Residential Performance Code Methodology for Crediting Dehumidification and Smart Vent Applications

Rationale

As energy efficiency reduces the hours where air conditioning is called for, and as codes require outdoor air to be brought into homes, humidity levels in homes may rise to the point where dehumidification is required. However, there are currently no standards in Florida's Energy Conservation Code for dehumidification. Thus, a mechanical contractor that invest in an expense such as variable speed heat pumps or heat pipe technology in order to dehumidify and save energy receives little benefit relative to another home that installs an inefficient dehumidifier. A reference home dehumidification strategy needs to be determined.

Another strategy to reduce moisture loads is to allow flexible hours of ventilation. Another research proposal, if funded, will quantify those benefits. However, the energy conservation code will need to have a strategy for providing the appropriate baseline for a reference home.

Overview

The performance method (R405) is the most popular compliance method in Florida. The method requires a software vendor to virtually create a baseline reference home the same size as the home to be permitted and insulate and equip it to a set of parameters spelled out in Table R405.5.2.1. This table includes the temperature that both the to-be-permitted home and the baseline must be maintained to simulate heating and cooling. It also has rules on energy use of the ventilation system for the baseline home. What needs to be added are the following parameters:

1. The humidity set point required to be maintained, and whether this applies all year or only at certain times of year. Also, if this set point is constant or does it start dehumidifying at one set point and shut off at another like many portable dehumidifiers.
2. The energy use of the dehumidifier in the baseline home. Is using a constant W/liter removed a sufficient methodology and what should the baseline value be?
3. For simulations that allow smart ventilation, what level of ventilation must be maintained, and if that smart ventilation reduces ventilation during peak times, does the baseline stay constant in its ventilation rate?

Scope of Work

Task 1: Literature review of dehumidification strategies, devices and controls

Task 2: Literature review of dehumidification set point recommendations and studies of energy use associated with various set points.

Task 3: Literature review of smart ventilation strategies and recent developments at ASHRAE and LBNL regarding allowances.

Task 4: Based on the literature search, develop draft rules.

Task 5: Test draft rules in a simulation program.

Task 6. Write report to include the literature review, final recommendations for code changes, and expected impact for example homes.

Expected Outcome and Impact on the Code:

Performance modeling rules for dehumidifiers and smart ventilation will be developed and residential humidity levels controlled in ways that are energy-efficient will be able to be credited if the FBC adopts the changes developed.

Budget:

$20,000