



TECHNICAL SERVICE DEPARTMENT
Technical Service Bulletin
1-800-432-8373



Basic Venting of Gas Fired Water Heaters and the XR 90 Fan Assist Water Heater

Appliance Venting Category	Vent Pressure	Condensing or Non-Condensing?	Common Vent Pipe Material	Rheem Products
3.3.6.11.1* Category I Vented Appliance. An appliance that operates with a non-positive vent static pressure and with a vent gas temperature that avoids excessive condensate production in the vent.	Non-positive; atmospheric vented; gravity vented; most common category of gas fired water heaters.	Non condensing (traditionally less than @ 82% efficiency)	Metal double wall "B" vent	Guardian system residential gas, Ultra Low NOx; XR90
3.3.6.11.2* Category II Vented Appliance. An appliance that operates with a non-positive vent static pressure and with a vent gas temperature that may cause excessive condensate production in the vent	Non-positive	Condensing	Special venting material per the product manufacturer	None; very few appliances are seen in residential applications; prohibit interconnection of the exhaust systems with other gas appliances.
3.3.6.11.3* Category III Vented Appliance. An appliance that operates with a positive vent static pressure and with a vent gas temperature that avoids excessive condensate production in the vent.	Positive (usually created by a 'blower motor' of some kind); and generally cannot be adjoined to a gravity-vented water heater.	Non condensing (traditionally less than @ 82% efficiency)	Stainless Steel; these usually require 3-inches clearance to combustibles and the joints must be sealed air tight.	Tankless – non condensing
3.3.6.11.4* Category IV Vented Appliance. An appliance that operates with a positive vent static pressure and with a vent gas temperature that may cause excessive condensate production in the vent.	Positive (usually created by a 'blower motor' of some kind); and generally cannot be adjoined to a gravity-vented water heater.	Condensing; have cool exhaust temperatures which will condense	Plastic (PVC, CPVC, ABS, etc)	PowerVent, Power Direct Vent, Ventmaster, Spiderfire, AdvantagePlus; Tankless fully condensing

*Definitions for this column are from the National Fuel Gas Code. The categories may also be based on vent temperature rise above dew point and pressure. These can be found in the ANSI Z223.1, Z21.47, Z21.10.3 and Z21.13; National mechanical codes; Regional building codes; and state mandated venting codes.

“Gravity” means these water heaters rely upon on the basic principal of the "stack effect" of a heated mass of air. The flue gas is less dense (hotter) than the ambient air surrounding the appliance creating a pressure difference (negative) inside the vent. This is subject to flue size, height, temperature and the availability of “dilution” air through the draft diverter or combustion chamber to create flow up the vent. To achieve correct draft the flue gas must be hot; usually 300⁰-400⁰ Fahrenheit to escape through to the flue termination outside the home. All Category I gas appliances can use B-Vent (sometimes a portion of single-wall connector) as the typical flue. B-Vent is a galvanized steel coaxial pipe with a circulation air annular space between the inner and outer liner. Type B-Vent is approved only for Category I venting rated appliances.



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Fan assist water heaters, such as the XR90, have an integral fan commonly called the inducer fan, which is installed solely to overcome the internal flue and flue baffle resistance to airflow. The exhaust after the flue and vent connector on the XR90 relies on heat and natural stack effect (hot goes up) to vent properly. Remember, the more efficient the water heater, the longer the flue and flue baffle is to allow for more heat transfer into the surrounding water. That explains why the XR90 is so tall for a 29 gallon tank. Longer flues and baffles require inducer fans which place a slight **negative pressure** on the flue to be sure the products of combustion are evacuated so as to allow for gravity venting.

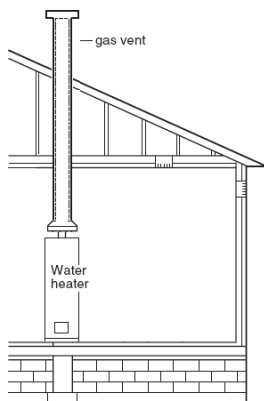
Since induced draft water heaters that are **Category I** rated can be common vented with other **Category I** appliances, we know we can use Code tables to size the vents. These will be listed “two or more appliances” and maximum combined BTU input amounts will appear in the FAN (Fan Assist) plus NAT (natural draft vent) common vent columns. The smaller appliance should enter the common flue above the larger BTU rated appliance and as high as possible whenever practical.

Induced draft water heaters (like the XR90) are categorized as FAN (for Fan Assist) in the NFGC venting tables. The inspector should not confuse these water heaters with those that are power vented (pressurize the venting to propel the exhaust gases) water heaters such as Category III and IV appliances. A common misunderstanding of the Code, has led many inspectors to conclude that this is a prohibited connection. The code states as follows: “Vent connectors serving appliances vented by natural draft shall not be connected into any portion of mechanical draft (blower motor) system operating under positive pressure.”

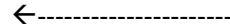
When a **Category I** vented water heater is connected to a **Category III or IV** power-vented product (furnaces or other products) back-drafting can occur at the draft diverter of the water heater. This will cause spillage of combustion gases at the draft diverter exposing occupants of the home to poisonous gases.

Finally.....

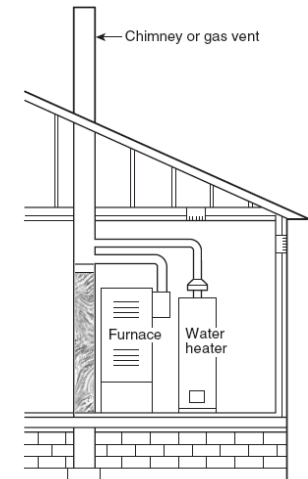
Single Appliance venting vs Multi-venting or common venting



Single appliance venting is the traditional method of one vent pipe per water heater.



Common venting is the method of connecting two or more gas appliances (water heater plus something else) into a common vent. **This is only allowed with Category I appliances.**





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Number of Appliances: Single			
Appliance Type: Category I			
Appliance Vent Connection: Single Wall Metal Connector			
Type B Double-Wall Gas Vent			
3 inch		4 inch	
Height	Lateral	Height	Lateral
ft	ft	ft	ft
6	0	6	2
8	0	8	2
10	2	10	2
15	5	15	2
20	5	20	2
30	5	30	2
50	5	50	2

Excerpted from the National Fuel Gas Code-Latest Edition

There are four charts on page 13 of the XR90 use and care manual. Since they are all installation and application specific, the installer must interpret the codes how to common vent these appliances.

Lateral is an “off set” in feet from the primary venting pathway /tube/pipe. For example, if the total vertical length of the vent is 30 feet, then the maximum lateral distance is 5 feet using 3 inch B-vent; or 2 feet using 4 inch B-vent.

Number of Appliances: Two or More			
Appliance Type: Category I			
Appliance Vent Connection: Type B Double-Wall Connector			
Type B Double-Wall Gas Vent			
3 inch		4 inch	
Height	Lateral	Height	Lateral
ft	ft	ft	ft
6	0	6	3
8	0	8	3
10	0	10	3
15	0	15	3
20	3	20	3
30	3	30	3
50	3	50	3

Excerpted from the National Fuel Gas Code-Latest Edition

In this example, we are ‘common venting’ two Category I appliances (furnace and water heater). This is allowed by code. Since they are all installation and application specific, the installer must interpret the codes how to common vent these appliances.

Using the same 30 foot vertical rise of the venting, the max lateral in either case is only 3 feet. The use and care manual applies ONLY to the XR90; not the furnace. There are other venting complications such as the combined Btu input of both appliances; how large is the pipe above the connection “T”; and which appliance is considered the primary appliance for the purposes of vent.

