#4273

What can generate 5 Pascals of depressurization?

Most new houses contain at least a clothes dryer and a bathroom or kitchen fan. These devices, operating at the same time can provide an air flow of at least 230 cfm (113 L/s).

A clothes dryer, a bathroom fan, and a kitchen rangehood drawing 230 cfm, can generate a depressurization of at least 5 Pa in the average new house in seven out of 12 cities (Quebec City, Winnipeg, Montreal, Regina, Saskatoon, Halifax, and Fredericton).

Much of the low cost ventilation equipment used in most houses does not perform as its supposed to (it is not suitable for continuous use because it is too noisy and is not durable). In spite of the poor performance of cheap fans, 18% of new houses will depressurize to more than the 5 Pascal limit recommended for naturally aspirated combustion appliances. 20% of new houses will be depressurized by more than 10 Pa by the average dryer, bathroom plus kitchen fan.

Table 2 shows the average, minimum and maximum airflows required to create a pressure difference of 5 Pascals in typical new houses.

With today's busy lifestyles, it is not out of line to suggest that most fans will run at the same time, as people come home from work, one takes a shower, supper is cooked, and a load of laundry is done (or it may be in the morning as everyone is rushing to get out of the house).

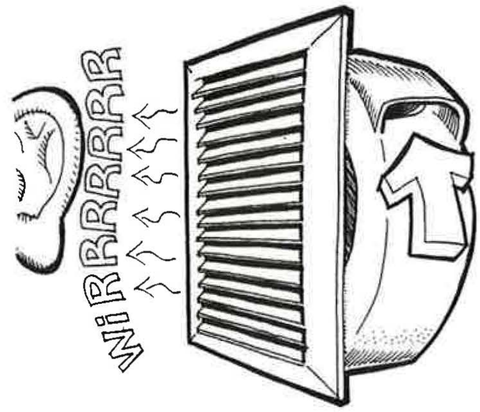
The moral of the story? New houses are being built tighter. When designing and equipping the house, it must be remembered that the house works as a whole system. When selecting exhaust equipment it is important to consider how it relates to all the other equipment in the house.

This item is based on work by Tom Hamlin, Michael Lubun and John Forman reported on in an as yet unpublished draft report.

Ventilation Case Study: the importance of noise levels

Richard Kadulski

Regular readers will know I have written much about energy efficiency and ventilation issues. Many probably believe I live in a state-of-the-art energy efficient home. It may dismay some that home is really a modest 1 bedroom 650 sq.ft. mid 70's vintage spec built condo apartment (that's taken a lot of effort to repair construction faults!).



At long last, I have installed a central ventilation system: an AERECO humidity controlled ventilation system (Solplan Review No. 11 Oct-Nov 1986). It has a central fan with exhaust ports in the kitchen area and bathroom. Humidity controlled fresh air inlets are located in the bedroom and living area.

The unit continuously draws about 44 cfm (18 cfm from the bathroom, 26 from kitchen) to maintain a 50% relative humidity. The system places the apartment under a small negative pressure (approx 0.006" WG or 1½ Pascals). Until we weather-stripped the door, this was enough to draw in smells from the unpressurized hallway.

The apartment is a corner unit so that in theory "cross ventilation" is available. Was there any point in going to this great length? I can verify that "cross ventilation" doesn't work all the time, especially when you need it most! During the winter it's too cold to open the windows, in the spring and fall leaving windows open all day has no effect (assuming security was not a consideration).

The smell of fried onions or other cooking odours or the aroma of smelly socks left on the floor would linger even if a window or two was left open. In other words, despite the best intentions the apartment could generally have been described as being stuffy. The continuously operating ventilation system has resolved the problem of lingering odours; the apartment is no longer stuffy.

However, the installation underlined the importance of paying attention to the noise levels generated by continuously operating mechanical equipment. Today's younger generation, by the time they reach their late teens has often suffered hearing loss after time spent in rock concerts, in loud night clubs or under Walkman earphones and may not appreciate quiet.

But for someone who appreciates quiet, or at least being able to control their auditory environment, and has good hearing, the control of noise and the elimination of irritating back-

TABLE A
Measured noise levels

background level	30 dB
Refrigerator[1]	39 dB
Microwave[1]	58 dB
Plumbing noises[2]	41 dB
Central ventilation system when first installed[3]	33 dB
soft whisper at 6 feet	35 dB
background level (in a quiet office)	35 - 40 dB

[1] from 3 feet away

[2] building plumbing noises from a common wall

[3] about 12 feet away from the exhaust

ground noises is important and healthy. This means that a good ventilation system has to be quiet. But how quiet is quiet? The B.C. Building Code now requires fans to be rated for lass than 2.5 sones or 60 decibels. That is too loud for continuous operation.

We did measurements of noise levels in the apartment before and after installation. The background noise level is 30 dB.

Table A shows sound levels generated by household appliances and by the ventilation system. Appliance noises are generally tolerated as they are intermittent.

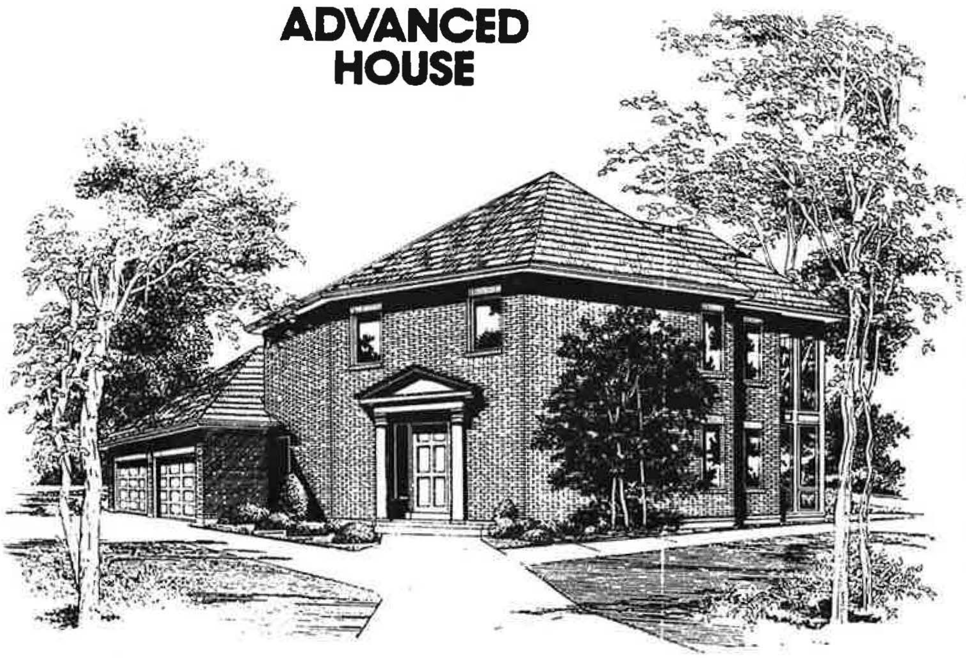
Noise generated by the central ventilation system when first installed registered 33 dB in the living area (about 12 feet away from the exhaust). 33 dB is quiet, right? At home, it is surprising how irritating even such a low level is. While it may be tolerable in many situations it was too loud for comfort. The supplier was able to provide an alternate model of the exhaust port that reduced the noise by 3 dB.

Advanced House a reality

The Advanced House demonstrates new products and technologies that can reduce total home energy use without compromising comfort and safety.

The Advanced House uses products that are at the leading edge of technology; most are already commercially available. It is designed to use one quarter the energy of a conventionally-built home.

Energy efficiency is important because global warming and many of the other environmental problems we face is caused largely by our misuse of energy. It is a small step towards environmentally responsible housing.



Features include:

* High-performance energy-efficient windows: triple-glazed, double low-E with gas fill, and insulating edge spacers (R-5.2). These units are now commercially available.
* Integrated mechanical system: a single piece of equipment replaces the furnace, the hot water tank, the air conditioner and the ventilation system. The efficient unit provides 60% energy savings over conventional equipment.
* Energy-efficient appliances: the appliances demonstrated in the house use between 20% and 60% of the energy of average appliances.
* Energy Efficient lighting: efficient fluorescent lights that are attractive, practical and use 80% less energy.
* High levels of insulation: R-40 (RSI 7) walls, R-60 (RSI 10.6) ceilings and R-37 (RSI 6.55) basement drastically reduce space heating and cooling energy use. Environmentally friendly cellulose insulation was used. A blown in batt was used in the walls.
* Airtight construction: as in R-2000 construction, a continuous air barrier prevents air leakage and protects the building fabric. Fresh air is continuously distributed to each room.
* Two-storey passive-solar sunspace: is a solar collector that collects and stores solar heat for the rest of the house and preheats the ventilation air.
* Energy-efficient fireplace: most fireplaces waste energy and contribute to air pollution. The efficient prefab contraflow fireplace reduces emissions and stores heat.
* Energy-monitoring: a two-year testing and monitoring program will verify whether the house and its components perform as expected.

What about costs?

The house was built by the Fram Building group's regular sub trades, who did not break out all the incremental costs. As well, because of the high profile of this project many suppliers contributed materials so hard costs were not established. Elizabeth White, the project manager, estimates that a realistic value for the incremental costs of achieving this level of construction, for this type of design could be in the range of $20,000.

The Advanced House is a cooperative project involving the Ontario Ministry of Energy, Energy Mines Resources Canada, Ontario Hydro, and the Fram Group.

The Advanced House is located in Metropolitan Toronto (corner of Vodden and Laurelcrest streets, north of Highway 7, west of Dixie Rd. in Brampton, Ontario). The house will be open for public and industry tours until February 1991. 12:00 noon - 6:00 p.m., Wednesday, Thursday and Friday; 10:00 a.m. - 4:00 p.m. Saturday and Sunday. For tours or information phone (416) 450-6713