



# ENERGY STAR® Program Requirements for Programmable Thermostats

## Eligibility Criteria (Version 1.2)

Below is the product specification (Version 1.2) for ENERGY STAR qualified programmable thermostats. A product must meet all of the identified criteria if it is to be labeled as ENERGY STAR by its manufacturer.

- 1) Definitions: Below is a brief description of a programmable thermostat and its common operational modes as relevant to ENERGY STAR.
  - A. Programmable Thermostat: A device that enables the user to set one or more time periods each day when a comfort setpoint temperature is maintained and one or more time periods each day when an energy-saving setpoint temperature is maintained. This device enables the user to save energy because the heating and cooling equipment is not running needlessly at a comfort temperature setpoint 24 hours per day. A programmable thermostat may be capable of controlling one or more zones of a conditioned space.
  - B. Setpoint Temperature: The temperature setting in degrees Fahrenheit or degrees Celsius for any given time period.
  - C. Comfort Setpoint Temperature: The temperature setting in degrees Fahrenheit or degrees Celsius for the time period during which the building is expected to be occupied, e.g., the early morning and evening hours.
  - D. Comfort Time: The time period during which the conditioned space is expected to be occupied, e.g., the early morning and evening hours.
  - E. Energy-Saving Setpoint Temperature: The setpoint temperature for the energy-saving periods, usually specified for both the heating and cooling seasons.
    1. Set-Back Temperature: The setpoint temperature for the energy-saving periods during the heating season, generally at night and during unoccupied hours. This is a lower setpoint temperature than the comfort setpoint temperature.
    2. Set-Up Temperature: The setpoint temperature for the energy-saving periods during the cooling season, generally at night and during unoccupied hours. This is a higher setpoint temperature than the comfort setpoint temperature.
  - F. Cycle Rate: The number of times the heating or cooling unit goes on and off in a given hour. This is measured when the heating and air-conditioning equipment is operating at a 50% load condition, as measured under the National Electrical Manufacturers Association (NEMA) DC-3 standard titled "Residential Controls- Electrical Wall-Mounted Room Thermostats".<sup>1</sup>
  - G. Recovery Systems:
    1. Conventional Recovery: A feature of a programmable thermostat that activates the heating or cooling system at the comfort time set by the user.
    2. Heat Pump Recovery: A feature of a programmable thermostat that allows the heat pump to recover gradually from an energy-saving setpoint temperature to a comfort setpoint

<sup>1</sup> National Electrical Manufacturers Association (NEMA), 1300 North 17<sup>th</sup> Street, Suite 1847, Rosslyn, VA 22209

temperature. The heat pump recovery feature is designed to minimize the use of auxiliary heat while also minimizing the on-time of the system.

3. Pre-Comfort Recovery: A feature of a programmable thermostat that allows the heating/cooling system to recover gradually from an energy-saving setpoint temperature to a comfort setpoint temperature. This feature provides comfort while minimizing the on-time of the system during the recovery period. If the pre-comfort recovery system is capable of minimizing the use of auxiliary heat, then it is identical to a heat pump recovery system.

H. Hold Feature: This feature enables the user to override the programmable thermostat's program for a period of time, either specified or unlimited. A short-term hold may allow the user to skip to the next part of the program, and/or temporarily set the programmable thermostat to a different temperature until the next part of the program begins. A long-term hold may allow the user to set the programmable thermostat at a temperature for a fixed period of time, usually during a vacation.

- 2) Qualifying Products: For the purposes of ENERGY STAR, programmable thermostats shall have at least two different programming periods (for weekday and weekend programming) and at least four possible temperature settings (i.e., wake, day, evening, and sleep settings). Programmable thermostat settings shall be pre-programmed so the day and sleep time periods are at least 8 hours long.
- 3) Energy-Efficiency Specifications for Qualifying Products: Only those products listed in Section 2 that meet the criteria below (see items A through G) may qualify as ENERGY STAR.
  - A. Programmable thermostat shall be capable of maintaining room temperature swings within  $\pm 2^{\circ}\text{F}$  of the setpoint temperature.
  - B. Programmable thermostat shall be capable of cycling the heating/cooling equipment at the cycle rates required by all ENERGY STAR qualified heating and cooling equipment. The cycle rate and heating/cooling anticipator setting shall be easy for installer to adjust and must remain at their installed setting even if there is an external power outage or battery failure that causes the programmable thermostat to be de-programmed.
  - C. All programmable thermostat models shall be equipped with a conventional recovery system. Programmable thermostat models marketed and sold for use with heat pump systems shall be equipped with a heat pump recovery system. Programmable thermostat models marketed and sold for use with non-heat pump systems shall be equipped with a pre-comfort recovery system. Definitions of these recovery systems are provided in Section 1, above.
  - D. Programmable thermostat shall have a hold feature that allows the user to temporarily override the program for an unspecified period (such as a vacation), without deleting the program. It is recommended that the programmable thermostat have more than one way to override the program. For instance a long term hold (vacation) and short term hold (override to the next setpoint) is recommended.
  - E. Partner shall ship programmable thermostats with setpoint temperatures and times as specified in Table 1 below. For a specific example of acceptable setpoint time and temperature settings, see Table 2 below.

<b>Table 1: Programmable Thermostat Setpoint Temperatures</b>		
<b>Setting</b>	<b>Setpoint Temperature (Heat)</b>	<b>Setpoint Temperature (Cool)</b>
Wake	≤70°F	≥78°F
Day	setback at least 8°F	setup at least 7°F
Evening	≤70°F	≥78°F
Sleep	setback at least 8°F	setup at least 4°F

<b>Table 2: Acceptable Setpoint Times and Temperature Settings</b>			
<b>Setting</b>	<b>Time</b>	<b>Setpoint Temperature (Heat)</b>	<b>Setpoint Temperature (Cool)</b>
Wake	6 a.m.	70°F	78°F
Day	8 a.m.	62°F	85°F
Evening	6 p.m.	70°F	78°F
Sleep	10 p.m.	62°F	82°F

F. Partner shall provide clear instructions and packaging regarding whether the programmable thermostat is intended for use with a heat pump or conventional system, instructions for the installer to adjust the cycle rates, and instructions for the user to adjust the times and temperatures for the setpoint temperatures.

G. In addition to the above criteria, Partner shall ensure that the customer may be able to change the settings on the programmable thermostat with little difficulty. The ease with which the customer can change the setback times and temperatures is of primary importance. Therefore, the programmable thermostat must include easy to follow instructions, and clearly defined settings on the programmable thermostat. In order to achieve this, Partner shall consider focus groups to analyze the ease of programming of the programmable thermostat, and other methods of determining the ease of use of the programmable thermostat.

- 4) **Test Criteria:** Manufacturers are required to perform tests and self-certify those product models that meet the ENERGY STAR guidelines.
- 5) **Effective Date:** The date that manufacturers may begin to qualify products as ENERGY STAR will be defined as the *effective date* of the agreement. The ENERGY STAR Programmable Thermostat specification is effective immediately. ENERGY STAR performance requirements will be suspended effective 12/31/09. In the event that revised performance specifications for Programmable Thermostats are developed in the interim, the suspension will be superceded by the effective date of the new performance specifications.
- 6) **Future Specification Revisions:** ENERGY STAR reserves the right to change the specification should technological and/or market changes affect its usefulness to consumers, industry, or the environment. In keeping with current policy, revisions to the specification are arrived at through industry discussions.