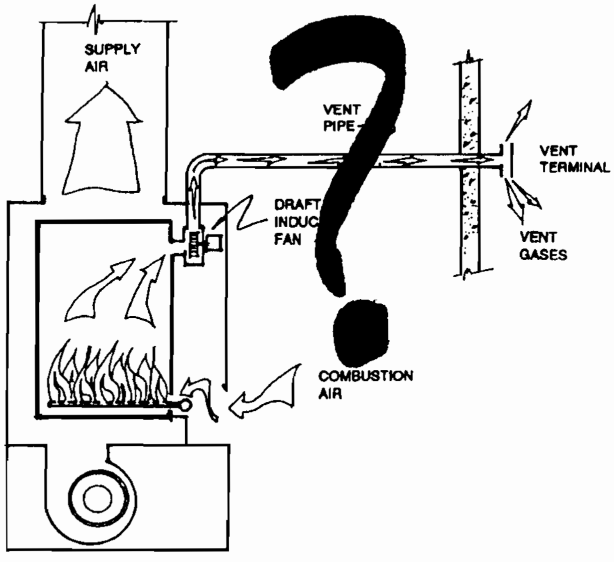
Residential Ventilation Issues

by Dara Bowser & Bob Allison

No more High Temperature Plastic Venting....What to do about the Ventilation System?

As most of us are aware by now, high temperature plastic combustion venting pipe bearing the names PLEXVENT, SEL-VENT and ULTRAVENT have been effectively disallowed on new installations by the Ministry of Consumer and Corporate Relations, Fuel Safety Branch. Additionally, the ULC approval for PLEXVENT and ULTRAVENT has been withdrawn.

It is important to recognise that this is not all of the plastic vents used on combustion appliances. Most high efficiency appliances and side-wall vented hot water heaters use PVC, CPVC or ABS pipe. The special high-temperature pipe was used primarily on mid-efficiency (78-80% AFUE) furnaces and some older models of side-wall vented water heaters. The high temperature pipe can usually be recognized by the trade-name printed on it, the silicone sealant at the joints and the high temperature thimbles required for installation.



GAS FURNACE
POSITIVE VENTED INDUCED DRAFT

At first blush, this would appear to cause problems with the ventilation system design, particularly where permits have been issued for Type I (Exhaust only) ventilation systems and the house is not yet complete. Some alternatives are: (in order of increasing first cost)

a) Change the furnace to a non-plastic mid-efficiency side-wall vented model. There are two brands of mid-efficiency furnaces approved for installation with side-wall venting using metallic pipe. One of these uses an insulated, flexible aluminum vent piping system for example. This does not represent a significant increase in first cost, although these furnaces may be hard to obtain because of the sudden high demand, or in situations where the mechanical contractor does not have access to these brands.

b) Install a high-efficiency side-wall vented or direct-vent furnace. These furnaces use PVC or CPVC vent pipe which has not experienced problems. There is a cost premium for this equipment, however, the owner of the house will enjoy the benefits of improved heating economy.

c) Install a PWSSHS (Potable Water Space Heating System or "Combo" System) with a side-wall vented or Direct Vented Hot-Water Tank and a Hydronic Fan-coil Unit for heating the house. There may or may not be a cost premium for this system, depending on whether or not the water tank is being rented or purchased. Because these systems are limited to the heating capacity of the hot-water tank, care should be exercised when the systems is sized. This usually means that a detailed heat-loss calculation must be done and an appropriate oversize factor added for the hot-water demand. These systems have also attracted some controversy with respect to the plumbing arrangements.

d) Install a B-Vented furnace and design the Ventilation System to Part 6 of the OBC. In this case (unlike the previous three examples), the ventilation system will undergo substantial change, and compliance will be according to Part 6. Sentences 6.2.1.1. and 6.2.2.1.(2) direct the code user to use a compliance standard which meets the objectives of Section 9.32 and this standard is accepted as being CSA F326. Because the F326 standard considers the B-vented furnace to be a *spillage susceptible* combustion appliance, the depressurization limit for the house will be set at -5 Pa. Under these conditions, the normal ventilation set-up would consist of an HRV with no other large exhaust appliances besides the dryer. The reason that the HRV is normally used is that it is difficult or impossible to get an "Exhaust Only" ventilation system to pass the -5 Pa criteria when a test is done. Although outside air can be brought into the return air of the furnace system, it is not usually possible to bring in a sufficient quantity of air to balance the required ventilation without lowering the return air temperature below the recommended minimum temperature of -60°F. A "mixing box" could be used to raise the incoming air temperature, but these only do so when the furnace is firing, so the temperature remains unacceptably low between combustion cycles. In addition, it is usually not sufficient to rely on duct sizing to regulate the airflow. The incoming air duct should be balanced on site using an air-flow meter at the system start-up. F326 rules may also require an interlock between the exhaust device(s) and the furnace blower, or the installation of a motorized damper.

Of the above systems, a), b) & c) remain in section 9.32 as far as compliance is concerned, and the design of the ventilation systems does not change substantially. When a *spillage susceptible* appliance is used (such as the B-vented furnace in example d) above), F326 does not permit the ventilation system and other exhaust appliances to exert more than a -5 Pa depressurization when operated in a prescribed fashion. This requirement can be met through design calculations or by a test. The design calculations and test procedures are described in the HRAI **Residential Mechanical Ventilation Systems Manual.** In general, the test is more forgiving the calculation procedure, but the calculation may establish compliance prior to construction, thus avoiding the sometimes difficult task of testing co-ordination after completion but prior to occupancy. The relationship of compliance by calculation and/or test will be discussed in future articles.

High temperature plastic venting is one of this year's hottest topics, and one that probably won't go away for a while, given the number of existing installations. As we write, ULC and others are working on "fixes" for new and existing installations. Whatever these fixes turn out to be, we'll cover them in future articles.

This and other topics are covered in detail in the 2-day OBOA workshop: "**Residential Ventilation Systems for Building Officials**".

****Dara Bowser** is an HRAI Ventilation Instructor, an associate member of the <u>CSA Technical Committee on Residential Mechanical Ventilation</u>. Dara has been involved in residential ventilation as a consultant, manufacturer, and trainer for the past 12 years.*

****Bob Allison** is the Deputy Chief Building Official of the Regional Municipality of Haldimand-Norfolk and has 20 years experience a building official. Bob takes a keen interest in ventilation and assisted in the development of the 2-day OBOA Ventilation Workshop for Building Officials.*

*Special thanks to **Barry Bowman**, for special assistance with regards to plastic venting. Barry is an HRAI Instructor and chair of the CGA B149 Sub-committee on Combustion Venting.*