

Achieving the 7.5 CFM per occupant balanced venting standard



Most third party certified green building standards require a designed fresh air intake strategy based on 7.5 cfm provided air per occupant. Here in North Carolina the outdoor air is often oppressively humid and we've eliminated many of the sources of indoor air contamination so I use a simple and inexpensive form of exhaust-only ventilation that gives me the fresh air I need when people are in the home but automatically scales back when they are gone.

If we are to provide 7.5 cfm per occupant then that means that we will need to provide $7.5 \times 60 = 450$ cubic feet per occupant per hour, the equivalent of a 110 CFM bath fan (running at 80 cfm actual) for 5.6 minutes. If the average individual spends 12 hours per day at home and 12 hours away from home we need to run that bath fan 5.6 minutes times 12 hours or 67.5 minutes per day to provide adequate fresh air for that occupant. If the house hold has some occupants such as teenagers or adult children who only occupy the home intermittently there should be a mechanism by which the house can dynamically respond to the variation in occupancy levels. Time delay occupancy sensors used as bath fans switches turn out to be an excellent way to allow the home to respond to varying occupancies with input from the homeowners. We set the master bath fan at a 45 minute time delay on the assumption that it will get triggered on average three times a day by two occupants, we put the kids bath fan on a thirty minute delay and the powder room on a 15 minute delay. This way if the kids are away at school there will be no additional ventilation since their bath will not see any use. If the adults both use the master bath at the same time every morning the fact that they count double will be compensated for by the longer off cycle and if there is a social event in the home and the powder room bath sees additional activity the house will automatically adjust for that additional occupancy. We use energy star rated 110 CFM Panasonic bath fans but any Energy Star rated bath fan will do. It is essential to have your energy star certifier verify the output of the fan to confirm the efficacy of your timer calculations.

Our goal is to provide balanced and filtered make-up air, with a designed exhaust and a balancing intake. Some builders put a filtered fresh air duct from the exterior to the return air duct going into the HVAC system but this makes the makeup air respond to the operation of the HVAC rather than the occupancy of the building. The home does not need additional make up air on the hottest and coldest day of the year. For a while Joe Lstiburek's Building Science Corp and Masco's System Vision program were using a FanCycler timer, combined with a 6" intake vent from the exterior to the return air manifold, to turn on the HVAC fan on a schedule to assure adequate ventilation. A good idea except that the homeowners tended to disable these devices according to Brian Coble at Advanced Energy who was in charge of that programs implementation (we designed his house and got to spend a lot of time talking building science with him as part of that).

