ENERGY STAR Program Requirements
Product Specification for Smart Thermostat Products

Eligibility Criteria
Draft 1 Version 2.0

Following are the eligibility requirements for the Version 2.0 ENERGY STAR Smart Thermostats program. Smart Thermostat (ST) products shall meet all the identified criteria to earn the ENERGY STAR.

Note: EPA proposes renaming the product category to Smart Thermostats because consumers recognize the term and to reduce confusion with other products such as communicating thermostats.

1) Definitions:

   A. <u>Communication Link</u>: The mechanism for bi-directional data transfers between the ST device and one or more external applications, devices or systems.

   B. <u>Smart Thermostat Device</u>: A device that controls heating, ventilation, and air-conditioning (HVAC) equipment to regulate the temperature of the room or space in which it is installed and has the ability to communicate with sources external to the HVAC system. For connection, the ST device may rely on a Wi-Fi home area network and an internet connection that is independent of and not part of the ST Device. Where the ST device relies upon other devices that are not reasonably expected to be in the home, e.g., Zigbee gateway, these devices are part of the ST device.

   C. <u>Smart Thermostat Product:</u> For the purposes of this specification, the ST product includes the ST device in the home with associated firmware, which is assumed to be updated during the time the ST device is used in the home, as well as a ST service supported by hardware and software outside of the home. The ST service would typically provide web and smartphone-based thermostat control. See Figure 1 for a pictorial representation. Functions in the left-most group must be physically located in the home. Functions in the middle group commonly operate using a combination of hardware that is physically located within the home and services that rely fully or partially on communication with the cloud. The functions on the right typically reside in the cloud.
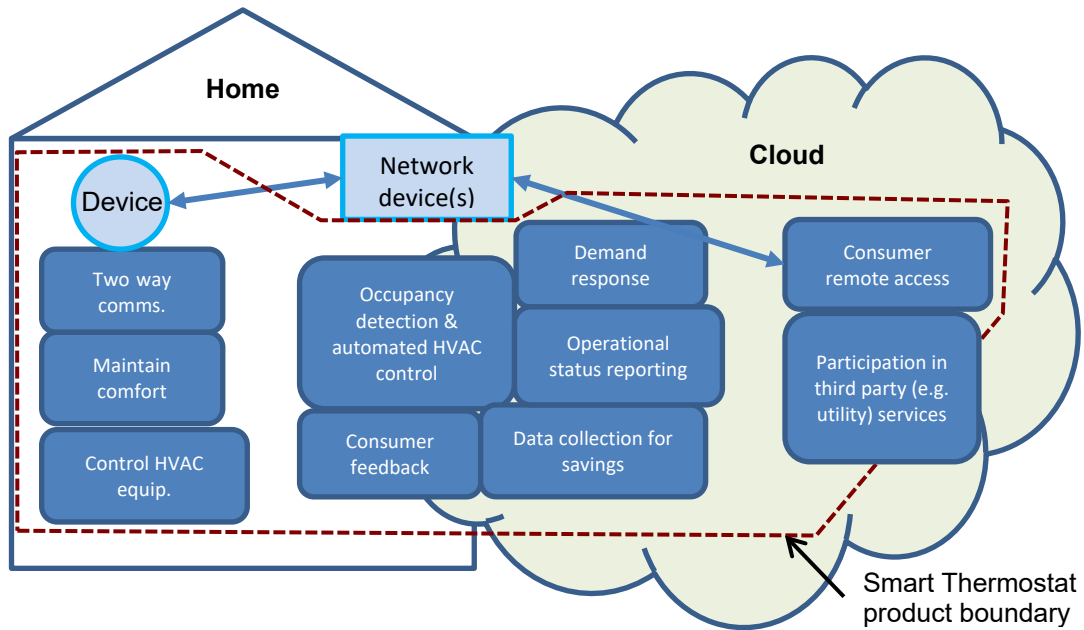
Figure 1: Smart Thermostat Product

D. <u>Smart Thermostat Service Provider:</u> The organization that brands the ST service. ST services typically include smart phone and web control applications, messaging relevant to energy consumption, and application programming interfaces (API) that enable consumer-authorized interconnection with utilities and other 3rd parties.

E. <u>Core Heating Day/Core Cooling Day:</u> A core heating day has more than 30 minutes of heating equipment run time and no cooling equipment run time. Similarly, a core cooling day has more than 30 minutes of cooling equipment run time and no heating equipment run time.

F. <u>Demand Response (DR):</u> Changes in electric usage by demand-side resources from their normal consumption patterns in response to changes in the price of electricity over time, or to incentive payments designed to induce lower electricity use at times of high wholesale market prices or when system reliability is jeopardized[1].

G. <u>Demand Response Management System (DRMS):</u> The system operated by a program administrator, such as the utility or third party, which dispatches signals with DR instructions and/or price signals to the ENERGY STAR ST products and receives messages from the ST product.

H. <u>Interface Specification:</u> A document or collection of documents that contains detailed technical information to facilitate access to relevant data and product capabilities over a communications interface

I. <u>Line Voltage Thermostat:</u> Thermostat that directly switches a load and has a nominal voltage between 120 and 240 V.

J. <u>Wall-Mounted Line Voltage Thermostat:</u> A one-piece line voltage thermostat that is designed to be installed on a wall away from the heating unit and directly controls load-switching and has a nominal voltage between 120 and 240 V.

Note: EPA added definitions for line voltage thermostats in harmonization with CSA C828:19 to expand the scope of the specification.

---

[1] Federal Energy Regulatory Commission, <u>National Assessment and Action Plan on Demand Response | Federal Energy Regulatory Commission (ferc.gov)</u>

59   K.   Load Management Entity: DRMS, home energy management system, and the like.

60   L.   Low Voltage Thermostat: Thermostat that switches load and operates at a nominal voltage < 30
61   V AC.

62   M.   Network Standby: A state where the ST device is:

63   1.   installed and interconnected in accordance with provided instructions,

64   2.   with no direct or remote user interaction (e.g., smart phone app, web interface, occupancy
65   detection), and

66   3.   sufficient time has elapsed to allow the ST device to enter a low power state, as applicable.
67   For example, the screen has dimmed or turned off automatically.

68   N.   Open Standards: Communication with entities outside the smart thermostat that use, for all
69   communication layers, standards:
70   • included in the Smart Grid Interoperability Panel (SGIP) Catalog of Standards,[2] and/or
71   • included in the NIST Smart Grid Framework Tables 4.1 and 4.2, and/or
72   • adopted by the American National Standards Institute (ANSI) or another well-established
73   international standards organization such as the International Organization for
74   Standardization (ISO), International Electrotechnical Commission (IEC), International
75   Telecommunication Union (ITU), Institute of Electrical and Electronics Engineers (IEEE) or
76   Internet Engineering Task Force (IETF).

77   O.   Product Family: A group of closely related ST products sharing a primary strategy for delivering
78   savings and using similar ST devices. All members of a product family shall share one score on
79   the field savings metrics for heating and cooling. ST products using different strategies to
80   produce savings shall be in different product families.

---

81 **Note:** EPA considered revising the product family definition to be more specific and exclusive. We
82 requested vendors to provide results from each product within their product family and did not come
83 across any statistically significant differences. As a result, EPA has decided against revising the product
84 family definition and criteria in the Version 2.0 specification.

---

85   P.   Static Temperature Accuracy: The deviation in the room temperature displayed and/or
86   communicated by the ST device from 70°F (21°C); after one hour in a calibrated temperature
87   chamber set to 70°F (21°C).[3]
88
89 **2) Scope:**

90   A.   Included Products: Only products that meet the definition of a ST product, as specified herein, are
91   eligible for ENERGY STAR certification. ST products provided as part of a larger product
92   offering, such as a home security system, may be certified but will be subject to specific labeling
93   requirements. Wall mounted line voltage thermostats used with baseboards are also eligible for
94   certification.

95   B.   Excluded Products:

96   1   ST products that are unable to collect the required data for the energy savings metric as
97   required by Section 3) B.4.

98   2   Non-wall-mounted line voltage thermostats.

99   3   Ductless mini split controllers

---

[2] Catalog Of Standards | SEPA (sepapower.org)
[3] The static temperature accuracy definition is based on requirements in National Electrical Manufacturers
Association (NEMA) DC 3, Annex A 2013 Energy-Efficiency Requirements for Programmable Thermostats.

100 **Note:** EPA proposes explicitly adding wall-mounted line voltage thermostats to the scope based on
101 market demand, a significant savings opportunity, and research with thermostat service providers
102 showing that these products can be evaluated with the ENERGY STAR metric. Non-wall mounted line
103 voltage thermostats are excluded from CSA C828:19 standard and operate differently, such that using the
104 same criteria would be problematic. EPA also proposes clarifying that mini-split system controllers are
105 beyond the scope of ENERGY STAR specification as the current ENERGY STAR method makes several
106 assumptions that are incorrect or unproven for these products, and there is no alternative method
107 available to evaluate these products for energy savings. EPA welcomes work with stakeholders to
108 establish such a method.

109 **3) Eligibility Criteria:**

110   A. <u>Smart Thermostat Device Requirements:</u>

111   Each ST device in a product family shall fulfill these requirements:

112   1. In the absence of connectivity to the ST service provider, retain the ability for residents to
113   locally:

114   a. view the room temperature,

115   b. view and adjust the set temperature, and

116   c. switch between off, heating and cooling.

117

118   2. Meet requirements set out in Table 1, below:

119

120 **Table 1: Smart Thermostat Device Criteria**

Applicable Products	Parameter	Performance Requirement
All	Time to enter network standby after user interaction (on the device, remote or occupancy detection)	≤ 5.0 minutes
Low-Voltage devices	Static temperature accuracy	≤ ± 2.0 °F
	Network standby average power consumption[i]	≤ 1.0 W average
Line-Voltage devices	Droop	≤ ± 1.5 °C
	Temperature Differential	0.5 ± 0.05 °C
	Static temperature accuracy	≤ ± 0.5 °C
	Network standby average power consumption[i]	≤ 1.0 W average

121
122   i Includes all equipment necessary to establish connectivity to the ST service provider's
123   cloud, except those that can reasonably be expected to be present in the home, such as
124   Wi-Fi routers and smart phones.

125 **Note:** After discussions with stakeholders and reviewing products available in the market, EPA proposes
126 requiring the network standby average power consumption to be less than or equal to 1W. EPA proposes
127 additional criteria for droop and temperature differential for line voltage thermostats in harmonizing with
128 the CSA 828:19 standard. EPA seeks stakeholder feedback on the clarity of the requirements pertaining
129 to Line-Voltage thermostat devices.

130 B. Smart Thermostat Product Requirements: The following capabilities may be enabled through the
131 ST device, ST service or any combination of the two. The ST product shall maintain these
132 capabilities through subsequent firmware and software changes. The ST service provider shall
133 maintain documentation that demonstrates compliance to these requirements. Initial certification
134 of these requirements will be based on a review of product literature.

135 1. Ability for consumers to set and modify a schedule.

136 2. Provision of feedback to occupants about the energy impact of their choice of settings.

137 3. Ability for consumers to access information relevant to their HVAC energy consumption, e.g.,
138 HVAC run time.

139 4. The ST product shall be capable of collecting the following data, including where noted, to the
140 indicated resolution and accuracy:

141 a. Unique thermostat ID

142 b. ZIP code (installed location)

143 c. Controlled HVAC equipment type to the extent it can be determined by the ST product:

144

Name	Definition	Enumeration
heat_type	furnace	Forced air furnace (any fuel)
	heat_pump_electric_backup	Only heating where thermostat controls heat pump with electric resistance heat (strip heat)
	heat_pump_no_backup	Only heating where thermostat controls the Heat pump
	heat_pump_dual_fuel	Only heating where thermostat controls dual fuel heat pump (e.g., gas or oil fired)
	electric_resistance	Line voltage-controlled heaters (baseboard, radiant, etc.)
	other	Not included in any of the above
	none	No central heating system

heat_stage	single_stage	Single capacity furnace or single stage compressor
	two_stage	Dual capacity furnace or dual stage compressor
	modulating	Modulating or variable capacity unit
cool_type	central	Central AC
	heat_pump	Centrally ducted Heat pump
	other	Evaporative cooler, etc.
	none	No central cooling system
cool_stage	single_stage	Single stage compressor
	two_stage	Dual stage compressor
	modulating	Modulating or variable capacity compressor

145   d.   Hourly cooling equipment run time (reported to the nearest minute)

146   •   Not required for line-voltage thermostat products

147   e.   Hourly heating equipment run time (reported to the nearest minute)

148   f.   Hourly auxiliary heat run time (reported to the nearest minute)

149   •   Not required for line-voltage thermostat products

150   g.   Hourly emergency heat run time (reported to the nearest minute)

151   •   Not required for line-voltage thermostat products

152   h.   Hourly average conditioned space temperature (reported to nearest 0.5°F)

153   i.   Hourly average heating set point temperature (reported to nearest 1.0°F)

154   j.   Hourly average cooling set point temperature (reported to nearest 1.0°F)

155   •   Not required for line-voltage thermostat products

156	**Note:** EPA updated the software and now requires hourly data based on the stakeholder feedback. This
157	update affected some calculations; however, there is no impact on the metric. EPA has clarified that
158	parameters relevant only to control of air conditioners and heat pumps need not be reported by line
159	voltage products, though they must use the same input file format as other products and fill in such
160	parameters with none or (blank), such that they are read in as Not a Number by EPA software.

161   5. Demand Response

162   a. Grid Communications – The ST product shall include a communication link that facilitates
163   the use of open standards, as defined in this specification, for all communication layers to
164   enable DR functionality.

165   **Note:** ST products that enable direct, on-premises, open-standards based
166   interconnection are preferred, but alternative approaches, where open-standards
167   connectivity is enabled only with use of off-premises services, are also acceptable.

168   b. Open Access – To enable interconnection with the ST product over the communication
169   link, an interface specification, application programming interface (API) or similar
170   documentation shall be made available that, at a minimum, enables DR functionality.

171   **Note:** While EPA encourages broad availability of the interface spec or API, ST service
172   providers may elect to limit dissemination of these documents to certified/qualified
173   developers, integration partners and the like.

174   c. Consumer Override – Consumers shall be able to override their ST product's response to
175   any DR signal.

176   d. Demand Response Capabilities Summary – A ≤ 250-word summary description of the ST
177   product's and/or associated ST service provider's DR capabilities/services shall be
178   submitted. In this summary, EPA recommends noting the following, as applicable:

179   • DR services that the ST product has the capability to participate in such as load
180   dispatch, ancillary services, price notification and price response.

181   • Whether the ST device can be directly addressed via the interface specification,
182   API or similar documentation.

183   • Support for locational DR, e.g., to ZIP code(s), feeder(s), or to ST device
184   endpoints specified by the Load Management Entity.

185   • List open communications supported by the ST device and/or ST service,
186   including applicable certifications.

187   • Feedback to Load Management Entity, e.g., verification/M&V, override notification.

188   • Measures to limit consumer comfort impacts, if any.

189   • DR response configurability/flexibility by the consumer and/or Load Management
190   Entity.

191   • Whether the ST device and/or the ST product comply with the 2016 California
192   Energy Commission Title 24, Part 6 Joint Appendix 5.

193   C. Field Savings: ST products shall demonstrate typical product performance in the field by one of
194   two methods. To be certified, ST products must have at least 12 months of interval data. The end
195   of the measurement period analyzed for initial certification shall be no more than 6 months before
196   the analysis is submitted for certification. These requirements refer to reported performance of
197   the ST product.

198

199   1. Metric Performance:

Table 2: Smart Thermostat Energy Savings Criteria

Applicable Products	Metric	Statistical measure	Performance Requirement
All	Annual % run time reduction, heating (HS)	Lower 95% confidence limit of weighted national mean	≥ 8%
		Weighted national mean of 20th percentiles	≥ 4%
Low-Voltage Devices	Annual % run time reduction, cooling (CS)	Lower 95% confidence limit of weighted national mean	≥ 10%
		Weighted national mean of 20th percentiles	≥ 5%
Low-Voltage Devices	Resistance heat utilization for heat pump installations with electric backup when outdoor temperature is between 30F and 45F(RHU)	Upper bound 95th confidence limit of the national mean	≤ 0.2

Note: EPA proposes a performance requirement for resistance heat utilization to ensure that heat pumps aren't achieving high scores at the expense of energy-wasting excess resistance heat. Based on the stakeholder discussion and to ensure statistically significant data EPA proposes that vendors submit a heat pump only sample as a part of data submission.

2. Alternative Field Study: In lieu of meeting metric performance requirements outlined in Table 2, partner may propose an alternative means of verification so long as it demonstrates the mean reduction in energy use (or representative proxy) using their ST product as compared to a typical thermostat. E.g., A/B study based on utility meter data. To earn the ENERGY STAR, the partner must demonstrate HVAC energy savings equal to the run time reductions shown in Table 2. Unless otherwise agreed, partners using this allowance shall also apply the ENERGY STAR Method to Demonstrate Smart Thermostat Field Savings and submit the output at time of initial certification and periodically as required for all ST products. All studies must be pre-approved and shall meet the following requirements:

   a. Results of the study shall be representative of mean and 20th percentile savings across the U.S.

   b. The study shall provide a method for ongoing monitoring of results, equivalent to semi-annual reporting of metric scores. This may involve periodically re-running the study on a smaller set of consumers, for instance.

   Process:

   a. Partner shall submit a proposal for the study to EPA, demonstrating compliance with the study requirements. This is expected to be an iterative process involving conversation

| 249 | | | between the Partner and EPA. EPA will post proposed studies to a publicly accessible |
| 250 | | | web page during the period they are under consideration. |

251   b. Once the study design is approved, the Partner will execute the study and report the
252   results to EPA along with the previously agreed-upon documentation.

253   c. EPA will determine whether results meet the requirements of the specification and will
254   publish successful studies.

255   d. Partners must provide updated study results and associated statistics as agreed to in the
256   study design to EPA every 6 months demonstrating compliance with the requirements of
257   the specification for continued certification of ST product.

258 **Note:** EPA simplified the A/B study section to provide stakeholders alternative means of verification with
259 minimal complexity. To date, no prospective partners have asked to use this option.

260   D. <u>Significant Digits and Rounding</u>:

261   1. All calculations shall be carried out with directly measured (unrounded) values.

262   2. Unless otherwise specified below, compliance with specification limits shall be evaluated
263   using directly measured or calculated values rounded to the nearest 0.1°F.

264   3. Directly measured or calculated values that are submitted for reporting on the ENERGY
265   STAR website shall be rounded to the nearest significant digit as expressed in the
266   corresponding specification limit.

267 **4) Test Requirements:**

268   A. <u>Product Families</u>: A product family may be established under the following circumstances:

269   1. Each ST device that is part of a ST product within the product family is separately tested to
270   ensure it meets the requirements in section 3) A.

271   2. Each ST service/ST device combination shall comply with section 3) B.

272   3. All members of the product family use the same primary savings strategy or strategies.

273   4. All installations within a product family shall be considered as a single population for
274   determining field savings, and the metric performance scores shall apply to all members of
275   the product family.

276   *Examples of allowable variations within a product family:*

277   • *For ST products that derive savings from automatic temperature changes without*
278   *prompting users, the user interface differences of ST devices would be irrelevant.*

279   • *For ST products that rely on occupancy detection to deliver savings, including motion*
280   *sensing by the ST device and ST services that track occupants via mobile device*
281   *location services:*

282   o *ST products with similar occupancy detection can be in the same product family.*

283   o *ST products with dissimilar occupancy detection would fall into different product*
284   *families unless the occupancy detection is not part of a primary savings strategy.*

285   • *For ST products that can provide different services in different utility service territories*
286   *based on utility program offerings, (e.g., precooling is available in areas with time-of-*
287   *use rates); these variations can be in a single product family, as long as they do not*
288   *impact primary savings strategies.*

289   • *For ST products that include the capability to add services that may increase energy*
290   *savings, all variations may be in the same product family.*

291   B. <u>Software updates</u>: Software updates are expected to not affect product savings, or to increase
292   savings, and do not require recertification. Software changes that alter the principle that savings
293   rest upon, or which are expected to reduce savings, would define a new product and would
294   require a new certification.

295   C. <u>Test Methods:</u>

296   The following methods shall be used to demonstrate ENERGY STAR certification:

297   **Table 3: Test Methods for ENERGY STAR Certification**

Applicable Products	ENERGY STAR Requirement	Test Method Reference
All	Functionality in the absence of connectivity	As per section 4) D. and 4) E. below
	Time to standby	IEC 62301, Ed. 2.0, 2011-01, Household electrical appliances – Measurement of standby power, subject to clarifications in section 4) D. and 4) G. below
	Network standby power consumption	
Low-Voltage Products	Reduction in average annual % run time, heating (HS)	ENERGY STAR Method to Demonstrate Smart Thermostat Field Savings, Version 2.0
	Reduction in average annual % run time cooling (CS)	
	Average resistance heat utilization for heat pump installations (RU)	
Line-Voltage Products	Static temperature accuracy	As per section 4) D. and 4) F. below
	Droop	CSA C828:19, Performance requirements for line voltage thermostats used with individual room electric space heating devices – Section 4 (General requirements) and Section 5 (Thermal regulation test requirements), subject to clarification in section 4) D. and 4) H. below
	Temperature Differential	

298   **Note:** EPA proposes requiring line voltage thermostats to be tested as per the CSA C828:19 standard
299   and fulfil the criteria mentioned in the same for static temperature accuracy, droop, and temperature
300   differential.

301   D. <u>Smart Thermostat Device Configuration for Testing</u>

302   1.   Configure and provision the Unit Under Test's (UUT) connected functionality, including

| 303 | | | enrollment of applicable services and updating to latest version of firmware. |

E. Functionality in the Absence of Connectivity

1. Install and configure the ST device either into a test environment or to control compatible HVAC heating and cooling source equipment. Ensure that the test setup enables observation of the UUT's HVAC control signals or actions, e.g., monitoring the UUTs wiring terminals for state changes or observing switching of HVAC equipment.

2. Disable connectivity, for example by shutting down the Wireless LAN.

3. Verify (pass/fail) the capability for a user to interact with the ST device to:

   a. Observe the room temperature,

   b. Observe and adjust the setpoint, and

   c. Switch between off, heating and cooling

      • Line-voltage products are only required to switch between off and heating

F. Static Temperature Accuracy

1. Install and configure four ST devices and four temperature sensors with a calibrated temperature logger onto a ½" wallboard panel with at least 3" separation between each UUT and temperature sensor or logger. The temperature sensors/logger shall have minimum ±0.1°F accuracy.

2. Suspend the wallboard panel in the center of a thermal chamber ensuring at least 12" of separation from chamber walls, ceiling and floor.

Mounting the UUTs in this manner approximates typical mounting in homes. Keeping the mounting panel and the ST devices at least a foot from the chamber minimizes the effect of any heat radiating off of these surfaces. ST devices generate a small amount of heat. Maintaining a 3" or greater separation between adjacent ST devices and temperature loggers will minimize the effects of adjacent ST devices on measured temperatures.
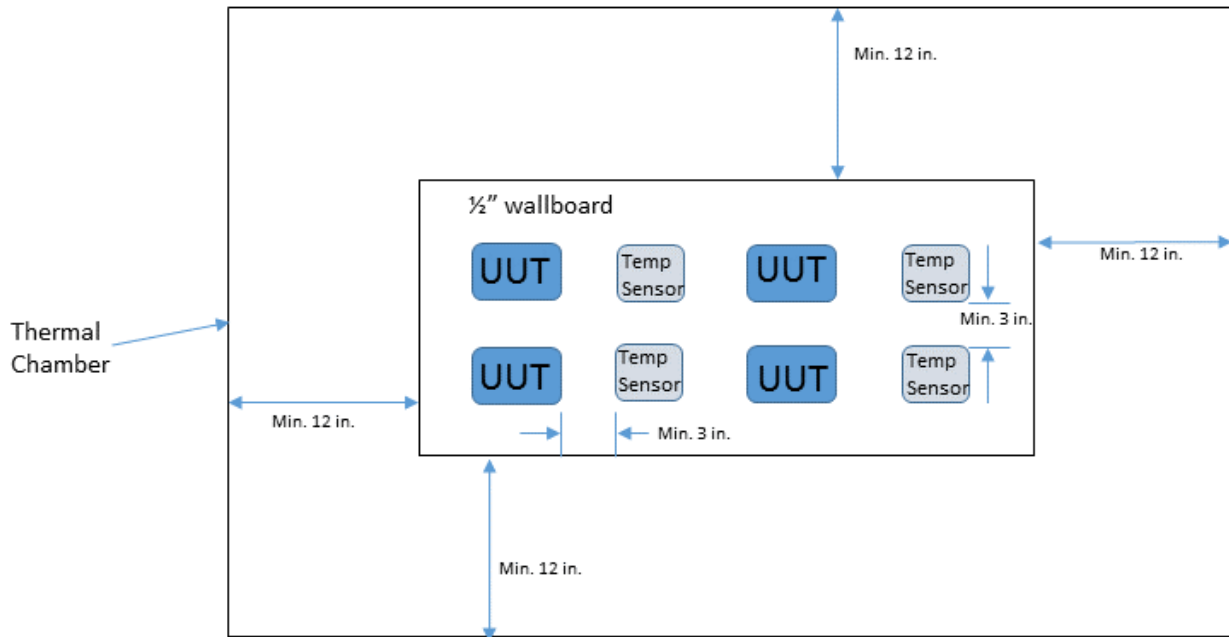
Figure 2: Typical Test Setup

3. Provide power to each UUT. It is unnecessary to connect to HVAC heating and cooling source equipment or to monitor the UUTs wiring terminals. Ensure that the test setup

331	enables observation of the UUTs indoor temperature reading.

4. Configure the ST communications, connect to the default ST service and ensure the ST devices are able to maintain a connectivity with the chamber door closed.

   While attempting to re-establish communications, certain STs are known to generate additional internal heat that can impact temperature accuracy. By ensuring a stable link status, STs will be tested in their normal operational mode.

5. Configure the UUTs so that they will not be calling for heating, fan, or cooling at the test temperature of 70°.

6. Test Conduct

   a. Close the chamber door and set it to 70°F. Once this temperature is reached, chamber temperature shall be maintained at 70 ± 0.5°F for at least one hour.

   b. Deactivate all thermal chamber fans. After deactivation, all temperatures recorded by each temperature sensor shall be within 70 ± 2°F for the remainder of this test.

   For many temperature chambers, fans can only be deactivated by shutting down the chamber. In this scenario, the rate of temperature change will be dependent upon the ambient temperature in the lab. An ambient lab temperature of approximately 70°F should minimize the rate of change.

   Fan-forced air flow in a thermal chamber is not representative of typical convection currents in a home and can impact the accuracy of temperatures displayed by the ST device.

   c. Record the difference between the room temperature displayed by each UUT and recorded by its adjacent temperature sensor at 30, 45 and 60 minutes after deactivating the fan. If a higher resolution temperature is reported over the communications link, use this as the UUT "displayed" temperature. (Test labs must generally work with ST service providers in order to obtain this data.)

   d. Calculate static temperature accuracy as the average of these 12 values.

G. Implementation of IEC 62301 for Smart Thermostat Testing

   Note: This test is not applicable to UUTs or parts of UUTs (e.g., remote sensors) that are powered solely by batteries. Where the ST device relies upon other devices that are not reasonably expected to be in the home, e.g., Zigbee gateway, these devices are part of the ST device and shall be included in this test.

   1. Assure that the ST device is appropriately configured as per section 4) B.

      a. This test need not be performed in a temperature chamber.

      b. Configure the UUT in accordance with the requirements of IEC 62301, Ed. 2.0, 2011-01, "Measurement of Household Appliance Standby Power," Section 4, "General Conditions for Measurements," unless otherwise noted in this document. In the event of conflicting requirements, this ENERGY STAR test method shall take precedence.

   2. Test Conduct – Measure power consumption at the power input to the UUT using the sampling method, section 5.3.2 of IEC 62301, Edition 2.0 2011-01.

      a. Verify ability to control the UUT over the communication link, then close all apps and web interfaces.

      b. Increase the setpoint using the ST device controls.

      c. Wait five minutes, while taking appropriate measures to allow the UUT to enter into and remain in network standby mode for the duration of the test, e.g.

         • No additional UUT user interactions,

| 376 | | • Ensure occupancy sensing UUTs do not detect occupancy, |
| 377 | | • Ensure apps and/or web remote interfaces remain closed. |

| 379 | d. | Separately measure and record average energy consumption over a five-minute period. |

| 380 | e. | Check measurement stability in accordance with IEC 62301, Edition 2.0 2011-01, and |
| 381 | | section 5.3.2. |

382	f.	If stability criteria are not satisfied, repeat the test, starting from step 2. b, with the test
383		period extended in five-minute increments (i.e., 10m, 15m, 20m…) as necessary to
384		establish requisite measurement stability.

| 385 | g. | Once stable, repeat the test over two additional test periods, starting from step 2. b. |

| 386 | h. | Record power consumption as the average over the second and third test periods. |

5) Effective Date:

The ENERGY STAR Smart Thermostat Version 2.0 specification shall take effect on TBD. To certify for ENERGY STAR, a Smart Thermostat Product shall meet the ENERGY STAR specification in effect on the date of connection. The date of connection is specific to each unit and is the date on which a unit is considered to be a Smart Thermostat Product.

Note: The Version 2.0 specification will be effective nine months after it is finalized, potentially as early as the end of 2022. Products may certify to the new specification as soon as it is final.

6) Future Criteria Revisions:

EPA 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. In the event of a specification revision, please note that the ENERGY STAR certification is not automatically granted for the life of a ST product model.

Several topics that are likely to be examined in ongoing work and/or in future revisions have been identified. Some pertain only to the specification and others to the metric. They include:

A. Inclusion of products intended to control mini-splits and other variable capacity products. This depends on finding ways to evaluate products that save energy (or at least don't waste it) when controlling these high-efficiency products.

B. Refinement of the ST device static temperature accuracy test, to enable a more stringent performance requirement.

C. For the Method to Demonstrate ST Field Savings, and associated software:

    a. Exploring the potential to use average comfort temperature baselines that vary geographically. Such baselines are expected to capture a wider variety of primary savings strategies.

    b. Exploring the potential to include STs that control variable capacity equipment and ductless mini-split controllers.

    c. Incorporating weather normalization, to enable comparison of savings from different calendar years.

    d. Further refining procedures to handle missing data.

    e. Updating the fitting to the linear model such that results from a larger number of homes can be considered for product performance.