

## Why Test for Carbon Monoxide?

Is carbon monoxide (CO) testing of gas and oil fueled appliances required in a home inspection? No. But some home inspectors do measure CO production. CO is produced when fuel does not burn as completely as possible, and it is poisonous and sickening to us breathing creatures. Healthy people can tolerate low levels of CO, but infants and folks with health and breathing problems are susceptible to even low levels like 10 ppm (parts/million). In the 1980's The American Society of Heating, Refrigeration and Air Conditioning Engineers (ASHRAE) developed a standard for CO levels stating that continuous exposure indoors for an eight hour period should not exceed 9 ppm.

Home inspectors worry about any condition that might introduce CO into the indoor air and affect the humans and pets there. We do this by looking for conditions and equipment that would cause a build-up of CO.

1. If the appliance is vented to the outside air (all furnaces, pool heaters & water heaters, and some gas log heaters), then there must be no spillage shortly after the venting system has established its drafting effect, sucking all the exhaust gases out of the house. Many appliances release some fuel odor and exhaust when they go through the first moments of their burn cycle, and this is acceptable.
2. CO levels of up to 100 ppm, measured in the flue gases, are acceptable for VENTED appliances. Vented style, gas logs in fireplaces can produce more than 100 ppm CO as long as they don't spill into the room. The damper must have a hold-open safety clamp installed to avert the damper being shut while the heater is burning.
3. Again, the rule for VENTED appliances is: NO SPILLAGE OF EXHAUST GASES. Often we inspectors will create a worse case scenario by closing all doors and windows, then turning on the furnace blower, kitchen range vent and clothes dryer to see if any of these air-sucking appliances will cause the combustion appliance to back-vent and spill exhaust into the house. This routine is especially important in the case of a water heater or furnace installed near a clothes dryer, and especially where these appliances are confined to a small room.
4. In the case of UNVENTED gas heaters (a) in a fireplace with damper sealed, (b) in a fake fireplace enclosure, or (c) a free-standing room heater, the rule is that the heater should not make the CO level rise above 9 ppm over a several hour period. Since we aren't around for hours to do such a test, we have to be creative. One thing for sure, if the heater does not spill gases with more than 9 ppm CO into the room, then indoor air will be less than 9 ppm.
5. Gas cooking ranges are often not vented to the outside air by a range hood. That's unfortunate. I advise folks to install a vented hood because it is best to exhaust out heat, cooking odors and the combustion products of the range. Ovens are notorious for generating lots of CO, and should be tested in both BAKE and BROIL modes. CO levels of 300-400 ppm are common, but something less than 50 ppm is attainable in many ranges; and a technician may be able to "tune" the range for cleaner burning. No matter how well-behaved the range is, it should never be used to heat the house.
6. Home inspectors look for other signs of combustion problems: sooting around burners, corrosion of the smoke pipe, scorching marks from flame rollout around burners, distortion of flames when the blower runs in a furnace, soapy-like odor to the flue gases, etc. Skilled combustion technicians measure other things and often disassemble appliances. They look at draft pressure, temperature of the heated air, CO production over a long period, cracks in the heat exchanger, etc.
7. Why not simply recommend the use of inexpensive carbon monoxide alarms? The sad truth is that Underwriters Laboratory approval (UL 2034) allows for a CO alarm not to show a digital readout or signal trouble until the CO concentration is above 30 ppm. Then it must not "honk" until the concentration is above 70 ppm...steadily for four hours. Thus, the UL approved detector that one buys in the store is woefully crude and may only alarm when people and pets are already getting sick from CO poisoning. That is not my idea of an honest safety monitor. More sensitive alarms are available, but more expensive.
8. The proper placement for a CO alarm (smoke detectors, too) is high on a wall, or on the ceiling... since warm air rises carrying CO with it. If the alarm is a 120 volt type, get one with an extension cord so it can go high on a wall. Install it near bedroom doors so that sleepers can hear it. NEWER HOMES in NC permitted since January 1, 2011 must have CO alarms installed near sleeping rooms and at every level of habitable space. Also, as of 1/1//2011 for EXISTING HOMES & TOWNHOUSES a CO alarm must be provided anytime a combustion appliance is added or replaced, an addition is built, or if interior alterations or repairs are made that requires a building permit.