



# ENERGY STAR® Program Requirements for Programmable Thermostats – Tier 1

## DRAFT 1 Version 2.0 Partner Commitments

**Note:** Some time ago, the Environmental Protection Agency (EPA) informed stakeholders of its intention to sunset the ENERGY STAR programmable thermostat program on December 31, 2009 due to widespread concerns regarding real savings being realized by ENERGY STAR qualified products. EPA has also articulated that the Agency believes that key concerns with the current program could be overcome if ENERGY STAR programmable thermostats (1) deliver the most energy savings, (2) are the best communicators, (3) are the easiest to use; and (4) satisfy consumer demand for electronic products manufactured with reduced toxic substances.

With the above in mind, EPA has worked with stakeholders to create the enclosed Draft 1 Version 2.0 Programmable Thermostat Specification for your review. EPA sees these Tier 1 requirements as a key first step to fully realize the energy-saving potential of programmable thermostats. EPA believes that further enhancements to usability and communication capabilities are needed and achievable in the near future. As such, EPA is also working with the U.S. Department of Energy and other groups to develop metrics or benchmarks that will allow a more refined comparison of products' usability. EPA sees this approach as a critical component for Tier 2 requirements. EPA welcomes stakeholder engagement in the benchmark and ENERGY STAR Tier 2 development processes over the coming year.

EPA is aware of some programmable thermostats that have all of the features proposed in the enclosed Draft 1 Version 2.0 specification and many others that have some of these features. EPA believes that these features are an essential stepping stone toward achieving the full energy-savings potential of programmable thermostats. EPA welcomes stakeholder feedback on all aspects of this Draft 1 Version 2.0 specification.

### Commitment

- The following are the terms of the ENERGY STAR Partnership Agreement as it pertains to the manufacturing of ENERGY STAR qualified programmable thermostats. The ENERGY STAR Partner must adhere to the following program requirements:
- comply with current ENERGY STAR Eligibility Criteria, defining the performance criteria that must be met for use of the ENERGY STAR certification mark on programmable thermostats and specifying the testing criteria for programmable thermostats. EPA may, at its discretion, conduct tests on products that are referred to as ENERGY STAR qualified. These products may be obtained on the open market, or voluntarily supplied by Partner at EPA's request;
- comply with current ENERGY STAR Identity Guidelines, describing how the ENERGY STAR marks, name, and educational graphic may be used. Partner is responsible for adhering to these guidelines and for ensuring that its authorized representatives, such as advertising agencies, dealers, and distributors, are also in compliance;
- participate in the new consumer education campaign which may include, but is not limited to, any of the following tactics:
  - For Retail-based Manufacturers:
    - Providing educational content (e.g., consumer brochure, takeaways, etc.) in-store
    - Developing in-store educational materials/campaigns with utility(ies) and retailer(s) by offering a special deal/coupon, co-op materials such as brochures and/or POP, training for store employees, or other promotional/educational activities

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- Using the ENERGY STAR education graphic in product literature (i.e., user manuals, spec sheets, marketing materials, etc.) and on the manufacturer's Internet site
  - Consistently using approved messaging on product packaging/literature, Web site, trade articles, training for retail employees, and other channels
  - For Distribution/Dealer-based Manufacturers:
    - Providing educational content to distributors/dealers for use with their customers
    - Providing brochures, signage, etc. to distributors/dealers for their store, as appropriate
    - Providing messaging to the distributors/dealers to use in their advertising and promotions
    - Running special promotions with dealers/distributors – manufacturer rebates, etc.
    - Using the ENERGY STAR education graphic in product literature (i.e., user manuals, spec sheets, marketing materials, etc.) and on the manufacturer's Internet site
    - Consistently using approved messaging on product packaging/literature, Web site, trade articles, trade shows, training for distributors/dealers, and other channels;
  - qualify at least one ENERGY STAR programmable thermostat model within one year of activating the programmable thermostats portion of the agreement. When Partner qualifies the product, it must meet the specification (e.g., Tier 1 or 2) in effect at that time;
  - provide clear and consistent labeling of ENERGY STAR qualified programmable thermostat. The ENERGY STAR mark must be clearly displayed on the top/front of the product, in product literature (i.e., user manuals, spec sheets, etc.), on product packaging, and on the manufacturer's Internet site where information about ENERGY STAR qualified models is displayed;
  - provide to EPA, on an annual basis, an updated list of ENERGY STAR qualifying programmable thermostat models. Once the Partner submits its first list of ENERGY STAR qualified programmable thermostat models, the Partner will be listed as an ENERGY STAR Partner. Partner must provide annual updates in order to remain on the list of participating product manufacturers;
  - provide to EPA, on an annual basis, unit shipment data or other market indicators to assist in determining the market penetration of ENERGY STAR. Specifically, Partner must submit the total number of ENERGY STAR qualified programmable thermostats shipped (in units by model) or an equivalent measurement as agreed to in advance by EPA and Partner. Partner is also encouraged to provide ENERGY STAR qualified unit shipment data segmented by meaningful product characteristics (e.g., capacity, size, speed, or other as relevant), total unit shipments for each model in its product line, and percent of total unit shipments that qualify as ENERGY STAR. The data for each calendar year should be submitted to EPA, preferably in electronic format, no later than the following March and may be provided directly from the Partner or through a third party. The data will be used by EPA only for program evaluation purposes and will be closely controlled. Any information used will be masked by EPA so as to protect the confidentiality of the Partner; and
  - notify EPA of a change in the designated responsible party or contacts for programmable thermostats within 30 days.

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## 101 **Performance for Special Distinction**

102 In order to receive additional recognition and/or support from EPA for its efforts within the Partnership, the  
103 ENERGY STAR Partner may consider the following voluntary measures and should keep EPA informed  
104 on the progress of these efforts:

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- 106 • consider energy efficiency improvements in company facilities and pursue the ENERGY STAR mark  
107 for buildings;  
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- 109 • purchase ENERGY STAR qualified products. Revise the company purchasing or procurement  
110 specifications to include ENERGY STAR. Provide procurement officials' contact information to EPA  
111 for periodic updates and coordination. Circulate general ENERGY STAR qualified product  
112 information to employees for use when purchasing products for their homes;  
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- 114 • ensure the power management feature is enabled on all ENERGY STAR qualified monitors in use in  
115 company facilities, particularly upon installation and after service is performed;  
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- 117 • provide general information about the ENERGY STAR program to employees whose jobs are  
118 relevant to the development, marketing, sales, and service of current ENERGY STAR qualified  
119 product models;  
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- 121 • feature the ENERGY STAR mark(s) on Partner Web site and in other promotional materials. If  
122 information concerning ENERGY STAR is provided on the Partner Web site as specified by the  
123 ENERGY STAR Web Linking Policy (this document can be found in the Partner Resources section  
124 on the ENERGY STAR Web site at [www.energystar.gov](http://www.energystar.gov)), EPA may provide links where appropriate  
125 to the Partner Web site;  
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- 127 • provide a simple plan to EPA outlining specific measures Partner plans to undertake beyond the  
128 program requirements listed above. By doing so, EPA may be able to coordinate, communicate,  
129 and/or promote Partner's activities, provide an EPA representative, or include news about the event  
130 in the ENERGY STAR newsletter, on the ENERGY STAR Web pages, etc. The plan may be as  
131 simple as providing a list of planned activities or planned milestones that Partner would like EPA to  
132 be aware of. For example, activities may include: (1) increase the availability of ENERGY STAR  
133 qualified products by converting the entire product line within two years to meet ENERGY STAR  
134 guidelines; (2) demonstrate the economic and environmental benefits of energy efficiency through  
135 special in-store displays twice a year; (3) provide information to users (via the Web site and user's  
136 manual) about energy-saving features and operating characteristics of ENERGY STAR qualified  
137 products, and (4) build awareness of the ENERGY STAR Partnership and brand identity by  
138 collaborating with EPA on one print advertorial and one live press event;  
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- 140 • provide quarterly, written updates to EPA as to the efforts undertaken by Partner to increase  
141 availability of ENERGY STAR qualified products, and to promote awareness of ENERGY STAR and  
142 its message;  
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- 144 • join EPA's SmartWay Transport Partnership to improve the environmental performance of the  
145 company's shipping operations. SmartWay Transport works with freight carriers, shippers, and other  
146 stakeholders in the goods movement industry to reduce fuel consumption, greenhouse gases, and  
147 air pollution. For more information on SmartWay, visit [www.epa.gov/smartway](http://www.epa.gov/smartway);  
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- 149 • join EPA's Climate Leaders Partnership to inventory and reduce greenhouse gas emissions.  
150 Through participation, companies create a credible record of their accomplishments and receive  
151 EPA recognition as corporate environmental leaders. For more information on Climate Leaders, visit  
152 [www.epa.gov/climateleaders](http://www.epa.gov/climateleaders); and  
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- 154 • join EPA's Green Power partnership. EPA's Green Power Partnership encourages organizations to  
155 buy green power as a way to reduce the environmental impacts associated with traditional fossil  
156 fuel-based electricity use. The partnership includes a diverse set of organizations including Fortune  
157 500 companies, small and medium businesses, government institutions as well as a growing  
158 number of colleges and universities, visit [www.epa.gov/grnpower](http://www.epa.gov/grnpower).



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# ENERGY STAR® Program Requirements for Programmable Thermostats – Tier 1

## DRAFT 1 Version 2.0 Eligibility Criteria

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Below is the **Draft 1** Version 2.0 product specification for ENERGY STAR qualified programmable thermostats. A product must meet all of the identified criteria if it is to earn the ENERGY STAR.

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**Note:** The goal of this specification is to identify programmable thermostats that maximize the likelihood of energy savings and minimize environmental impacts through a combination of technical features, user friendliness, and reduced toxic materials.

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1) **Definitions:** Below is a brief description of a programmable thermostat and its common operational modes as relevant to ENERGY STAR.

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A. **Auxiliary Heat:** Electric resistance heat used to supplement the heat pump during periods of low temperature or rapid recovery.

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B. **Line Voltage Thermostat:** A device that acts to automatically control the temperature of the room or space in which it is installed by controlling the line-voltage electrical load directly or indirectly through a line-voltage operating control.

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C. **Low Voltage Thermostat:** A device that acts to automatically control the temperature of the room or space in which it is installed by controlling the applied energy to a low-voltage operating control in a Class 2 circuit.

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D. **Programmable Thermostat (PT):** A device that enables a 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. A PT enables the user to save energy because the heating and cooling equipment is not required to maintain a comfort temperature setpoint 24 hours per day. A PT may be capable of controlling one or more zones of a conditioned space.

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E. **Programmable Communicating Thermostat (PCT):** A Programmable Thermostat with the ability to communicate with external devices. When integrated into a Home Energy Management system, a PCT may be controlled by or control additional devices. Examples of capabilities provided by such systems include: Internet (web) enabled scheduling; remote Heating, Ventilating, and Air Conditioning (HVAC) control; messaging and energy rate alert display.

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F. **Home Area Network (HAN):** A network typically used for communication and control of connected devices in a single local area.

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G. **Home Energy Management System:** For the purpose of this specification, a Home Energy Management System is comprised of interconnected devices, integrated into a system designed to schedule, control, and monitor energy usage within the residence. A typical system may be comprised of a controller or gateway that forms the HAN and acts as a gateway to the Internet. The controller may include imbedded energy management software or may leverage a code base located on a local PC or remote server. In addition to the controller, HAN devices may include an in home display (IHD), PCTs, direct load control relays, addressable light switches, meters and appliance modules. In general, each of these devices shall add one or more of the following intrinsic functions:

- 216 • Load Control
- 217 • Measurement
- 218 • Display/User Interface
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220 The energy management system aggregates energy usage data from interconnected devices  
221 and empowers the resident with tools and information intended to encourage responsible and  
222 reduced energy usage. The system may also help to identify low cost solutions that increase  
223 energy efficiency within the residence.

224 **Note:** The Draft 1 Version 2.0 specification includes new definitions for line voltage and low voltage  
225 thermostats. These changes are intended to clarify that line voltage thermostats are not within the scope  
226 of this specification, as explained in Section 2 below. EPA has also broadened the scope of the  
227 “programmable thermostat” definition to include communicating thermostats and HANs, and has provided  
228 a definition for “home energy management systems” to support the PCT upgradeability requirements for  
229 all qualified programmable thermostats (see Section 3). EPA is interested in refining the definitions of PCT  
230 and HAN for this specification and encourages stakeholders to comment on the text proposed above to  
231 ensure it is technically sound.

- 232 H. Conventional HVAC: For the purpose of this specification, conventional HVAC encompasses all  
233 non Heat Pump HVAC systems.
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- 235 I. Heat Pump: For the purpose of this specification, a Heat Pump is a mechanical apparatus that  
236 transfers heat to or from the premises to the outside air or ground.
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- 238 J. Dual Fuel Heat Pump: For the purpose of this specification, a Dual Fuel Heat Pump typically  
239 integrates a high-efficiency multi-stage heat pump with a high efficiency gas or oil furnace. To  
240 maximize efficiency of the system, the furnace is utilized for cold outdoor temperatures and the  
241 heat pump for milder temperatures. The PT monitors outdoor temperature and selectively utilizes  
242 the two heat sources to optimize energy efficiency.

243 **Note:** EPA has added definitions for auxiliary heat, conventional HVAC, a heat pump, and a dual fuel  
244 heat pump to clarify the terms referenced in this specification.

- 245 K. Setpoint Temperature: The temperature setting in degrees Fahrenheit or degrees Celsius for any  
246 given time period.
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- 248 L. Comfort Setpoint Temperature: The temperature setting in degrees Fahrenheit or degrees  
249 Celsius for the time period during which the premises is expected to be occupied (e.g., the early  
250 morning and evening hours for a residence).
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- 252 M. Comfort Time: The time period during which the conditioned space is expected to be occupied  
253 (e.g., the early morning and evening hours for a residence).
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- 255 N. Energy-Saving Setpoint Temperature: The setpoint temperature for the energy-saving periods,  
256 usually specified for both the heating and cooling seasons.
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  - 258 1. Set-Back Temperature: The setpoint temperature for the energy-saving periods during the  
259 heating season, generally at night and during unoccupied hours. This is a lower setpoint  
260 temperature than the comfort setpoint temperature.
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  - 262 2. Set-Up Temperature: The setpoint temperature for the energy-saving periods during the cooling  
263 season, generally at night and during unoccupied hours. This is a higher setpoint temperature  
264 than the comfort setpoint temperature.
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- 266 O. Cycle Rate: The number of times the heating or cooling unit turns on and off in a given hour.  
267 Cycle rate is measured when the heating and air-conditioning equipment is operating at a 50%

268 duty cycle, as defined in the National Electrical Manufacturers Association (NEMA) DC 3-2008  
269 standard titled "Residential Controls- Electrical Wall-Mounted Room Thermostats" standard.<sup>1</sup>

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271 P. Recovery Systems:

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273 1. Conventional Recovery: A feature of a programmable thermostat that changes setpoints to the  
274 program values at the program schedule times.  
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276 2. Heat Pump Recovery: A feature of a programmable thermostat that allows the heat pump to  
277 recover gradually from an energy-saving setpoint temperature to a comfort setpoint  
278 temperature. The heat pump recovery feature is designed to minimize the use of auxiliary heat  
279 while also minimizing the on-time of the system.  
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281 3. Pre-Comfort Recovery: A feature of a programmable thermostat that initiates a gradual  
282 recovery from an energy-saving setpoint temperature to a comfort setpoint temperature in  
283 advance of the program schedule times. This feature provides comfort and reduces energy  
284 consumption by minimizing the on-time of the system during the recovery period. If the pre-  
285 comfort recovery system is capable of minimizing the use of auxiliary heat, then it also complies  
286 with the heat pump recovery definition, above.

287 **Note:** EPA has further clarified the definitions for recovery systems.

288 Q. Hold Features:

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290 1. Short Term Hold: A feature of a programmable thermostat that enables a user to temporarily  
291 override the programmable thermostat's setpoint. The Short Term Hold shall be active only until  
292 the next scheduled program event.  
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294 2. Long Term Hold: A feature of a programmable thermostat that enables a user to override the  
295 thermostat program for a period of time, either specified or unlimited. Examples of Long Term  
296 Hold implementations include timed hold, scheduled hold, and vacation hold.

297 **Note:** EPA has expanded the description of thermostat hold modes to differentiate between short term  
298 and long term features.

299 2) Qualifying Products:

300 **Note:** EPA has made several changes and additions to the qualifying product requirements in this Draft 1  
301 Version 2.0 specification. These new requirements are intended to target leadership thermostat models  
302 with the capability of controlling the latest and most efficient multi-stage HVAC equipment. These  
303 requirements include the following: (1) Three minimum weekday - weekend program schedules with a  
304 default program schedule of 5-2. Requiring three different program schedules increases options for  
305 consumers with varied schedules. The default requirement of a 5-2 program schedule is designed to meet  
306 the needs of the majority of residential users; (2) Compatibility with most HVAC systems including heat  
307 pump and 3-stage heat / 2-stage cool systems; (3) Support for external temperature sensors and dual fuel  
308 heat pump systems; and (4) Ability to upgrade to a PCT by field installation of a HAN communication  
309 module.

310 This ENERGY STAR specification is applicable to low voltage room thermostats. Line voltage thermostats  
311 are outside the scope of this specification. In addition, the following requirements must be met:

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313 A. The product must provide by default a pre-programmed 5-2 (weekday – weekend) program  
314 schedule with a minimum of four possible schedule periods (i.e., wake, day, evening, and sleep).  
315 Day and sleep periods must be at least 8 hours in duration.  
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<sup>1</sup> National Electrical Manufacturers Association (NEMA), 1300 North 17<sup>th</sup> Street, Suite 1847, Rosslyn, VA 22209

- 317 B. The product must provide one or more user selectable, pre-programmed 5-1-1 (weekday –  
318 Saturday – Sunday) and 7-day program schedules, each with a minimum of four possible  
319 schedule periods (i.e., wake, day, evening, and sleep). Day and sleep periods must be at least 8  
320 hours in duration.
- 321 C. The product must be compatible with most HVAC systems including both Heat Pump and  
322 conventional HVAC systems up to and including 3-stage heat / 2-stage cool plus humidity control.
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324 D. The product must interface with external temperature sensors and control Dual Fuel Heat Pump  
325 systems.
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327 E. The product must be upgradeable to a PCT by installation of a HAN communication module.
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- 330 3) Specifications for Qualifying Products: The following are minimum characteristics of ENERGY STAR  
331 qualified programmable thermostats:
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- 333 • Maximize energy savings
  - 334 • Provide intuitive controls – easy to use and program
  - 335 • Have the capability of communicating with other devices within the HAN and utility load  
336 control programs
  - 337 • Be easy to install
  - 338 • Deliver on consumer demand regarding reduced toxic materials

339 **Note:** EPA aims to develop a specification that will 1) produce demonstrable energy savings from the use  
340 of programmable thermostats and 2) encourage the improvement of user interface design for these  
341 products. As such, EPA proposes several requirements to ensure that ENERGY STAR qualified  
342 programmable thermostats save energy by being easy to use and install and are capable of  
343 communicating with energy management systems. EPA encourages enhanced usability of programmable  
344 thermostats, but also allows flexibility in the specification to foster new ideas for continuing energy savings  
345 from programmable thermostat use.

346 EPA seeks feedback on the proposed phased approach and specifically on the Tier 1 requirements as a  
347 valuable first step in realizing savings potential. EPA also invites manufacturers, utilities, and stakeholders  
348 to participate in field studies to verify the effectiveness of ENERGY STAR qualified thermostats in saving  
349 heating and cooling energy.

- 350 A. Tier 1 Program Requirements: The following Tier 1 requirements are based on the characteristics  
351 outlined above. Only those products listed in Section 2 that meet the criteria below may qualify as  
352 ENERGY STAR under Tier 1.

353 **Usability Requirements:**

354 **Note:** EPA has proposed several minimum usability requirements to ensure a more intuitive interface for  
355 consumers of ENERGY STAR qualified programmable thermostats. EPA is committed to expanding and  
356 quantifying usability requirements in Tier 2. These requirements will make use of a usability metric or  
357 benchmark to allow for more refined evaluation of the usability of a product. Absent the availability of such  
358 a metric, EPA proposes verifiable usability criteria for Tier 1.

- 359 1. The product shall include a single click or a single button push that triggers an energy saving  
360 mode. This mode shall simultaneously activate the energy savings setpoint temperature and  
361 place the thermostat in Long Term Hold. This hold shall remain active until cancelled by the user.  
362 The mode should be given a descriptive label. EPA recommends the use of the term “Away”.

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**Note:** To maximize energy savings, EPA believes this mode should be quickly accessible by a user who is exiting the premises. Long Term Hold is required for this mode to ensure that the system stays in the energy saving mode until cancelled by the user either locally or via remote control (for a PCT integrated into an energy management system). EPA requests comment on standardized terms such as “Away”.

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2. The product shall provide the user the ability to raise or lower the setpoint temperature with a single button push. Setpoint changes made while in program mode shall activate a Short Term Hold indicator that informs the users that the change will be overridden by the program at the next scheduled change.
3. The product shall have one or more Hold modes that enable the user to override the thermostat program for a period of time, either specified or unlimited, without deleting the program. It is recommended that the product offer more than one means for the user to override the program. For instance, a long term hold (vacation) and short term hold (override to the next setpoint) is recommended.
4. The product shall have a backlit display. The backlight of the display shall power off after **XX** minutes of user inactivity.

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**Note:** EPA seeks input on an appropriate period of time (in minutes or seconds) after which the backlight of the display will power off due to user inactivity. Stakeholders are encouraged to provide a suggested time period as well as the rationale or data to support their recommendation.

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5. The product display shall have primary and secondary characters (i.e., numbers) that are at least 16mm and 4.75mm in height, respectively.
6. The product shall inform the user when a modification to programmed settings by the user has been accepted.
7. The product shall store program schedules and system, fan, temperature and hold settings in non-volatile memory in case of an external power outage or battery failure.
8. The product shall be capable of retrieving standard time signals and resetting its internal clock based on those signals.
9. The product shall offer the user a choice of operation in Fahrenheit or Celsius based on user preference. When operating in Celsius, the temperature shall be displayed to a resolution of no less than 0.5 degree Celsius. When operating in Fahrenheit, the temperature shall be displayed to a resolution of no less than 1 degree Fahrenheit.

400 **Technical Requirements:**

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**Note:** EPA proposes several new technical requirements to ensure maximum efficiency of HVAC systems controlled by ENERGY STAR qualified programmable thermostats. These PT requirements include: (1) a maximum cycle rate of 5 per hour; (2) the capability to interface with an outdoor temperature sensor; (3) humidity control; (4) maximum power consumption limits in any operational mode; and (5) lead-free and mercury-RoHS compliance. Stakeholders are encouraged to provide feedback on these requirements.

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An increasing number of building codes require continuous mechanical ventilation. EPA invites recommendations on how the ENERGY STAR programmable thermostat specification should address this requirement.

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10. The product shall maintain room temperature within  $\pm 2^{\circ}\text{F}$  of the setpoint temperature when tested to NEMA DC 3-2008 section 4.5.2 Differential Tests.

- 412 11. The product Cycle Rate shall be less than 5 cycles per hour when tested to NEMA DC 3-2008  
 413 section 4.5.3 Cycle Rate Test conducted at a 50% duty cycle.  
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 415 12. The product shall include the ability to interface with an optional outdoor temperature sensor. For  
 416 Dual Fuel Heat Pump installations, the thermostat shall use the outdoor sensor to provide  
 417 automatic cutover to/from the backup heat source based on installer configurable cutover  
 418 temperatures.  
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 420 13. The product shall be equipped with selectable Conventional, Heat Pump and Pre-Comfort  
 421 recovery systems. When configured for Heat Pump installations, the Heat Pump recovery system  
 422 shall be active by default. When configured for conventional HVAC installations, the Pre-Comfort  
 423 recovery system shall be active by default.  
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 425 14. The product shall include humidity control and be capable of maintaining desired humidity levels  
 426 when coupled with suitable HVAC equipment.  
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 428 15. The product shall not consume more than **X** watts of power in any operational mode and no more  
 429 than **X** watts at other times. When the thermostat is enabled with optional HAN communication  
 430 modules it may consumer **X** watts of power in any operational mode and no more than **X** watts of  
 431 power at all other times.

432 **Note:** EPA is seeking data that informs on appropriate levels in watts for operation and other modes for  
 433 non-HAN and HAN enabled products.

- 434 16. All programmable thermostat models shall be lead-free and comply with Restriction of Use of  
 435 Hazardous Substances (RoHS) regulations for mercury.  
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 437 17. The product shall be shipped from the factory with setpoint temperatures and times as specified in  
 438 Table 1 below. For a specific example of acceptable setpoint time and temperature settings, see  
 439 Table 2 below.  
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Table 1: Programmable Thermostat Setpoint Temperatures		
Setting	Setpoint Temperature (Heat)	Setpoint Temperature (Cool)
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

Table 2: Acceptable Setpoint Times and Temperature Settings			
Setting	Time	Setpoint Temperature (Heat)	Setpoint Temperature (Cool)
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

442 **Communication Requirements:**

443 **Note:** EPA proposes that ENERGY STAR qualified programmable thermostats be upgradeable to a PCT.  
444 By including this requirement, EPA envisions ENERGY STAR programmable thermostats could support  
445 downloading and processing of usage data and facilitate remote control and scheduling as well as provide  
446 increased insight into energy usage to encourage voluntary reduction of energy consumption and increase  
447 energy efficiency.

448 EPA invites comments from manufacturers, utilities, and other stakeholders to develop technical  
449 specifications for communication capabilities that offer greatest flexibility and user friendliness at the  
450 lowest cost.

- 451 18. The product shall use HAN communication modules featuring standardized, low-power, low-  
452 bandwidth HAN communication protocols.
- 453 19. The product shall log and retain usage data. Under typical usage, the thermostat shall retain data  
454 for the most recent 7-day period. This data shall be displayable on the thermostat and  
455 downloadable when integrated into an energy management system.
- 456 20. The product shall include a low-battery indicator that activates at least 2 months prior to critical  
457 battery depletion. This requirement is only applicable to products that use batteries.

461 **Documentation Requirements:**

- 462 21. Product documentation and installation instructions must guide the installer through both  
463 installation and configuration of the programmable thermostat. These instructions shall include  
464 relevant instructions for use with all compatible systems, both heat pump and conventional HVAC.
- 465 22. Product documentation must use graphics and text. Installer and user documentation must be  
466 posted on the manufacturer’s website in electronic format and must be available for at least 10  
467 years after cessation of product manufacture.
- 468 23. Product documentation must provide clear instructions for the user to operate the thermostat and  
469 adjust programmed schedule times and setpoint temperatures.

473 **Note:** EPA proposes several documentation requirements to ensure that installation and user  
474 documentation materials are easily accessible to users. EPA proposes that user documentation be  
475 available electronically for 10 years after a product is no longer manufactured and sold in the marketplace.

476 **Ease of Installation Requirements:**

477 **Note:** EPA proposes several requirements to ensure easy and proper installation of programmable  
478 thermostats. EPA also aims to reduce toxic waste by encouraging partners to design thermostat products  
479 that use efficient and long-lasting battery technologies that are commonly available.

480 Based on prior stakeholder comments, EPA also seeks industry input on aspects of customer service  
481 (e.g., e-mail and call support) that should be incorporated into this ENERGY STAR specification.

482 24. The HVAC wiring terminal designations of the product shall comply with Table 5-1 in NEMA DC 3-  
483 2008.

484 25. The product shall incorporate features to facilitate “no-new-wires” installation in retrofit  
485 applications where no common wire is available at the thermostat location.  
486  
487

488 26. The product shall use commonly available batteries free of special handling and/or hazardous  
489 waste disposal requirements. This requirement is only applicable to products that use batteries.  
490

491 27. The product shall be designed for a typical battery life of a minimum of 18 months. This  
492 requirement is only applicable to products that use batteries.  
493

494 B. Tier 2 Program Requirements: To take the next step in promoting efficiency and recognizing  
495 forthcoming improvements in technology, EPA will continue to evaluate market and technological  
496 changes, and based on its assessment, develop Tier 2 requirements for stakeholder review and  
497 input. EPA's goal is to finalize Tier 2 levels no later than **October 1, 2010** to provide manufacturers  
498 ample time to transition product literature and other ENERGY STAR materials prior to the Tier 2  
499 effective date.

500 **Note**: For Tier 2 usability requirements, EPA intends to implement usability metrics or benchmarks to  
501 evaluate usability of programmable thermostats. Requirements may reference common terms that define  
502 "simple" text, terms, icons, and standard ergonomic guidelines for buttons and other components of the  
503 programmable thermostat interface. EPA invites manufacturers and stakeholders to submit  
504 recommendations for testing usability, including the aspects to be covered and types of tests to be  
505 undertaken.

506 4) Test Criteria: To qualify a programmable thermostat as ENERGY STAR, the product must meet  
507 ENERGY STAR guidelines. Products must be tested in accordance to NEMA DC 3-2008 standard  
508 section 4.5.2 Differential Tests and section 4.5.3 Cycle Rate Test conducted at a 50% duty cycle.

509 **Note**: EPA will be engaging all ENERGY STAR stakeholders on the enhancement of product verification.  
510 EPA expects to propose that programmable thermostats meet verification requirements similar to those in  
511 place for Residential Ventilating Fans. These requirements can be found at  
512 [http://www.energystar.gov/ia/partners/product\\_specs/program\\_reqs/vent\\_fans\\_prog\\_req.pdf](http://www.energystar.gov/ia/partners/product_specs/program_reqs/vent_fans_prog_req.pdf), page 14. EPA invites  
513 stakeholder feedback on this approach.

514 5) Effective Date: The date that products must meet the requirements specified under the Version 2.0  
515 Programmable Thermostat specification will be defined as the *effective date* of the agreement. The  
516 Version 2.0 ENERGY STAR Programmable Thermostat specification is effective immediately and  
517 supersedes the suspension of Version 1.2 ENERGY STAR performance requirements effective  
518 December 31, 2009.  
519

520 A. Qualifying Products under Tier 1 of the Version 2.0 Specification: Tier 1 of the Version 2.0  
521 ENERGY STAR Programmable Thermostat specification will commence immediately. All  
522 products, including models originally qualified under the previous Version 1.2 programmable  
523 thermostat specification, with a date of manufacture on or after **December 31, 2009** must  
524 meet the new Version 2.0 requirements in order to qualify for ENERGY STAR. The date of  
525 manufacture is specific to each unit and is the date (e.g., month and year) on which a unit is  
526 considered to be completely assembled.

527 **Note**: EPA has proposed a December 31, 2009 effective date for this Tier 1 Specification. Recognizing  
528 the very short time period between now and December 31, EPA seeks feedback on the benefit of the very  
529 near term implementation of the proposed Tier 1 requirements versus sunsetting the program on  
530 December 31, 2009 and allowing more time to transition to new requirements.

531 B. Qualifying Products under Tier 2 of the Version 2.0 Specification: The second phase of this  
532 specification, Tier 2, will commence on **July 1, 2011**. All models, including those originally  
533 qualified under Tier 1, with a date of manufacture on or after **July 1, 2011** must meet the Tier  
534 2 requirements in order to qualify for ENERGY STAR.  
535

536 C. Elimination of Grandfathering: EPA will not allow grandfathering under this Version 2.0  
537 ENERGY STAR specification. **ENERGY STAR qualification under previous versions is**  
538 **not automatically granted for the life of the product model**. Therefore, any product sold,

539 marketed, or identified by the manufacturing partner as ENERGY STAR must meet the  
540 current specification in effect at the time of manufacture of the product.

541 **Note:** Once the new Version 2.0 specification takes effect, all ENERGY STAR qualified programmable  
542 thermostat models will be required to meet the new Version 2.0 Tier 1 levels to remain qualified. All  
543 existing ENERGY STAR qualified models that met Version 1.2 requirements but do not meet Version 2.0  
544 Tier 1 requirements will be removed from the ENERGY STAR qualified products list by EPA and may no  
545 longer bear the ENERGY STAR mark or designation for any purpose. If a new specification is not in effect  
546 on December 31, the program will sunset and the full qualified products list for programmable thermostats  
547 will be removed. In this scenario, EPA will work with partners to build a new qualified product list once a  
548 new specification takes effect.

549 6) Future Specification Revisions: ENERGY STAR reserves the right to change the specification should  
550 technological and/or market changes affect its usefulness to consumers or industry or its impact on  
551 the environment. In keeping with current policy, revisions to the specification will be discussed with  
552 stakeholders. In the event of a specification revision, please note that ENERGY STAR qualification is  
553 not automatically granted for the life of a product model. To qualify as ENERGY STAR, a product  
554 model must meet the ENERGY STAR specification in effect on the model's date of manufacture.