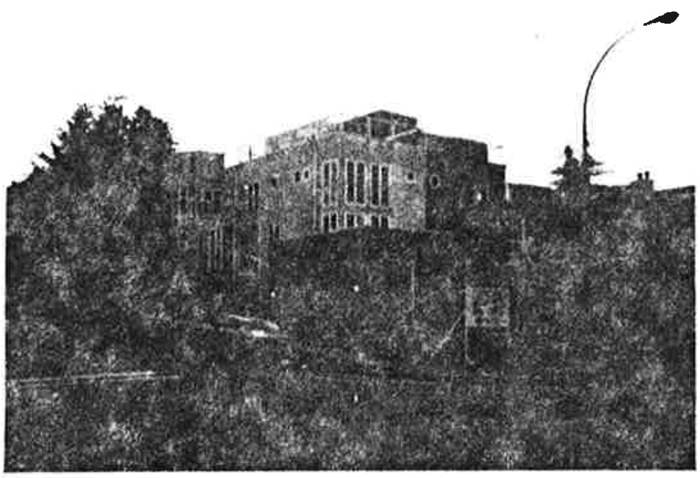
HIGH FASHION ENERGY EFFICIENT TOWNHOUSES

The quality of air in well sealed, airtight homes is still a cause of concern to many. Contaminants such as formaldehyde, carbon monoxide, radon gas, water vapour (and resulting moulds and fungi) originate from materials off-gassing, occupants, and appliance use. Resident ill-health, allergies and discomfort are associated with these pollutants.

Detailed research work and monitoring of numerous houses now underway will determine just how valid these concerns are, and what construction techniques can overcome any problems.

Two recently completed townhouse units explore architectural and engineering solutions to air quality problems in energy efficient homes. Elia Sterling and David McIntyre of TDS Ltd. designed and built the townhouses in Vancouver's Kitsilano area.



A number of technical issues were considered in the design and construction of the 1800 square foot units.

1. Limiting of indoor sources of contamination

Standard construction techniques and materials frequently are sources of pollutants. Reduced contaminant levels are achieved by extensive use of chemically stable materials and minimal use of glues, plywood and particle board.

Floors are ceramic tile or hardwood, finished with a natural oil finish containing no additives.

Combustion by-product gases are avoided by using electrical appliances. Sterling points out that combustion appliances cause problems with backdrafting. Several hundred deaths per year in North America are attributed to this problem. A major cross Canada study to evaluate the significance of the backdrafting problem is about to be started.

Sterling suggests that gas fired appliances (especialy stoves) would probably not be approved for indoor use if they were being introduced today.

In accordance with market preference, the townhouses have fireplaces. They are zero-clearance BIS units, equipped with tight fitting glass doors and outdoor combustion air.

2. Limiting contaminants off-gassed from construction materials

Pollution due to acoustical sealant is being evaluated. One unit was built using the standard airtight polyethylene air vapour barrier method, while the second unit uses airtight drywall air vapour barrier.

Acoustical caulking is used regularly to seal polyethylene vapour barriers. Off-gassing from this caulking is not generally considered as a pollution source. Sterling points out that it does have an odour, and is made from a chemical soup of components. There is no information available whether these may be a problem, or whether there might be a health problem. Hydocarbon levels will be monitored.

Little interior grade plywood (which uses a urea formaldehyde resin) is employed. Where particle board is used (mostly in cabinets) the material is complete sealed.

3. Limiting entry of exterior contaminants

Crawlspaces are vented to minimize the entry of radon gas.

Mechanical ventilation equipment and air intakes are located at the roof level to reduce infiltration of other outdoor contaminants. The common location for HRV inlet ports is near the ground, where dust, fungi spores, auto exhausts and other contaminants tend to settle. This is especially of concern at the location which is on an major traffic artery.

Ventilation equipment includes filtration and heat recovery mechanisms.

4. Control of occupant generated contaminants by mechanical ventilation

The question of what the appropriate ventilation level for a house should be is still uncertain. Studies at various US laboratories, the World Health Organization, and tests assessing UFFI effects in Quebec, suggest that minimum ventilation rates should be .5 air changes per hour. Some suggest that it should be 1.0 air change. The R2000 program requires .5 air changes. How much latitude there is in setting ventilation rates for safer indoor air quality is still unknown.

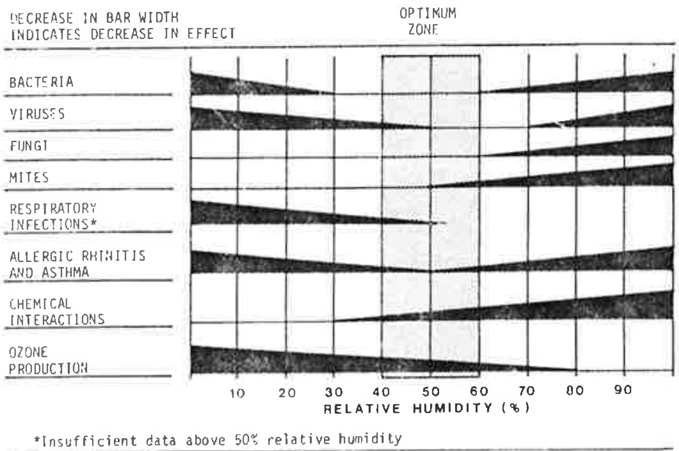
The ventilation rate in these units is set at .5 air changes per hour, increasing to 1.0.

Timer switches are located in the bathroom and kitchen.

5. Control of indoor humidity

Ventilation is controlled by humidistats, located in the centre of the house to automatically double the fresh air supply.

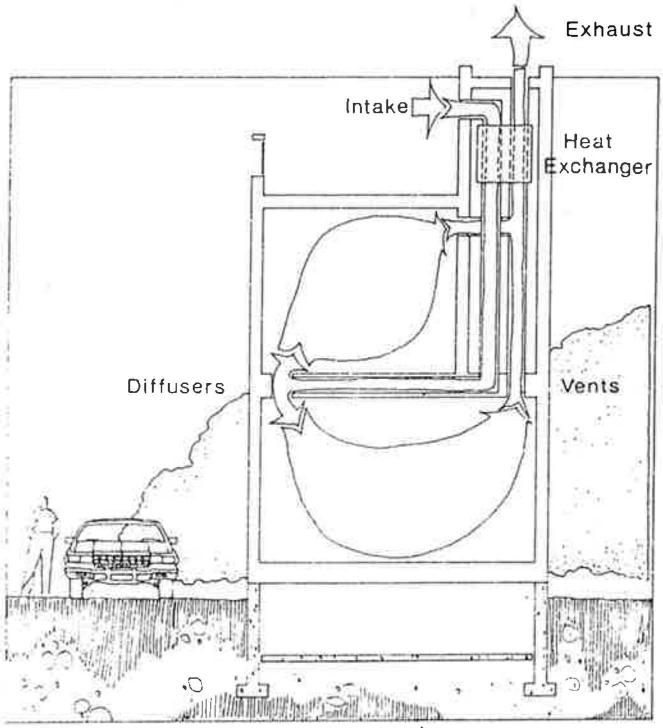
The ability of humidistats to maintain humidity levels within an acceptable level will be monitored.



Humidistats control ventilation to achieve optimum humidity

6. Control of occupant generated contaminants by natural ventilation

The design maximizes the natural cross/stack ventillation through the unit. Operable windows are placed in the bathrooms and kitchens. Some of the larger storage closets on exterior walls have windows as well.



Ventilation system schematic

7. Daylighting of all interior spaces.

The units are profusely glazed to maximize daylighting, as well as to take advantage of the spectacular harbour view available on the site.

The windows are double glazed, vinyl frame units.

Supplementary heating for one unit is provided by an electric heat pump, in a central forced air system. When the house thermostat calls for heat, the heat pump is activated and extracts heat from the exhaust air. This unit is able to supply most of the domestic hot water need of the home (if more is required, the electric hot water tank heating element is activated).

Fresh air is introduced and stale air exhausted through the heat exchanger which is sized to supply .5 air changes per hour at low speed operation. The recirculating system draws air from the top of the house, filters out particles and mixes diluted cooler outdoor air. The rapid change-over of air ensures even heating and ventilation throughout.

The second unit uses drop-in electric floor heaters, placed at the perimeter of the house near windows. The high volume air recirculation system minimizes stratification of heat within the building. Two air-tight wood burning fireplaces (with outdoor combustion air) could heat the unit by themselves.

The heat recovery ventilator (with aluminum cores) was sized to give a minimum continuous ventilation rate of .5 air changes per hour under normal operating conditions.

Fresh air is introduced at the roof level. Household air is filtered through a 60% high efficiency particulate filter and a permasorb medium that extracts pollutant gases (and odours). The system is capable of cleaning the indoor air 4 times per hour on high speed. This would keep formaldehyde at 1/10 the threshold limit under a worse case condition.

A HOTCAN analysis of the performance indicates that the cost of heating (with electricity) should not amount to more than $ 120. for each unit, which is at the limits of the R2000 program.

Air quality and energy consumption in these two homes, and in other control houses will be monitored to evaluate the effectiveness of architectural and engineering solutions used.

The most obvious benefit for the buyer is the quiet interior - the houses are located in a fashionable part of the city, close to the beach, on a very busy street.

These are at the top end of the market, but they illustrate new building and design concepts, as well as being a part of a research project. They will be monitored for the next 2 years.

The style and design of these units may reflect a West Coast bias. However, with proper modifications, lessons learned from this project can be used in other climatic zones.

The units were built as a speculative project. They were sold at over $280,000 each before completion.

HRV UPDATE

AIR CHANGER CO. CHANGES HANDS

Nortron Industries Ltd. of Mississauga Ont. has acquired the assets of Air Changer Co., a pioneering manufecturer of Heat Recovery Ventilators. It is now a division of Nortron Industries, but will continue under its present operating management.

Personnel and operations will move into Nortron's plant in Mississauga. This facility is presently being expanded from 70,000 to 105,000 sq.ft.

Nortron, and its associate company Broan Ltd. are suppliers of heating amd ventilating equipment.

HRV INSTALLER CERTIFICATION

The preliminary schedule for HRV certified installer training courses has been prepared. These sessions are designed for heating trades personnel. Eligible attendees, after completing the course and an examination are certified to install HRV's.

Installation by certified installers is a requirement of the new CSA standards.

This series of courses begins in December, and will continue until April. The following are preliminary dates and locations for the first sessions. Further dates will be published in the next issue of SOLPLAN REVIEW.

DEC 3/85	HALIFAX	CITADEL INN
	TORONTO	AIRPORT HOLIDAY INN
DEC 4/85	TORONTO	AIRPORT HOLIDAY INN
DEC 5/85	CALGARY	HOLIDAY INN
DEC 10/85	SASKATOON	HOLIDAY INN
DEC 12/85	MONCTON	WANDLYNN INN
JAN 5/85	ST. JOHN'S NF	HOLIDAY INN
	WINNIPEG	HOLIDAY INN
JAN 6/85	OTTAWA	SKYLINE HOTEL
JAN 7/85	EDMONTON	HOLIDAY INN
	CHARLOTTETOWN	WANDLYNN INN

These are PRELIMINARY dates and locations. For confirmation of time and place, contact the Heating Refrigeration Air Conditioning Institute national office (Tel: 416-239-8191), the local EMR-CREO office, or the R2000 coordinator in your area.