Ask Jon Eakes

WHAT IS A COMBUSTION FRESH AIR SUPPLY?

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FURNACES & BOILERS
Well-sealed houses need a fresh air supply for combustion. (search keyword "Combustion Air" for the title "DOES MY FURNACE GET ENOUGH AIR?") The most common technique in basement installations, is to use an insulated duct to dump air next to the combustion intake.Â The gas code says to end this duct "within 1ft above and within 2 feet horizontally from the flame level of the appliance...".Â Because the duct comes from the joist area down towards the floor it must be heavily insulated to minimize condensation.
This effectively provides combustion air and sufficient draft air to minimize the effect of exhaust fans on the furnace chimney. However, this open duct bypasses a controlled ventilation system, particularly a heat recovery ventilator, and makes for a permanently cold basement floor. (search keyword "Air Quality" for the title "WHAT IS A CONTROLLED COLD-AIR INLET?")
The national gas code is the strictest code in addressing this problem because gas burns with a cooler chimney temperature than other fuels and hence can have more trouble creating a safe draft. The gas code requires 1 sq. in. of free open duct (taking into account the reduction of air flow through bug screens) for every 5,000 BTU capacity of the total of all the gas burning appliances (furnace and water heater). In many modern houses this means 6 to 8 in. diameter open ducts in the basement. The result may be fine for the furnace but will over ventilate the house and dry it out to the point where it is impossible to humidify not to mention the arctic temperatures on the basement floor -- as many Calgary condominium dwellers can testify to. So homeowners simply stuff these ducts, where contractors bother to put them in, with rags.
The problem is that the furnace needs this large air supply while it is heating, but that most of the time this unrestricted air supply is simply over ventilating the house.
In the early 80's a number of creative solutions were created to provide this air to the furnace while trying to keep the basement warm. I mention these efforts here because they keep getting re-invented every few years by people who aren't aware that they have proven to be poor or even dangerous solutions in the past.
The worst but valiant effort was the sealed furnace rooms.
Many houses were supplied with ventilation ducts that looped down and then back up and then back down again along the basement wall, to create something similar to a plumbing trap which we called a "Saskatoon Loop". Others had the duct terminate in a sort of bucket, again to try to create a "trap" sort of arrangement. Both of these worked fairly well, except when the wind blew, still chilling the basement part of the time.
Finally a company in Camrose, Alberta developed the Hoyme Damper, a motorized damper that is interlocked to the furnace thermostat. When the thermostat calls for heat, the damper opens, and then the furnace goes on. When the thermostat turns off the furnace, the damper closes the cold air supply. Why is this still the only damper approved by the gas code? Because they bothered to make it failsafe and frost proof -- if anything goes wrong, it opens the air supply. This is now a well known and common solution to the combustion air problem in the Prairies, but is very poorly known in the rest of Canada. Eastern contractors just don't believe that homeowners are willing the spend the money (about $200 installed) for an elegant solution that will protect their health, so they don't even offer it, or are simply not aware of it. So in the East, the arguments rage on as to whether we need or don't need a combustion air supply, while in the West they let technology make it both comfortable and safe.
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Keywords:
Furnace, Combustion Air, Boiler, Heating, Duct