ENERGY STAR® Program Requirements
Product Specification for
Residential Climate Controls

Test Method – Usability
Rev. DRAFT (Aug-2011)

1 OVERVIEW

The following test method shall be used for determining product compliance with the Performance-Based Usability Requirements in the ENERGY STAR Eligibility Criteria for Residential Climate Controls.

2 APPLICABILITY

This ENERGY STAR Test Method is applicable to Residential Climate Controls subject to Performance-Based Usability Testing, as described in the ENERGY STAR Residential Climate Controls Specification.

3 DEFINITIONS

Unless otherwise specified, all terms used in this document are consistent with the definitions contained in the ENERGY STAR Eligibility Criteria for Residential Climate Controls.

- User Group: A group of persons, recruited by the test laboratory in accordance with selection criteria included in this test method. Members of this group are responsible for individually performing usability tasks on the UUT in accordance with this test method
- Individual User: A member of the User Group
- Test Administrator: The individual(s) facilitating Residential Climate Control usability testing
- UUT: Unit Under Test

4 USER GROUP SELECTION

A) User Group size: to be determined

B) User Group Composition:

1) The User Group shall concurrently meet the following three requirements:
   i) Represented Age Group;
   ii) Gender; and
   iii) Level of Education.

2) The details for these four requirements include:
   i) Age Groups

- Age 21–34 – 28.6% of users
- Age 35–49 – 28.6% of users
- Age 50–64 – 28.6% of users
- Age 65–79 – 14.2% of users

ii) Gender Composition

- Male – 50% of users
- Female – 50% of users

iii) Level of Education

- Less than High-School Education – 14% of users
- High-School Graduate & Less than Bachelor's Degree – 57% of users
- Bachelor's Degree or Higher – 29% of users

The user group shall be composed such that requirements are locked together. For example, the user group **shall not** be composed 14 males aged 21-49 and 14 females aged 50-79. Rather, the user group shall be composed of 14 males that are as close to evenly distributed as possible across all age groups and levels of education and 14 females that are as close to evenly distributed as possible across all age groups and levels of education.

3) Individual User Requirements:

i) U.S. resident.

ii) No prior experience with the UUT or alternative user interface, if relevant.

iii) No association or prior involvement with the HVAC or related industries, including family members associated with the company providing the UUT.

iv) No financial interest associated with the UUT or its manufacture, including stocks, bonds or other investments.

v) No other conflicts of interest that could unfairly influence test results.

Note: Individual User requirements are designed to help ensure that the User Group is impartial and representative of the U.S. market.

5 PERFORMANCE-BASED USABILITY REQUIREMENTS

Usability test requirements, to be used with this test method, are detailed in Section 3 of the ENERGY STAR Program Requirements for Residential Climate Controls – Eligibility Criteria, including the usability metric and compliance criteria.

6 TEST PROCEDURE

A) Test Equipment

Table 1: Test Equipment

Test Equipment	**Measurement / Units**	**Measurement Accuracy** (minimum)
Humidistat	Relative Humidity / %	± 5%

Test Equipment	Measurement / Units	Measurement Accuracy (minimum)
Thermometer	Ambient Temperature / °F	± 0.5°F
Sound Level Meter	Ambient Noise / dB SPL	± 2dB SPL
Stopwatch	Test Interval / s	± 0.5s

Note: Specified measurement accuracy is intended to permit suitable measurements to be performed with low-cost test instrumentation.

B) Test Administration:

1) Usability testing shall be conducted by test administrator(s) who shall:

i) Configure UUT.

ii) Ensure test environment is orderly, quiet, and comfortable.

iii) Provide verbal instructions to individual users in accordance with the Residential Climate Controls Test Administrator Scripts, included as Annex A.

iv) Observe task performance.

v) Assess and record task success.

vi) Measure and record time to complete.

2) Test administrators shall not offer additional guidance or assistance beyond the Residential Climate Controls Test Administrator Scripts.

3) Test administrator capturing task success and time to complete task shall not be visible to the user. The test administrator capturing task success may either be behind a one-way mirror that looks into the test room, in the test room but out of site of the user, or in a separate room watching a video feed.

Note: DOE intends for test administrator(s) to explain required tasks or provide a print out of the required tasks, time to complete limits, and data collection process to individual users. Test administrator(s) are required to observe task performance in order to assess task success. Administrator(s) should help to provide a comfortable orderly environment so that individual users may focus on task completion. Administrator(s) are not allowed to offer guidance or coaching, and should not add stress, for example, by closely peering over the individual user's shoulder while observing.

C) UUT Configuration: The UUT(s) shall be configured for operation prior to the start of each day of usability testing. Multiple UUTs may be configured (one per task perhaps) to make the test run faster and smoother. Correct configuration shall be verified prior to each task and test iteration. UUT configuration shall be accurately documented and shall include the following steps:

1) Ensure that UUT configuration is "as shipped"; reset configuration to "as shipped" if required.

2) Perform minimal configuration so that UUT functionality is representative of a typical installation.

Note: UUT configuration has been minimized in order to simplify test administration and minimize expense.

D) Test Setup:

1) **On-the-Wall Interfaces, UUT Setup** shall be representative of typical home installations. The UUT shall be affixed to a wall in its normal orientation, with the center of the device 5 feet above the floor. Use of alternate mounting heights are permitted in cases where a 5-foot height is problematic for an individual user. As an example, a mounting height 3 ½ feet above the floor will better suit a user in a wheel chair.

2) **Web-Based Interfaces, UUT Setup** shall be representative of typical home installations. The UUT shall be affixed to the wall as described above. A computer, smart phone, or other device that provides access to the alternative interface shall be available and placed on a desk at which the User shall sit during testing. The manufacturer is responsible for providing this equipment with their test unit.

Note: Climate Control (thermostat) mounting height is not specified by the National Electrical Code and is often loosely specified in installation instructions. "Approximately 5 feet from the floor" is a rule of thumb for installation height and thus, a 5-foot height has been specified for this test method. EPA considers it important that the UUT installation and user interactions be representative of typical installations; for example, with the UUT mounted on a wall and the user standing during all interactions with the device.

3) **Current Date and Time** shall be clearly posted. Date shall be in MMM DD, YYYY format (e.g. "JAN 18, 2012"). Time shall be indicated with a digital clock and shall be in HH:MM 12-hour format (e.g., "12:30 PM").

4) **Test Environment** shall be quiet and dedicated to usability testing. Examples of suitable spaces include a meeting room, vacant office, or similar work space. The following environmental parameters shall be maintained during usability testing:

   i) Ambient Temperature (heating season): 70 ± 2°F

   ii) Ambient Temperature (cooling season): 78 ± 2°F

   iii) Relative Humidity: 20 – 60%

   iv) Ambient Noise: ≤ 45 dB SPL

Users shall not be permitted to access product documentation, external to the physical product , before or during the test. User documentation that is included as part of the physical product or interface (i.e., instructions/directions included on a flip down door, help menu) or instructions or help menus, incorporated into alternate interfaces may be accessible to the user during testing.

Note: Since the last revision of this test method, product documentation requirements have changed. Product documentation, external to the product, shall not be made available to the user before or during testing, to maintain consistency across all users. In order for Residential Climate Controls to be deemed "usable" they should be easy to use without the aid of a user manual. Additionally, the ENERGY STAR team has made the assumption that many Residential Climate Control owners lose/misplace their user manuals and/or do not have a copy of the user manual when they move into a home that has an existing Residential Climate Control unit and therefore will often have to program their Residential Climate Control units in the real world without the aid of product documentation.

E) Usability Tasks: Individual users shall perform each of the following usability tasks, in sequence, one time only.

1) **Task 1:** Set Date & Time – The product shall be provided in HVAC Heat mode with the default program schedule active and the default or home screen displayed. The product shall be provided with an incorrect date & time – the individual user shall be provided with the current date in the MMM, DD, YYYY format and a digital clock displaying current time. The user shall be instructed to set the current date and time in the product.

   Certain Climate Control models automatically set and maintain the date and time. If the UUT cannot be configured with an incorrect date and time, user group testing shall be waived for Task 1 and the UUT shall be assigned a score of 100, the maximum available, for Task 1.

2) **Task 2:** Identify Room Temperature and Setpoint – The product shall be provided in HVAC Heat mode with the default or home screen displayed – user shall be instructed to identify and read aloud the current room temperature and active setpoint.

3) **Task 3:** Turn on Heat – The product shall be provided in HVAC Off mode with the default or home screen displayed – user shall be instructed to set the product to HVAC Heat mode at an active setpoint of 68°F.

4) **Task 4:** Modify Program Schedule – The product shall be provided in HVAC Heat mode with the program schedule defined in Table 2 below active and the default or home screen displayed – user shall be instructed to configure and save the following day and time changes (Table 3) to the default Climate Control schedule as well as set the UUT to follow the modified schedule in HVAC Heat mode:

Table 2: Residential Climate Control - Schedule Periods and Setpoints

Setting	Time	Setpoint (Heat)	Setpoint (Cool)
Morning	6 a.m.	70°F	78°F
Day	8 a.m.	62°F	85°F
Evening	6 p.m.	70°F	78°F
Night	10 p.m.	62°F	78°F

Table 3: Residential Climate Control – Program Modifications

Time	Setpoint (Heat)
9:00 a.m. (Saturday) to 11:00 p.m. (Saturday)	68°F
11:00 p.m. (Saturday) to 6 a.m. (Sunday)	65°F

Table 4 and 5 below specifies acceptable programmed ranges for programmed times and setpoints, respectively. These ranges include a ±1°F tolerance for the programmed temperatures and a ±10 min tolerance for programmed times and shall be used in assessing successful completion of Task 5.

Table 4: Residential Climate Control – Compliant Programmed Times

Time Tolerance	Compliant Programmed Time
±10 min	8:50 – 9:10 a.m.
	10:50 – 11:10 p.m.
	5:50 – 6:10 a.m.

Table 5: Residential Climate Control – Compliant Programmed Setpoints

Temperature Tolerance	Compliant Programmed Setpoint
±1°F	67 – 69°F
	64 – 66°F

~~Note:~~ ~~Time and setpoint tolerances have been added. Allowance of these tolerances is intended to facilitate alternate methods of program modification without impacting comfort.~~

5) Task 5: Activate/Cancel Energy Saving Mode – The product shall be provided in HVAC Cool mode with the program schedule configured to maintain a temperature of 78°F during performance of this task and the default or home screen displayed. The user shall be instructed to configure the product to the Energy Saving Mode required by Paragraph A.3 of the Residential Climate Controls Specification Framework document, then verbally announce, "Savings activated." After activation of this mode, the user shall be instructed to return the product to follow the default program schedule in HVAC Cool mode and verbally announce, "Savings cancelled."

6) **Task 6:** Identify Energy Rate Tier – The product shall be configured to display Time of Use pricing information; it shall be provided in HVAC Heat mode with the default or home screen displayed – user shall be instructed to identify and read aloud the current energy rate tier or energy price as applicable.

Note: As set out in the RFP, task 6 should not be performed as part of the RFP testing, because the UUTs do not have the specified capability. Task 5 may or may not be performed on all UUTs, depending on the capabilities of the UUTs.

F) Usability Task Parameters

Table 6: Residential Climate Control – Usability Task Parameters

Task Number	Target Time to Complete (s)	k_i
1 – Set Date & Time	120	$k_1 = 194$
2 – Identify Room Temperature and Setpoint	5	$k_2 = 8.0$
3 – Turn On Heat	10	$k_3 = 16$
4 – Modify Program Schedule	180	$k_4 = 291$
5 – Activate/Cancel Energy Saving Mode	15	$k_5 = 24$
6 – Identify Energy Rate Tier	5	$k_6 = 8.0$

G) Data Collection:

1) Ambient temperature, relative humidity, and ambient noise shall be measured and recorded prior to the start of each day of usability testing.

2) Usability test data shall be recorded for each of the test iterations for each task, as follows:

   i) Test Date

   ii) Start Time

   iii) Task success

   - s=0, task completed incorrectly or not completed (e.g., user chooses to abandon task or give up), or
   - s=1, task completed correctly

   iv) Time to complete, if s=1

The format and method for data collection and recording shall be determined by the test laboratory. Sample data sheets are included in Annex B, for guidance. Excel 2003 based electronic versions shall also available on the ENERGY STAR website.

ANNEX A: RESIDENTIAL CLIMATE CONTROLS TEST ADMINISTRATOR SCRIPTS

1 IMPORTANT NOTES FOR TEST ADMINISTRATORS

Please note the following:

- Test administrators shall follow the test procedure in Section 6 of this document.
- Test administrators shall not influence the individual users in any way, including:
  - Verbal statements or cues beyond the scripts outlined below;
  - Body movements or hand gestures that could assist or dissuade an individual completing a task; or
  - Facial expressions or eye movements that would indicate what buttons to push or where to find specific information beyond what is read to the individual user.
- Administrators shall instruct or prevent individual users from observing the UUT until instructed to do so at the start of the first task.
- Written instructions shall be provided to individual users immediately prior to the start of each task. In order to ensure test impartiality, individual users waiting to begin testing shall be prevented from hearing the verbal instructions given by the test administrator to the current individual user or from seeing the test setup.
- Test administrators shall provide the individual user with a printout of the instructions for each task, prior to the start of each task. The individual user shall turn his back to the UUT while reading the task instructions. He may turn to face the UUT when he indicates that he is ready to begin the task.

2 TEST ADMINISTRATOR SCRIPTS

Text to be read aloud is in quotation marks and *italic* font. For each task, the instructions that may be provided as a printout are in quotation marks and *italic* font.

Specific, individualized directions to be given by the test administrator are in parentheses and non-italic font (e.g., location of the clock in the room).

Specific commands to be used within the test (e.g., times up) are in ***italic bold*** font.

A) Introduction Script:

"*Good Morning/Afternoon I'd like to begin by thanking you, in advance, for your participation in this important test program. Your participation will help us ensure that ENERGY STAR Residential Climate Controls save energy and money with energy saving modes that are simple to use and configure. You will be helping us evaluate a Residential Climate Control for ease of use. Please note that these devices are often called Programmable Thermostats and are used to control heating, ventilation, and air conditioning equipment. I will ask you to perform six tasks that require interaction with the device.*

Note: Task 6 should not be performed as part of the RFP testing, because the UUTs do not have the specified capability. Task 5 may not be performed on all UUTs, depending on the capabilities of the UUTs.

*I cannot answer any questions or influence your actions in any way. If you do not understand the instructions for any task, please let me know and I will reread those instructions a second time. After I read the instructions, please perform the task. Once you have completed a task, please say '**Task done**' and I will verify.*

*If you are having trouble completing a task or wish to stop working on a task for any reason, please say '**I give up**' and we will move to the next task until all are completed.*

I may need to adjust the Climate Control between tasks, and ask you to please not observe my actions while I do so.

Let's begin."

B) Task 1 Script: Set Date & Time

Before providing instructions for this task, configure the Climate Control in HVAC Heat mode with a time 7 hours and 20 minutes behind the current time and a date 4 months and 3 days behind the current date and with the default or home screen displayed. If configuration of an incorrect date and time is not possible, for example with Climate Controls that automatically configure the date and time, document this and assign the UUT a score of 100, the maximum available, for Task 1 and skip to Task 2.

"The date and time are currently incorrect on the Climate Control. When I say 'Begin,' please enter this date and time into the Climate Control (indicate direction where clock and calendar is located)*. When finished, say 'Task done.' If you are having trouble completing a task or wish to stop working on a task for any reason, please say 'I give up'. **Begin**."*

Start the timer. When the individual user says "***Task done***" or "***I give up***", stop the timer, check task correctness and record results. If the user appears to have completed the task but does not say "***Task done***" or "***I give up,***" the administrator shall say "**Are you done?**" Stop the timer when the user confirms that he/she is complete.

C) Task 2 Script: Identify Room Temperature and Setpoint

Before providing instructions for this task, configure the Climate Control to HVAC Heat mode, with the default or home screen displayed.

"*When I say 'Begin,' please read aloud the current room temperature and the temperature the residential climate control is trying to maintain. When finished, say 'Task done.' If you are having trouble completing a task or wish to stop working on a task for any reason, please say 'I give up".* ***Begin****."*

Start the timer. When the individual user says "***Task done***" or "***I give up***", stop the timer, check task correctness, and record results. If the user appears to have completed the task but does not say "***Task done***" or "***I give up,***" the administrator shall say "**Are you done?**" Stop the timer when the user confirms that he/she is complete.

D) Task 3 Script: Turn on Heat

Before providing instructions for this task, configure the Climate Control to a Heat setpoint of 72°F – then to HVAC Off mode, with the default or home screen displayed.

"*The Climate Control is currently turned off. When I say 'Begin,' please adjust the Climate Control to heat the room to 68°F." When finished, say 'Task done.' If you are having trouble completing a task or wish to stop working on a task for any reason, please say 'I give up'.* ***Begin****."*

Start the timer. When the individual user says "***Task done***" or "**I give up**", stop the timer, check task correctness, and record results. If the user appears to have completed the task but does not say "***Task done***" or "***I give up,***" the administrator shall say "**Are you done?**" Stop the timer when the user confirms that he/she is complete.

E) Task 4 Script: Modify Program Schedule

Before providing instructions for this task, configure the Climate Control to HVAC Heat mode with the ~~default~~ ENERGY STAR program schedule defined in the table below of the specification active and the default or home screen displayed.

Setting	Time	Setpoint (Heat)	Setpoint (Cool)
Morning	6 a.m.	70°F	78°F
Day	8 a.m.	62°F	85°F
Evening	6 p.m.	70°F	78°F
Night	10 p.m.	62°F	78°F

"*The Residential Climate Control unit is currently controlling heating. It is using a predefined schedule for heating. You want to adjust the Residential Climate Control to include the following changes. This sheet has the information you will need."*

Hand the individual user a sheet of paper with the following (**bold** text):

> **Please configure the Climate Control so that the home is automatically heated to 68°F from 9:00 AM to 11:00 PM on Saturdays, then heated to 65°F during the overnight period starting at 11:00 PM on Saturday nights.**

"*Please review this page which lists information that you will be asked to enter into the Climate Control. Let me know when you are ready to proceed."*

Pause until the individual user indicates his/her readiness.

"When I say Begin, please modify and save the Climate Control program schedule. Then set the Climate Control to follow this heating schedule. Change only the times and temperatures as indicated on the page, with which I've provided you. Then, verbally announce 'Task done.' If you are having trouble completing a task or wish to stop working on a task for any reason, please say 'I give up'. ***Begin***"

Start the timer. When the individual user says "***Task done***" or "***I give up***" stop the timer, check task correctness and record results. If the user appears to have completed the task but does not say "***Task done***" or "***I give up,***" the administrator shall say "**Are you done?**" Stop the timer when the user confirms that he/she is complete.

F) Task 5 Script: Activate/Cancel Energy Saving Mode

Before providing instructions for this task, ensure that the Climate Control Energy Saving Mode is configured with default Heat and Cool setpoints of 62°F and 85°F (Framework Requirement A.3). Then, configure the Climate Control to follow a program schedule configured to maintain a temperature of 78°F during performance of this task. Configure the Climate Control to display the default or home screen.

"This Residential Climate Control has an easily accessible Energy Saving Mode that will remain on until cancelled. This mode is typically activated when leaving the home and cancelled after returning."

"When I say Begin, please activate the Energy Saving Mode. Once activated, verbally announce 'Savings activated.' Next, cancel the Energy Saving Mode, then, verbally announce 'Savings cancelled – Task done.'

If you are having trouble completing a task or wish to stop working on a task for any reason, please say 'I give up'. Would you like me to repeat the instructions one more time?"

If the answer is yes, repeat the above instructions; if no, say, *"**Begin**"*

Once you say Begin, start the timer.. You will also need to verify proper setting of Away Mode as the individual user is instructed to cancel it immediately after it is activated. If the time limit expires, say "***Time is up***." When the individual user says "***Away mode cancelled – Task done***" stop the timer, verify task correctness and record results. If the user appears to have completed the task but does not say "***Task done***" or "***I give up,***" the administrator shall say "**Are you done?**" Stop the timer when the user confirms that he/she is complete.

G) Task 6 Script: Identify Energy Rate Tier

Before providing instructions for this task, collect the sheet of paper from Task 5. If necessary, configure the Climate Control to HVAC Heat mode with the default or home screen displayed.

"Please identify and read aloud the current electricity price, or price tier. Then, verbally announce "***Task done***.' As with the previous tasks, i*f you are having trouble completing a task or wish to stop working on a task for any reason, please say 'I give up'"*

Start the timer and monitor the Task 6 time limit. When the individual user says "***Task done***" or "***I give up***" stop the timer, check task correctness and record results. If the user appears to have completed the task but does not say "***Task done***" or "***I give up***," the administrator shall say "**Are you done?**" Stop the timer when the user confirms that he/she is complete.

H) Exit Script:

"You have completed all tasks and this concludes our testing. Thank you. We appreciate your participation in this testing program. Please return to the (insert appropriate destination—example: front desk) *before you leave."*

ANNEX B: SAMPLE DATA SHEETS

The following pages include sample data sheets for recording data from each of the six tasks that comprise the ENERGY STAR Residential Climate Controls Test Method for Usability.

Electronic versions of these documents will also be made available on the ENERGY STAR website in their final form.

ENERGY STAR Usability Data Sheet - Task 1
Set Date & Time

Test Laboratory: _____ Ambient Temperature: _____
Test Date(s): _____ Relative Humidity: _____
DUT Manufacturer: _____ Ambient Noise: _____
DUT Model: _____
DUT s/n: _____
DUT Rev: _____
DUT Firmware ID: _____

If t_1 ≥ 300 s, or task is completed erroneously; enter s = 0

Usability Panelist No.	Test Date (MM/DD/YYYY)	Start Time (HH:MM AM/PM)	s (0 or 1)	t_1 (s)	M_1 (0 - 100)
1	11/11/2010	8:00AM	1	100	74.8
2	11/11/2010	8:00AM	1	55	85.9
3	11/11/2010	8:00AM	1	90	77.2
4	11/11/2010	8:00AM	1	89	77.5
5	11/11/2010	8:00AM	1	140	65.4
6	11/11/2010	8:30AM	1	130	67.7
7	11/11/2010	8:30AM	1	55	85.9
8	11/11/2010	8:30AM	1	49	87.4
9	11/11/2010	8:30AM	1	80	79.7
10	11/11/2010	9:00AM	1	120	70.0
11	11/11/2010	8:30AM	1	110	72.4
12	11/11/2010	8:30AM	1	55	85.9
13	11/11/2010	8:30AM	0		0.0
14	11/11/2010	9:00AM	1	120	70.0
15	11/11/2010	9:00AM	0		0.0
16	11/11/2010	8:30AM	0		0.0
17	11/11/2010	8:30AM	0		0.0
18	11/11/2010	9:00AM	1	120	70.0
19	11/11/2010	9:00AM	0		0.0
20	11/11/2010	9:00AM	1	45	88.5
21	11/11/2010	9:00AM	1	50	87.2

$$M_i = \frac{200s}{1 + e^{x_i}}$$

$$M_i(avg) = \frac{M_i(user\ 1) + M_i(user\ 2) + \cdots + M_i(user\ 21)}{21}$$

M_1 (avg) = 59.3
Task Compliance: PASS

where: i = task number
$x_i = t_i / k_i$
t_i = time to complete task i (seconds)
k_i = constant for task i
$k_1 = 194$ for task 1

$s = 0$ if task is completed erroneously or not completed within alloted time
$s = 1$ if task is completed correctly, within alloted time

ENERGY STAR Usability Data Sheet - Task 2
Turn on Heat

Test Laboratory: _____ Ambient Temperature: _____
Test Date(s): _____ Relative Humidity: _____
DUT Manufacturer: _____ Ambient Noise: _____
DUT Model: _____
DUT s/n: _____
DUT Rev: _____
DUT Firmware ID: _____

If t_2 ≥ 60 s, or task is completed erroneously; enter s = 0

Usability Panelist No.	Test Date (MM/DD/YYYY)	Start Time (HH:MM AM/PM)	s (0 or 1)	t_2 (s)	M_2 (0 - 100)
1	11/11/2010	8:30AM	1	5	84.5
2	11/11/2010	8:30AM	1	3	90.7
3	11/11/2010	8:30AM	1	4	87.6
4	11/11/2010	8:30AM	1	6	81.5
5	11/11/2010	8:30AM	1	6	81.5
6	11/11/2010	9:00AM	1	4	87.6
7	11/11/2010	9:00AM	0		0.0
8	11/11/2010	8:30AM	1	6	81.5
9	11/11/2010	8:30AM	1	6	81.5
10	11/11/2010	9:00AM	1	4	87.6
11	11/11/2010	9:30AM	1	6	81.5
12	11/11/2010	9:30AM	1	3	90.7
13	11/11/2010	9:30AM	1	3	90.7
14	11/11/2010	8:30AM	1	3	90.7
15	11/11/2010	8:30AM	1	4	87.6
16	11/11/2010	8:30AM	1	6	81.5
17	11/11/2010	8:30AM	1	6	81.5
18	11/11/2010	9:00AM	1	4	87.6
19	11/11/2010	9:00AM	0		0.0
20	11/11/2010	9:00AM	0		0.0
21	11/11/2010	9:30AM	1	10	69.7

$$M_i = \frac{200s}{1 + e^{x_i}}$$

$$M_i(avg) = \frac{M_i(user\ 1) + M_i(user\ 2) + \cdots + M_i(user\ 21)}{21}$$

$M_2(avg)$ = 72.6
Task Compliance: PASS

where: i = task number
$x_i = t_i / k_i$
t_i = time to complete task i (seconds)
k_i = constant for task i
k_2 = 16 for task 2

s = 0 if task is completed erroneously or not completed within alloted time
s = 1 if task is completed correctly, within alloted time

ENERGY STAR Usability Data Sheet - Task 3
Identify Room Temp & Setpoint

Test Laboratory: _____ Ambient Temperature: _____
Test Date(s): _____ Relative Humidity: _____
DUT Manufacturer: _____ Ambient Noise: _____
DUT Model: _____
DUT s/n: _____
DUT Rev: _____
DUT Firmware ID: _____

If t_3 ≥ 30 s, or task is completed erroneously; enter s = 0

Usability Panelist No.	Test Date (MM/DD/YYYY)	Start Time (HH:MM AM/PM)	s (0 or 1)	t_3 (s)	M_3 (0 - 100)
1	11/11/2010	9:00AM	1	5	69.7
2	11/11/2010	9:00AM	1	2	87.6
3	11/11/2010	9:00AM	1	3	81.5
4	11/11/2010	9:00AM	1	6	64.2
5	11/11/2010	9:00AM	1	6	64.2
6	11/11/2010	9:30AM	1	4	75.5
7	11/11/2010	9:30AM	1	2	87.6
8	11/11/2010	9:30AM	1	2	87.6
9	11/11/2010	9:30AM	1	3	81.5
10	11/11/2010	9:30AM	1	3	81.5
11	11/11/2010	10:00AM	1	6	64.2
12	11/11/2010	10:00AM	1	3	81.5
13	11/11/2010	9:00AM	1	2	87.6
14	11/11/2010	9:00AM	1	3	81.5
15	11/11/2010	9:00AM	1	6	64.2
16	11/11/2010	9:00AM	1	6	64.2
17	11/11/2010	9:30AM	1	4	75.5
18	11/11/2010	9:30AM	1	2	87.6
19	11/11/2010	9:30AM	1	2	87.6
20	11/11/2010	9:30AM	1	3	81.5
21	11/11/2010	10:00AM	1	5	69.7

$$M_i = \frac{200s}{1 + e^{x_i}}$$

$$M_i(avg) = \frac{M_i(user\ 1) + M_i(user\ 2) + \cdots + M_i(user\ 21)}{21}$$

$M_3(avg)$ = 77.4
Task Compliance: PASS

where: i = task number
$x_i = t_i / k_i$
t_i = time to complete task i (seconds)
k_i = constant for task i
k_3 = 8.0 for task 3

s = 0 if task is completed erroneously or not completed within alloted time
s = 1 if task is completed correctly, within alloted time

ENERGY STAR Usability Data Sheet - Task 4
Modify Program Schedule

Test Laboratory: _____ Ambient Temperature: _____
Test Date(s): _____ Relative Humidity: _____
DUT Manufacturer: _____ Ambient Noise: _____
DUT Model: _____
DUT s/n: _____
DUT Rev: _____
DUT Firmware ID: _____

If t_4 ≥ 360 s, or task is completed erroneously; enter s = 0

Usability Panelist No.	Test Date (MM/DD/YYYY)	Start Time (HH:MM AM/PM)	s (0 or 1)	t_4 (s)	M_4 (0 - 100)
1	11/11/2010	10:00AM	1	140	76.4
2	11/11/2010	10:00AM	1	120	79.7
3	11/11/2010	10:00AM	1	210	65.4
4	11/11/2010	10:00AM	1	190	68.5
5	11/11/2010	10:00AM	0		0.0
6	11/11/2010	10:30AM	1	100	83.0
7	11/11/2010	10:30AM	1	340	47.4
8	11/11/2010	10:30AM	1	130	78.0
9	11/11/2010	10:30AM	1	100	83.0
10	11/11/2010	10:30AM	1	87	85.2
11	11/11/2010	10:00AM	1	190	68.5
12	11/11/2010	10:00AM	0		0.0
13	11/11/2010	10:30AM	1	100	83.0
14	11/11/2010	10:30AM	1	340	47.4
15	11/11/2010	10:30AM	1	130	78.0
16	11/11/2010	10:30AM	1	100	83.0
17	11/11/2010	10:30AM	1	87	85.2
18	11/11/2010	11:00AM	1	99	83.2
19	11/11/2010	11:00AM	1	110	81.3
20	11/11/2010	11:00AM	1	130	78.0
21	11/11/2010	11:00AM	1	125	78.8

$$M_i = \frac{200s}{1 + e^{x_i}}$$

$$M_i(avg) = \frac{M_i(user\ 1) + M_i(user\ 2) + \cdots + M_i(user\ 21)}{21}$$

$M_4(avg)$ = 68.2
Task Compliance: PASS

where: i = task number
$x_i = t_i / k_i$
t_i = time to complete task i (seconds)
k_i = constant for task i
$k_4 = 291$ for task 4

$s = 0$ if task is completed erroneously or not completed within alloted time
$s = 1$ if task is completed correctly, within alloted time

ENERGY STAR Usability Data Sheet - Task 5
Activate & Cancel Away Mode

Test Laboratory: _____ Ambient Temperature: _____
Test Date(s): _____ Relative Humidity: _____
DUT Manufacturer: _____ Ambient Noise: _____
DUT Model: _____
DUT s/n: _____
DUT Rev: _____
DUT Firmware ID: _____

If t_5 ≥ 90 s, or task is completed erroneously; enter s = 0

Usability Panelist No.	Test Date (MM/DD/YYYY)	Start Time (HH:MM AM/PM)	s (0 or 1)	t_5 (s)	M_5 (0 - 100)
1	11/11/2010	9:30AM	1	10	79.5
2	11/11/2010	9:30AM	1	11	77.5
3	11/11/2010	9:30AM	1	20	60.6
4	11/11/2010	9:30AM	1	5	89.6
5	11/11/2010	9:30AM	0		0.0
6	11/11/2010	10:00AM	1	12	75.5
7	11/11/2010	10:00AM	1	14	71.6
8	11/11/2010	10:00AM	1	15	69.7
9	11/11/2010	10:00AM	1	8	83.5
10	11/11/2010	9:30AM	1	20	60.6
11	11/11/2010	9:30AM	1	5	89.6
12	11/11/2010	9:30AM	0		0.0
13	11/11/2010	10:00AM	1	12	75.5
14	11/11/2010	10:00AM	1	14	71.6
15	11/11/2010	10:00AM	1	15	69.7
16	11/11/2010	10:00AM	1	8	83.5
17	11/11/2010	10:00AM	1	8	83.5
18	11/11/2010	10:30AM	1	7	85.5
19	11/11/2010	10:30AM	1	6	87.6
20	11/11/2010	10:30AM	1	8	83.5
21	11/11/2010	10:30AM	1	9	81.5

$$M_i = \frac{200s}{1 + e^{x_i}}$$

$$M_i(avg) = \frac{M_i(user\ 1) + M_i(user\ 2) + \cdots + M_i(user\ 21)}{21}$$

$M_5(avg)$ = 70.5
Task Compliance: PASS

where: i = task number
$x_i = t_i / k_i$
t_i = time to complete task i (seconds)
k_i = constant for task i
$k_5 = 24$ for task 5

$s = 0$ if task is completed erroneously or not completed within alloted time
$s = 1$ if task is completed correctly, within alloted time

ENERGY STAR Usability Data Sheet - Task 6
Identify Energy Rate Tier

Test Laboratory: _____ Ambient Temperature: _____
Test Date(s): _____ Relative Humidity: _____
DUT Manufacturer: _____ Ambient Noise: _____
DUT Model: _____
DUT s/n: _____
DUT Rev: _____
DUT Firmware ID: _____

If t_6 ≥ 30 s, or task is completed erroneously; enter s = 0

Usability Panelist No.	Test Date (MM/DD/YYYY)	Start Time (HH:MM AM/PM)	s (0 or 1)	t_6 (s)	M_6 (0 - 100)
1	11/11/2010	10:30AM	1	5	69.7
2	11/11/2010	10:30AM	1	4	75.5
3	11/11/2010	10:30AM	1	3	81.5
4	11/11/2010	10:30AM	1	3	81.5
5	11/11/2010	10:30AM	1	4	75.5
6	11/11/2010	11:00AM	1	6	64.2
7	11/11/2010	11:00AM	1	5	69.7
8	11/11/2010	11:00AM	1	4	75.5
9	11/11/2010	11:00AM	1	5	69.7
10	11/11/2010	10:30AM	1	4	75.5
11	11/11/2010	10:30AM	1	3	81.5
12	11/11/2010	10:30AM	1	3	81.5
13	11/11/2010	10:30AM	1		100.0
14	11/11/2010	11:00AM	2	6	128.3
15	11/11/2010	11:00AM	1	5	69.7
16	11/11/2010	11:00AM	1	4	75.5
17	11/11/2010	11:00AM	1	6	64.2
18	11/11/2010	11:30AM	1	4	75.5
19	11/11/2010	11:30AM	1	8	53.8
20	11/11/2010	11:30AM	1	9	49.0
21	11/11/2010	11:30AM	1	3	81.5

$$M_i = \frac{200s}{1 + e^{x_i}}$$

$$M_i(avg) = \frac{M_i(user\ 1) + M_i(user\ 2) + \cdots + M_i(user\ 21)}{21}$$

$M_6(avg)$ = 76.1
Task Compliance: PASS

where: i = task number
$x_i = t_i / k_i$
t_i = time to complete task i (seconds)
k_i = constant for task i
$k_6 = 8.0$ for task 6

$s = 0$ if task is completed erroneously or not completed within alloted time
$s = 1$ if task is completed correctly, within alloted time