HRV'S NEED "TOUCH-UP" HEAT WHEN USED IN COMBINATION WITH RADIANTLY HEATED BUILDINGS

"Radiant Heat - Is heat transfer transmitted through space/air in all directions from a body/object with more energy to a body/object with less energy. If one object is warmer than another, the cooler object will absorb the heat radiated from the warmer object, cooling one and warming the other. The sun is a perfect example of radiant heat exchange, the radiant heat travels through cold space until it hits a surface. This is why people and objects feel much warmer when exposed to the sun than when they are shaded. **AIR IS HEATED VERY LITTLE BY RADIANT ENERGY, IT IS HEATED PRIMARILY BY COMING IN CONTACT, VIA CONVECTION, WITH OBJECTS HEATED BY THE SUN OR OTHER HEAT SOURCES." THIS SAME CONCEPT IS AT WORK IN RADIANT HEATING SYSTEMS INCLUDING LEGALETT.**

LEGALETT radiant floor heating provides even, comfortable, warmth, as there is less air movement. There are no drafts with this type of heating except for building envelope infiltration and/or mechanical ventilation. The thermal mass evens out temperature fluctuations. The floor is warm to the touch. Unlike conventional forced-air furnaces, radiant floor heating has no ducts or radiators to contribute to dust collection. The LEGALETT System is virtually an invisible system.

"Thermal comfort" means that a person feels comfortable - they are neither too cold nor too warm. It can be achieved when the air temperature, humidity and air movement are within a specified range often referred to as the "comfort zone". Even with ideal conditions, cold or warm walls, ceilings, or floors can cause local air temperature differences that may cause discomfort. Drafts caused by air movement may also be a factor, even if the temperature of the air is within accepted parameters. Air velocity is one of the six main factors affecting human thermal comfort. Because of its important influence on skin temperature, skin wettedness, convective and evaporative heat loss, and thermal sensation, air velocity has always been incorporated into thermal comfort standards.

In a radiant heated building ventilation must be done separately, but remember - in general, the less air movement in a room or the lower the air velocity, the higher the thermal comfort level. The introduction of outside air to the living space for new "well constructed" homes is, however, recommended or required by code to reduce indoor humidity levels and pollutants. The use of a Heat Recovery Ventilator (HRV) or Energy Recovery Ventilator (ERV) is common for this purpose. During winter months all HRV's (or ERV's) recover heat from the exhaust air to PRE-HEAT the incoming air. In all cases, the PRE-HEAT effectiveness reduces as the outdoor air temperature drops off. In other words, an HRV may be 80% efficient at 5°C (41°F) outdoor air temperature, and 55% efficient at -10°C (14°F). Since a radiant floor heating system does not heat the air, but only objects in the heated space, an HRV introduces COLD AIR DRAFTS. FOR THIS REASON - LEGALETT RECOMMENDS THE USE OF AN IN DUCT "TOUCH UP" HEATER FOR ALL HRV INSTALLATIONS TO REDUCE COLD AIR DRAFTS.

HRV's typically use about 100 to 200 Watts per hour of electrical energy to move air. The in duct heater typically would consume an additional 500 to 2,000 Watts depending on outside temperature. An in duct heater maybe electric or water coil. The use of an HRV, i.e. the time it is run or the amount of outside air introduced to a home, is dependant on occupancy, the number of showers taken, cooking of meals, etc. Therefore, the required amount of outside air introduced in to a home can vary considerably. All recommendations from government agencies are averages and based on good practice and call for design capacity of about 1 air change every 3 hours or for a 2,000 sq.ft. home about 90 CFM of fresh air make up. HRV's are typically supplied with controls including timers for scheduled ventilation, demand switches for high-speed ventilation of bathrooms, utility rooms and kitchens (although a range hood may still be needed), humidistats to control moisture levels in the home and various gas sensors. An HRV may have multiple air flow speeds or maybe run intermittently. HRV's require their own duct system. HRV ducts are usually 6" to 8", and require sealing and insulation (like any good duct system) when outside the thermal envelope.

Existing building codes for radiantly heated homes require an HRV. A typical ten-room home (living room, dining room, family room, kitchen, two bathrooms, a master bedroom, and three bedrooms) would require an HRV with a rated capacity of 120 CFM. To ensure adequate ventilation for humidity control, the total ventilation capacity of the HRV at high speed should be close to this total. The suggested low speed HRV ventilation rate should be 40–60 percent of the high speed.

From an air quality perspective, a minimum ventilation rate of 15 CFM is required for each person in the home. If 2 people live in a 2,000 sq.ft. home, chances are the HRV is over-ventilating even at low speed and should be run intermittently to control humidity only. Running the HRV only as required for air quality and humidity control can have a significant beneficial effect on total heating costs.

EXAMPLES:

Scenario 1: A/C with HRV

- 4,000 sq.ft. home
- Occupancy: 2
- A/C system installed for summer cooling, 2,000 CFM capacity, used in winter to distribute fresh air from HRV, R12 insulation on A/C ductwork in attic, above ceiling insulation
- HRV installed capacity: 200 CFM, 60% average efficiency
- 7,000°F heating degree days - Ottawa, CAN

Typical Operation (not recommended):
- A/C system operates full time to circulate air in home and distribute fresh air from HRV, which also runs full-time.
- Total yearly operating cost: $2,100

Optimum Operation (recommended):
- A/C System operation only when HRV requires fresh air distribution. HRV runs 4 hours per day to provide an average of 30 CFM
- Total yearly operating cost: $300

Yearly Savings via proper operation: $1,800

Scenario 2: HRV

- 2,000 sq.ft. home
- Occupancy: 3
- HRV distributes fresh air directly, HRV ducting installed at bottom of (or below) attic insulation
- HRV installed capacity: 100 CFM, 60% average efficiency
- 7,000°F heating degree days - Ottawa, CAN

Typical Operation (not recommended):
- HRV runs full-time.
- Total yearly operating cost: $300

Optimum Operation (recommended):
- HRV runs 11 hours per day to provide an average of 45 CFM
- Total yearly operating cost: $100

Yearly Savings via proper operation: $200

All attic ducting should be installed at bottom of (or below) attic insulation for maximum energy efficiency. **(As shown on the right)**