ENERGY STAR® Program Requirements
Product Specification for
Residential Climate Controls

Test Method – Usability
Rev. DRAFT (Jan. 2011)

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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) conducting Residential Climate Control usability testing.
- UUT: Unit Under Test

4 USER GROUP SELECTION

A) User Group size: 21 individuals

Note: For the purposes of this RFP, this section is informational only and the specifications of the RFP should be followed instead. User Group size may be adjusted, based on this effort.

B) User Group Composition:

1) The 21-member User Group shall concurrently meet the following four requirements:
   i) Represented Age Group,
   ii) Gender;
   iii) Level of Education, and
   iv) Vision.

2) The details for these four requirements include:

i) Age Groups

- Age 21–34 – 6-individuals
- Age 35–49 – 6-individuals
- Age 50–64 – 6-individuals
- Age 65–79 – 3-individuals

ii) Gender Composition

- 50% each male and female individuals, plus one of either gender.

iii) Level of Education

- Less than High-School Education – 3-individuals
- High-School Graduate & Less than Bachelor's Degree – 12-individuals
- Bachelor's Degree or Higher – 6-individuals

iv) Vision

- No Color Vision Deficiency – 20-individuals
- Red-Green Color Vision Deficiency – 1-individual (male)

Note: In response to stakeholder concerns about the "reference device", EPA is releasing this draft with a relatively large User Group designed to provide more reproducible test results. In the long term, we think a reference device has potential to increase the reproducibility of the tests. EPA sees three options for adjusting the User Group size and providing a reference.

1) Use the test as described here.

2) Use a smaller User Group and a reference device for each task. The reference device would not be intended to reflect the best available solution, but rather a common solution. There would be no single device that can act as a reference for all tests; instead, different devices would be chosen for different tests. Usability experts that we spoke to felt this was not a good idea, in addition to stakeholder concerns about possible advantages to some manufacturers arising from the choice of reference.

3) Use a "virtual reference", a unit programmed on a small touchscreen device such as an Android phone or iPhone. The device would provide the user with the apparent functionality of a thermostat. This could be designed either to be the best available technology or to be a functionally sufficient solution. EPA believes that in the long term, this is the best option for the test, and intends to pursue it in subsequent revisions of the test method. Ideally, the virtual reference would be developed by industry. However, EPA will make contingency plans to develop it.

The December 14, 2010, meeting included a targeted discussion of these options.

The User Group composition is designed be representative of U.S. demographics on a National basis. Age group, Gender and Level of Education percentages are based on 2000 U.S. census data. Vision percentages are based on National Institute of Health data.

The 2000 U.S. census data indicates that 9% Speak English "less than very well." EPA is considering adding appropriate representation in the User Group for the U.S. population segment where English is not the primary spoken language at home.

Data from the 2010 U.S. census is expected to be released in the December 2010 timeframe. EPA will evaluate this data and adjust the User Group composition, if warranted.

3) Individual User Requirements:

i) U.S. resident.

ii) No prior experience with the UUT.

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.

Discussion Point: Are there additional restrictions or requirements that should be considered?

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%
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.

Note: EPA intends for test administrator(s) to explain 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.

Discussion Points: Are there additional administrator requirements that should be added? Can wording be improved to better achieve the above goals?

C) UUT Configuration: The test sample shall be configured for operation prior to the start of each day of usability testing. Configuration shall be verified to be correct prior to each 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.

Discussion Points: Are additional instructions required? Should EPA require the configuration of additional settings such as type of HVAC, number of stages, etc. before testing may be performed?

D) Test Setup:

1) **UUT Mounting** 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.

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.

2) **Written User Documentation** (included in "as shipped" product) shall be readily available to the individual users during testing. User documentation shall be placed on a small shelf, wall-mounted document bin, table or other similar, readily-accessible location.

Note: A test administrator will indicate to each individual user the availability of user documentation. The test script will include associated verbiage such as "…should you desire to consult it, user documentation is available for your use" to signal that use of this documentation is optional.

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

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 MM 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:** Activate/Cancel Energy Saving Mode – The product shall be provided in HVAC Cool mode with the default program schedule active 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.”

5) **Task 5:** Modify Program Schedule – The product shall be provided in HVAC Heat mode with the default ENERGY STAR program schedule active and the default or home screen displayed – user shall be instructed to configure and save the following day and time changes (Table 2) 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 – Program Modifications

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

Table 3 and 4 below specifies acceptable programmed ranges for programmed times and setpoints, respectively. These ranges include a ±1°F tolerance for the programmed temperatures and a ±10m tolerance for programmed times and shall be used in assessing successful completion of Task 5.

Table 3: Residential Climate Control – Compliant Programmed Times

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

Table 4: 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.

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: The six tasks above are ordered from more straightforward to more complex. In some, but not all, cases usability tasks may relate to prescriptive path requirements. In order to avert a larger comprehensive set of tasks required to ensure a 1:1 mapping between prescriptive requirements and performance-based testing, a smaller, representative sampling of usability tasks was selected.

As set out in the RFP, tasks 4 and 6 should not be performed as part of the RFP testing, because the UUT does not have the specified capability.

F) Usability Task Parameters

Table 5: 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 – Activate/Cancel Energy Saving Mode	15	$k_4 = 24$
5 – Modify Program Schedule	180	$k_5 = 291$
6 – Identify Energy Rate Tier	5	$k_6 = 8.0$

G) Data Collection:

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

6) Usability test data shall be recorded for each of the 21 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.
  - 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.
- Test administrators shall read the prescribed scripts in a clear, slow, and methodical manner to ensure that the individual user understands what is being requested of them.
- Verbal 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.

2 TEST ADMINISTRATOR SCRIPTS

Text to be read aloud is 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 written user documentation).

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 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 this Residential Climate Control* (indicate location and gesture with one hand) *for ease of use. Please note that these devices 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. I will be taking notes while you perform the tasks and will record how long each task takes to complete.*

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. Written user documentation is available for your use, here (describe location and gesture with one hand)*, should you wish to use it.*

*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 six 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 an incorrect date and time 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, assign the UUT a score of 100, the maximum available, for Task 1 and skip to Task 2.

"The date and time is 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.

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 set temperature, also called the active setpoint. 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, checktask correctness and record results.

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.

E) Task 4 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 HVAC Cool mode with the default program schedule active and the default or home screen displayed.

"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 and monitor the Task 4 time limit. 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.

F) Task 5 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 active and the default or home screen displayed.

"*The Climate Control is controlling heating in Program Mode. In this Winter mode, room temperature is controlled according to a schedule to maintain comfort when the home is occupied and to save energy when occupants are away or sleeping. Climate Control program schedules may be adjusted to meet your personal or family's schedule You would like your home to be automatically heated to a comfortable temperature all day on Saturdays. For this task you will be asked to adjust the Climate Control to make this change. 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 from 11:00 PM on Saturday nights to 6:00 AM the following mornings.**

"*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 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.

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.

H) Exit Script:

"You have completed all six 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_2 (s)	M_2 (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

$M_1(avg)$ = 59.3
Task Compliance: PASS

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$$M_i = \frac{200s}{1 + e^{x_i}} \qquad M_i(avg) = \frac{M_i(user\ 1) + M_i\ (user\ 2) + \ ... + M_i(User\ 21)}{21}$$

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Where:

i = task number

$x_i = t_1/k_1$

t_1 = time to complete task 1 (seconds)

k_1 = 194

S =0 if task is completed erroneously or not completed within allotted time

S = 1 if task is completed correctly, within allotted time

ENERGY STAR Usability Data Sheet - Task 2
Identify Room Temp & Setpoint

Test Laboratory: _____
Test Date(s): _____
DUT Manufacturer: _____
DUT Model: _____
DUT s/n: _____
DUT Rev: _____
DUT Firmware ID: _____

Ambient Temperature: _____
Relative Humidity: _____
Ambient Noise: _____

If t_2 ≥ 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_2 (s)	M_2 (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

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

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$$M_i = \frac{200s}{1 + e^{x_i}} \qquad M_i(avg) = \frac{M_i(user\ 1) + M_i\ (user\ 2) + \ ... + M_i(User\ 21)}{21}$$

Where: i = task number

$x_i = t_2/k_2$

t_2 = time to complete task 2 (seconds)
k_2 = 8.0

S =0 if task is completed erroneously or not completed within allotted time
S = 1 if task is completed correctly, within allotted time

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ENERGY STAR Usability Data Sheet - Task 3
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_3 ≥ 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

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

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$$M_i = \frac{200s}{1 + e^{x_i}} \qquad M_i(avg) = \frac{M_i(user\ 1) + M_i\ (user\ 2) + \ ... + M_i(User\ 21)}{21}$$

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Where: i = task number

$x_i = t_3/k_3$

t_3 = time to complete task 2 (seconds)
k_3 = 16

S =0 if task is completed erroneously or not completed within allotted time
S = 1 if task is completed correctly, within allotted time

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ENERGY STAR Usability Data Sheet - Task 4
Activate & Cancel Energy Saving 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_4 ≥ 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_2 (s)	M_2 (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

$M_4(avg)$ = 70.5
Task Compliance: PASS

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$$M_i = \frac{200s}{1+e^{x_i}} \qquad M_i(avg) = \frac{M_i(user\ 1) + M_i\ (user\ 2) + \ldots + M_i(User\ 21)}{21}$$

356 Where:

i = task number

$x_i = t_4/k_4$

t_4 = time to complete task 4 (seconds)

k_4 = 24

S =0 if task is completed erroneously or not completed within allotted time

S = 1 if task is completed correctly, within allotted time

ENERGY STAR Usability Data Sheet - Task 5
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_5 ≥ 600 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	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

$M_5(avg)$ = 68.2
Task Compliance: PASS

$$M_i = \frac{200s}{1+e^{x_i}} \qquad M_i(avg) = \frac{M_i(user\ 1) + M_i\ (user\ 2) + \ldots + M_i(User\ 21)}{21}$$

Where:

i = task number

$x_i = t_5/k_5$

t_5 = time to complete task 5 (seconds)

$k_5 = 291$

S =0 if task is completed erroneously or not completed within allotted time

S = 1 if task is completed correctly, within allotted 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_2 (s)	M_2 (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

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

$$M_i = \frac{200s}{1+e^{x_i}} \qquad M_i(avg) = \frac{M_i(user\ 1) + M_i\ (user\ 2) + \ldots + M_i(User\ 21)}{21}$$

Where:

i = task number

$x_i = t_6/k_6$

t_6 = time to complete task 6 (seconds)

k_6 = 8.0

S =0 if task is completed erroneously or not completed within allotted time

S = 1 if task is completed correctly, within allotted time