The Things You Should Know about Vent free Appliances

Many of our clients consider a “vent free” appliance as an alternative. Three things often drive the attraction to such appliances. A desire for efficiency, lower cost, or no glass front. Nonetheless, the term “vent free” is usually not fully understood. Let's explore what is involved with a choice for such an appliance.

The desire for efficiency seems to ride on the idea that all of the heat from the appliance will come into the living area. There is no doubt that “vent free” has a lower upfront cost since installation does not require venting materials. But, we should realize that while no pipe is used, the appliance still has byproducts of combustion and those are not just the heat. All the by-products are “vented” through the living space. They include carbon dioxide, a mix of aldehydes and other components such as un-burnt mercapton, water vapor, and carbon monoxide.

Carbon dioxide (CO_2) is of small concern. After all we respire CO_2 with every breath we exhale. Our house plants love it and give us Oxygen in return. Were it to replace much of the O_2 in our home we would find ourselves short of breath, however, the appliance is equipped an O_2 depletion “sensor” which shuts the appliance off before the levels get unacceptable. That is why there is a limit to how small off a room in which the appliance may be installed.

Aldehydes result from incomplete combustion. In order to have pretty yellow flames, the appliance is designed with less than 100% combustion efficiency. Otherwise the flames would have the appearance of a Bunsen burner. Aldehydes have a distinctive treacle odor.

Gas (both natural – methane, and LP – liquid petroleum) is colorless and odorless. In order for it to be detectable without using expensive equipment mercapton is added. Sometime not all of it is burnt and the odor is detectable even though the gas has been burnt.

For every hour the appliance is burnt, at least 1 liter of water vapor evolves. A normal amount of relative humidity (RH) in a home ranges from 25% to 50%. The added water vapor can easily increase the RH to 90% or more. Imagining a sweltering summer day? While the house temperature may be low enough to make that tolerable that water vapor will be seen on windows, sliders, and doors. Unseen may be condensation inside the walls.

Most dire, perhaps, is carbon monoxide (CO_1 or just CO) is the by-product with which we are justifiably concerned. A “vent free” appliance is designed to have complete enough combustion that the CO emission is pretty low, perhaps 3 parts per million (PPM). This presumes that the air mixture in the burner is correct, the logs are arranged exactly as the manufacturer intends, and no environmental aspect is impinging the process.

OSHA sets a limit for the exposure levels of CO based on time. For 8 hours the limit is 30 PPM. But we typically live in our homes for longer periods of time. The 12 hour exposure limit is 9 PPM. The World Health Organization set that limit just a bit lower at 7 PPM. We end up with a safety factor of only 4 PPM. For this reason we insist that each client who will have “vent free” appliance also have a

CO detector that has a numerical read out and a peak or max level button. One can walk past the detector often and see zero. Pressing the peak level button reveals the highest level read since the detector was last reset.
While CO can be fatal it has a more insidious concern. CO at less than fatal levels can cause brain damage. Symptoms of CO poisoning mimic flu symptoms. They include fatigue, nausea, headache, dry eyes, and congestion. If you are experiencing flue symptoms it is a good idea to press the max button on your CO detector!

Finally, we need to consider heat as a byproduct of combustion. Wood framing is all around the fireplace. It is to the sides and underneath. There may be form wood under the hearth and hearth extension. The combustible floor in front of the fireplace must be considered. Combustible mantels and breast plates must be considered. While an vent free appliance does not use the flue, all of these areas are still at risk. The thermal breaks around the fireplace must be correct, even more so since there is no cooling air moving through the system. While clients do not intend to use venting, every so often they still do. Hence, the flue needs to be inspected to verify that it can be used for venting if needed.

Oh! Am I forgetting the glass front? The alternative to “vent free” is “direct vent”. Direct vent appliances use 100% outside air for combustion and therefore are not air hogs like open fireplaces. They burn at pretty high combustion efficiency allowing very little (~15%) of the heat produced to escape with the exhaust. Best of all 0.0% of the exhaust enters the living space. They do, however all have a glass front that only removes for servicing. But then, why would you ever need to access the fire in a normal situation. Certainly not for S'Mores.

Last, but not least, vent free appliances are prohibited for use in sleeping rooms. This seems simple enough, but it means the appliance can not be used for emergency heat or if the room will be temporarily used as an invalid room.

Now that you have a more full understanding of what a “vent Free” appliance entails and the cautious requirements (CO detector), Closer to the Hearth is willing to install such appliances. Let's set aside a time for a Site Survey!

There are many models of Carbon Monoxide (CO) detectors. Our favorite model is the KN-COPP-3 made by Kidde. Any model with a number readout and a peak button is acceptable.