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Water Heater Venting — Part II

Julius Ballanco, PEby *Julius Ballanco, P.E.*

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ARTICLE TOOLS

[Email](#) [Print](#) [Reprints](#) [Share](#)*Follow the rules for venting or risk premature failure.*

Last month, I addressed the changes in the classification of venting systems that impact the venting of a water heater. A standard tank-type, gas-fired water heater is a Category I appliance. Also in Category I are many residential furnaces and boilers. However, furnaces and some boilers use fan-assist combustion. As a result, this category of appliances is classified as Category I, Fan, whereas a water heater is Category I, Nat.

Combining a fan-assist combustion appliance with a natural burning combustion appliance requires attention to detail in sizing and installing the vent system. The fan-assist venting must match with the natural venting to allow the vent system to operate properly. Failure to follow the rules for venting can result in the premature failure of a vent system. This, of course, can lead to the escape of carbon monoxide into a building. A lethal dosage of carbon monoxide is 0.04 percent (not 4 percent, 0.04 percent) in the breathing atmosphere. That is a rather small quantity of CO. Hence it is imperative that you get the venting system right.

Before reviewing the venting of water heaters and fan-assist appliances, I should first recap the requirements for venting a water heater and a nonfan-assist Category I appliance. The old rule of thumb was the area of the largest vent plus 50 percent of the area of all the other vents connecting to the common vent is the minimum area of the common vent or Type B vent. This rule of thumb still would apply.

Another requirement was that the vent connector could extend 75 percent of the height of the chimney or vent. Again, this still would apply, assuming there is no fan-assist appliance connecting.

A major change occurred in exterior masonry chimneys. New tables were added to the Fuel Gas Code, which severely restricts the use of exterior masonry chimneys. An exterior masonry chimney is a chimney that has three sides exposed to the outside. You can no longer connect a single 40-, 50- or 75-gallon water heater to an exterior masonry chimney, unless the installation is in Southern California or South Florida.

What?! You read that correctly; you cannot connect one water heater to an exterior masonry chimney. What is required is for a Type B vent to be installed inside the masonry chimney.

This change reflects the concern for condensate attacking the inside wall of the masonry chimney. Since the venting of a water heater is minimal, there is not enough energy to heat up the wall of the masonry chimney to prevent condensation. This requirement does not pertain to inside masonry chimneys, only those chimneys on the exterior of the building.

Fan-Assist Rules

When you combine the venting of a water heater with a fan-assist appliance, throw out all of the old rules of thumb; they don't apply. The venting is completely different. First, the distance of the vent connector is greatly reduced. The distance from the water heater to the chimney or vent is 1 1/2 feet for every inch of vent connector. For example, a 4-inch vent connector can extend a maximum of 6 feet. This could mean that a water heater may have to be moved closer to the chimney or vent.

There are exceptions to this requirement when you reduce the capacity of the vent connector. The size of the vent connector must be determined by tables, not the water heater vent outlet. These tables can be found in the Fuel Gas Code, of which you should have a copy. When common-venting multiple appliances, you need to size each vent connector and the common vent by these tables.

The sizing is based on the input rating of the gas-fired appliance. Each vent connector size has three columns for sizing: two columns are for fan-assist appliances, and one for natural appliances. When sizing for a water heater, you only look at the NAT column. This column lists the maximum input rating permitted for a given vent connector size.

The sizing is not based on the appliance outlet. For example, if a 40-gallon water heater has a 3-inch draft hood and vent connection, it doesn't necessarily mean that a 3-inch vent connector is permitted. For most installations, a 3-inch vent connector must be increased to a minimum size of 4 inches. That is because the maximum input rating permitted on a 3-inch vent connector ranges from 26,000 to 42,000 Btu/hour, depending on the height of the vent and the rise of the vent connector. Since most 40-gallon water heaters are 40,000 Btu/hour or greater, you will find that most often the vent connector must be a minimum of 4 inches.

The maximum size (largest) permitted is always two diameters larger than the vent connector from the appliance. Hence, a 3-inch water heater vent outlet can have a 3-, 4- or 5-inch vent connector, depending on the tables, but not a 6-inch.

The combined vent size is regulated by the same table. At the bottom of the table, they list the maximum input rating for the common vent, depending on the type of appliances connecting. For a water heater and fan-assist appliance, the column would be FAN+NAT.

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The maximum size of a vent is seven times the area of the small vent connector. Hence if there is a 3-inch vent connector, the largest vent size permitted would be 7 inches (actually 7.93 inches, but they don't make a vent that size). Again, there are exceptions to this when designed by engineering calculations.

If an offset of the vent is installed in the attic, this reduces the capacity of the vent. The reduction in capacity is 20 percent. If the table lists 100,000 Btu/hour as the maximum limit, that reduces to 80,000 Btu/hour when an offset is installed.

Some other rules that will impact water heaters: When installed in an unconditioned space, the vent connector must be double-walled. For example, a water heater installed in an attic or garage. Again, depending on the location (and climate), there are exceptions to this requirement.

When connecting a water heater and fan-assist appliance together, the majority of the time you will not be able to connect to a masonry chimney. When connecting to a masonry chimney, a liner is often required.

If you want to simplify your life, I would suggest buying one of the computer programs that sizes the vent system. One of the better programs is Elite Software. You can review a sample of the program at www.elitesoft.com.

Make sure you understand and install the venting system correctly. An incorrect installation can have deadly consequences.

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