Taking the Guesswork out of HVAC System Sizing

Standard Practices

A good Heating, Ventilation and Air-Conditioning (HVAC) contractor will use a "Manual J" method of heat loss and heat gain calculation to determine heating and cooling loads. This involves using specific building characteristics including orientation, dimensions and thermal performance of walls, ceilings, basements, windows, doors, etc. Local averaged weather data and summer and winter peak design temperatures are also considered. Then, a building is usually placed into an air-leakage category based on construction tightness estimates and a generalized wind shielding description to guess at how the building will perform (or not perform) in breezy or windy conditions. This, in short, is the accepted standard method for heating and cooling load calculations in North America.

In the interest of customer satisfaction, by insuring that desired interior design conditions can be met at all times, an HVAC contractor will often add considerable extra heating and cooling capacity to calculated loads when selecting equipment. This fairly common desire to oversize is largely due to the un-predictability of performance that is expected from typically constructed "leaky" buildings. Extra heating and cooling capacity adds significant extra cost and additional HVAC system space requirements. This is particularly true on the air-conditioning side. And, during the summer, comfort is often compromised by an oversized, short cycling A/C system that super-cools without de-humidifying adequately. Short cycling as such, will produce a cold clammy environment rather than a cool dry one that results from longer A/C run cycles. Depending on the type of heating system and fuel used, oversizing equipment often negatively affects heating efficiencies and produces noticeable temperature swings which also affect comfort levels. In addition, in the spring and fall or during mild winter conditions, often "stack and wind effects," which cause natural infiltration, are minimal. During these periods, even "leaky" code constructed buildings will experience poor air-quality due to excessive humidity levels and the build-up of other contaminants from materials, products or processes within the building.

Removing the Un-predicability

Once again, "Building Tight and Ventilating Right" is the answer to minimizing guesswork involved in HVAC equipment selection. Tight construction drastically reduces the significance of air-leakage and its effect on HVAC system sizing. And, tight construction coupled with balanced, continuous, supply and exhaust ventilation at a slow rate based on the number of occupants ensures proper air-quality during all weather conditions. With this approach, correct ventilation can be ensured and air-leakage components in energy load calculations are small and predictable.

A Multi-Function Product That Works

The challenge relating to building tight is that buildings are complicated and air-tightness is difficult and expensive to achieve with conventional materials and construction practices. The **ICYNENE Insulation System** handles this "tightness" challenge easily. In one day, a two person crew can install the complete thermal envelope for a 2500 sq.ft. home, eliminating the need for a house-wrap (air-barrier) and conventional vapor diffusion retarder (VDR - vapor barrier). Where codes do require a dedicated VDR, one coat of VDR quality primer paint on the inside of the sheetrock is sufficient. Using a Blower Door Test, Icynene insulated homes regularly test at less than 1.5 ACH50 (1.5 air-changes per hour at -50 Pascals of internal pressure) while code constructed homes often test at 5 to 7 ACH50. In addition, by nature of the foam structure, the form fitting material provides R