @ BACK  
(optional)

**POWERMAX 200™**

3/4" N.G. Supply, 1/2 psig, 200K BTUH

**CT-1 Assembly**

1" SUPPLY

PIPING & WIRING IS THE SAME WHEN USING A PANT LEG VENT.  
EYEBROW HOOD IS PROVIDED FOR PANTLEG APPLICATION. SEE DETAILS

PIPING AND ELECTRICAL ARE  
SCHEMATIC REPRESENTATION ONLY

#### 7.3.4 Mechanical Draft Systems.

- | (a) Gas utilization equipment, except incinerators, requiring venting shall be permitted to be vented by means of mechanical draft systems of either forced or induced draft design.
- \* (b) Forced draft systems and all portions of induced draft systems under positive pressure during operation shall be designed and installed so as to prevent leakage of flue or vent gases into a building.
- \* (c) Vent connectors serving equipment vented by natural draft shall not be connected into any portion of mechanical draft systems operating under positive pressure.
- \* (d) When a mechanical draft system is employed, provision shall be made to prevent the flow of gas to the main burners when the draft system is not performing so as to satisfy the operating requirements of the equipment for safe performance.
- \* (e) The exit terminals of mechanical draft systems shall be not less than 7 feet (2.1 m) above grade where located adjacent to public walkways and shall be located as specified in 7.8(a) and (b).

#### 7.3.5\* Ventilating Hoods and Exhaust Systems.

- \* | (a) Ventilating hoods and exhaust systems shall be permitted to be used to vent gas utilization equipment installed in commercial applications.
- (b) Where automatically operated gas utilization equipment is vented through a ventilating hood or exhaust system equipped with a damper or with a power means of exhaust, provisions shall be made to allow the flow of gas to the main burners only when the damper is open to a position to properly vent the equipment and when the power means of exhaust is in operation.

7.3.6 Circulating Air Ducts and Plenums. No portion of a venting system shall extend into or pass through any circulating air duct or plenum.

#### 7.4 Type of Venting System to be Used.

7.4.1 The type of venting system to be used shall be in accordance with Table IX.

7.4.2 Plastic Piping. Approved plastic piping shall be permitted to be used for venting equipment listed for use with such venting materials.

| 7.4.3 Special Gas Vent. Special gas vent shall be listed and installed in accordance with the terms of the special gas vent listing and the manufacturers' instructions.

**7.3.3 Design and Construction.** Gas utilization equipment required to be vented shall be connected to a venting system designed and constructed in accordance with the provisions of Section 7.4 through 7.15.

#### **7.3.4 Mechanical Draft Systems.**

Mechanical or forced draft systems are systems in which a fan blows air into the appliance and through the vent to the outdoors. When a forced draft system is used, appliance leakage will enter the room in which the appliance is installed and can create a hazard. In induced draft systems the fan draws the products of combustion from the appliance into the vent to the outdoors. In both forced and induced draft systems, leakage of combustion products into the building can occur in the portion of the vent downstream from the fan.

- (a) Gas utilization equipment, except incinerators, requiring venting shall be permitted to be vented by means of mechanical draft systems of either forced or induced draft design.
- (b) Forced draft systems and all portions of induced draft systems under positive pressure during operation shall be designed and installed so as to prevent leakage of flue or vent gases into a building.
- (c) Vent connectors serving equipment vented by natural draft shall not be connected into any portion of mechanical draft systems operating under positive pressure.
- (d) When a mechanical draft system is employed, provision shall be made to prevent the flow of gas to the main burners when the draft system is not performing so as to satisfy the operating requirements of the equipment for safe performance.
- (e) The exit terminals of mechanical draft systems shall be not less than 7 feet (2.1 m) above grade where located adjacent to public walkways and shall be located as specified in 7.8(a) and (b).

Sections 7.8(a) and (b) specify location of vent terminals in relation to air inlets, doors, and windows. The information is shown in Figure A.7.8 also.

#### **7.3.5\* Ventilating Hoods and Exhaust Systems.**

- (a) Ventilating hoods and exhaust systems shall be permitted to be used to vent gas utilization equipment installed in commercial applications.

(b) Where automatically operated gas utilization equipment is vented through a ventilating hood or exhaust system equipped with a damper or with a power means of exhaust, provisions shall be made to allow the flow of gas to the main burners only when the damper is open to a position to properly vent the equipment and when the power means of exhaust is in operation.

**A.7.3.5** See A.7.2.3.

**7.3.6 Circulating Air Ducts and Plenums.** No portion of a venting system shall extend into or pass through any circulating air duct or plenum.

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## **7.4 Type of Venting System to be Used.**

**7.4.1** The type of venting system to be used shall be in accordance with Table IX.

To use the table, locate in the left-hand column the type of gas utilization equipment to be vented and read across to find the type(s) of venting system(s) that are permitted. For example, listed Category I equipment can be vented using a Type B gas vent, chimney, single-wall metal pipe, chimney lining system listed for gas venting, or special gas vent listed for the equipment.

The table refers to appliance Categories I through IV. These were added in a Tentative Interim Amendment (or Addenda) in 1987 and incorporated into the 1988 edition of the *Code*. The categories are based on vent temperature and pressure (see table on page 246). In the 1992 edition the definitions were changed from a specific temperature breakpoint for all appliances of 140 F° (78 C°) above dewpoint to the temperature specified in the relevant ANSI standard for each appliance. At the time of publication of this *Handbook*, all appliance standards specify 140 F° (78 C°) above dewpoint, but this may change in the future.

In the table on page 246, non-positive vent pressure refers to the pressure in the vent when it is lower than the pressure of the atmosphere. The incorporation of a fan into the appliance does not always mean that the vent pressure is positive. When in doubt, check the appliance nameplate or instructions for the category number, or check the vent pressure with a manometer or other pressure gauge when the appliance is operating.

**Table IX Type of Venting System to be Used**

Gas Utilization Equipment	Type of Venting System
Listed Category I equipment Listed equipment equipped with draft hood Equipment listed for use with Type B gas vent	Type B gas vent (7.6) Chimney (7.5) Single-wall metal pipe (7.7) Listed Chimney lining system for gas venting (7.5.1c). Special Gas Vent listed for this equipment (7.4.3)
Listed vented wall furnaces	Type B-W gas vent (7.6, 6.28)
Category II equipment	As specified or furnished by manufacturers of listed equipment (7.4.2., 7.4.3)
Category III equipment	As specified or furnished by manufacturers of listed equipment (7.4.2., 7.4.3)
Category IV equipment	As specified or furnished by manufacturers of listed equipment (7.4.2., 7.4.3)

**246 Part 7: Venting of Equipment**

Appliance Category†	Vent Pressure	Temperature Above/Below Defined in Relevant ANSI Standard	Comment
I	Non-Positive*	Above	Natural draft venting
II	Non-Positive*	Below	Materials must be corrosion resistant. Condensate must be drained.
III	Positive**	Above	Vent must be gastight.
IV	Positive**	Below	Vent must be liquid and gastight. Condensate must be drained.

\*Non-positive vent pressure means that even if fans or blowers are used in the appliance or vent systems, venting is accomplished by natural draft. (The vent pressure is lower than the atmospheric pressure.)

\*\*Positive vent pressure means that fans, blowers, or other means are used to propel vent gases through the vent at above atmospheric pressure.

†The newer models of appliances will be identified as Category I, II, III, or IV on the nameplate on the appliance and will be stated as such in the manufacturers' installation instructions.

**7.4.2 Plastic Piping.** Approved plastic piping shall be permitted to be used for venting equipment listed for use with such venting materials.

Prior to the introduction of high efficiency gas utilization equipment, plastic was prohibited as a vent material. High efficiency appliances reduced vent temperatures resulting in condensate formation, and as accumulation of condensate became a problem, plastic became the preferred material. Note that plastic vent materials can be used for listed gas utilization equipment only when specified in the manufacturers' instructions.