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Proposed change for 2005 C&RD Program Improper use of Heat Pump Thermostats

Problem:

Current specifications require use of outdoor thermostats on heat pumps to lock out auxiliary heat, and allow use of main thermostats that do not have heat pump recovery. Outdoor temperature sensors may be used in lieu of outdoor thermostats; however, most manufacturers that offer this option do not have an auxiliary heat lock out feature that can be programmed at the outdoor temperatures required by the specifications.

Analysis:

Modern controls for residential heat pump systems have evolved to the point they use microprocessor thermostats that allow the system to use the high efficiency refrigeration cycle to bring the home to set point temperature by starting the system at a variable time. This feature is known as Heat Pump Recovery (a.k.a. Optimal Start or Intelligent Recovery) and has been identified by Energy Star as a requirement on Tier I and Tier II programmable thermostats used for heat pump systems. This is vastly superior to the old method, which was to use the auxiliary electric resistance heat for setback recovery. Microprocessor control systems have been used for decades in commercial systems, and continuous price reductions have brought microprocessor controlled residential thermostats to the point they are the most cost effective and energy efficient control to use on a heat pump system.

Current specifications require that an outdoor thermostat be used to lock out the auxiliary heat when the outdoor temperature is above 35 degrees F, a temperature that is below the programmable point of the thermostats that have an outdoor temperature sensor / auxiliary heat lockout function. Use of an outdoor thermostat on a microprocessor-controlled thermostat has several drawbacks:

- The outdoor thermostat disables auxiliary heat without feedback to the microprocessor. This interferes with the heat pump recovery algorithm.
- The installing contractor, believing that he has installed an "operator proof" system, is less likely to explain the setback programming and other energy saving features of the thermostat.
- When the customer complains of erratic system operation, the contractor is more likely to disable the heat pump recovery feature, or advise the customer to use less aggressive setbacks.

This allows control systems that do not optimize heat pump energy savings. Use of outdoor thermostat lockouts on auxiliary heat impairs the benefits of thermostats that have heat pump recovery, and reduces the cost effectiveness of the measure.

Proposed Solution:

Require that thermostats for heat pump systems have heat pump recovery, and prohibit installers from disabling this feature. Prohibit the use of outdoor thermostats that lock out the auxiliary heat (or the primary stage of auxiliary heat in systems that have multiple stage auxiliary heat). Require that installers instruct the homeowner of heat pump recovery features and programming of setback thermostats.

Questions or comments may be directed to:

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