

# Living safely near the Combustion Appliance Zone

## Ventilation important when using fuel-burning appliances

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Living Green



I am about to take you on a journey to a place where inside is partly outside, where machines breath air like living things – a place where key rules must be obeyed or sickness and even death may prevail. The destination is not the “Twilight Zone” – I am taking you to the Combustion Appliance Zone!

Most of us rely on some type of fuel burning or combustion appliance in our home to provide heat for warmth, hot water, cooking or even just as decoration (such as a fireplace). The Combustion Appliance Zone (CAZ) can be any area where one or more fuel-burning appliances are installed.

In most of our homes, the most recognizable CAZ is a hall utility closet – when we open the door to this closet we see a gas fired furnace and often enough, the hot water heater. Another typical CAZ is inside the garage next to the wall shared with the home.

Every CAZ needs a few key things for the appliances working in the area to perform safely. There must be a source of fresh air that can be mixed with the fuel source to support clean and efficient burning of the fuel (usually natural gas or propane and sometimes wood, bio pellets or coal). The process of combining and converting fuel and air to make heat creates some rather nasty by-products, including carbon monoxide and a wide range of other volatile organic compounds.

Each CAZ needs some sort of drafting chimney or flue to move these waste gases and compounds out of the home. Last, and maybe most important, the CAZ must have a boundary that separates the area where the combustion occurs from the heated and air conditioned space inside our house where our families live. Our builders, plumbers and heating contractors do a good job of isolating the CAZ in modern homes and providing fresh air and waste gas venting. As with any complex system,



**When using a hot water heater – part of the Combustion Appliance Zone – it's important to make sure it's in an area that is well ventilated.**

occasionally things can go wrong.

Unfortunately, when problems arise with a CAZ we may not know until it has impacted a family's health or even taken a life. Here is a “to do” list to stop problems early:

- Make sure screened fresh air vents in the CAZ space extend to the outside of the home and are not covered by stored items, insulation from the attic or any other debris.
- The door to the CAZ should be fire rated and weather sealed, just like a door opening to the exterior (I see lots of hollow core, bi-fold or vented doors used in this application and these doors must be replaced and sealed to maintain a safe CAZ).
- Interior walls of CAZ closets or areas should be finished with taped sheet rock – any openings or penetrations through the wall or down into the return air box below must be sealed.
- The waste gas flue vent pipe at the top of furnaces and water heaters should be continuous with no gaps or breaks and should always extend up to the outlet at the ceiling with no downward or horizontal sections. Metal flue joints should be permanently secured (not taped).
- The draft hood at the base of the waste gas flue should line up directly over the top of and be securely fastened to the appliance.
- Any build up of soot (black areas) at flue connections or openings to appliances can indicate the equipment is not venting or burning cleanly and must be serviced.
- Watch the furnace or water heater start a heating cycle. If flame “rolls out” from within the heat exchanger area, the unit is not venting right and should be serviced right away.
- Have your older furnace heat exchanger (10 to 15 years or older) inspected every couple of years by a Building Performance Analyst (BPI) or licensed heating contractor. Metal fatigue will eventually occur in every furnace if kept in service for too long – when it does occur, combustion gases mix with heated air and get spread to every ducted room in the home.
- Have ductwork tested for leakage by a Home Energy Rater (HER) or BPI analyst. Leaky ductwork can create negative pressure at areas in a home that can pull combustion gas in to the living space.
- Use a HERs rater or BPI analyst to conduct Worst Case Depressurization testing. This test demonstrates that there will be a slight positive pressure within a home at all times – minimizing risk of combustion gas flowing into conditioned family areas. If negative pressures are recorded, the rater or analyst will prescribe corrective actions.

- Install high-quality carbon monoxide sensors high on a wall in each bedroom and living space (carbon monoxide sensitivity levels vary greatly with these units – shop for the ones with lowest level of CO parts per million detection capacity).

Some other CAZ areas are not as easily confined as a hall utility closet. Your garage can serve as a CAZ if water heaters or furnaces are installed there. If you change the configuration of an overhead garage door by sealing it or if you convert a garage to a living space, you can create a dangerous CAZ. Gas kitchen ranges and cook tops, gas fired clothes dryers and wood- or gas-fired fireplaces and stoves each require an amount of fresh air for clean combustion and may require special waste gas venting.

The most dangerous situations I find are those created when combustion appliances are installed in areas that were never designed to be a CAZ. We have thousands of all electric homes in Las Cruces built in the late '60s and '70s. Rising electric rates led homeowners to convert one or all of the electric heating appliances in many of these homes to natural gas or propane. Well meaning do-it-yourselfers and handy men installed gas-fired furnaces or water heaters in areas that are not adequately vented or vented at all. I see this with gas water heaters very frequently. Thankfully, many of these homes are not very weather tight and folks living there go on blissfully unaware – but if you live in a home that has a gas water heater installed in an unvented closet, kitchen or closed in porch, patio or laundry room (I have even found some in kids' bedrooms!) call a licensed Heating Air Conditioning and Ventilation contractor (HVAC) immediately to come out and make sure the unit can operate safely where it is installed.

High-efficiency gas furnaces and water heaters that operate with sealed combustion are available. This means a dedicated CAZ does not have to be created since the combustion process is confined within the equipment. Sealed combustion equipment should be considered any time older gas or electric units are replaced, they are safer to live with and cost less to operate. Sealed combustion appliances should only be installed by licensed HVAC or plumbing contractors.

Don't let gas fired heating and cooling equipment terrorize or be detrimental to you and haunt your family. Get out of the “Twilight Zone” by learning about and implementing Combustion Appliance Zone safety in your house.

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