2006/1005/EC: Council Decision of 18 December 2006 concerning conclusion of the Agreement between the Government of the United States of America and the European Community on the coordination of energy-efficiency labelling programmes for office equipment

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Council Decision of 18 December 2006 concerning conclusion of the Agreement between the Government of the United States of America and the European Community on the coordination of energy-efficiency labelling programmes for office equipment (2006/1005/EC)

THE COUNCIL OF THE EUROPEAN UNION,
Having regard to the Treaty establishing the European Community, and in particular Article 133, in conjunction with Article 300(2), first subparagraph, first sentence, and Article 300(4) thereof,
Having regard to the proposal from the Commission,
Whereas:
(1) The Council Decision authorising the Commission to open negotiations for an Agreement between the Government of the United States of America and the European Community on the coordination of energy-efficiency labelling programmes for office equipment was adopted on 5 May 2006.
(2) The negotiations have been concluded and the Agreement between the Government of the United States of America and the European Community on the coordination of energy-efficiency labelling programmes for office equipment (hereinafter referred to as "the Agreement") was initialled by both Parties on 7 June 2006.
(3) The appropriate internal Community procedures should be established to ensure proper operation of the Agreement.
(4) The market for office equipment is evolving rapidly. It is essential to reassess frequently the potential for maximising energy savings and environmental benefits by stimulating the supply of and demand for energy-efficient products. It is therefore necessary to empower the Commission, assisted by a Community advisory board made up of national representatives and of all interested parties, to reassess and upgrade the Common Specifications for office equipment set out in Annex C to the Agreement regularly and to take certain decisions for implementation of the Agreement, such as the layout of the Energy Star logo and the guidelines for use of the logo contained in Annexes A and B respectively.
(5) Implementation of the Agreement should be reviewed by the Technical Commission established by the Agreement.
(6) Each party to the Agreement should designate a management entity and the procedure for amending the Agreement should be defined.
(7) The Agreement should be approved,
HAS DECIDED AS FOLLOWS:
Article 1
The Agreement between the Government of the United States of America and the European Community on the coordination of energy-efficiency labelling programmes for office equipment, including its Annexes, is hereby approved on behalf of the Community.
The text of the Agreement and the Annexes thereto are attached to this Decision.
Article 2
The President of the Council is hereby authorised to designate the person(s) empowered to sign the Agreement in order to bind the Community.
Article 3

The President of the Council shall, on behalf of the Community, give the notification in writing provided for in Article XIV(1) of the Agreement.

Article 4

1. The Commission shall represent the Community in the Technical Commission provided for in Article VII of the Agreement, after having heard the views of the members of the European Community Energy Star Board established by Regulation (EC) No 2422/2001 of the European Parliament and of the Council [1]. After consulting the European Community Energy Star Board, the Commission shall carry out the tasks referred to in Articles VI(5), VII(1) and (2), and IX(4) of the Agreement.

2. With a view to preparing the position of the Community with regard to amendments to the list of office equipment in Annex C to the Agreement, the Commission shall take into account any opinion given by the European Community Energy Star Board.

3. The position of the Community with regard to decisions to be taken by the management entities shall be determined, with regard to amendments of Annex A (Energy Star name and common logo), Annex B (Guidelines for proper use of the Energy Star name and common logo), and Annex C (Common Specifications) to the Agreement, by the Commission, after consultation of the European Community Energy Star Board.

4. In all other cases, the position of the Community with regard to decisions to be taken by the Parties to the Agreement shall be determined by the Council, acting on a proposal from the Commission in accordance with Article 300 of the Treaty.

Article 5

This Decision shall be published in the Official Journal of the European Union.

Done at Brussels, 18 December 2006.

For the Council

The President

J.-E. Enestam

[1] OJ L 332, 15.2.2001, p. 1.

Agreement

between the Government of the United States of America and the European Community on the coordination of energy-efficiency labelling programs for office equipment

The Government of the UNITED STATES OF AMERICA and the EUROPEAN COMMUNITY, hereinafter "the Parties";

DESIRING to maximise energy savings and environmental benefits by stimulating the supply of and demand for energy-efficient products;

TAKING INTO ACCOUNT the Agreement between the Government of the United States of America and the European Community on the Coordination of Energy-Efficient Labelling Programs for Office Equipment, done on 19 December 2000, and its annexes, as amended (hereinafter "the 2000 Agreement");

SATISFIED by the progress made under the 2000 Agreement;

CONVINCED that additional benefits will be achieved by continuing mutual efforts on ENERGY STAR;

HAVE AGREED AS FOLLOWS:

Article I

General Principles

1. A common set of energy-efficiency specifications and a common logo shall be used by the Parties for the purpose of establishing consistent targets for manufacturers, thereby maximising the effect of their individual efforts on the supply of and demand for such product types.

2. The Parties shall use the Common Logo for the purpose of identifying qualified energy-efficient product types listed in Annex C.

3. The Parties shall ensure that common specifications encourage continuing improvement in efficiency, taking into account the most advanced technical practices on the market.
4. The Common Specifications strive to represent not more than 25 percent of models for which data is available at the time the specifications are set while also taking other factors into consideration.
5. The Parties shall endeavour to ensure that consumers have the opportunity to identify efficient products by finding the label in the market.

Article II

Relation to the 2000 Agreement

This Agreement supersedes in its entirety the 2000 Agreement.

Article III

Definitions

For the purposes of this Agreement:
(a) "ENERGY STAR" means the service mark designated in Annex A and owned by the United States Environmental Protection Agency ("U.S. EPA");
(b) "Common Logo" means the certification mark designated in Annex A and owned by U.S. EPA;
(c) "ENERGY STAR Marks" means the "ENERGY STAR" name and the Common Logo, as well as any versions of these marks that may be developed or modified by the Management Entities or Program Participants, as herein defined, including the sign or marking contained in Annex A of this Agreement;
(d) "ENERGY STAR Labelling Program" means a program administered by a Management Entity using common energy-efficiency specifications, marks, and guidelines to be applied to designated product types;
(e) "Program Participants" means manufacturers, vendors, or resale agents that sell designated, energy-efficient products that meet the specifications of and who have chosen to participate in, the ENERGY STAR Labelling Program by registering or entering an agreement with the Management Entity of either Party;
(f) "Common Specifications" are the energy-efficiency and performance requirements, including testing methods listed in Annex C, used by Management Entities and Program Participants to determine qualification of energy-efficient products for the Common Logo.

Article IV

Management entities

Each Party hereby designates a management entity responsible for implementation of this Agreement (the "Management Entities"). The European Community designates the Commission of the European Communities ("Commission") as its Management Entity. The United States of America designates the U.S. EPA as its Management Entity.

Article V

Administration of the ENERGY STAR Labelling Program

1. Each Management Entity shall administer the ENERGY STAR Labelling Program for the energy-efficient product types listed in Annex C, subject to the terms and conditions set forth in this Agreement. Program administration includes registering Program Participants on a voluntary basis, maintaining Program Participant and compliant product lists, and enforcing the terms of the Guidelines for Proper Use of the ENERGY STAR Name and Common Logo set forth in Annex B.
2. The ENERGY STAR Labelling Program shall use the Common Specifications listed in Annex C.
3. To the extent that each Management Entity takes effective measures to educate consumers about the ENERGY STAR Marks, it shall do so in accordance with the Guidelines for Proper Use of the ENERGY STAR Name and Common Logo set forth in Annex B.
4. Each Management Entity shall bear the expenses for all of its activities under this Agreement.

Article VI

Participation in the ENERGY STAR Labelling Program

1. Any manufacturer, vendor or resale agent may enter the ENERGY STAR Labelling Program by registering as a Program Participant with the Management Entity of either Party.
2. Program Participants may use the Common Logo to identify qualified products that have been tested in their own facilities or by an independent test laboratory and that meet the Common Specifications set forth in Annex C, and may self-certify product qualification.
3. The registration of a Program Participant in the ENERGY STAR Labelling Program by the Management Entity of one Party shall be recognised by the Management Entity of the other Party.
4. To facilitate the recognition of Program Participants in the ENERGY STAR Labelling Program in accordance with Paragraph 3 above, the Management Entities shall cooperate in order to maintain common lists of all Program Participants and products that qualify for the Common Logo.
5. Notwithstanding the self-certification procedures specified in Paragraph 2 above, each Management Entity reserves the right to test or otherwise review products that are or have been sold within its territories (in the territories of the European Community Member States in the case of the Commission) to determine whether the products are certified in accordance with the Common Specifications set forth in Annex C. The Management Entities shall communicate and cooperate fully with one another to ensure all products bearing the Common Logo meet the Common Specifications set forth in Annex C.

Article VII

Program coordination between the Parties

1. The Parties shall establish a Technical Commission to review implementation of this Agreement, composed of representatives of their respective Management Entities.
2. In principle, the Technical Commission shall meet annually and shall consult at the request of one of the Management Entities to review the operation and administration of the ENERGY STAR Labelling Program, the Common Specifications set forth in Annex C, product coverage, and the progress in achieving the objectives of this Agreement.
3. Nonparties (including other governments and industry representatives) may attend meetings of the Technical Commission as observers, unless otherwise agreed by both Management Entities.

Article VIII

Registration of the ENERGY STAR Marks

1. The U.S. EPA, as owner of the ENERGY STAR marks, has registered the marks in the European Community as Community Trade Marks. The Commission shall not seek or obtain any registration of the ENERGY STAR marks or any variation of the marks in any country.
2. The U.S. EPA undertakes not to consider as an infringement of these marks the use, by the Commission or by any Program Participant registered by the Commission, of the sign or marking contained in Annex A in accordance with the terms of this Agreement.

Article IX

Enforcement and non-compliance

1. In order to protect the ENERGY STAR marks, each Management Entity shall ensure the proper use of the ENERGY STAR marks within its territory (within the territories of the European Community Member States in the case of the Commission). Each Management Entity shall ensure that the ENERGY STAR marks are used only in the form that appears in Annex A. Each Management Entity shall ensure that the ENERGY STAR marks are used solely in the manner specified in the Guidelines for Proper Use of the ENERGY STAR Name and Common Logo set forth in Annex B.
2. Each Management Entity shall ensure that prompt and appropriate action is taken against Program Participants, whenever it has knowledge that a Program Participant has used an infringing mark or has affixed the ENERGY STAR marks to a product that does not comply with the Specifications set forth in Annex C. Such actions shall include, but not be limited to:
(a) informing the Program Participant in writing of its non- compliance with the terms of the ENERGY STAR Labelling Program;
(b) through consultations, developing a plan to reach compliance;

and
(c) if compliance cannot be reached, terminating the registration of the Program Participant, as appropriate.
3. Each Management Entity shall ensure that all reasonable actions are taken to end the unauthorised use of the ENERGY STAR marks or use of an infringing mark by an entity that is not a Program Participant. Such actions shall include, but shall not be limited to:
(a) informing the entity using the ENERGY STAR marks of ENERGY STAR Labelling Program requirements and the Guidelines for Proper Use of the ENERGY STAR Name and Common Logo; and
(b) encouraging the entity to become a Program Participant and register qualified products.
4. Each Management Entity shall immediately notify the Management Entity of the other Party of any infringement of the ENERGY STAR marks of which it has knowledge as well as the action taken to end such infringement.
Article X
Procedures for amending the Agreement and for adding new Annexes
1. Either Management Entity may propose an amendment to this Agreement and may propose new annexes to the Agreement.
2. A proposed amendment shall be made in writing and shall be discussed at the next meeting of the Technical Commission, provided that it has been communicated to the other Management Entity at least sixty days in advance of such meeting.
3. Amendments to this Agreement and decisions to add new annexes shall be made by mutual agreement of the Parties. Amendments to Annexes A, B, and C shall be made according to the provisions of Articles XI and XII.
Article XI
Procedures for amending Annexes A and B
1. A Management Entity seeking to amend Annex A or Annex B shall follow the procedures set forth in paragraphs 1 and 2 of Article X.
2. Amendments to Annexes A and B shall be made by mutual agreement of the Management Entities.
Article XII
Procedures for amending Annex C
1. A Management Entity seeking to amend Annex C to revise existing Specifications, or to add a new product type ("Proposing Management Entity") shall follow the procedures set forth in paragraphs 1 and 2 of Article X, and shall include in its proposal:
(a) a demonstration that significant energy savings would result from revising the Specifications or adding the new product type;
(b) as appropriate, energy consumption requirements for various power consumption modes;
(c) information on the standardised testing protocols to be used in evaluating the product;
(d) evidence of existing non-proprietary technology that would make possible cost-effective energy savings without negatively affecting product performance;
(e) information on the estimated number of product models that would meet the proposed specification and approximate market share represented;
(f) information on the views of industry groups potentially affected by the proposed amendment; and
(g) a proposed effective date for the new Specifications, taking into consideration product life cycles and production schedules.
2. Proposed amendments that are accepted by both Management Entities shall enter into force on a date mutually agreed by the Management Entities.
3. If, after receipt of a proposal made in accordance with paragraphs 1 and 2 of Article X, the other Management Entity ("Objecting Management Entity") is of the view that the proposal does not meet the requirements specified in Paragraph 1 above or otherwise objects to the proposal it shall promptly

(normally by the next Technical Commission Meeting) notify the Proposing Management Entity in writing of its objection and shall include any available information supporting its objection; for example, information demonstrating that the proposal, if adopted, would likely:
(a) disproportionately and unfairly confer market power on one company or industry group;
(b) undermine overall industry participation in the ENERGY STAR labelling program;
(c) conflict with its laws and regulations;
or
(d) impose burdensome technical requirements.
4. The Management Entities shall make best efforts to reach agreement on the proposed amendment at the first meeting of the Technical Commission following the proposal. If the Management Entities are unable to reach agreement on the proposed amendment at this Technical Commission meeting, they shall seek to reach agreement in writing prior to the subsequent Technical Commission meeting.
5. If, by the end of the subsequent Technical Commission meeting, the Parties are unable to reach agreement, the Proposing Management Entity shall withdraw its proposal; and with respect to proposals to revise existing Specifications, the corresponding product type shall be removed from Annex C by the date agreed upon in writing by the Management Entities. All Program Participants shall be informed of this change and of the procedures to be followed to implement this change.
6. When preparing new Common Specifications or revising existing Common Specifications, the Management Entities shall ensure effective coordination and consultation among themselves and with their respective stakeholders, particularly with regard to the content of the working documents and timelines.

Article XIII

General provisions

1. Other environmental labelling programs are not covered by this Agreement and may be developed and adopted by either of the Parties.
2. All activities undertaken under this Agreement shall be subject to the applicable laws and regulations of each Party and to the availability of appropriated funds and resources.
3. Nothing in this Agreement shall affect the rights and obligations of any Party deriving from a bilateral, regional or multilateral agreement into which it has entered prior to the entry into force of this Agreement.
4. Without prejudice to any other provisions of this Agreement, either Management Entity may run labelling programs with respect to product types not included in Annex C. Notwithstanding any other provisions of this Agreement, neither Party shall hinder the import, export, sale or distribution of any product because it bears the energy-efficiency marks of the Management Entity of the other Party.

Article XIV

Entry into force and duration

1. This Agreement shall enter into force on the date upon which each Party has notified the other in writing that its respective internal procedures necessary for its entry into force have been completed.
2. This Agreement shall remain in force for a period of five years. At least one year prior to the end of this period, the Parties shall meet to discuss renewal of this Agreement.

Article XV

Termination

1. Either Party may terminate this Agreement at any time by providing three months written notice to the other Party.
2. In the event of termination or non-renewal of this Agreement, the Management Entities shall inform all Program Participants which they have registered of the termination of the joint program. Moreover, Management Entities shall inform the Program Participants which they have registered that each Management Entity may continue the labelling activities under two separate individual programs. In this case, the European Community labelling program will not use the ENERGY STAR

marks. The Commission shall ensure that itself, the Member States of the European Community and any Program Participants which it has registered cease using the ENERGY STAR marks by the date agreed upon in writing by the Management Entities. The obligations contained in this Article XV (2) shall survive the termination of this Agreement.

Article XVI

Authentic languages

Done in duplicate at Washington D.C. on the twentieth day of December in the year two thousand and six in the Czech, Danish, Dutch, English, Estonian, Finnish, French, German, Greek, Hungarian, Italian, Latvian, Lithuanian, Maltese, Polish, Portuguese, Slovakian, Slovenian, Spanish and Swedish, languages, each of these versions being equally authentic. In case of difficulties concerning interpretation, English shall prevail.

Por la Comunidad Europea

Za Evropské společenství

For Det Europæiske Fællesskab

Für die Europäische Gemeinschaft

Euroopa Ühenduse nimel

Για την Ευρωπαϊκή Κοινότητα

For the European Community

Pour la Communauté européenne

Per la Comunità europea

Eiropas Kopienas vārdā

Europos bendrijos vardu

az Európai Közösség részéről

Għall-Komunità Ewropea

Voor de Europese Gemeenschap

W imieniu Wspólnoty Europejskiej

Pela Comunidade Europeia

Za Európske spoločenstvo

Za Evropsko skupnost

Euroopan yhteisön puolesta

För Europeiska gemenskapens vägnar

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+++++ TIFF +++++

Por el Gobierno de los Estados Unidos de América

Za vládu Spojených států amerických

For regeringen for Amerikas Forenede Stater

Für die Regierung der Vereinigten Staaten von Amerika

Ameerika Ühendriikide valitsuse nimel

Για την Κυβερνηση των Ηνωμενων Πολιτειων τησ Αμερικησ

For the Government of the United States of America

Pour le gouvernement des États-Unis d'Amérique

Per il governo degli Stati Uniti d'America

Amerikas Savienoto Valstu valdības vārdā

Jungtinių Amerikos Valstijų vyriausybės vardu

az Amerikai Egyesült Államok kormánya részéről

Għall-Gvern ta' l-Istati Uniti ta' l-Amerika

Voor de regering van Verenigde Staten van Amerika

W imieniu rządu Stanów Zjednoczonych Ameryki

Pelo governo Estados Unidos da América

Za vládu Spojené štáty americké

Za vlado Združene države Amerike
Amerikan yhdysvaltojen hallituksen puolesta
För Amerikas förenta staters regering
+++++ TIFF +++++

ANNEX A
ENERGY STAR NAME AND COMMON LOGO
Name: ENERGY STAR
Common logo:
+++++ TIFF +++++

ANNEX B
Guidelines for proper use of the Energy Star name and common logo
The ENERGY STAR name and Common logo are marks of the U.S. EPA. As such, the name and Common logo may only be used in accordance with the following guidelines and the Partnership Agreement or the European Commission Registration Form signed by Program Participants in the ENERGY STAR labelling program. Please distribute these guidelines to those who will be responsible for preparing ENERGY STAR materials on your behalf.
U.S. EPA, and the European Commission, in the European Community Member States Territory oversee proper use of the ENERGY STAR name and Common logo. This includes monitoring the use of the marks in the marketplace, and directly contacting those organisations that are using them improperly or without authorisation. Consequences of misusing the marks may include the termination of the Program Participant's participation in the ENERGY STAR labelling program, and, for products imported into the U.S. improperly using the marks, the possible seizure by the U.S. Customs Services of those goods.
General Guidelines
The ENERGY STAR Program is a partnership between businesses and organisations on one side and the US Federal government or the European Community on the other side. As part of this partnership, businesses and organisations can use the ENERGY STAR name and Common logo, as part of their energy efficiency and environmental activities.
Organisations must enter into an agreement with a management entity – the Environmental Protection Agency for the US or the European Commission for the EU– to use the marks as provided in this document. Alterations to these marks are not allowed as the alterations would confuse businesses and consumers about the source of the ENERGY STAR program and reduce its value for all.
Organisations using these marks must abide by the following general guidelines:
1. The ENERGY STAR name and Common Logo may never be used in any manner that would imply endorsement of a company, its products, or its services. Neither the Common Logo nor the ENERGY STAR name may be used in any other company name or logo, product name, service name, domain name, or Web site title, nor may the Common Logo, the ENERGY STAR name, or any similar mark be applied for as a trademark, or as part of a trademark by any entity other than the U.S. EPA.
2. The ENERGY STAR name and Common Logo may never be used in a manner that would disparage ENERGY STAR, EPA, the Department of Energy, the European Community, the European Commission, or any other government body.
3. The Common Logo may never be associated with products that do not qualify as ENERGY STAR.
4. Partners and other authorised organisations are responsible for their own use of the ENERGY STAR name and Common Logo, as well as use by their representatives, such as ad agencies and implementation contractors.
Using the ENERGY STAR Name
- The ENERGY STAR name should always appear in capital letters;

- The registration symbol ® must be used with the first time the words "ENERGY STAR" appear in material for the U.S. market;
and
- The ® symbol should always be in superscript;
- There shall be no space between the words "ENERGY STAR" and the ® symbol;
- The ® symbol shall be repeated in a document for each chapter title or Web page.

Using the Common Logo

The Common Logo is a mark to be used as a label only on those products that meet or exceed ENERGY STAR performance guidelines.

Uses of the Common Logo include:

- On a qualifying and registered product;
- In product literature for a qualifying product;
- On the Web to identify a qualifying product;
- In advertising where it is used near to or on a qualifying product;
- On Point of Purchase materials;
- On qualifying product packaging.

Appearance of the Common Logo

US EPA created this mark to maximise the visual impression of the mark and for contrast and legibility. The mark includes the ENERGY STAR symbol in a block with the ENERGY STAR name in a block directly below to reinforce the legibility of the symbol. The two blocks are separated by a white rule equal in thickness to the arc within the symbol. The mark also has a white key line around it that is also equal in thickness to the arc within the symbol.

Clear Space

US EPA and the EU Commission require that a clear space of .333 (1/3) the height of the graphic box within the mark surround the mark at all times. No other graphic elements, such as text and images can appear in this area. US EPA and the EU Commission require this clear space since the Common logo frequently appears on materials using complex imagery such as other marks, graphic devices, and text.

Minimum Size

The mark may be resized, but the proportions must be maintained. For legibility, we recommend that the mark not be reproduced smaller in width than .375 inch (3/8"; 9.5 mm) for print. Lettering legibility inside the mark must be maintained on the Web.

Preferred Colour

The preferred colour for the mark is 100 % Cyan. Alternate versions in black or reversed out to white are allowed. The Web colour equivalent of 100 % Cyan is hex colour #0099FF. If multicolour printing is available for advertising, product literature, or point of purchase materials the mark should be printed in 100 % Cyan. If this colour is not available, then black can be substituted.

Incorrect Uses of the Mark

Please:

- Do not use the mark on non-qualifying products.
- Do not alter the mark by using the ENERGY STAR symbol block without the block containing the name "ENERGY STAR".

When reproducing the mark please:

- Do not make the mark an outline.
- Do not use a white mark on a white background.
- Do not change the colours of the mark.
- Do not distort the mark in any way.
- Do not alter the lock up of the mark.
- Do not place the mark on a busy image.
- Do not rotate the mark.

- Do not separate any of the mark's elements.
- Do not substitute any part of the mark.
- Do not use any other typeface to replace part of the mark.
- Do not violate the clear space of the mark.
- Do not skew the mark.
- Do not change the size of the mark lock up.
- Do not replace the approved wording.
- Do not use the Common logo in an unapproved colour.
- Do not let text run into the mark.
- Do not use the symbol block alone. The ENERGY STAR name must appear as well.
- Do not delete the symbol block from the mark.

Writing and Talking About ENERGY STAR

To maintain and build the value of ENERGY STAR, U.S. EPA and the EU Commission recommend terminology to use when writing and talking about elements of the program.

CORRECT	INCORRECT
ENERGY STAR qualified computer	ENERGY STAR compliant computer ENERGY STAR certified computer ENERGY STAR rated computer
Computer that has earned the ENERGY STAR	
Products that have earned the ENERGY STAR	ENERGY STAR product ENERGY STAR products (referring to a suite of products) ENERGY STAR equipment Endorsed by US EPA Meeting ENERGY STAR standards
PARTNERS/PROGRAM PARTICPANTS	
An ENERGY STAR Partner	An ENERGY STAR company
Company X, an ENERGY STAR Partner	Company X, a company endorsed by US EPA
A company participating in ENERGY STAR	A US EPA approved seller of ENERGY STAR equipment
A company promoting ENERGY STAR	Endorsed by US EPA
ENERGY STAR qualified monitors	ENERGY STAR Monitor Program
GOVERNMENT SOURCE OF AUTHORITY	
Products that earn the ENERGY STAR prevent greenhouse gas emissions by meeting strict energy efficiency guidelines set by the US EPA and the EU Commission	
ENERGY STAR and the ENERGY STAR mark are registered US marks	
ENERGY STAR is a registered mark owned by the US government	
PERFORMANCE GUIDELINES	
ENERGY STAR guidelines	ENERGY STAR Standards
ENERGY STAR specifications	US EPA-approved
ENERGY STAR performance levels	US EPA-endorsed
Voluntary programs	Received an endorsement by US EPA

Questions Regarding the Use of the ENERGY STAR Name and Common Logo

ENERGY STAR Hotline
In the U.S. call toll-free:1-888-STAR-YES (1-888-782–7937)
Outside the U.S. Call: 202-775–6650
Fax: 202-775–6680
www.energystar.gov
EUROPEAN COMMISSION
Directorate-General Energy and Transport
Phone: +32 2 2985792
Fax: +32 2 2966016
www.eu-energystar.org

ANNEX C
COMMON SPECIFICATIONS
I. COMPUTER SPECIFICATIONS
The following Computer Specifications shall be applicable through 19 July 2007. See Section VIII for the Computer Specifications that shall be applicable as of 20 July 2007.
A. Definitions
1. Computer: A desktop, tower or mini-tower, or portable unit, including high-end desktop computers, personal computers, workstations, network computer desktops, X terminal controllers, and computer-based point-of-sale retail terminals. To qualify, the unit must be capable of being powered from a wall outlet, but this does not preclude units that are capable of being powered from a wall outlet and also from a battery. This definition is intended primarily to cover computers sold for use in businesses or homes. This definition of a computer does not include computers sold or otherwise marketed as "File Server" or "Server".
2. Monitor: A cathode-ray tube (CRT), flat panel display (e.g. a liquid crystal display) or other display device and its associated electronics. A monitor may be sold separately or integrated into the computer chassis. This definition is intended primarily to cover standard monitors designed for use with computers. For purposes of this specification, however, the following may also be considered a monitor: mainframe terminals, and physically separate display units.
3. Integrated computer system: Systems in which the computer and visual display monitor are combined into a single unit. Such systems must meet all of the following criteria: it is not possible to measure the power consumption of the two components separately; and the system is connected to the wall outlet through a single power cable.
4. Inactivity: A period of time during which a computer does not encounter any user input (e.g. keyboard input or mouse movement).
5. Low-power or "sleep" mode: The reduced power state that the computer enters after a period of inactivity.
6. Wake events: A user, programmed, or external event or stimulus that causes the computer to transition from its low-power/.sleep. mode to its active mode of operation. Examples of wake events include, but are not limited to, movement of the mouse, keyboard activity or a button press on the chassis and, in the case of external events, stimulus conveyed via a telephone, remote control, network, cable modem, satellite, etc.
B. Product qualification for ENERGY STAR
1. Technical specifications
(a) Computers: An ENERGY STAR qualified computer shall satisfy the following conditions:
There are two guidelines – A and B – under which a computer can be qualified as ENERGY STAR. The two guidelines have been developed to provide Program Participants with the freedom to approach power management and energy efficiency in different ways.
The following types of computers must be qualified under Guideline A.
- Computers that are shipped with the capability to be on networks such that they can remain in their low-power/sleep mode while their network interface adapter retains the ability to respond to network queries.
- Computers that are not shipped with a network interface capability.
- Computers shipped to a non-networked environment.
EPA expects computers sold or otherwise marketed as personal computers to be qualified under Guideline A only.
Computers that are shipped with the capability to be on networks that currently require the computer's processor and/or memory to be involved in maintaining its network connection while in sleep mode can be qualified under Guideline B. Computers qualifying under Guideline B are expected to maintain identical network functionality in and out of sleep mode.
(i) Guideline A

(a) The computer shall enter a sleep mode after a period of inactivity.
(b) If the computer is shipped with the capability to be on a network, it shall have the ability to enter a sleep mode while on the network.
(c) If the computer is shipped with the capability to be on a network, it shall retain in sleep mode its ability to respond to wake events directed or targeted to the computer while on a network. If the wake event requires the computer to exit the sleep mode and perform a task, the computer shall re-enter its sleep mode after a period of inactivity after the completion of the task requested. Program Participant may use any means available to achieve the behaviour described in this subsection.
(d) The computer shall consume power in the sleep mode according to Table 1.
Table 1
Maximum continuous power rating of power supply [1] | Watts in sleep mode |
≤ 200 W | ≤ 15 W |
> 200 W ≤ 300 W | ≤ 20 W |
> 300 W ≤ 350 W | ≤ 25 W |
> 350 W ≤ 400 W | ≤ 30 W |
> 400 W | 10 % of the maximum continuous output rating |
Computers that always maintain a level of power consumption of 15 watts or less comply with the power consumption requirements of this Specification, and are not required to incorporate the sleep mode described in Section A.
(ii) Guideline B
(a) The computer shall enter a sleep mode after a period of inactivity.
(b) If the computer is shipped with the capability to be on a network, it shall have the ability to enter a sleep mode irrespective of the network technology.
(c) The computer shall retain in sleep mode its ability to respond to all types of network requests. There shall be no loss in network functionality available to the user (e.g. the network functionality available to the user during the sleep mode shall be the same as that was available before the computer entered the sleep mode).
(d) The computer shall consume in the sleep mode, no more than 15 % of the maximum continuous power rating of its power supply.
(b) Integrated Computer Systems: An ENERGY STAR qualified integrated computer system shall satisfy the following conditions.
(i) The integrated computer system shall enter a sleep mode after a period of inactivity.
(ii) If the integrated computer system is shipped with the capability to be on a network, it shall have the ability to enter a sleep mode while on the network.
(iii) If the integrated computer system is shipped with the capability to be on a network, it shall retain in sleep mode its ability to respond to wake events directed or targeted to the computer while on a network. If the wake event requires the computer to exit the sleep mode and perform a task, the integrated computer system shall re-enter its sleep mode after a period of inactivity after the completion of the task requested.
Program Participant may use any means available to achieve the behaviour described in this subsection.
(iv) An integrated computer system shall consume no more than 35 watts in the sleep mode. Integrated computer systems that always maintain a level of power consumption less than or equal to 35 watts comply with the power consumption requirements of this Agreement and are not required to incorporate the sleep mode described in Section I.A.
2. Shipment Settings: In order to ensure that the maximum number of users take advantage of the low-power/"sleep" state, Program Participant shall ship its computers and/or integrated computer systems with the power management feature enabled. The default time for all products shall be pre-set for less than 30 minutes. (EPA recommends that the pre-set time be set between 15 and 30

minutes). The user shall have the ability to change the time settings or disable the sleep/low-power mode.
3. Operating Systems: The proper activation of a computer's low-power/"sleep" mode is typically contingent upon the installation and use of a particular version of an operating system. If a computer is shipped from the Program Participant with one or more operating systems, the computer shall be capable of entering and fully recovering from the low-power/"sleep" sleep mode while running in at least one of those operating systems. If the computer is not shipped with operating system software, the Program Participant shall clearly specify which mechanism will render the computer ENERGY STAR qualified. In addition, if any special software, hardware drivers, or utilities are necessary for the proper activation and recovery of the sleep mode, they must be installed in the computer. The Program Participant shall include this information in product literature (e.g. user's manual or data sheets) and/or on its Internet website. Brochures and advertisements shall be worded to avoid misleading statements.
4. Monitor Control: The computer shall include one or more mechanisms through which it can activate the low-power modes of an ENERGY STAR qualified monitor. Program Participant shall clearly specify in product literature the manner in which its computer can control ENERGY STAR qualified monitors, and any special circumstances that must exist in order for monitor power management to be accomplished. Program Participant shall set the computer's default to activate the monitor's first low-power or sleep mode within 30 minutes of user inactivity. Program Participant shall also set the default time for the next level of power management such that the monitor enters the second low-power or "deep sleep" mode within 60 minutes of inactivity. The combined total of the default times for both low-power modes shall not exceed 60 minutes. Program Participant can choose to set the computer to activate the monitor to enter the second low-power or "deep sleep" mode directly within 30 minutes of inactivity.
The user shall have the ability to change the time settings or disable the low-power modes for the monitor control. This monitor control requirement does not apply to integrated computer systems. However, integrated computer systems that are marketed and sold as part of a docking system shall have the capability to automatically control the power of an externally connected monitor.
C. Test Guidelines for ENERGY STAR Qualified Computers
1. Test Conditions: Outlined below are the ambient test conditions which should be established when performing the power measurement. These are necessary in order to ensure that outside factors do not affect the test results, and that test results can be reproduced later.
Line Impedance: < 0.25 ohm
Total Harmonic Distortion: < 5 %
Voltage:
Input AC Voltage [2]: 115 VAC RMS ±5 V RMS
Input AC Frequency [3]: 60 Hz ±3 Hz
Ambient Temperature: 25 deg. C ±3 deg. C
2. Testing Equipment: The goal is to accurately measure the TRUE power consumption [4] of the device or monitor. This necessitates the use of a True RMS Watt-Meter. There are many watt-meters to choose from, but manufacturers will need to exercise care in selecting an appropriate model. The following factors should be considered when purchasing a meter and setting up the actual test.
Crest Factor:
A previous version of the ENERGY STAR testing procedure included a requirement that manufacturers utilise a watt-meter with a crest factor greater than 8. As many Program Participants pointed out, this is not a useful or relevant requirement. The following paragraphs are meant to discuss the issues relating to crest factor and to clarify the intent of the initial incorrect statement. Unfortunately, in order to remedy the error, the ENERGY STAR program cannot provide a specific equipment requirement. Testing is as much art as it is science, and manufacturers and testers will

have to exercise judgement, and draw on people well versed in testing issues, to select an appropriate meter.
+++++ TIFF +++++
Figure 1
To begin, it is important to understanding that devices which contain switching power supplies draw current in a waveform different from typical sinusoidal current [5]. Figure 1 shows the typical current waveform for a typical switched electronic device. While virtually any watt-meter can measure a standard current waveform, it is more difficult to select a watt meter when irregular current waveforms are involved.
It is critical that the watt-meter selected be capable of reading the current drawn by the device without causing internal peak distortion (i.e., clipping off the top of the current wave). This requires a review of the meter's crest factor [6], and of the current ranges available on the meter. Better meters will have higher crest factors, and more choices of current ranges.
When preparing the test, the first step should be to determine the peak current (amps) associated with the device being measured. This can be accomplished using an oscilloscope. Then a current range must be selected that will enable the meter to register the peak current. Specifically, the full scale value of the current range selected multiplied by the crest factor of the meter (for current) must be greater than the peak current reading from the oscilloscope. For example, if a watt meter has a crest factor of 4, and the current range is set on 3 amps, the meter can register current spikes of up to 12 amps. If measured peak current is only 6 amps, the meter would be satisfactory. The other concern to be aware of is that if the current range is set too high in order to register peak current, it may lose accuracy in measuring the non-peak current. Therefore, some delicate balancing is necessary. Again, with more current range choices and higher crest factors you will get better results.
Frequency Response:
Another issue to consider when selecting a watt-meter is the frequency response rating of the meter. Electronic equipment that contains switching power supplies causes harmonics (odd harmonics typically up to the 21st). These harmonics must be accounted for in power measurement, or the Wattage consumption will be inaccurate. Accordingly, ENERGY STAR recommends that manufacturers purchase watt-meters that have a frequency response of at least 3 kHz. This will account for harmonics up to the 50th, and is recommended by IEC 555.
Resolution:
Manufacturers will probably want a meter than can provide resolution of 0.1 W.
Accuracy:
Another feature to consider is the resulting accuracy you will be able to achieve. Catalogues and specification sheets for watt-meters typically provide information on the accuracy of power readings that can be achieved at different range settings. If you are measuring a product that is very close to the maximum energy consumption for the mode being tested, you will need to set up a test that will provide greater accuracy.
Calibration:
Watt meters should be calibrated every year to maintain their accuracy.
3. Test Method: Manufacturers should measure the Average power consumption of the devices when in the off or low-power modes. This should be done by measuring the Energy consumption over a 1-hour period. The resulting energy consumption can be divided by 1 hour to calculate average Watts.
Power Measurement for Energy Saving Modes: This test should be conducted for each of the energy saving modes (e.g., low-power, off, standby, sleep) applicable to a particular device for ENERGY STAR qualification. Prior to the start of this test, the machine should have been plugged in to a live power line but turned off and stabilised at room ambient conditions for at least 12 hours. An appropriate watt-hour meter should be in line with the machine, ready to give an accurate indication of machine energy consumption without disruption of the power source. This measurement may be done sequentially with the off-mode power measurement; the two tests together should take no more

than 14 hours to perform, including the time required for the machine to be plugged in and turned off.
Turn on the device, and let it go through its warm-up cycle. After the default time to the energy saving mode has passed, read and record the watt-hour meter indication and the time (or start the stopwatch or timer). After 1 hour, read and record the watt-hour indication again. The difference between the two readings of the watt-hour meter is the low-power mode energy use; divide by 1 hour to obtain the average power rating.
II. COMPUTER MONITOR SPECIFICATIONS
A. Definitions
1. Computer Monitor (also referred to as "Monitor"): A commercially-available, electronic product with a display screen and its associated electronics encased in a single housing that is capable of displaying output information from a computer via one or more inputs, such as VGA, DVI, and/or IEEE 1394. The monitor usually relies upon a cathode-ray tube (CRT), liquid crystal display (LCD), or other display device. This definition is intended primarily to cover standard monitors designed for use with computers. To qualify, the computer monitor must have a viewable diagonal screen size greater than 12 inches and must be capable of being powered by a separate AC wall outlet or a battery unit that is sold with an AC adapter. Computer monitors with a tuner/receiver may qualify as Energy Star under this specification as long as they are marketed and sold to consumers as computer monitors (i.e., focusing on computer monitor as the primary function) or as dual function computer monitors and televisions. However, products with a tuner/receiver and computer capability that are marketed and sold as televisions are not included in this specification.
2. On Mode/Active Power: The product is connected to a power source and produces an image. The power requirement in this mode is typically greater than the power requirement in Sleep and Off Modes.
3. Sleep Mode/Low Power: The reduced power state that the computer monitor enters after receiving instructions from a computer or via other functions. A blank screen and reduction in power consumption characterise this mode. The computer monitor returns to On Mode with full operational capability upon sensing a request from a user/computer (e.g., user moves the mouse or presses a key on the keyboard).
4. Off Mode/Standby Power: The lowest power consumption mode which cannot be switched off (influenced) by the user and that may persist for an indefinite time when a computer monitor is connected to the main electricity supply and used in accordance with the manufacturer's instructions. For purposes of this specification, Off Mode is defined as the power state when the product is connected to a power source, produces no images, and is waiting to be switched to On Mode by a direct signal from a user/computer (e.g., user pushes power switch) [7].
5. Hard Off Mode: A condition where the product is still plugged into the mains, but has been disconnected from an external power source. This mode is usually engaged by the consumer via a "hard off switch." While in this mode, a product will not draw any electricity and will usually measure 0 watts when metered.
6. Disconnect: The product has been unplugged from the mains and therefore is disconnected from all external power sources.
B. Qualifying Products
In order to qualify as ENERGY STAR, a computer monitor model must meet the definition in Section A, and the specification requirements provided in Section II.C, below. As explained in Section II.A.1, this specification does not cover products with computer capability that are marketed and sold as televisions.
C. Energy-Efficiency Specifications for Qualifying Products
Only those products listed in Section II.B that meet the following criteria may qualify as ENERGY STAR.

Widescreen Models: Widescreen (e.g., 16:9, 15:9, etc.) models are eligible to earn the ENERGY STAR, provided that they meet the energy-efficiency requirements in these specifications. There are no separate specifications for widescreen models and as such, they must comply with Sections II.C.1 and II.C.2, below.

1. On Mode/Active Power: To qualify as ENERGY STAR, computer monitor models must not exceed the following maximum active power consumption equation: If X < 1 megapixel, then Y = 23; if X > 1 megapixel, then Y = 28X. Y is expressed in watts and rounded up to the nearest whole number and X is the number of megapixels in decimal form (e.g., 1920000 pixels = 1.92 megapixels). For example, the maximum power consumption for a computer monitor with 1024 × 768 resolution (or .78 megapixels) would be Y = 23 watts and for a computer monitor with 1600 × 1200 resolution would be 28(1.92) = 53.76 or 54 watts when rounded up

To qualify a computer monitor as ENERGY STAR, it must be tested according to the protocol outlined in Section II.D, Test Methodology.

2. Sleep and Off Modes

(a) Maximum power consumption levels for Sleep and Off Modes are provided in Table 2 below. Computer monitors capable of multiple Sleep Modes (i.e., Sleep and Deep Sleep) shall meet the Sleep Mode requirement below in all such modes. For example, a computer monitor tested at 4 watts in Sleep and 2 watts in Deep Sleep would not qualify because one of the Sleep Modes exceeds 2 watts.

(b) Sleep Mode Exception: Computer monitors that have the capability to proceed automatically from On Mode/Active Power to an Off Mode/Standby Power of 1 watt or less comply with these energy consumption requirements. The computer monitor's Off Mode/Standby Power must be activated within 30 minutes of user inactivity or as otherwise defined in future versions of the Computer Specification. Upon resumption of user activity (e.g., user moves the mouse or presses a key on the keyboard), the computer monitor must return to full operational capability. In other words, a Sleep Mode is not necessary if the computer monitor can proceed from On Mode/Active Power to Off Mode/Standby Power and meet the ENERGY STAR requirements in the Off Mode/Standby Power.

Table 2

Energy-Efficiency Criteria for Sleep and Off Modes

Sleep Mode	≤ 2 watts
Off Mode	≤ 1 watt

(c) Sleep Mode Enabling: Energy savings from the computer monitor's Sleep Mode can only be achieved if this power-saving mode is enabled. Enabling and default times are driven by the computer; where feasible (e.g., where monitor manufacturer has a business relationship with specific computer manufacturers or where monitor manufacturer also sells its own computers or bundled products), monitor manufacturer should ensure that ENERGY STAR qualified computer monitors have their Sleep Modes enabled when shipped to the customer. Further, the computer shall activate the computer monitor's Sleep Mode within 30 minutes of user inactivity or as otherwise defined. If a computer monitor has the capability to proceed automatically from On Mode/Active Power to Off Mode/Standby Power, then, consistent with the Sleep Mode requirements, the computer monitor's Off Mode/Standby Power must be activated within 30 minutes of user inactivity or as otherwise defined.

D. Test Methodology

Product Testing Set-up, Methodology, and Documentation: The testing and measurement methods below reference published specifications from the Video Electronics Standards Association (VESA) Display Metrology Committee and the International Electrotechnical Commission (IEC), and supplement those guidelines where necessary with methods developed in cooperation with the computer monitor industry.

Manufacturers are required to perform tests and self-certify those product models that meet the ENERGY STAR guidelines. Families of computer monitor models that are built on the same chassis and are identical in every respect but housing and colour may be qualified through submission of test

data for a single, representative model. Likewise, models that are unchanged or that differ only in finish from those sold in a previous year may remain qualified without the submission of new test data, assuming the specification remains unchanged.
The power requirement shall be measured from the outlet or power source to the product under test. The average true power consumption of the computer monitor shall be measured during the On Mode/Active Power, the Sleep Mode/Low Power, and the Off Mode/Standby Power. When performing measurements to self-certify a product model, the product being tested must initially be in the same condition (e.g., configuration and settings) as when shipped to the customer, unless adjustments need to be made pursuant to instructions below.
To ensure a consistent means for measuring the power consumption of electronics products, the following protocol must be followed, which has three main components:
Product Testing Set-up and Conditions: Outlined below in Sections 1(a) through (h) are the ambient test conditions and measurement protocols that must be respected when performing power measurements.
Product Testing Methodology: The actual test steps for measuring power in On Mode/Active Power, Sleep Mode/Low Power, and Off Mode/Standby Power are provided in Section 2(a), below.
Product Testing Documentation: Documentation requirements for submittal of qualified product data are detailed in Section 3, below.
This protocol ensures that outside factors do not adversely affect the test results and that the test results can be consistently reproduced. Manufacturers may elect to use an in-house or independent laboratory to provide the test results.
1. Product Testing Set-up and Conditions
(a) Test Conditions: General Criteria
Supply Voltage [8]: | Europe: | 230 (±1 %) Volts AC, 50 Hz (±1 %) |
North America: | 115 (±1 %) Volts AC, 60 Hz (±1 %) |
Australia/New Zealand: | 230 (±1 %) Volts AC, 50 Hz (±1 %) |
Japan: | 100 (±1 %) Volts AC, 50 Hz (±1 %)/60 Hz (±1 %) |
Total Harmonic Distortion (Voltage): | < 2 % THD |
Ambient Temperature: | 20 °C ±5 °C |
Relative Humidity: | 30 – 80 % |
Line Impedance: | < 0.25 ohm |
(Reference IEC 62301: Household Electrical Appliances – Measurement of Standby Power, Sections 3.2, 3.3 and VESA Flat Panel Display Measurements (FPDM) Standard 2.0, Section 301-2)
(b) Dark Room Conditions: When performing light measurements, the computer monitor shall be located in a dark room condition. The computer monitor screen illuminance measurement (E), when in Off Mode/Standby Power, must be 1.0 Lux or less. Measurements should be made at a point perpendicular to the centre of the screen using a Light Measuring Device (LMD) with the computer monitor in Off Mode/Standby Power (Reference VESA FPDM Standard 2.0, Section 301-2F).
(c) Colour Controls and Peripherals: All colour controls (hue, saturation, gamma, etc.) shall be placed at their factory default settings. No external devices shall be connected to any included Universal Serial Bus (USB) hubs or ports. Any built-in speakers, TV tuners, etc. may be placed in their minimum power configuration, as adjustable by the user, to minimise power use not associated with the display itself. Circuit removal or other actions not under user control may not be taken to minimise power use.
(d) Power Measurement Test Conditions: CRT pixel format shall be set at the preferred pixel format with the highest resolution that is intended to be driven at a 75 Hz refresh rate. A VESA Discrete Monitor Timing (DMT) or newer industry standard pixel format timing must be used for the test. The CRT monitor must be capable of meeting all its manufacturer-stated quality specifications in the tested format. For LCDs and other fixed pixel technologies, pixel format shall be set to the native

level. LCD refresh rate shall be set to 60 Hz, unless a different refresh rate is specifically recommended by the manufacturer, in which case that rate shall be used.
(e) Power Measurement Protocols: Computer monitor power consumption shall be measured in watts with an imposed test pattern. Warm-up time shall be a minimum of a 20-minute period (Reference VESA FPDM Standard 2.0, Section 301-2D or 305-3 for warm-up test). A true RMS power meter with a crest factor of at least five shall be used to measure the power use of each randomly chosen unit at one or more, as appropriate, of the voltage/frequency combinations provided in Section II.D.1(a) (Reference VESA Standard: Display Specifications and Measurement Procedures, Version 1.0, Revision 1.0, Section 8.1.3). Measurements shall be taken after wattage values are stable over a three-minute period. Measurements are considered stable if the wattage reading does not vary more than 1 % over the three-minute period (Reference IEC 4.3.1). (Manufacturers shall ignore the input sync signal check cycle when metering the model in Sleep Mode/Low Power and Off Mode/Standby Power.) Manufacturers shall use calibrated measuring equipment capable of measurements accurate to one-tenth of a watt or better.
Borrowing from European Norm 50301 (Reference BSI 03-2001, BS EN 50301:2001, Methods of Measurement for the Power Consumption of Audio, Video, and Related Equipment, Annex A), EPA has established a test procedure where the number of units required for test depends on the test results for the first unit. For the purposes of ENERGY STAR, if a tested computer monitor uses at least 15 % less power (i.e., greater than or equal to 15 %) than the ENERGY STAR specification in all three operating modes (On Mode/Active Power, Sleep Mode/Low Power, and Off Mode/Standby Power), then it only has to be tested once. However, if a tested computer monitor is within 15 % (i.e., less than 15 %) of the ENERGY STAR specification in any of the three operating modes, then two more units have to be tested. None of the test values may exceed the ENERGY STAR specification for the model to qualify as ENERGY STAR. All of the test results as well as the average values (based on the three or more data points) must be reported on an ENERGY STAR Qualifying Product Information (QPI) form.
The following example further illustrates this approach:
Example: For simplicity, assume the specification is 100 watts or less and only applies to one operational mode. 85 watts would represent the 15 % threshold.If the first unit is measured at 80 watts, no more testing is needed and the model qualifies (80 watts is at least 15 % more efficient than the specification and is "outside" the 15 % threshold).If the first unit is measured at 85 watts, no more testing is needed and the model qualifies (85 watts is exactly 15 % more efficient than the specification).If the first unit is measured at 90 watts, then two more units must be tested to determine qualification (90 watts is only 10 % more efficient than the specification and is "within" the 15 % threshold).If three units are tested at 90, 98, and 105 watts, the model does not qualify as ENERGY STAR–even though the average is 98 watts– because one of the values (105) exceeds the ENERGY STAR specification.
(f) Luminance Test Patterns and Procedures: For CRT monitors, the technician shall initiate the AT01P (Alignment Target 01 Positive Mode) pattern (VESA FPDM Standard 2.0, A112-2F, AT01P) for screen size and use it to set the computer monitor to the manufacturer's recommended image size, which is typically slightly smaller than maximum viewable screen size. Then, test pattern (VESA FPDM Standard 2.0, A112-2F, SET01K) shall be displayed that provides eight shades of grey from full black (0 volts) to full white (0.7 volts) [9]. Input signal levels shall conform to VESA Video Signal Standard (VSIS), Version 1.0, Rev. 2.0, December 2002. The technician shall adjust (where feasible) the computer monitor brightness control downward from its maximum until the lowest black bar luminance level is just slightly visible (VESA FPDM Standard 2.0, Section 301-3K). The technician shall then display a test pattern (VESA FPDM Standard 2.0, A112-2H, L80) that provides a full white (0.7 volts) box that occupies 80 % of the image. The technician shall then adjust the contrast control until the white area of the screen provides at least 100 candelas per square meter of luminance, measured according to VESA FPDM Standard 2.0, Section 302-1.

For all Fixed Pixel displays (e.g., LCDs and others), test pattern (VESA FPDM Standard 2.0, A112-2F, SET01K) shall be displayed that provides eight shades of grey from full black (0 volts) to full white (0.7 volts).2 Input signal levels shall conform to VESA Video Signal Standard (VSIS), Version 1.0, Rev. 2.0, December 2002. With the brightness and contrast controls at maximum, the technician shall check that, at a minimum, the white and near white grey levels can be distinguished. If white and near white grey levels cannot be distinguished, then contrast shall be adjusted until they can be distinguished. The technician shall next display a test pattern (VESA FPDM Standard 2.0, A112-2H, L80) that provides a full white (0.7 volts) box that occupies 80 % of the image. The technician shall then adjust the brightness control until the white area of the screen provides at least 175 candelas per square meter of luminance, measured according to VESA FPDM Standard 2.0, Section 302-1. [If computer monitor's maximum luminance is less than 175 candelas per square meter (e.g., 150), then technician shall use the maximum luminance (e.g., 150) and report the value to EPA with other required testing documentation. Similarly, if the computer monitor's minimum luminance is greater than 175 candelas per square meter (e.g., 200), then technician shall use the minimum luminance (e.g., 200) and report the value on the ENERGY STAR QPI form.

(g) Light Measurement Protocols: When light measurements, such as illuminance and luminance, need to be made, a LMD shall be used with the computer monitor located in dark room conditions. The LMD shall be used to make measurements at the centre of, and perpendicular to the computer monitor screen (Reference VESA FPDM Standard 2.0, Appendix A115). The screen surface area to be measured shall cover at least 500 pixels, unless this exceeds the equivalent of a rectangular area with sides of lengths equal to 10 % of the visible screen height and width (in which case this latter limit applies). However, in no case may the illuminated area be smaller than the area the LMD is measuring (Reference VESA FPDM Standard 2.0, Section 301-2H).

(h) Display Set-up and Characterisation: The computer monitor test sample characteristics shall be recorded prior to the test. The following information shall be recorded at a minimum:

Product Description/Category (e.g., 17-inch computer monitor with white housing) |
Display Technology (e.g., CRT, LCD, Plasma) |
Brand Name/Manufacturer |
Model Number |
Serial Number |
Rated Voltage (VAC) and Frequency (Hz) |
Viewable Diagonal Size (inches) |
Aspect Ratio (e.g., 4:3) |
Recommended Image Size (actual size tested) Width X Height |
Viewing Angle (horizontal and vertical degrees) |
Screen Refresh Rate (during test) (Hz) |
Number of Pixels as Tested (horizontal) |
Number of Pixels as Tested (vertical) |
Maximum Claimed Resolution (horizontal) |
Maximum Claimed Resolution (vertical) |
Analogue, Digital, or Both Interfaces |
Instrumentation Information (e.g., type of signal generator) |

2. Product Testing Methodology

(a) Test Method: Following are the test steps for measuring the true power requirements of the test unit in On Mode/Active Power, Sleep Mode/Low Power, and Off Mode/Standby Power. Manufacturers are required to test their computer monitors using the analogue interface, except in those cases where one is not provided (i.e., digital interface monitors, which are defined as only having a digital interface for purposes of this test method). For digital interface monitors, please see Footnote 8 for voltage information and then follow the test method below using a digital signal generator.

(i) On Mode/Active Power
(a) Connect the test sample to the outlet or power source and test equipment. For computer monitors shipped with an external power supply, the external power supply (as opposed to a reference power supply) must be used in the test.
(b) Power on all test equipment and properly adjust power source voltage and frequency.
(c) Check for normal operation of the test unit and leave all customer adjustments set to factory default settings.
(d) Bring the test unit into On Mode/Active Power either by using the remote control device or by using the ON/OFF switch on the test unit cabinet. Allow the unit under test to reach operating temperature (approximately 20 minutes).
(e) Set the proper display mode. Refer to Section II.D.1(d), Power Measurement Test Conditions.
(f) Provide dark room conditions. See Sections II.D.1(g), Light Measurement Protocols, and B, Dark Room Conditions.
(g) Set size and luminance. Refer to Section II.D.1(f), Luminance Test Patterns and Procedures for CRT or Fixed Pixel displays. Once luminance is set, dark room conditions are no longer needed.
(h) Either verify that the wall outlet power is within specifications or adjust the AC power source output as described in Section II.D.1(a) (e.g., 115V ±1 %, 60Hz ±1 %).
(i) Set the power meter current range. The full-scale value selected multiplied by the crest factor rating (Ipeak/Irms) of the meter must be greater than the peak current reading from the oscilloscope.
(j) Allow the readings on the power meter to stabilise and then take the true power reading in watts from the power meter. Measurements are considered stable if the wattage reading does not vary more than 1 % over the three-minute period. See Section II.D.1(e), Power Measurement Protocols.
(k) Power consumption shall be recorded, as well as total pixel format (horizontal × vertical pixels displayed), to calculate pixels/watt.
(l) Record the test conditions and test data.
(ii) Sleep Mode/Low Power (Power Switch On, No Video Signal)
(a) At the conclusion of the On Mode/Active Power test, initiate the computer monitor's Sleep Mode/Low Power. The method of adjustment shall be documented along with the sequence of events required to reach the Sleep Mode/Low Power. Power on all test equipment and properly adjust operation range.
(b) Allow the computer monitor to remain in Sleep Mode/Low Power until stable power readings are measured. Measurements are considered stable if the wattage reading does not vary more than 1 % over the three-minute period. Manufacturers shall ignore the input sync signal check cycle when metering the model in Sleep Mode/Low Power.
(c) Record the test conditions and test data. The measurement time shall be sufficiently long to measure the correct average value (i.e., not peak or instantaneous power). If the device has different Sleep Modes that can be manually selected, the measurement should be taken with the device in the most energy consumptive of those modes. If the modes are cycled through automatically, the measurement time should be long enough to obtain a true average that includes all modes.
(iii) Off Mode/Standby Power (Power Switch Off)
(a) At the conclusion of the Sleep Mode/Low Power test, initiate the computer monitor's Off Mode/Standby Power. If only one power switch is provided (i.e., a soft off or a hard off), press that switch; if two power switches are provided (i.e., a soft off AND a hard off), press the soft off switch. The method of adjustment shall be documented along with the sequence of events required to reach the Off Mode/Standby Power. Power on all test equipment and properly adjust operation range.
(b) Allow the computer monitor to remain in Off Mode/Standby Power until stable power readings are measured. Measurements are considered stable if the wattage reading does not vary more than 1 % over the three-minute period. Manufacturers shall ignore the input sync signal check cycle when metering the model in Off Mode/Standby Power.

(c) Record the test conditions and test data. The measurement time shall be sufficiently long to measure the correct average value (i.e., not peak or instantaneous power).

3. Product Testing Documentation

Submittal of Qualified Product Data: Partners are required to self-certify those product models that meet the Energy Star guidelines and report information on an ENERGY STAR QPI form. ENERGY STAR qualifying product data, including information about new as well as discontinued models, must be provided on an annual basis, or more frequently if desired by the manufacturer.

E. User Interface

Manufacturers are strongly recommended to design products in accordance with the user interface standards being developed by the Power Management Controls project to make power controls more consistent and intuitive across all electronic devices. For details on this project, see http://eetd.LBL.gov/Controls.

III. PRINTER, FAX MACHINE, AND MAILING MACHINE SPECIFICATIONS

The following Printer, Fax Machine, and Mailing Machine Specifications shall be applicable until 31 March 2007.

A. Definitions

1. Printer: Imaging equipment, manufactured as a standard model, that serves as a hard-copy output device, and is capable of receiving information from single-user or networked computers. In addition, the unit must be capable of being powered from a wall outlet. This definition is intended to cover products that are advertised and sold as printers including printers that can be upgraded to a multifunction device (MFD) [10].

2. Fax Machine: Imaging equipment, manufactured as a standard model, that serves as a hard copy output device whose primary function is sending and receiving information. Plain paper fax machines are covered under this Specification (e.g., ink jet/bubble jet, laser/LED, and thermal transfer). The unit must be capable of being powered from a wall outlet. This definition is intended to cover products that are advertised and sold as fax machines.

3. Combination Printer/Fax Machine: Imaging equipment manufactured as a standard model that serves as both a fully-functional printer and fax machine, as defined above. This definition is intended to cover products that are marketed and sold as a combination printer/fax device.

4. Mailing Machine: Imaging equipment that serves to print postage onto mail pieces. The unit must be capable of being powered from a wall outlet. This definition is intended to cover products that are advertised and sold as mailing machines.

5. Print Speed: Pages per minute (ppm) measures the printing speed of a model. Print speed corresponds to the product's print speed as advertised by Program Participant. For Line Printers (e.g., dot matrix/impact printers), print speed is based on the method established in ISO 10561.

For wide format printers designed to handle primarily A2 or 17″ × 32″ paper or larger, the print speed is specified in terms of monochrome text output at the default resolution. The print speed measured as A2 or A0-sized prints per minute, shall be converted into A4-sized print speeds as follows: (a) One A2 print per minute is equivalent to four A4 prints per minute; (b) One A0 print per minute is equivalent to 16 A4 prints per minute.

For mailing machines, pages per minute (ppm) are considered equivalent to mail pieces per minute (ppm).

6. Accessory: A piece of additional equipment that is not necessary for the standard operation of the base unit, but may be added before or after shipping in order to enhance or change printer performance. Examples of accessories include finishers, sorters, additional paper supply devices, and duplex units. An accessory may be sold separately under its own model number, or sold with a base unit as part of a printer.

7. Active Mode: The condition (or mode) in which the product is producing hard copy output or receiving hard copy input. The power requirement in this mode is typically greater than the power requirement in standby mode.

8. Standby Mode: The condition that exists when the product is not producing hard copy output or receiving hard copy input and is consuming less power than when producing such output or receiving such input. The transition from Standby Mode to Active Mode should cause no noticeable delay in the production of hard copy output.
9. Sleep Mode: The condition that exists when the product is not producing hard copy output or receiving hard copy input and is consuming less power than when in standby mode. In the transition from Sleep Mode to Active Mode, there may be some delay in the production of hard copy output, however there shall be no delay in the acceptance of information from a network or other input sources. The product enters this mode within a specified time period after the last hard copy output was produced.
10. Default Time To Sleep Mode: The time period set by the Program Participant prior to shipping that determines when the product will enter the Sleep Mode. The default time shall be measured from the time that the last piece of hard copy output was produced.
11. Duplexing: The process of producing text, an image, or a combination of text and image on both sides of a single sheet of paper.
12. Standard Model: The term used to describe a product and its bundled features as marketed and sold by the Program Participant and as manufactured for its intended use.
13. Wake Event: As used in this agreement, a "wake event" is defined as a user, programmed, or external event or stimulus that causes the unit to transition from its standby or Sleep Mode to its active mode of operation. A "wake event" as defined in this Specification does not include network related polling queries or "pings" that commonly occur in network environments.
B. Product Qualification for ENERGY STAR
1. Technical Specifications
(a) Sleep Mode: ENERGY STAR Program Participant agrees that only those products that are capable of entering a Sleep Mode after a period of inactivity or maintain a level of power consumption at or below the levels of power specified in Tables 3 through 8 (below), may qualify as ENERGY STAR.
(b) Default Time: ENERGY STAR Program Participant agrees to set the product's default time to activate the Sleep Mode within the time specified in Tables 3 through 8 (below) from the completion of the last job (e.g., from the time that the last piece of hard copy output was produced). Program Participant also shall ship products with the default time for the Sleep Mode set to the levels specified in Tables 3 through 8 (below).
(c) Network Functionality: ENERGY STAR Program Participant agrees to qualify products as they are intended to be used (Section III.A.12 above) by the end-user, particularly products intended to be connected to a network. ENERGY STAR Program Participant agrees that all products marketed, advertised, or sold as network-capable must meet the ENERGY STAR specifications (below) when configured as network-ready (i.e., with network functionality).
(i) If the product is shipped with the capability to be on a network, it shall have the ability to enter a Sleep Mode while on the network.
(ii) If the product has the capability to be on a network, it shall retain in Sleep Mode its ability to respond to wake events directed or targeted to the product while on a network.
(d) Duplexing: For all standard-size printers above 10 ppm in which a duplexing unit is installed, it is recommended that ENERGY STAR Program Participant educate its customers about using their printers with duplex set as the default printing mode. Education may consist of information about the appropriate printer driver and print menu setup in the product manuals, or by providing specific instructions about the printer driver when a duplexing unit is installed.
(e) Detailed Specifications: ENERGY STAR Program Participant agrees to qualify products according to the following specifications:
Table 3
Stand Alone Fax Machines
(designed to accommodate primarily A4 or 8.5″ × 11″ sized paper)

Product Speed In Pages Per Minute (ppm) | Sleep Mode (Watts) | Default Time To Sleep Mode |
0 < ppm ≤ 10 | ≤ 10 | ≤ 5 minutes |
10 < ppm | ≤ 15 | ≤ 5 minutes |
Table 4
Mailing Machines
Product Speed In Mail Pieces Per Minute (mppm) | Sleep Mode (Watts) | Default Time To Sleep Mode |
0 < mppm ≤ 50 mppm | ≤ 10 | ≤ 20 minutes |
50 < ppm ≤ 100 mppm | ≤ 30 | ≤ 30 minutes |
100 < mppm ≤ 150 mppm | ≤ 50 | ≤ 40 minutes |
150 < mppm | ≤ 85 | ≤ 60 minutes |
Table 5
Standard Size Printers and Printer/Fax Combinations []
(designed to accommodate primarily A3, A4, or 8.5″ × 11″ sized paper)
Product Speed In Pages Per Minute (ppm) | Sleep Mode (Watts) [12] | Default Time To Sleep Mode |
0 < ppm ≤ 10 | ≤ 10 | ≤ 5 minutes |
10 < ppm ≤ 20 | ≤ 20 | ≤ 15 minutes |
20 < ppm ≤ 30 | ≤ 30 | ≤ 30 minutes |
30 < ppm ≤ 44 | ≤ 40 | ≤ 60 minutes |
44 < ppm | ≤ 75 | ≤ 60 minutes |
Table 6
Impact Printers designed to accommodate primarily A3 paper
Sleep Mode (Watts) | Default Time To Sleep Mode |
≤ 28 | ≤ 30 minutes |
Table 7
Large/Wide-Format Printers
(designed to accommodate primarily A2 or 17″ × 22″, or larger paper)
Product Speed In Pages Per Minute (ppm) | Sleep Mode (Watts) | Default Time To Sleep Mode |
0 < ppm ≤ 10 | ≤ 35 | ≤ 30 minutes |
10 < ppm ≤ 40 | ≤ 65 | ≤ 30 minutes |
40 < ppm | ≤ 100 | ≤ 90 minutes |
Table 8
Colour Printers []
(designed to accommodate primarily A3, A4, or 8.5″ × 11″ sized paper)
Product Speed In Colour Pages Per Minute (ppm) | Sleep Mode (Watts) | Default Time To Sleep Mode |
0 < ppm ≤ 10 | ≤ 35 | ≤ 30 minutes |
10 < ppm ≤ 20 | ≤ 45 | ≤ 60 minutes |
20 < ppm | ≤ 70 | ≤ 60 minutes |
2. Exceptions and Clarifications
After shipping, the ENERGY STAR Program Participant or its designated service representative shall not alter the models covered by this Specification in any way that will affect the products' ability to meet the specifications outlined above. Two exceptions follow:
(a) Default Times: After shipping, the ENERGY STAR Program Participant, designated service representative, or customer may change the default times for the Sleep Mode, up to a factory-set maximum of 240 minutes. If a manufacturer chooses to design products with more than one power management mode, then the combined total of the default times shall not exceed 240 minutes.
(b) Disabling the Sleep Mode: In an individual case where the Sleep Mode is causing a customer sizeable inconvenience due to his/her particular usage patterns, the Program Participant, designated service representative, or customer may disable this Sleep Mode feature. If the Program Participant

chooses to design its product models to allow the customer to disable the Sleep Mode feature, then the disable option shall be accessed in a manner different from the time settings. E.g., if a software menu provides Sleep Mode delay times of 15, 30, 60, 90, 120, and 240 minutes, then "disable" or "off" shall not be a choice in this menu. It shall be a hidden (or less obvious) choice or included in a different menu.

C. Test Guidelines

1. Test Conditions: Outlined below are the ambient test conditions which should be established when performing the power measurement. These are necessary in order to ensure that outside factors do not affect the test results, and that test results can be reproduced later.

Line Impedance: < 0.25 ohm

Total Harmonic Distortion: < 5 %

(Voltage)

Ambient Temperature: 25 deg. C ±3 deg. C

Input AC Voltage: 115 VAC RMS ±5 V RMS

Input AC Frequency: 60 Hz ±3 Hz

2. Testing Equipment: The provisions of Section I.C.2 apply.

3. Test Method: The provisions of Section I.C.3 apply.

IV. COPIER SPECIFICATIONS

The following Copier Specifications shall be applicable until 31 March 2007.

A. Definitions

1. Copier: A commercial reprographic imaging unit whose sole function is the production of duplicates from a graphic hard copy original. A copier must include a marking system, an imaging system, and a paper handling module. All black and white plain paper copier technologies are covered under this Specification, though the intent is to focus on widely-used standard copier equipment such as light lens copiers. The Specifications outlined below apply to standard-sized copiers designed to handle A4 or 8.5″ × 11″ paper and large format copiers designed to handle A2 or 17″ × 22″ paper or larger.

2. Copier Speed: Copies per minute (cpm) measures the reproduction speed of the copier. One copy is defined as one 8.5″ × 11″ or A4-sized page. Double-sided copies are considered as two images and therefore two copies even though they are copied onto one piece of paper. For all copier models sold in the U.S. market, measurement of copier speed shall be based on 8.5″ × 11″ letter-sized paper. For copiers sold in markets other than the U.S., copier speed shall be based on either 8.5″ × 11″ or A4-sized paper, depending on which is standard in a particular market.

For large format copiers designed to handle primarily A2 or 17″ × 22″ paper or larger, the copier speed measured as A2- or A0-sized copies per minute shall be converted to A4-sized copier speeds as follows: (a) One A2 copy per minute is equivalent to four A4 copies per minute, and (b) One A0 copy per minute is equivalent to 16 A4 copies per minute.

Copiers qualified as ENERGY STAR shall be divided into five categories: low speed standard-sized copiers, medium speed standard-sized copiers, high speed standard-sized copiers, low speed large format copiers, and medium and high speed large format copiers.

(a) Low Speed Standard-Sized Copiers: Copiers with an engine speed for producing multiple images of 20 copies per minute or less.

(b) Medium Speed Standard-Sized Copiers: Copiers with an engine speed for producing multiple images of greater than 20 and less than or equal to 44 copies per minute.

(c) High Speed Standard-Sized Copiers: Copiers with an engine speed for producing multiple images of greater than 44 copies per minute.

(d) Low Speed Large Format Copiers: Copiers with an engine speed for producing multiple images of 40 copies per minute or less (expressed as A4-sized copies per minute).

(e) Medium and High Speed Large Format Copiers: Copiers with an engine speed for producing multiple images of greater than 40 copies per minute (expressed as A4-sized copies per minute).

3. Base Unit: For a given engine speed, the base unit is defined as the most basic version of a copier that is actually sold as a fully operational model. The base unit is typically designed and shipped in a single piece, and does not include any external power-consuming accessories that may be sold separately.
4. Accessory: A piece of additional equipment that is not necessary for the standard operation of the base unit, but that may be added before or after shipping in order to enhance or change copier performance. An accessory may be sold separately under its own model number, or sold with a base unit as part of a copier package or configuration. Examples of accessories include: sorters, large capacity paper feeders, etc. It is assumed that the addition of an accessory, irrespective of its own power consumption, will not substantially increase (more than 10 percent) the off mode power consumption of the base unit. Any accessories shall not impede the normal operation of the auto-off and low-power features.
5. Copier Model: For purposes of this Specification, a copier model is defined as a base unit and one or more specific accessories that are advertised and sold to consumers under a single model number. When advertised and sold to consumers without any additional accessories, a base unit is also considered a copier model.
6. Low-Power Mode: For purposes of this Specification, the low-power mode is the lowest power state the copier can automatically enter within some period of copier inactivity, without actually turning off. The copier enters this mode within a specified period of time after the last copy was made. For purposes of determining the power consumption in this low-power mode, the company may choose to measure the lowest of either the energy-saver mode or the standby mode.
7. Energy-Saver Mode: The condition that exists when the machine is not making copies, has previously reached operating conditions but is consuming less power than when the machine is in stand-by mode. When the copier is in this mode, there may be some delay before the copier will be capable of making the next copy.
8. Standby Mode: The condition that exists when the machine is not making copies, has reached operating conditions and is ready to make a copy, but has not yet entered into energy-saver mode. When the copier is in this mode, there will be virtually no delay before the copier is capable of making the next copy.
9. Off Mode: For purposes of this Specification, the off mode is defined as the condition that exists when the copier is connected to an appropriate electrical source, and has been recently shut off via the auto-off feature [14]. When measuring power in this mode, control equipment for remote servicing may be excluded.
10. Auto-off Feature: For purposes of this Specification, the auto-off feature is defined as the ability for the copier to automatically shut itself off within a specified period of time after the last copy was made. The copier shall automatically enter its off mode after execution of this feature.
11. Plug-in Mode: The condition that exists when the machine is connected to an appropriate electrical source and is not turned on. To turn the copier on, the user typically needs to manually restart the copier via the on/off switch.
12. Default Times: The time period set by the Program Participant prior to shipping that determines when the copier will enter its various modes, i.e., the low-power mode, the off mode, etc. Both the off mode default times and the low-power mode default times shall be measured from the time the last copy was made.
13. Recovery Time: The amount of time needed to bring the copier from a low-power mode to the standby mode.
14. Automatic Duplex Mode: The mode in which the copier automatically places images on both sides of a copy sheet, by automatically sending both the copy sheet and the graphic original through the copier model. Examples of this are one-sided to two-sided copying, or two-sided to two-sided copying. For purposes of this Specification, a copier model is considered to have an automatic duplex

mode only if the copier model includes all accessories needed to satisfy the above conditions, i.e., an automatic document feeder and accessories for automatic duplexing capabilities.

15. Weekly Timer: An internal device that turns a copier on and off at predetermined times each business day. When programming a timer, the customer shall be able to distinguish between business days and weekends/holidays (i.e., a timer shall not turn on a copier on Saturday and Sunday mornings if employees are not normally in the office on weekends). The customer shall also have the ability to disable the timer. Weekly timers are optional features, and therefore are not required on Energy Star compliant copiers. If included in copier models, weekly timers shall not conflict with the functioning of the low-power and auto-off features.

B. Product Qualification for ENERGY STAR

1. Technical Specifications

To qualify for ENERGY STAR, a copier shall meet the Specifications outlined below:

Table 9

Criteria for ENERGY STAR Qualified Copiers

Copier Speed (copies per minute)	Low-Power Mode (Watts)	Low-Power Default Time	Recovery Time 30 seconds	Off Mode (Watts)	Off Mode Default Time	Automatic Duplex Mode
0 < cpm < 20	None	NA	NA	< 5	< 30 min	No
20 < cpm < 44	3.85 × cpm + 5	15 min.	Yes	< 15	< 60 min	Optional
44 < cpm	3.85 × cpm + 5	15 min.	Recommended	< 20	< 90 min	Optional
LARGE FORMAT COPIERS						
0 < cpm < 40	NA	NA	NA	< 10	< 30 min.	No
40 < cpm	3.85 × cpm + 5	15 min.	Recommended	< 20	< 90 min.	No

Program Participant shall set the default times for the auto-off feature to the levels specified in the Table above. The default times for the off mode and the low-power mode shall be measured from the time the last copy was made.

For all copier speeds where it is optional that the duplex mode be set as the default, if a model is shipped with automatic duplexing capabilities, then it is recommended that duplexing be set as the default mode. Program Participant may provide users with the ability to override this default duplex mode for single-sided copies.

2. Exceptions and Clarifications

After shipping, Program Participant or its designated service representative shall not alter the copier model in any way that will affect the copier's ability to meet the specifications outlined above. Certain exceptions are allowed in changing the default times, the off mode specifications, and the duplex mode. These exceptions are as follows:

(a) Default Times: After shipping, the Program Participant, designated service representative, or customer may change the default times for either the low-power mode and/or off mode, but only up to a Program Participant set maximum of 240 minutes (i.e., the combined total for off mode and low-power mode default times shall not exceed 240 minutes).

(b) Off Mode Power Consumption: In some cases, Program Participant may need to ship a copier model with the anti-humidity device disconnected in order to meet off mode power requirements. If this situation leads to sizable inconvenience for a specific customer, Program Participant (or the designated service representative) may connect the anti-humidity device. If Program Participant determines that in a certain geographical area there are chronic reliability problems associated with high humidity levels, Program Participant may contact the EPA program manager and discuss alternative solutions. Program Participants in the European Community Member States Territory may contact the European Commission. For example, EPA or the European Commission may allow Program Participant to connect the anti-humidity devices in copier models that are shipped to a very humid geographical area.

(c) Disabling the Auto-Off Feature: In an individual case where the auto-off feature is causing a customer sizable inconvenience due to his/her particular usage patterns, the Program Participant,

designated service representative, or customer may disable this auto-off feature. If Program Participant chooses to design its copier models to allow the customer to disable the auto-off feature, then the disable option shall be accessed in a manner different from the time settings. (e.g., if a software menu provides off-mode delay times of 30, 60, 90, 120, and 240 minutes, then "disable" or "off" shall not be a choice in this menu. It shall be a hidden (or less obvious) choice, or included in a different menu.).

C. Test Guidelines

1. Test Conditions: Outlined below are the ambient test conditions which should be established when performing the power measurement. These are necessary in order to ensure that outside factors do not affect the test results, and that test results can be reproduced later.

Line Impedance: < 0.25 ohm
Total Harmonic Distortion: < 3 %
Ambient Temperature: 21 deg. C ±3 deg. C
Relative Humidity: 40 – 60 %
Distance From Wall: 2 ft. min.
Other Market-Specific Criteria:

Market	Paper Size	Voltage/Frequency
United States	8.5″ × 11″	115 V RMS ±5 V 60 Hz ±3Hz
Europe	A4	230 V RMS ±10 V 50 Hz ±3 Hz
Japan	A4	100 V RMS ±5 V 50 Hz ±3 Hz and 60 Hz ±3 Hz 200 V RMS ±10 V 50 Hz ±3 Hz and 60 Hz ±3 Hz

2. Testing Equipment: The provisions of Section I.C 2 apply.

3. Test Method: The provisions of Section I.C.3 apply.

V. SCANNER SPECIFICATIONS

The following Scanner Specifications shall be applicable until 31 March 2007.

A. Definitions

1. Scanner: For purposes of this Specification, a scanner is defined as an electro-optical device for converting colour or black-and-white information into electronic images that can be stored, edited, converted, or transmitted primarily in a personal computing environment. Scanners defined as such are typically used for digitizing hard-copy images. The intent of this Specification is to focus on widely-used desktop scanners (e.g., flatbed, sheet-fed, and film scanners); however, high-end office document management scanners that meet the specifications outlined below may qualify for the Energy Star logo. This Specification is for stand-alone scanners; it does not cover multifunction products with scanning capabilities, network scanners (i.e., scanners that connect exclusively to a network and are capable of managing the scanned information for transmissions to multiple locations on the network), or scanners that are not powered directly by the building power supply.

2. Base Unit: The base unit is defined as the most basic version of a scanner that is actually sold as a fully operational model. The base unit is typically designed and shipped in a single piece, and does not include any external power-consuming accessories that may be sold separately.

3. Scanner Model: For purposes of this Specification, a scanner model is defined as a base unit and one or more specific accessories that are advertised and sold to consumers under a single model number. When advertised and sold to consumers without any additional accessories, a base unit is also considered a scanner model.

4. Accessory: Any piece of additional equipment that is not necessary for the standard operation of the scanner, but that may be added in order to enhance or change scanner performance. An accessory may be sold separately under its own model number, or sold with a base unit as part of a scanner package or configuration. Examples of accessories include automatic document feeders (ADFs) and transparency adaptors.

5. Low-power Mode: For purposes of this Specification, the low-power mode is the lowest power state the scanner is designed to enter after some period of inactivity, without actually turning off. The scanner enters this mode within a specified period of time after the last image was scanned.
6. Default Time: The time period set by the Program Participant prior to shipping that determines when the scanner will enter the low-power mode. The low-power mode default time shall be measured from the time the last image was scanned.
B. Product Qualification for ENERGY STAR
Technical Specifications: Program Participant agrees to introduce one or more specific base units that meet the specifications outlined below.
Table 10
Criteria for ENERGY STAR Qualified Scanners
Low-power Mode | Low-power Mode Default Time |
≤ 12 watts | ≤ 15 minutes |
C. Test Guidelines
1. Test Conditions: Outlined below are the ambient test conditions which should be established when performing the power measurement. These are necessary in order to ensure that outside factors do not affect the test results, and that test results can be reproduced later.
Line Impedance: < 0.25 ohm
Total Harmonic Distortion: < 5 %
Ambient Temperature: 25 deg. C ±3 deg. C
Input AC Voltage: 115 VAC RMS ±5 V RMS
Input AC Frequency: 60 Hz ±3 Hz
2. Testing Equipment: The provisions of Section I.C.2 apply.
3. Test Method: The provisions of Section I.C.3 apply.
VI. MULTIFUNCTION DEVICE SPECIFICATIONS
The following Multi-function Device Specifications shall be applicable until 31 March 2007.
A. Definitions
1. Multifunction Device: A Multifunction Device (MFD) is a physically integrated device or a combination of functionally integrated components (the "base unit", see definition below) that produces hard copy duplicates from graphical hard copy originals (distinct from single sheet convenience copying, see next paragraph) as well as performing one or both of the following core functions: printing of documents (from digital information received from direct connect computers, networked computers, file servers and fax transmissions) or faxing (send and receive). An MFD may also include scanning to computer file or any other capabilities not listed in this Specification. The device may be connected to a network, and may output black & white, grey scale, or colour images. EPA anticipates that a separate Specification may ultimately be required to cover colour devices, because of likely technological developments related to colour imaging, but for now these devices are included in this Specification.
This Specification covers products that are marketed and sold as multifunction equipment whose primary function is copying but that are able to perform one or both of the additional core functions of printing or faxing. Devices whose primary function is faxing, and offer limited sheet copying capabilities (so-called single sheet "convenience copying") are covered under the printer/fax Specification.
If the MFD is not a single integrated unit but a set of functionally integrated components, then the manufacturer must certify that when installed correctly in the field the sum of all power use for all MFD components comprising the base unit will achieve the power levels listed below to qualify as an ENERGY STAR Qualified MFD.
Some digital copiers can be upgraded into an MFD in the field with the installation of add-on devices that allow printing or faxing capabilities. Program Participants may consider this system of components to be an MFD, and may qualify it according to the specifications in Tables 11 and 12.

However, when the digital copier is sold independently of the add-on devices, the copier must qualify according to the upgradeable digital copier specifications in Table 13 and 14.
Some printers can be upgraded into an MFD in the field with the installation of add-on devices that allow copying (not just single sheet convenience copying) and may also allow faxing capabilities. Program Participants may consider this system of components to be an MFD, and may qualify it according to the MFD specifications. However, when sold independently, the printer cannot be represented as an ENERGY STAR qualified device unless it meets the ENERGY STAR specification for printers, in Section III.
2. Image reproduction speed: Images per minute (ipm) measures the image reproduction speed specified in terms of monochrome text output per minute at the default resolution of the MFD. One image is defined as one 8.5″ × 11″ or A4-sized printed page of single-spaced monochrome text output, 12 point type, Times font, 1″ (2.54 cm) margins on all sides of the page. Double-sided prints or copies count as two images even though they are printed on one piece of paper. If at a later date EPA creates a test procedure specifically designed to measure print speed, then that test procedure shall supersede the output speed specifications listed in this section.
For all multifunction device models, engine speed shall be based on either 8.5″ × 11″ or A4-sized paper, depending on which is the standard in a particular market. If copier and print speeds are different, whichever speed is higher shall be used to determine to which speed category the device belongs.
For large format multifunction device models designed to handle primarily A2 or 17″ × 22″ paper or larger, the reproduction speed measured as A2 or A0-sized images per minute, shall be converted into A4-sized image reproduction speeds, as follows:
(a) One A2 image per minute is equivalent to 4 A4 images per minute;
(b) One A0 image per minute is equivalent to 16 A4 images per minute.
Multifunction Devices will be divided into the following categories:
Personal Multifunction Devices: Multifunction devices with an engine speed for producing multiple images of 10 images per minute or less.
Low Speed Multifunction Devices: Multifunction devices with an engine speed for producing multiple images of greater than 10 and less than or equal to 20 images per minute.
Medium Speed Multifunction Devices: Multifunction devices with an engine speed for producing multiple images of greater than 20 and less than or equal to 44 images per minute.
Medium/High Speed Multifunction Devices: Multifunction devices with an engine speed for producing multiple images of greater than 44 and less than or equal to 100 images per minute.
High Speed Multifunction Devices [15] Multifunction devices with an engine speed for producing multiple images of greater than 100 images per minute.
3. Base Unit: For a given engine speed, the base unit is defined as the most basic version of a multifunction device that is actually sold as a fully operational model. The base unit can be designed and shipped as a single piece or as a combination of functionally integrated components. The base unit must allow copying and one or both of the additional core functions of printing or faxing. The base unit does not include any external power-consuming accessories that may be sold separately.
4. Accessories: A piece of additional equipment that is not necessary for the standard operation of the base unit, but that may be added before or after shipping in order to enhance or change multifunction device performance. Examples of accessories include: sorters, large capacity paper feeders, paper finishing equipment, large paper supply devices, output paper organisers, and key counters. An accessory may be sold separately under its own model number, or sold with a base unit as part of a multifunction device package or configuration. It is assumed that the addition of any accessories will not substantially increase (more than a total of 10 percent for all accessories) the low-power or sleep mode power consumption of the base unit (irrespective of the power consumption of the accessories). Any accessories shall not impede the normal operation of the low-power and sleep mode features.

5. Multifunction Device Model: For purposes of this Specification, a multifunction device model is defined as a base unit and one or more specific accessories that are advertised and sold to consumers under a single model number. When advertised and sold to consumers without any additional accessories, a base unit is also considered a multifunction device model.
6. Standby Mode: The condition that exists when the machine is not producing output, has reached operating conditions and is ready to make hard copy output, but has not yet entered into the low-power mode. When the multifunction device is in this mode, there will be virtually no delay before the multifunction device is capable of making the next hard copy output.
7. Low-power Mode: For purposes of this Specification, the low-power mode is the condition that exists when the multifunction device is not producing hard copy output and is consuming less power than when in a standby mode. When the multifunction device is in this mode there may be some delay in the production of hard copy output. In this mode there shall be no delay in the acceptance of information from fax or printing or scanning input sources. The multifunction device enters this mode within a specified period of time after the last hard copy output was made no matter what the input source. For products that meet the low-power mode power requirements in standby mode, no further power reductions are required.
8. Sleep Mode: For purposes of this Specification, the sleep mode is the lowest power state the multifunction device can automatically enter without actually turning off. In this mode both hard copy output and the acceptance of imaging information from some input ports may be delayed. The multifunction device enters the sleep mode within a specified period of time after the last hard copy output was made or after it has entered the low-power mode if a low-power mode is provided.
9. Default Times: The time period set by the Program Participant prior to shipping that determines when the multifunction device will enter its various modes.(i.e., the low-power mode, the sleep mode, etc. Both the sleep mode default times and the low-power mode default times shall be measured from the time the last hard copy output was made.)
10. Recovery Time: The amount of time needed to bring the multifunction device from the low-power mode to the standby mode.
11. Automatic Duplex Mode: The mode in which the multifunction device automatically places images on both sides of a sheet by automatically sending both the sheet and the graphic original through the multifunction device. Examples of this are one-sided to two-sided copying, two-sided to two-sided copying, or double-sided printing. For purposes of this Specification, a multifunction device model is considered to have an automatic duplex mode only if the multifunction device model includes all accessories needed to satisfy the above conditions (i.e., an automatic document feeder and accessories for automatic duplexing capabilities).
12. Weekly Timer: An internal device that turns a multifunction device on and off at predetermined times each day. When programming a timer, the customer shall be able to distinguish between business days and weekends/holidays (i.e., a timer shall not turn on a copier on Saturday and Sunday mornings if employees are not normally in the office on weekends). The customer shall also have the ability to disable the timer. Weekly timers are optional features, and therefore are not required on ENERGY STAR Qualified MFDs. If included in multifunction device models, weekly timers shall not conflict with the functioning of the low-power and sleep mode features.
13. Upgradeable Digital Copier: A commercial reprographic imaging unit whose sole function is the production of duplicates from a graphic hard copy original using digital imaging technology, but that provides the option of being upgraded to offer multiple functions, such as printing or fax capabilities, through the installation of add-on devices. In order to be classified as an upgradeable digital copier under the MFD Specification, the upgrade options must be available on the market or intended for availability within one year after the base unit is launched. Digital copiers that are not designed for functional upgrades must qualify for ENERGY STAR under the Copier Specification.
B. Product Qualification for ENERGY STAR
1. Technical Specifications

ENERGY STAR Program Participant agrees to introduce one or more specific multifunction device models that meet the specifications outlined in the Tables below.

(a) Standard-sized Multifunction devices: To qualify for ENERGY STAR, multifunction device models designed to handle primarily 8.5″ × 11″ or A4-sized paper shall meet the specifications provided in Table 11. All device speeds shall be measured with respect to the number of 8.5″ × 11″ or A4-sized images that feed through per minute, as described in Section VI.A.2, above.

Table 11

Criteria for ENERGY STAR Qualified Multifunction Devices

Multifunction Device Speed (images per minute)	Low-power Mode (Watts)	Recovery Time 30 seconds	Sleep Mode (Watts)	Sleep Mode Default Time	Automatic Duplex Mode
0 < ipm < 10	NA	NA	< 25	< 15 min	No
10 < ipm < 20	NA	NA	< 70	< 30 min	No
20 < ipm < 44	3.85 × ipm + 50	Yes	< 80	< 60 min	Optional
44 < ipm < 100	3.85 × ipm + 50	Recommended	< 95	< 90 min	Optional
100 < ipm	3.85 × ipm + 50	Recommended	< 105	< 120 min	Optional

(b) Large Format Devices: To qualify for ENERGY STAR, large format multifunction device models designed to handle primarily A2 or 17″ × 22″ paper or larger shall meet the specifications provided in Table 12. All large format device speeds shall be measured with respect to the number of A4-sized images that feed through per minute, as described in Section IV.A.2, above.

Table 12

Criteria for ENERGY STAR Qualified Multifunction Devices – LARGE FORMAT DEVICES

Multifunction Device Speed (images per minute)	Low-power Mode (Watts)	Recovery Time 30 seconds	Sleep Mode (Watts)	Sleep Mode Default Time	Automatic Duplex Mode
0 < ipm < 40	NA	NA	< 70	< 30 min	No
40 < ipm	4.85 × ipm + 50	Recommended	< 105	< 90 min	No

(c) Upgradeable Digital Copiers: To qualify for ENERGY STAR under the Multifunction Device Specification, upgradeable digital copiers designed to handle primarily 8.5″ × 11″ or A-4 sized paper shall meet the specifications provided in Table 13. All device speeds shall be measured with respect to the number of 8.5″ × 11″ or A-4 sized images that feed through per minute, as described in Section IV.A.2, above.

Table 13

Criteria for ENERGY STAR Qualified Multifunction Devices – UPGRADEABLE DIGITAL COPIERS

Note that criteria for upgradeable digital copiers are identical to those of the Copier Specification.

Upgradeable Digital Copier Speed (images per minute)	Low-power Mode (Watts)	Recovery Time 30 seconds	Sleep Mode [16] (Watts)	Sleep Mode Default Time
0 < ipm ≤ 10	NA	NA	≤ 5	≤ 15 min
10 < ipm ≤ 20	NA	NA	≤ 5	≤ 30 min
20 < ipm ≤ 44	3.85 × ipm + 5	Yes	≤ 15	≤ 60 min
44 < ipm ≤ 100	3.85 × ipm + 5	Recommended	≤ 20	≤ 90 min
100 < ipm	3.85 × ipm + 5	Recommended	≤ 20	≤ 120 min

(d) Large Format Upgradeable Digital Copiers: To qualify for ENERGY STAR under the Specification for Multifunction Devices, upgradeable digital copiers designed to handle primarily A2 or 17″ × 22″ or larger sized paper shall meet the specifications provided in Table 14. All device speeds shall be measured with respect to the number A-4 sized images that feed through per minute, as described in Section VI.A.2 of the Specification.

Table 14

Criteria for ENERGY STAR Qualified Multifunction Devices – LARGE FORMAT UPGRADEABLE DIGITAL COPIERS

Upgradeable Digital Copier Speed (images per minute)	Low-power Mode (Watts)	Recovery Time 30 seconds	Sleep Mode (Watts)	Sleep Mode Default Time

0 < ipm ≤ 40 | NA | NA | ≤ 65 | ≤ 30 min |
40 < ipm | 4.85 × ipm + 45 | NA | ≤ 100 | ≤ 90 min |
2. Additional requirements
In addition to the requirements shown in Tables 11 through 14, the following additional requirements must also be met.
(a) Default time for low-power mode: For MFDs and upgradeable digital copiers, Program Participant shall ship multifunction device models with the default time for the low-power mode set at 15 minutes. Program Participant shall set the default times for the sleep mode to the levels specified in Tables 11 through 14. The default times for the low-power mode and the sleep mode shall be measured from the time the last copy was made or the last page was printed.
(b) Recovery time from low-power mode: The actual recovery time from low-power mode shall be placed in product literature for those products that have a low-power mode.
(c) Weekly timers: Note that weekly timers may be incorporated, but shall not adversely affect or interfere with the normal operation of the low-power or sleep modes. It is EPA's intention that any added features complement the reduced power modes and not negate their effects.
(d) Auto-duplex features: Duplexing is not required to be the default setting for any multifunction devices. However, it is required to be offered as an option for all standard size multifunction devices faster than 20 ipm. Further, it is recommended that multifunction devices be shipped with automatic duplexing set as the default mode for copying and any other feasible functions and described to customers upon installation.
3. Exceptions and Clarifications:
After shipping, Program Participant or its designated service representative shall not alter the multifunction device model in any way that will affect the multifunction device's ability to meet the specifications outlined above. Certain exceptions are allowed in changing the default times and the duplex mode. These exceptions are as follows:
(a) Default Times: After shipping, the Program Participant, designated service representative, or customer may change the default times for either the low-power or sleep-mode feature, but only up to a factory-set maximum of 240 minutes (i.e., the combined total of the default times shall not exceed 240 minutes).
(b) Anti-humidity devices: In some cases, Program Participant may need to ship a multifunction device model with the anti-humidity device disconnected in order to meet sleep mode power requirements. If this situation leads to sizable inconvenience for a specific customer, Program Participant (or the designated service representative) may connect the anti-humidity device. If Program Participant determines that in a certain geographical area there are chronic reliability problems associated with high humidity levels, Program Participant may contact the EPA [17] program manager (as named in Annex B) and discuss alternative solutions. For example, EPA may allow Program Participant to connect the anti-humidity devices in multifunction device models that are shipped to a very humid geographical area.
(c) Disabling the Sleep Mode: In an individual case where the Sleep Mode is causing a customer sizable inconvenience due to his/her particular usage patterns, the Program Participant, designated service representative, or customer may disable this Sleep Mode feature. If Program Participant chooses to design its multifunction device models to allow the customer to disable the Sleep Mode feature, then the disable option shall be accessed in a manner different from the time settings (e.g., If a software menu provides sleep mode delay times of 15, 30, 60, 90, 120, and 240 minutes, then "disable" or "off" shall not be a choice in this menu. It shall be a hidden (or less obvious) choice or included in a different menu).
C. Test Guidelines
1. Test Conditions

Outlined below are the ambient test conditions which should be established when performing the power measurement. These are necessary in order to ensure that outside factors do not affect the test results, and that test results can be reproduced later.
Line Impedance: < 0.25 ohm
Total Harmonic Distortion: < 3 %
Ambient Temperature: 21 deg. C ±3 deg. C
Relative Humidity: 40 - 60 %
Distance From Wall: 2 ft. min.
Other Market-Specific Criteria:
Market | Paper Size | Voltage/Frequency |
United States | 8.5″ × 11″ | 115 V RMS ±5 V 60 Hz ±3Hz |
Europe | A4 | 230 V RMS ±10 V 50 Hz ±3 Hz |
Japan | A4 | 100 V RMS ±5 V 50 Hz ±3 Hz and 60 Hz ±3 Hz 200 V RMS ±10 V 50 Hz ±3 Hz and 60 Hz ±3 Hz |
2. Testing Equipment: The provisions of Section I.C.2 apply.
3. Test Method: The provisions of Section I.C.3 apply.
VII. IMAGING EQUIPMENT SPECIFICATION
The following Imaging Equipment Specifications shall be applicable as of 1 April 2007.
A. Definitions
Products
1. Copier: A commercially-available imaging product whose sole function is the production of hard copy duplicates from graphic hard copy originals. The unit must be capable of being powered from a wall outlet or from a data or network connection. This definition is intended to cover products that are marketed as copiers or upgradeable digital copiers (UDCs).
2. Digital Duplicator: A commercially available imaging product that is sold in the market as a fully-automated duplicator system through the method of stencil duplicating with digital reproduction functionality. The unit must be capable of being powered from a wall outlet or from a data or network connection. This definition is intended to cover products that are marketed as digital duplicators.
3. Facsimile Machine (Fax Machine): A commercially-available imaging product whose primary functions are scanning hard copy originals for electronic transmission to remote units and receiving similar electronic transmissions to produce hard copy output. Electronic transmission is primarily over a public telephone system, but also may be via computer network or the Internet. The product also may be capable of producing hard copy duplicates. The unit must be capable of being powered from a wall outlet or from a data or network connection. This definition is intended to cover products that are marketed as fax machines.
4. Mailing Machine: A commercially-available imaging product that serves to print postage onto mail pieces The unit must be capable of being powered from a wall outlet or from a data or network connection. This definition is intended to cover products that are marketed as mailing machines.
5. Multifunction Device (MFD): A commercially-available imaging product, which is a physically-integrated device or a combination of functionally-integrated components, that performs two or more of the core functions of copying, printing, scanning, or faxing. The copy functionality as addressed in this definition is considered to be distinct from single sheet convenience copying offered by fax machines. The unit must be capable of being powered from a wall outlet or from a data or network connection. This definition is intended to cover products that are marketed as MFDs or multifunction products (MFPs).
Note: If the MFD is not a single integrated unit but a set of functionally integrated components, then the manufacturer must certify that when installed correctly in the field, the sum of all energy or power use for all MFD components comprising the base unit will achieve the energy or power levels provided in Section VII.C. to qualify as an ENERGY STAR MFD.

6. Printer: A commercially-available imaging product that serves as a hard copy output device, and is capable of receiving information from single-user or networked computers, or other input devices (e.g., digital cameras). The unit must be capable of being powered from a wall outlet or from a data or network connection. This definition is intended to cover products that are marketed as printers, including printers that can be upgraded into MFDs in the field.
7. Scanner: A commercially-available imaging product that functions as an electro-optical device for converting information into electronic images that can be stored, edited, converted, or transmitted, primarily in a personal computing environment. The unit must be capable of being powered from a wall outlet or from a data or network connection. This definition is intended to cover products that are marketed as scanners.
Marking Technologies
8. Direct Thermal (DT): A marking technology that transfers an image by burning dots onto coated media as it passes over a heated print head. DT products do not use ribbons.
9. Dye Sublimation (DS): A marking technology where images are formed by depositing (subliming) dye onto the print media based upon the amount of energy delivered by the heating elements.
10. Electrophotography (EP): A marking technology characterised by illumination of a photoconductor in a pattern representing the desired hard copy image via a light source, development of the image with particles of toner using the latent image on the photoconductor to define the presence or absence of toner at a given location, transfer of the toner to the final hard copy medium, and fusing to cause the desired hard copy to become durable. Types of EP include Laser, LED, and LCD. Colour EP is distinguished from monochrome EP in that toners of at least three different colours are available in a given product at one time. Two types of colour EP technology are defined below:
(a) Parallel Colour EP: A marking technology that uses multiple light sources and multiple photoconductors to increase the maximum colour printing speed.
(b) Serial Colour EP: A marking technology that uses a single photoconductor in a serial fashion and one or multiple light sources to achieve the multi-colour hard copy output.
11. Impact: A marking technology characterised by the formation of the desired hard copy image by transferring colorant from a "ribbon" to the media via an impact process. Two types of impact technology are Dot Formed Impact and Fully-formed Impact.
12. Ink Jet (IJ): A marking technology where images are formed by depositing colorant in small drops directly to the print media in a matrix manner. Colour IJ is distinguished from monochrome IJ in that more than one colorant is available in a product at any one time. Typical types of IJ include Piezo-electric (PE) IJ, IJ Sublimation, and Thermal IJ.
13. Solid Ink (SI): A marking technology where the ink is solid at room temperature and liquid when heated to the jetting temperature. Transfer to the media can be direct, but is most often made to an intermediate drum or belt and then offset printed to the media.
14. Stencil: A marking technology that transfers images onto the print media from a stencil that is fitted around an inked drum.
15. Thermal Transfer (TT): A marking technology where the desired hard copy image is formed by depositing small drops of solid colorant (usually coloured waxes) in a melted/fluid state directly to the print media in a matrix manner. TT is distinguished from IJ in that the ink is solid at room temperature and is made fluid by heat.
Operational Modes, Activities, and Power States
16. Active: The power state in which the product is connected to a power source and is actively producing output, as well as performing any of its other primary functions.
17. Automatic Duplexing: The capability of a copier, fax machine, MFD, or printer to automatically place images on both sides of an output sheet, without manual manipulation of output as an intermediate step. Examples of this are one-sided to two-sided copying and two-sided to two-sided

copying. A product is considered to have automatic duplexing capability only if the model includes all accessories needed to satisfy the above conditions.
18. Default Delay Time: The time set by the manufacturer prior to shipping that determines when the product will enter a lower-power mode (e.g., Sleep, Off) following completion of its primary function.
19. Off: The power state that the product enters when it has been manually or automatically switched off but is still plugged in and connected to the mains. This mode is exited when stimulated by an input, such as a manual power switch or clock timer to bring the unit into Ready mode. When this state is resultant from a manual intervention by a user, it is often referred to as Manual Off, and when it is resultant from an automatic or predetermined stimuli (e.g., a delay time or clock), it is often referred to as Auto-off.
20. Ready: The condition that exists when the product is not producing output, has reached operating conditions, has not yet entered into any lower-power modes, and can enter Active mode with minimal delay. All product features can be enabled in this mode, and the product must be able to return to Active mode by responding to any potential input options designed into the product. Potential inputs include external electrical stimulus (e.g., network stimulus, fax call, or remote control) and direct physical intervention (e.g., activating a physical switch or button).
21. Sleep: The reduced power state that the product enters automatically after a period of inactivity. In addition to entering Sleep automatically, the product may also enter this mode 1) at a user set time-of-day, 2) immediately in response to user manual action, without actually turning off, or 3) through other, automatically-achieved ways that are related to user behaviour. All product features can be enabled in this mode and the product must be able to enter Active mode by responding to any potential input options designed into the product; however, there may be a delay. Potential inputs include external electrical stimulus (e.g., network stimulus, fax call, remote control) and direct physical intervention (e.g., activating a physical switch or button). The product must maintain network connectivity while in Sleep, waking up only as necessary.
Note: When reporting data and qualifying products that can enter Sleep mode in multiple ways, Program Participants should reference a Sleep level that can be reached automatically. If the product is capable of automatically entering multiple, successive Sleep levels, it is at the manufacturer's discretion which of these levels is used for qualification purposes; however, the default-delay time provided must correspond with whichever level is used.
22. Standby: The lowest power consumption mode which cannot be switched off (influenced) by the user and that may persist for an indefinite time when the product is connected to the main electricity supply and used in accordance with the manufacturer's instructions [18].
Note: For Imaging Equipment products addressed by this specification, the Standby power level usually occurs in Off mode, but can occur in Ready or Sleep. A product cannot exit Standby and reach a lower power state unless it is physically disconnected from the main electricity supply as a result of manual manipulation.
Product Size Formats
23. Large Format: Products categorised as Large Format include those designed for A2 media and larger, including those designed to accommodate continuous-form media at a width of 406 millimetres (mm) or wider. Large-format products may also be capable of printing on standard-size or small-format media.
24. Small Format: Products categorised as Small Format include those designed for media sizes smaller than those defined as Standard (e.g., A6, 4″ × 6″, microfilm), including those designed to accommodate continuous-form media at widths smaller than 210 mm.
25. Standard: Products categorised as Standard include those designed for standard-sized media (e.g., Letter, Legal, Ledger, A3, A4, and B4), including those designed to accommodate continuous-form media at widths between 210 mm and 406 mm. Standard-size products may also be capable of printing on small-format media.

Additional Terms

26. Accessory: An optional piece of peripheral equipment that is not necessary for the operation of the base unit, but that may be added before or after shipment in order to add functionality. An accessory may be sold separately under its own model number, or sold with a base unit as part of a package or configuration.

27. Base Product: A base product is the standard model shipped by the manufacturer. When product models are offered in different configurations, the base product is the most fundamental configuration of the model, which possesses the minimum number of functional adders available. Functional components or accessories offered as optional, rather than standard, are not considered part of the base product.

28. Continuous Form: Products categorised as Continuous Form include those which do not use a cut-sheet media size, and are designed for key industrial applications such as printing of bar codes, labels, receipts, waybills, invoices, airline tickets, or retail tags.

29. Digital Front-end (DFE): A functionally-integrated, network-attached server or desktop-derived server that hosts other computers and applications and acts as an interface to imaging equipment. A DFE uses its own dc power supply or draws its dc power from the imaging equipment product with which it operates. A DFE provides greater functionality to the imaging product. A DFE also offers at least three of the following advanced features:

(a) Network connectivity in various environments;

(b) Mailbox functionality;

(c) Job queue management;

(d) Machine management (e.g., waking the imaging equipment from a reduced power state);

(e) Advanced graphic user-interface (UI);

(f) Ability to initiate communication with other host servers and client computers (e.g., scanning to email, polling remote mailboxes for jobs);

or

(g) Ability to post-process pages (e.g., reformatting pages prior to printing).

30. Functional Adder: A functional adder is a standard product feature that adds functionality to the base marking engine of an imaging equipment product. The Operational Mode portion of this specification contains additional power allowances for certain functional adders. Examples of functional adders include wireless interfaces and scanning capability.

31. Operational Mode (OM) Approach: A method of testing and comparing the energy performance of imaging equipment products, which focuses on product energy consumption in various low-power modes. The key criteria used by the OM approach are values for low-power modes, measured in watts (W). Detailed information can be found in the Operational Mode Test Procedure in Section VII.D.3.

32. Marking Engine: The very basic engine of an imaging product, which drives the image production of that product. Without additional functional components, a marking engine cannot acquire image data to process and is, therefore, non-functional. A marking engine is reliant on functional adders for communication ability and image processing.

33. Model: An imaging equipment product that is sold or marketed under a unique model number or marketing name. A model may be comprised of a base unit or a base unit and accessories.

34. Product Speed: In general, for Standard-size products, a single A4 or 8.5″ × 11″ sheet printed/copied/scanned on one side in a minute is equal to one image-per-minute (ipm). If the maximum claimed speeds differ when producing images on A4 or 8.5″ × 11″ paper, the higher of the two shall be used.

- For mailing machines, one piece of mail processed in a minute is equal to one mail-piece-per-minute (mppm).

- For Small-format products, a single A6 or 4″ × 6″ sheet printed/copied/scanned on one side in a minute is equal to 0.25 ipm.

- For Large-format products, a single A2 sheet is equivalent to 4 ipm and one A0 sheet is equivalent to 16 ipm.
- For continuous-form products categorised as Small-format, Large-format, or Standard-size, print speed in ipm should be obtained from the product's maximum marketed imaging speed in meters per minute according to the conversion below:
X ipm = 16 × [Maximum media width (meters) × Maximum imaging speed (length-meters/minute)]
In all cases, the converted speed in ipm should be rounded to the nearest integer (e.g., 14.4 ipm rounds to 14.0 ipm; 14.5 ipm rounds to 15 ipm).
For qualification purposes, manufacturers should report the speed of the product according to the prioritisation of functions outlined below:
- Print Speed, unless the product cannot perform the print function, in which case,
- Copy Speed, unless the product cannot perform the print or copy functions, in which case,
- Scan Speed.
35. Typical Electricity Consumption (TEC) Approach: A method of testing and comparing the energy performance of imaging equipment products, which focuses on the typical electricity consumed by a product while in normal operation during a representative period of time. The key criteria of the TEC approach for imaging equipment is a value for typical weekly electricity consumption, measured in kilowatt-hours (kWh). Detailed information can be found in the Typical Electricity Consumption Test Procedure in Section VII.D.2.
B. Qualifying Products
In order to qualify as ENERGY STAR, an imaging equipment product must be defined in Section VII.A and meet one of the product descriptions in Table 15 or 16, below.
Table 15
Qualifying Products: TEC Approach
Product Area | Marking Technology | Size Format | Colour Capability | TEC Table |
Copiers | Direct Thermal | Standard | Monochrome | TEC 1 |
Dye Sublimation | Standard | Colour | TEC 2 |
Dye Sublimation | Standard | Monochrome | TEC 1 |
EP | Standard | Monochrome | TEC 1 |
EP | Standard | Colour | TEC 2 |
Solid Ink | Standard | Colour | TEC 2 |
Thermal Transfer | Standard | Colour | TEC 2 |
Thermal Transfer | Standard | Monochrome | TEC 1 |
Digital Duplicators | Stencil | Standard | Colour | TEC 2 |
Stencil | Standard | Monochrome | TEC 1 |
Fax Machines | Direct Thermal | Standard | Monochrome | TEC 1 |
Dye Sublimation | Standard | Monochrome | TEC 1 |
EP | Standard | Monochrome | TEC 1 |
EP | Standard | Colour | TEC 2 |
Solid Ink | Standard | Colour | TEC 2 |
Thermal Transfer | Standard | Colour | TEC 2 |
Thermal Transfer | Standard | Monochrome | TEC 1 |
Multifunction Devices (MFDs) | Direct Thermal | Standard | Monochrome | TEC 3 |
Dye Sublimation | Standard | Colour | TEC 4 |
Dye Sublimation | Standard | Monochrome | TEC 3 |
EP | Standard | Monochrome | TEC 3 |
EP | Standard | Colour | TEC 4 |
Solid Ink | Standard | Colour | TEC 4 |
Multifunction Devices (MFDs) | Thermal Transfer | Standard | Colour | TEC 4 |
Thermal Transfer | Standard | Monochrome | TEC 3 |

Printers | Direct Thermal | Standard | Monochrome | TEC 1 |
Dye Sublimation | Standard | Colour | TEC 2 |
Dye Sublimation | Standard | Monochrome | TEC 1 |
EP | Standard | Monochrome | TEC 1 |
EP | Standard | Colour | TEC 2 |
Solid Ink | Standard | Colour | TEC 2 |
Thermal Transfer | Standard | Colour | TEC 2 |
Thermal Transfer | Standard | Monochrome | TEC 1 |

Table 16
Qualifying Products: Operational Mode Approach

Product Area	Marking Technology	Size Format	Colour Capability	OM Table
Copiers	Direct Thermal	Large	Monochrome	OM 1
	Dye Sublimation	Large	Colour & Monochrome	OM 1
	EP	Large	Colour & Monochrome	OM 1
	Solid Ink	Large	Colour	OM 1
	Thermal Transfer	Large	Colour & Monochrome	OM 1
Fax Machines	Ink Jet	Standard	Colour & Monochrome	OM 2
Mailing Machines	Direct Thermal	N/A	Monochrome	OM 4
	EP	N/A	Monochrome	OM 4
	Ink Jet	N/A	Monochrome	OM 4
	Thermal Transfer	N/A	Monochrome	OM 4
Multifunction Devices (MFDs)	Direct Thermal	Large	Monochrome	OM 1
	Dye Sublimation	Large	Colour & Monochrome	OM 1
	EP	Large	Colour & Monochrome	OM 1
	Ink Jet	Standard	Colour & Monochrome	OM 2
	Ink Jet	Large	Colour & Monochrome	OM 3
	Solid Ink	Large	Colour	OM 1
	Thermal Transfer	Large	Colour & Monochrome	OM 1
Printers	Direct Thermal	Large	Monochrome	OM 8
	Direct Thermal	Small	Monochrome	OM 5
	Dye Sublimation	Large	Colour & Monochrome	OM 8
	Dye Sublimation	Small	Colour & Monochrome	OM 5
	EP	Large	Colour & Monochrome	OM 8
	EP	Small	Colour	OM 5
	Impact	Large	Colour & Monochrome	OM 8
	Impact	Small	Colour & Monochrome	OM 5
	Impact	Standard	Colour & Monochrome	OM 6
	Ink Jet	Large	Colour & Monochrome	OM 3
	Ink Jet	Small	Colour & Monochrome	OM 5
	Ink Jet	Standard	Colour & Monochrome	OM 2
	Solid Ink	Large	Colour	OM 8
	Solid Ink	Small	Colour	OM 5
	Thermal Transfer	Large	Colour & Monochrome	OM 8
	Thermal Transfer	Small	Colour & Monochrome	OM 5
Scanners	N/A	Large, Small & Standard	N/A	OM 7

C. Energy-Efficiency Specifications for Qualifying Products

Only those products listed in Section VII.B above that meet the following criteria may qualify as Energy Star.

Products Sold with an External Power Adapter: To qualify, imaging equipment products using a single-voltage external ac-dc or ac-ac power adapter must use an ENERGY STAR qualified adapter, or

one that meets the ENERGY STAR External Power Supply (EPS) specification when tested to the ENERGY STAR test method on the date the imaging product is qualified as ENERGY STAR. The ENERGY STAR specification and test method for single voltage external ac-dc and ac-ac power supplies may be found at www.energystar.gov/products.
Products Designed to Operate with an External DFE: To qualify, an imaging equipment product that is sold with a DFE that uses its own ac power source must use an ENERGY STAR qualified DFE, or one that meets the ENERGY STAR Computer specification when tested to the ENERGY STAR test method on the date the imaging product is qualified as ENERGY STAR. The ENERGY STAR specification and test method for computers may be found at www.energystar.gov/products.
Products Sold with an Additional Cordless Handset: To qualify, fax machines or MFDs with fax capability that are sold with additional cordless handsets must use an ENERGY STAR qualified handset, or one that meets the ENERGY STAR Telephony specification when tested to the ENERGY STAR test method on the date the imaging product is qualified as ENERGY STAR. The ENERGY STAR specification and test method for telephony products may be found at www.energystar.gov/products.
Duplexing: Standard-size copiers, MFDs, and printers that use EP, SI, and heat-intensive IJ marking technologies addressed by the TEC approach in Section VII.C.1 must meet the following duplexing requirements, based on product speed:
Table 17
Duplexing Requirements for Colour Copiers, MFDs, and Printers
Product Speed | Duplexing Requirement |
≤ 19 ipm | N/A |
20 – 39 ipm | Automatic duplexing must be offered as a standardfeature or optional accessory at the time of purchase. |
≥ 40 ipm | Automatic duplexing is required as a standard feature at the time of purchase. |
Table 18
Duplexing Requirements for Monochrome Copiers, MFDs, and Printers
Product Speed | Duplexing Requirement |
≤ 24 ipm | N/A |
25 – 44 ipm | Automatic duplexing must be offered as a standard feature or optional accessory at the time of purchase. |
≥ 45 ipm | Automatic duplexing is required as a standard feature at the time of purchase. |
1. ENERGY STAR Eligibility Criteria – TEC.
To qualify as Energy Star, the TEC value obtained for imaging equipment outlined in Section VII.B. Table 15 above must not exceed the corresponding criteria below.
For imaging products with a functionally-integrated DFE that relies on the imaging product for its power, manufacturers should subtract the DFE's energy consumption in Ready mode from the product's total TEC result before comparing the product's TEC to the criteria limits below. In order to take advantage of this allowance, the DFE must meet the definition in Section VII.A.29. and be a separate processing unit that is capable of initiating activity over the network.
Example: A printer's total TEC result is 24.5 kWh/week and its internal DFE consumes 50W in Ready mode. 50W × 168 hours/week = 8.4 kWh/week, which is then subtracted from the tested TEC value: 24.5 kWh/week – 8.4 kWh/week = 16.1 kWh/week. 16.1 kWh/week is then compared to the following criteria.
Note: In all of the following equations, x = Product speed (ipm).
Table 19
TEC Table 1
Product(s): Copiers, Digital Duplicators, Fax Machines, Printers |
Size Format(s): Standard-size |
Marking Technologies: DT, Mono DS, Mono EP, Mono Stencil, Mono TT |

| Tier I | Tier II |
Product Speed (ipm) | Maximum TEC (kWh/week) | Maximum TEC (kWh/week) |
≤ 12 | 1.5 kWh | TBD |
12 < ipm ≤ 50 | (0.20 kWh/ipm)x – 1 kWh | TBD |
> 50 ipm | (0.80 kWh/ipm)x – 31 kWh | TBD |
Table 20
TEC Table 2
Product(s): Copiers, Digital Duplicators, Fax Machines, Printers |
Size Format(s): Standard-size |
Marking Technologies: Colour DS, Colour Stencil, Colour TT, Colour EP, SI |
| Tier I | Tier II |
Product Speed (ipm) | Maximum TEC (kWh/week) | Maximum TEC (kWh/week) |
≤ 50 | (0.20 kWh/ipm)x + 2 kWh | TBD |
> 50 | (0.80 kWh/ipm)x – 28 kWh | TBD |
Table 21
TEC Table 3
Product(s): MFDs |
Size Format(s): Standard-size |
Marking Technologies: DT, Mono DS, Mono EP, Mono TT |
| Tier I | Tier II |
Product Speed (ipm) | Maximum TEC (kWh/week) | Maximum TEC (kWh/week) |
≤ 20 | (0.20 kWh/ipm)x + 2 kWh | TBD |
20 < ipm ≤ 69 | (0.44 kWh/ipm)x – 2,8 kWh | TBD |
> 69 | (0.80 kWh/ipm)x – 28 kWh | TBD |
Table 22
TEC Table 4
Product(s): MFDs |
Size Format(s): Standard-size |
Marking Technologies: Colour DS, Colour TT, Colour EP, SI |
| Tier I | Tier II |
Product Speed (ipm) | Maximum TEC (kWh/week) | Maximum TEC (kWh/week) |
≤ 32 | (0.20 kWh/ipm)x + 5 kWh | TBD |
32 < ipm ≤ 61 | (0.44 kWh/ipm)x – 2,8 kWh | TBD |
> 61 | (0.80 kWh/ipm)x – 25 kWh | TBD |
2. ENERGY STAR Eligibility Criteria – OM
To qualify as Energy Star, the power consumption values for imaging equipment outlined in Section VII.B. Table 16 above must not exceed the corresponding criteria below. For products that meet the Sleep-mode power requirement in Ready mode, no further automatic power reductions are required to meet the Sleep criterion. Additionally, for products that meet the Standby-power requirements in Ready or Sleep mode, no further power reductions are required to earn the ENERGY STAR.
For imaging products with a functionally-integrated DFE that relies on the imaging product for its power, the power consumption of the DFE should be excluded when comparing the product's measured Sleep to the combined marking-engine and functional-adder criteria limits below. The DFE must not interfere with the ability of the imaging product to enter or exit its lower-power modes. In order to take advantage of this exclusion, the DFE must meet the definition in Section VII.A.29 and be a separate processing unit that is capable of initiating activity over the network.
Default Delay Time Requirements: To qualify for ENERGY STAR, OM products must meet the default-delay time settings provided in Tables 23 through 25 below for each product type, enabled upon product shipment. In addition, all OM products must be shipped with a maximum machine delay time not in excess of four hours, which is only adjustable by the manufacturer. This maximum

machine delay time cannot be influenced by the user and typically cannot be modified without internal, invasive product manipulation. The default-delay-time settings provided in Tables 23 through 25 may be user adjustable.

Table 23

Maximum Default Delay Times to Sleep for Small-format and Standard-size OM Products, Excluding Mailing Machines, in Minutes

Product Speed (ipm)	Fax Machines	MFDs	Printers	Scanners
0 – 10	5	15	5	15
11 - 20	5	30	15	15
21 - 30	5	60	30	15
31 - 50	5	60	60	15
51 +	5	60	60	15

Table 24

Maximum Default Delay Times to Sleep for Large-format OM Products, Excluding Mailing Machines, in Minutes

Product Speed (ipm)	Copiers	MFDs	Printers	Scanners
0 – 10	30	30	30	15
11 – 20	30	30	30	15
21 – 30	30	30	30	15
31 – 50	30	60	60	15
51 +	60	60	60	15

Table 25

Maximum Default Delay Times to Sleep for Mailing Machines in Minutes

Product Speed (mppm)	Mailing Machines
0 – 50	20
51 – 100	30
101 – 150	40
151 +	60

Standby Requirements: To qualify for ENERGY STAR, OM products must meet the Standby power criteria provided in Table 26 for each product type.

Table 26

Maximum Standby Power Levels for OM Products in Watts

Product Type & Size Format	Standby (W) – Tier 1	Standby (W) – Tier 2
All Small Format and Standard-size OM Products without Fax Capability	1	Tier 1 levels remain unchanged
All Small Format and Standard-size OM Products with Fax Capability	2	Tier 1 levels remain unchanged
All Large Format OM Products and Mailing Machines	N/A	TBD

The eligibility criteria in OM Tables 1 through 8 (Tables 26-33) below address the marking engine of the product. Since products are expected to be shipped with one or more functions beyond a basic marking engine, the corresponding allowances below should be added to the marking engine criteria for Sleep. The total value for the base product with applicable "functional adders" should be used to determine eligibility. Manufacturers may apply no more than three Primary functional adders to each product model, but may apply as many Secondary adders as present (with Primary adders in excess of three included as Secondary adders). An example of this approach is provided below:

Example: Consider a Standard-size IJ printer with a USB 2.0 connection and a memory card connection. Assuming the USB connection is the Primary interface used during the test, the printer model would receive a functional-adder allowance of 0.5 W for USB and 0.1 for the memory card reader, for a total of 0.6 W of total functional-adder allowances. Since OM Table 2 (Table 27) provides a Sleep mode marking-engine criterion of 3 W, to determine qualification under ENERGY

STAR, the manufacturer would sum the Sleep mode marking-engine criterion with the applicable functional-adder allowances to determine the maximum power consumption permitted for qualification of the base product: 3 W + 0,6 W. If the power consumption of the printer in Sleep mode measures at or below 3.6 W, then the printer would meet the ENERGY STAR Sleep criterion.

Table 27

Qualifying Products: OM Functional Adders

Type	Details	Functional Adder Allowances (W)	
		Primary	Secondary
Interfaces	A. Wired < 20 MHz A physical data- or network-connection port present on the imaging product that is capable of a transfer rate < 20 MHz. Includes USB 1.x, IEEE488, IEEE 1284/Parallel/Centronics and RS232.	0.3	0.2
	B. Wired ≥ 20 MHz and < 500 MHz A physical data- or network-connection port present on the imaging product that is capable of a transfer rate ≥ 20 MHz and < 500 MHz. Includes USB 2.x, IEEE 1394/FireWire/i.LINK, and 100Mb Ethernet.	0.5	0.2
	C. Wired ≥ 500 MHz A physical data- or network-connection port present on the imaging product that is capable of a transfer rate ≥ 500 MHz. Includes 1G Ethernet.	1.5	0.5
	D. Wireless A data- or network-connection interface present on the imaging product that is designed to transfer data via radio-frequency wireless means includes Bluetooth and 802.11.	3.0	0.7
	E. Wired card/camera/storage A physical data- or network-connection port present on the imaging product that is designed to allow the connection of an external device, such as flash memory-card/smart-card readers and camera interfaces (including PictBridge).	0.5	0.1
	G. Infrared A data- or network-connection interface present on the imaging product that is designed to transfer data via infrared technology. Includes IrDA.	0.2	0.2
Other	Storage Internal storage drives present on the imaging product. Includes internal drives only (e.g., disk drives, DVD drives, Zip drives), and applies to each separate drive. This adder does not cover interfaces to external drives (e.g., SCSI) or internal memory.	—	0.2
	Scanners with CCFL lamps The presence of a scanner that uses Cold Cathode Fluorescent Lamp (CCFL) technology. This adder is applied only once, regardless of the lamp size or the number of lamps/bulbs employed.	—	2.0
	Scanners with non-CCFL lamps The presence of a scanner that uses a lamp technology other than CCFL. This adder is applied only once, regardless of the lamp size or the number of lamps/bulbs employed. This adder addresses scanners using Light-Emitting Diode (LED), Halogen, Hot-Cathode Fluorescent Tube (HCFT), Xenon, or Tubular Fluorescent (TL) technologies.	—	0.5
	PC-based system (cannot print/copy/scan without use of significant PC resources) This adder applies to imaging products that rely on an external computer for significant resources, such as memory and data processing, to perform basic functions commonly performed by imaging products independently, such as page rendering. This adder does not apply to products that simply use a computer as a source or destination for image data.	—	–0.5
	Cordless handset The capability of the imaging product to communicate with a cordless handset. This adder is applied only once, regardless of the number of cordless handsets the product is designed to handle. This adder does not address the power requirements of the cordless handset itself.	—	0.8
	Memory	—	1.0 W per 1 GB

| The internal capacity available in the imaging product for storing data. This adder applies to all volumes of internal memory and should be scaled accordingly. For example, a unit with 2.5 GB of memory would receive an allowance of 2.5 W while a unit with 0.5 GB would receive an allowance of 0.5 W. |
Other | Power-supply (PS) size, based on PS output rating (OR) [Note: this adder does not apply to scanners] | — | For PSOR > 10 W, 0.05 x (PSOR – 10 W) |
This adder applies to all imaging products except for scanners. The allowance is calculated from the internal or external power supply's rated DC output as specified by the power supply manufacturer. (It is not a measured quantity). For example, a unit that is rated to provide up to 3 A at 12 V has a PSOR of 36 W and would receive an allowance of 0.05 x (36-10) = 0.05 × 26 = 1.3 W of power supply allowance. For supplies that provide more than one voltage, the sum of power from all voltages is used unless the specifications note that there is a rated limit lower than this. For example, a supply which can supply 3A of 24 V and 1.5 A of 5 V output has a total PSOR of (3 × 24) + (1.5 × 5) = 79.5 W, and an allowance of 3475 W. |
For the adder allowances shown in Qualifying Products Table 25 above, distinctions are made for "Primary" and "Secondary" types of adders. These designations refer to the state in which the interface is required to remain while the imaging product is in Sleep. Connections that remain active during the OM test procedure while the imaging product is in Sleep are defined as Primary, while connections that can be inactive while the imaging product is in Sleep are defined as Secondary. Most functional adders typically are Secondary types.
Manufacturers should consider only the adder types that are available on a product in its as-shipped configuration. Options available to the consumer after the product is shipped or interfaces that are present on the product's externally-powered digital front-end (DFE) should not be considered when applying allowances to the imaging product.
For products with multiple interfaces, these interfaces should be considered as unique and separate. However, interfaces that perform multiple functions should only be considered once. For example, a USB connection that operates as both 1.x and 2.x may be counted only once and given a single allowance. When a particular interface may fall under more than one interface Type according to the table, the manufacturer should choose the function that the interface is primarily designed to perform when determining the appropriate adder allowance. For example, a USB connection on the front of the imaging product that is marketed as a PictBridge or "camera interface" in product literature should be considered a Type E interface rather than a Type B interface. Similarly, a memory-card-reader slot that supports multiple formats may only be counted once. Further, a system that supports more than one type of 802.11 may count as only one wireless interface.
Table 28
OM Table 1
Product(s): Copiers, MFDs |
Size Format(s): Large Format |
Marking Technologies: Colour DS, Colour TT, DT, Mono DS, Mono EP, Mono TT, Colour EP, SI |
| Sleep (W) |
Marking Engine | 58 |
Table 29
OM Table 2
Product(s): Fax Machines, MFDs, Printers |
Size Format(s): Standard-size |
Marking Technologies: Colour IJ, Mono IJ |
| Sleep (W) |
Marking Engine | 3 |
Table 30
OM Table 3

Product(s): MFDs, Printers |
Size Format(s): Large Format |
Marking Technologies: Colour IJ, Mono IJ |
| Sleep (W) |
Marking Engine | 13 |
Table 31
OM Table 4
Product(s): Mailing Machines |
Size Format(s): N/A |
Marking Technologies: DT, Mono EP, Mono IJ, Mono TT |
| Sleep (W) |
Marking Engine | 3 |
Table 32
OM Table 5
Product(s): Printers |
Size Format(s): Small Format |
Marking Technologies: Colour DS, DT, Colour IJ, Colour Impact, Colour TT, Mono DS, Mono EP, Mono IJ, Mono Impact, Mono TT, Colour EP, SI |
| Sleep (W) |
Marking Engine | 3 |
Table 33
OM Table 6
Product(s): Printers |
Size Format(s): Standard-size |
Marking Technologies: Colour Impact, Mono Impact |
| Sleep (W) |
Marking Engine | 6 |
Table 34
OM Table 7
Product(s): Scanners |
Size Format(s): Large Format, Small Format, Standard-size |
Marking Technologies: N/A |
| Sleep (W) |
Scanning Engine | 5 |
Table 35
OM Table 8
Product(s): Printers |
Size Format(s): Large Format |
Marking Technologies: Colour DS, Colour Impact, Colour TT, DT, Mono DS, Mono EP, Mono Impact, Mono TT, Colour EP, SI |
| Sleep (W) |
Marking Engine | 54 |
D. Testing Guidelines
The specific instructions for testing the energy efficiency of imaging equipment products are outlined in three separate sections below entitled:
- Typical Electricity Consumption Test Procedure;
- Operational Mode Test Procedure;
and
- Test Conditions and Equipment for ENERGY STAR Imaging Equipment Products.

The test results produced by these procedures shall be used as the primary basis for determining ENERGY STAR qualification.
Manufacturers are required to perform tests and self-certify those product models that meet the Energy Star guidelines. Families of imaging equipment models that are built on the same chassis and are identical in every respect except for housing and colour may be qualified through submission of test data for a single, representative model. Likewise, models that are unchanged or that differ only in finish from those sold in a previous year may remain qualified without the submission of new test data, assuming the specification remains unchanged.
If a product model is offered in the market in multiple configurations as a product "family" or series, the partner may test and report the highest configuration available in the family, rather than each and every individual model. When submitting model families, manufacturers continue to be held accountable for any efficiency claims made about their imaging products, including those not tested or for which data was not reported.
Example: Models A and B are identical, with the exception that model A is shipped with a wired interface > 500 MHz, and model B is shipped with a wired interface < 500 MHz. If model A is tested and meets the ENERGY STAR specification, then the partner may report the test data solely for model A, to represent both models A and B.
If a product's electrical power comes from Mains, USB, IEEE1394, Power-over-Ethernet, telephone system, or any other means or combinations of means, the net AC electrical power consumed by the product (taking into account ac-to-dc conversion losses, as specified in the OM test procedure) must be used for qualification.
1. Additional testing and reporting requirements are provided below.
Number of Units Required for Test
Testing shall be conducted by the manufacturer or its authorised representative on a single unit of a model.
(a) For products outlined in Section VII.B Table 15 of this specification, if the initial unit tested has TEC test results that meet the eligibility criteria but fall within 10 % of the criteria level, one additional unit of the same model must also be tested. Manufacturers shall report values for both units. To qualify as ENERGY STAR, both units must meet the ENERGY STAR specification.
(b) For products outlined in Section VII.C Table 16 of this specification, if the initial unit tested has OM test results that meet the eligibility criteria but fall within 15 % of the criteria level in any of the specified operating modes for that product type, then two more units shall be tested. To qualify as ENERGY STAR, all three units must meet the ENERGY STAR specification.
Submittal of Qualified Product Data to EPA or the European Commission, as appropriate
Partners are required to self-certify those product models that meet the ENERGY STAR guidelines and report information to EPA or the European Commission, as appropriate. The information to be reported for products shall be outlined shortly following publication of the final specification. In addition, partners must submit to EPA or the European Commission, as appropriate, excerpts from product literature that explain to consumers the recommended default delay-times for power management settings. The intent of this requirement is to support that products are being tested as shipped and recommended for use.
Models Capable of Operating at Multiple Voltage/Frequency Combinations
Manufacturers shall test their products based on the market(s) in which the models will be sold and promoted as ENERGY STAR qualified. EPA, the European Commission and their ENERGY STAR Country Partners have agreed upon a table with three voltage/frequency combinations for testing purposes. Please refer to the Imaging Equipment Test Conditions for details regarding international voltage/frequency and paper sizes for each market.
For products that are sold as ENERGY STAR in multiple international markets and therefore rated at multiple input voltages, the manufacturer must test at and report the required power consumption or efficiency values at all relevant voltage/frequency combinations. For example, a manufacturer that is

shipping the same model to the United States and Europe must measure, meet the specification, and report test values at both 115 Volts/60 Hz and 230 Volts/50 Hz in order to qualify the model as ENERGY STAR in both markets. If a model qualifies as ENERGY STAR at only one voltage/frequency combination (e.g., 115 Volts/60 Hz), then it may only be qualified and promoted as ENERGY STAR in those regions that support the tested voltage/frequency combination (e.g., North America and Taiwan).

2. Typical Electricity Consumption (TEC) Test Procedure

(a) Types of Products Covered: The TEC test procedure is for the measurement of Standard-size products defined in Section VII.B Table 15.

(b) Test Parameters

This section describes the test parameters to use when measuring a product under the TEC test procedure. This section does not cover test conditions, which are outlined in Section VII.D.4, below.

Testing in Simplex

Products shall be tested in simplex mode. Originals for copying shall be simplex images.

Test Image

The test image is Test Pattern A from ISO/IEC standard 10561:1999. It shall be rendered in 10 point size in a fixed-width Courier font (or nearest equivalent); German-specific characters need not be reproduced if the product is incapable of doing so. The image shall be rendered on an 8.5″ × 11″ or A4 sheet of paper, as appropriate for the intended market. For printers and MFDs that can interpret a page description language (PDL) (e.g., PCL, Postscript), images shall be sent to the product in a PDL.

Testing in Monochrome

Colour-capable products shall be tested making monochrome images unless incapable of doing so.

Auto-off and Network Enabling

The product shall be configured as-shipped and recommended for use, particularly for key parameters such as power-management default-delay times and resolution (except as specified below). All information from the manufacturer about recommended delay times shall be consistent with the as-shipped configuration, including those in operating manuals, on Web sites, and that provided by installation personnel. If a printer, digital duplicator or MFD with print-capability, or fax machine has an Auto-off capability and it is enabled as shipped, it shall be disabled prior to the test. Printers and MFDs that are capable of being network-connected as-shipped [19] shall be connected to a network. The type of network connection (or other data connection if not capable of being networked) is at the discretion of the manufacturer, and the type used shall be reported. Print jobs for the test may be sent over non-network connections (e.g., USB), even on those units that are network-connected.

Product Configuration

Paper source and finishing hardware shall be present and configured as-shipped and recommended for use; however, their use in the test is at the manufacturer's discretion (e.g., any paper source may be used). Anti-humidity features may be turned off if user-controllable. Any hardware that is part of the model and intended to be installed or attached by the user (e.g., a paper feature) shall be installed prior to this test.

Digital Duplicators

Digital duplicators should be set up and used in accordance with their design and capabilities. For example, each job should include only one original image. Digital duplicators shall be tested at maximum claimed speed, which is also the speed that should be used to determine the job size for performing the test, not at the default speed as-shipped, if different. Digital duplicators shall be otherwise treated as printers, copiers, or MFDs, depending on their capabilities as shipped.

(c) Job Structure

This section describes how to determine the number of images per job to use when measuring a product under the TEC test procedure, and jobs per day for the TEC calculation.

For purposes of this test procedure, the speed of the product that is used to determine the job size for the test shall be the manufacturer's reported maximum claimed simplex speed for making monochrome images on standard-sized paper (8.5″ × 11″ or A4), rounded to the nearest integer. This speed will also be used for reporting purposes as the Product Speed of the model. The default output speed of the product, which shall be used in the actual testing, is not measured and may differ from the maximum claimed speed due to factors such as settings for resolution, image quality, printing modes, document scan time, job size and structure, and paper size and weight.
Fax machines should always test with one image per job. The number of images per job to be used for all other IE products shall be computed according to the following three steps. For convenience, Table 37 provides the resultant images per job computation for each integral Product Speed up through 100 images per minute (ipm).
(i) Calculate the number of jobs per day. The number of jobs per day varies with Product Speed:
- For units with a speed of eight ipm or less, use eight jobs per day.
- For units with a speed between eight and 32 ipm, the number of jobs per day is equal to the speed. For example, a 14 ipm unit shall use 14 jobs per day.
- For units with a speed of 32 ipm and above, use 32 jobs per day.
(ii) Calculate the nominal amount of images per day [20] from Table 34. For example, a 14 ipm unit shall use 0.50 × 142, or 98 images per day.
Table 36
Imaging Equipment Job Table
Product type | Rating to use | Formula (images per day) |
Monochrome (except fax) | monochrome speed | 0.50 × ipm2 |
Colour (except fax) | monochrome speed | 0.50 × ipm2 |
(iii) Calculate the number of images per job by dividing the number of images per day by the number of jobs per day. Round down (truncate) to the nearest integer. For example, a figure of 15.8 indicates that 15 images should be made per job, rather than rounding to 16 images per job.
For copiers below 20 ipm, there shall be one original per required image. For jobs with large numbers of images, such as those for machines greater than 20 ipm, it may not be possible to match the number of required images, particularly with limits on the capacity of document feeders. Therefore, copiers 20 ipm and above may make multiple copies of each original as long as the number of originals is at least ten. This may result in more images being made than required. As an example, for a 50 ipm unit that requires 39 images per job, the test may be done with four copies of ten originals or three copies of 13 originals.
(d) Measurement Procedures
To measure time, an ordinary stopwatch and timing to a resolution of one second is sufficient. All energy figures are to be recorded as watt-hours (Wh). All time is to be recorded in seconds or minutes. "Zero meter" references are to the "Wh" readout of the meter. Tables 35 and 36 outline the steps of the TEC procedure.
Service/maintenance modes (including colour calibration) should generally not be included in TEC measurements. Any such modes that occur during the test shall be noted. If a service mode occurs during a job other than the first, that job may be dropped and a substitute job added to the test. In the case a substitute job is needed, do not record the energy values for the dropped job and add the substitute job immediately after Job 4. The 15-minute job interval shall be maintained at all times, including for the job that is dropped.
MFDs without print capability are to be treated as copiers for all purposes of this test procedure.
(i) Procedure for Printers, Digital Duplicators and MFDs with Print Capability, and Fax Machines
Table 37
TEC Test Procedure – Printers, Digital Duplicators and MFDs with Print Capability, and Fax Machines
Notes:

- Before beginning the test, it is helpful to check the power management default-delay times to ensure they are as-shipped, and to confirm that there is plenty of paper in the device.
- "Zero meter" references may be accomplished by recording the accumulated energy consumption at that time rather than literally zeroing the meter.
- Step 1 – The Off measurement period can be longer if desired to reduce measurement error. Note that the Off power is not used in the calculations.
- Step 2 – If the unit has no Ready indicator, use the time at which the power consumption level stabilises to the Ready level.
- Step 3 – After recording the Active0 time, the remainder of this job can be cancelled.
- Step 5 – The 15 minutes is from the job initiation. The unit must show increased energy consumption within five seconds of zeroing the meter and timer; it may be necessary to initiate the printing before zeroing to assure this.
- Step 6 – A unit that is shipped with short default-delay times might begin Steps 6-8 from Sleep.
- Step 9 – Units may have multiple Sleep modes so that all but the last Sleep mode are included in the Final period.

Step | Initial State | Action | Record (at end of step) | Possible States Measured |
1 | Off | Plug the unit into meter. Zero the meter; wait test period (five minutes or more). | Off energy | Off |
Testing Interval time |
2 | Off | Turn on unit. Wait until unit indicates it is in Ready mode. | — | — |
3 | Ready | Print a job of at least one output image but no more than a single job per Job Table. Record time to first sheet exiting unit. Wait until the meter shows that the unit has entered its final Sleep mode. | Active0 time | — |
4 | Sleep | Zero meter; wait one hour. | Sleep energy | Sleep |
5 | Sleep | Zero meter and timer. Print one job per Job Table. Record time to first sheet exiting unit. Wait until timer shows that 15 minutes have elapsed. | Job1 energy | Recovery, Active, Ready, Sleep |
Active1 time |
6 | Ready | Repeat Step 5. | Job2 energy | Same as above |
Active2 time |
7 | Ready | Repeat Step 5 (without Active time measurement). | Job3 energy | Same as above |
8 | Ready | Repeat Step 5 (without Active time measurement). | Job4 energy | Same as above |
9 | Ready | Zero meter and timer. Wait until meter and/or unit shows that unit has entered its final Sleep mode. | Final time | Ready, Sleep |
Final energy | — |

Each image shall be sent separately; they all may be part of the same document, but shall not be specified in the document as multiple copies of a single original image (unless the product is a digital duplicator, as specified in Section VII.D.2(b)).

For fax machines, which only use one image per job, the page shall be fed into the unit's document feeder for convenience copying, and may be placed in the document feeder before the test begins. The unit need not be connected to a telephone line unless the telephone line is necessary for performing the test. For example, if the fax machine lacks convenience copying capability, then the job performed in Step 2 shall be sent via phone line. On fax machines without a document feeder, the page should be placed on the platen.

(ii) Procedure for Copiers, Digital Duplicators, and MFDs without Print Capability

Table 38

TEC Test Procedure – Copiers, Digital Duplicators, and MFDs without Print Capability

Notes:

- Before beginning the test, it is helpful to check the power management default-delay times to ensure they are as-shipped, and to confirm that there is plenty of paper in the device.

- "Zero meter" references may be accomplished by recording the accumulated energy consumption at that time rather than literally zeroing the meter.
- Step 1 – The Off measurement period can be longer if desired to reduce measurement error. Note that the Off power is not used in the calculations.
- Step 2 – If the unit has no Ready indicator, use the time at which the power consumption level stabilises to the Ready level.
- Step 3 – After recording the Active0 time, the remainder of this job can be cancelled.
- Step 4 – If the unit turns off within this hour, record the Sleep energy and time at that point in time, but wait until a full hour has elapsed since the final Sleep mode was initiated before beginning Step 5. Note that the Sleep power measurement is not used within the calculation, and the unit may enter Auto-off within the full hour.
- Step 5 – The 15 minutes is from the job initiation. In order to be evaluated by this test procedure, products must be able to complete the required job per the Job Table within the 15-minute job interval.
- Step 6 – A unit that is shipped with short default-delay times might begin Steps 6-8 from Sleep or Auto-off.
- Step 9 – If the unit has already entered Auto-off before the start of Step 9, then the values for final energy and final time are zero.
- Step 10 – The Auto-off testing interval may be longer to improve accuracy.

Step | Initial State | Action | Record (at end of step) | Possible States Measured |
1 | Off | Plug the unit into meter. Zero the meter; wait test period (five minutes or more). | Off energy | Off |
Testing Interval time |
2 | Off | Turn on unit. Wait until unit indicates it is in Ready mode. | — | — |
3 | Ready | Copy a job of at least one image but no more than a single job per Job Table. Record time to first sheet exiting unit. Wait until the meter shows that the unit has entered its final Sleep mode. | Active0 time | — |
4 | Sleep | Zero meter; Wait one hour. If unit turns Off in less than one hour, record time and energy in Sleep, but wait full hour before moving to Step 5. | Sleep energy | Sleep |
Testing Interval time |
5 | Sleep | Zero meter and timer. Copy one job per Job Table. Record time to first sheet exiting unit. Wait until timer shows that 15 minutes has elapsed. | Job1 energy | Recovery, Active, Ready, Sleep, Auto-off |
Active1 time |
6 | Ready | Repeat Step 5. | Job2 energy | Same as above |
Active2 time |
7 | Ready | Repeat Step 5 (without Active time measurement). | Job3 energy | Same as above |
8 | Ready | Repeat Step 5 (without Active time measurement). | Job4 energy | Same as above |
9 | Ready | Zero meter and timer. Wait until meter and/or unit shows that unit has entered its Auto-off mode. | Final energy | Ready, Sleep |
Final time |
10 | Auto-off | Zero the meter; wait test period (five minutes or more). | Auto-off energy | Auto-off |

Originals may be placed in the document feeder before the test begins. Products without a document feeder may make all images off of a single original placed on the platen.

(iii) Additional Measurement for Products with a Digital Front End (DFE)

This step applies only to products that have a DFE as defined in Section VII.A.29.

If the DFE has a separate mains power cord, regardless of whether the cord and controller are internal or external to the imaging product, a five-minute energy measurement of the DFE alone shall be made while the main product is in Ready mode. The unit must be connected to a network if network-capable as shipped.

If the DFE does not have a separate mains power cord, the manufacturer shall document the ac power required for the DFE when the unit as a whole is in a Ready mode. This will most commonly be accomplished by taking an instantaneous power measurement of the dc input to the DFE and increasing this power level to account for losses in the power supply.

(e) Calculation Methods

The TEC value reflects assumptions about how many hours a day the product is in general use, the pattern of use during those hours, and the default-delay times that the product uses to transition to lower power modes. All electricity measurements are made as accumulated energy over time, and then converted to power by dividing by the length of the time period.

The calculations are based on imaging jobs being in two clusters each day with the unit going to its lowest power mode in between (as during a lunch break), as illustrated in Figure 2, which can be found at the end of this document. It is assumed that weekends have no usage, and no manual switching-off is done.

Final Time is the period of time from the last job being initiated to the start of the lowest power mode (Auto-off for copiers, digital duplicators and MFDs without print-capability; and Sleep for printers, digital duplicators and MFDs with print-capability, and fax machines) minus the 15-minute job interval time.

The following two equations are used for all product types:

Average Job Energy = (Job2 + Job3 + Job4) / 3

Daily Job Energy = (Job1 × 2) + [(Jobs per Day – 2) × Average Job Energy)]

The calculation method for printers, digital duplicators and MFDs with print-capability, and fax machines also uses the following three equations:

Daily Sleep Energy = [24 hours – ((Jobs per day / 4) + (Final Time × 2))] × Sleep Power

Daily Energy = Daily Job Energy + (2 × Final Energy) + Daily Sleep Energy

TEC = (Daily Energy × 5) + (Sleep Power × 48)

The calculation method for copiers, digital duplicators, and MFDs without print-capability also uses the following three equations:

Daily Auto-off Energy = [24 hours – ((Jobs per day / 4) + (Final Time × 2))] × Auto-off Power

Daily Energy = Daily Job Energy + (2 × Final Energy) + Daily Auto-off Energy

TEC = (Daily Energy × 5) + (Auto-off Power × 48)

The specifications of the metering equipment and ranges used in each measurement shall be reported. Measurements must be conducted so as to result in a total potential error of the TEC value of no more than 5 %. Accuracy does not need to be reported for cases where the potential error is below 5 %. When the potential measurement error is close to 5 %, manufacturers should take measures to confirm that it complies with the 5 % limit.

(f) References

ISO/IEC 10561:1999. Information technology – Office equipment – Printing devices – Method for measuring throughput – Class 1 and Class 2 printers.

Table 39

Job Table Calculated

Speed	Jobs/Day	Interim Images/Day	Interim Images/Job	Images/Job	Images/Day
1	8	1	0.06	1	8
2	8	2	0.25	1	8
3	8	5	0.56	1	8
4	8	8	1.00	1	8
5	8	13	1.56	1	8
6	8	18	2.25	2	16
7	8	25	3.06	3	24
8	8	32	4.00	4	32
9	9	41	4.50	4	36

10 | 10 | 50 | 5.00 | 5 | 50 |
11 | 11 | 61 | 5.50 | 5 | 55 |
12 | 12 | 72 | 6.00 | 6 | 72 |
13 | 13 | 85 | 6.50 | 6 | 78 |
14 | 14 | 98 | 7.00 | 7 | 98 |
15 | 15 | 113 | 7.50 | 7 | 105 |
16 | 16 | 128 | 8.00 | 8 | 128 |
17 | 17 | 145 | 8.50 | 8 | 136 |
18 | 18 | 162 | 9.00 | 9 | 162 |
19 | 19 | 181 | 9.50 | 9 | 171 |
20 | 20 | 200 | 10.00 | 10 | 200 |
21 | 21 | 221 | 10.50 | 10 | 210 |
22 | 22 | 242 | 11.00 | 11 | 242 |
23 | 23 | 265 | 11.50 | 11 | 253 |
24 | 24 | 288 | 12.00 | 12 | 288 |
25 | 25 | 313 | 12.50 | 12 | 300 |
26 | 26 | 338 | 13.00 | 13 | 338 |
27 | 27 | 365 | 13.50 | 13 | 351 |
28 | 28 | 392 | 14.00 | 14 | 392 |
29 | 29 | 421 | 14.50 | 14 | 406 |
30 | 30 | 450 | 15.00 | 15 | 450 |
31 | 31 | 481 | 15.50 | 15 | 465 |
32 | 32 | 512 | 16.00 | 16 | 512 |
33 | 32 | 545 | 17.02 | 17 | 544 |
34 | 32 | 578 | 18.06 | 18 | 576 |
35 | 32 | 613 | 19.14 | 19 | 608 |
36 | 32 | 648 | 20.25 | 20 | 640 |
37 | 32 | 685 | 21.39 | 21 | 672 |
38 | 32 | 722 | 22.56 | 22 | 704 |
39 | 32 | 761 | 23.77 | 23 | 736 |
40 | 32 | 800 | 25.00 | 25 | 800 |
41 | 32 | 841 | 26.27 | 26 | 832 |
42 | 32 | 882 | 27.56 | 27 | 864 |
43 | 32 | 925 | 28.89 | 28 | 896 |
44 | 32 | 968 | 30.25 | 30 | 960 |
45 | 32 | 1013 | 31.64 | 31 | 992 |
46 | 32 | 1058 | 33.06 | 33 | 1056 |
47 | 32 | 1105 | 34.52 | 34 | 1088 |
48 | 32 | 1152 | 36.00 | 36 | 1152 |
49 | 32 | 1201 | 37.52 | 37 | 1184 |
50 | 32 | 1250 | 39.06 | 39 | 1248 |
51 | 32 | 1301 | 40.64 | 40 | 1280 |
52 | 32 | 1352 | 42.25 | 42 | 1344 |
53 | 32 | 1405 | 43.89 | 43 | 1376 |
54 | 32 | 1458 | 45.56 | 45 | 1440 |
55 | 32 | 1513 | 47.27 | 47 | 1504 |
56 | 32 | 1568 | 49.00 | 49 | 1568 |
57 | 32 | 1625 | 50.77 | 50 | 1600 |
58 | 32 | 1682 | 52.56 | 52 | 1664 |
59 | 32 | 1741 | 54.39 | 54 | 1728 |

60 | 32 | 1800 | 56.25 | 56 | 1792 |
61 | 32 | 1861 | 58.14 | 58 | 1856 |
62 | 32 | 1922 | 60.06 | 60 | 1920 |
63 | 32 | 1985 | 62.02 | 62 | 1984 |
64 | 32 | 2048 | 64.00 | 64 | 2048 |
65 | 32 | 2113 | 66.02 | 66 | 2112 |
66 | 32 | 2178 | 68.06 | 68 | 2176 |
67 | 32 | 2245 | 70.14 | 70 | 2240 |
68 | 32 | 2312 | 72.25 | 72 | 2304 |
69 | 32 | 2381 | 74.39 | 74 | 2368 |
70 | 32 | 2450 | 76.56 | 76 | 2432 |
71 | 32 | 2521 | 78.77 | 78 | 2496 |
72 | 32 | 2592 | 81.00 | 81 | 2592 |
73 | 32 | 2665 | 83.27 | 83 | 2656 |
74 | 32 | 2738 | 85.56 | 85 | 2720 |
75 | 32 | 2813 | 87.89 | 87 | 2784 |
76 | 32 | 2888 | 90.25 | 90 | 2880 |
77 | 32 | 2965 | 92.64 | 92 | 2944 |
78 | 32 | 3042 | 95.06 | 95 | 3040 |
79 | 32 | 3121 | 97.52 | 97 | 3104 |
80 | 32 | 3200 | 100.00 | 100 | 3200 |
81 | 32 | 3281 | 102.52 | 102 | 3264 |
82 | 32 | 3362 | 105.06 | 105 | 3360 |
83 | 32 | 3445 | 107.64 | 107 | 3424 |
84 | 32 | 3528 | 110.25 | 110 | 3520 |
85 | 32 | 3613 | 112.89 | 112 | 3584 |
86 | 32 | 3698 | 115.56 | 115 | 3680 |
87 | 32 | 3785 | 118.27 | 118 | 3776 |
88 | 32 | 3872 | 121.00 | 121 | 3872 |
89 | 32 | 3961 | 123.77 | 123 | 3936 |
90 | 32 | 4050 | 126.56 | 126 | 4032 |
91 | 32 | 4141 | 129.39 | 129 | 4128 |
92 | 32 | 4232 | 132.25 | 132 | 4224 |
93 | 32 | 4325 | 135.14 | 135 | 4320 |
94 | 32 | 4418 | 138.06 | 138 | 4416 |
95 | 32 | 4513 | 141.02 | 141 | 4512 |
96 | 32 | 4608 | 144.00 | 144 | 4608 |
97 | 32 | 4705 | 147.02 | 157 | 4704 |
98 | 32 | 4802 | 150.06 | 150 | 4800 |
99 | 32 | 4901 | 153.14 | 153 | 4896 |
100 | 32 | 5000 | 156.25 | 156 | 4992 |

Figure 2

TEC Measurement Procedure

+++++ TIFF +++++

Job 1Job 2Job 3Job 4Final

Figure 2 shows a graphic form of the measurement procedure. Note that products with short default-delay times may include periods of Sleep within the four job measurements, or Auto-off within the Sleep measurement in Step 4. Also, print-capable products with just one Sleep mode will not have a Sleep mode in the final period. Step 10 only applies to copiers, digital duplicators, and MFDs without print-capability.

Figure 3
A Typical Day
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PowerAuto-Off (copiers)JobsFinalJobsFinalMorningAfternoon
Figure 3 shows a schematic example of an eight-ipm copier that performs four jobs in morning, four jobs in afternoon, has two "final" periods and an Auto-off mode for the remainder of the workday and all of the weekend. An assumed "lunchtime" period is implied but not explicit. The figure is not drawn to scale. As shown, jobs are always 15 minutes apart and in two clusters. There are always two full "final" periods regardless of the length of these periods. Printers, digital duplicators and MFDs with print capability, and fax machines use Sleep rather than Auto-off as the base mode but are otherwise treated the same as copiers.
3. Operational Mode (OM) Test Procedure
(a) Types of Products Covered: The OM Test Procedure is for the measurement of products defined in Section VII.B, Table 16.
(b) Test Parameters
This section describes the test parameters to use when measuring a product's power consumption under the OM Test Procedure.
Network Connectivity
Products that are capable of being network-connected as-shipped [21] shall be connected to at least one network during the test procedure. The type of network connection that is active is at the discretion of the manufacturer, and the type used shall be reported.
The product shall not receive operating power over the network connection (e.g., via Power over Ethernet, USB, USB PlusPower, or IEEE 1394) unless that is the only source of power for the product (i.e., no ac power source is present).
Product Configuration
The product shall be configured as shipped and recommended for use, particularly for key parameters such as power management default-delay times, print quality, and resolution. In addition:
Paper source and finishing hardware shall be present and configured as shipped; however, use of these features in the test is at the manufacturer's discretion (e.g., any paper source may be used). Any hardware that is part of the model and intended to be installed or attached by the user (e.g., a paper feature) shall be installed prior to this test.
Anti-humidity features may be turned off if they are user-controllable.
For fax machines, a page shall be fed into the unit's document feeder for convenience copying, and may be placed in the document feeder before the test begins. The unit need not be connected to a telephone line unless the telephone line is necessary for performing the test. For example, if the fax machine lacks convenience copying capability, then the job performed in Step 2 shall be sent via phone line. On fax machines without a document feeder, the page should be placed on the platen.
If a product has an Auto-off mode enabled as shipped, it shall be enabled prior to performing the test.
Speed
When conducting power measurements under this test procedure, the product shall produce images at the speed resultant from its default settings as shipped. However, the manufacturer's reported maximum claimed simplex speed for making monochrome images on standard-sized paper shall be used for reporting purposes.
(c) Power Measurement Method
All power measurements are to be made in accordance with IEC 62301 with the following exceptions:
To determine the voltage/frequency combinations to be used during testing, see the Test Conditions and Equipment for ENERGY STAR Imaging Equipment Products in Section VII.D.4.
The harmonics requirement used during testing is that specified in the IE Test Conditions document, which is more stringent than that required by IEC 62301.

The accuracy requirement for this OM test procedure is 2 % for all measurements except for Ready power. The accuracy requirement for measuring Ready power is 5 %, as provided in the Idocument. Thetions document. The 2 % figure is consistent with IEC 62301, although the IEC standard expresses it as a confidence level.
For products designed to operate using batteries when not connected to the mains, the battery shall be left in place for the test; however, the measurement should not reflect active battery charging beyond maintenance charging (i.e., the battery should be fully charged before beginning the test). Products with external power supplies shall be tested with the product connected to the external power supply.
Products powered by a standard low voltage dc supply (e.g., USB, USB PlusPower, IEEE 1394, and Power Over Ethernet) shall utilise a suitable ac-powered source of the dc power. This ac-powered source's energy consumption shall be measured and reported for the imaging equipment product under test. For imaging equipment powered by USB, a powered hub serving only the imaging equipment being tested shall be used. For imaging equipment powered by Power Over Ethernet or USB PlusPower, it is acceptable to measure the power distribution device with and without the imaging product connected, and use this difference as the imaging product's consumption. The manufacturer should confirm that this reasonably reflects the unit's dc consumption plus some allowance for power supply and distribution inefficiency.
(d) Measurement Procedure
To measure time, an ordinary stopwatch and timing to a resolution of one second is sufficient. All power figures are to be recorded in watts (W). Table 38 outlines the steps of the OM test procedure. Service/maintenance modes (including colour calibration) generally should not be included in measurements. Any adaptation of the procedure needed to exclude such modes that occur during the test shall be noted.
As stated above, all power measurements are to be made in accordance with IEC 62301. Depending on the nature of the mode, IEC 62301 provides for instantaneous power measurements, five-minute accumulated energy measurements, or accumulated energy measurements over periods long enough to properly assess cyclical consumption patterns. Regardless of the method, only power values should be reported.
Table 40
OM Test Procedure
Notes:
- Before beginning the test, it is helpful to check the power management default-delay times to ensure they are as shipped.
- Step 1 – If the unit has no Ready indicator, use the time at which the power consumption level stabilises to the Ready level, and note this detail when reporting the product test data.
- Steps 4 and 5 – For products with more than one Sleep level, repeat these steps as many times as necessary to capture all successive Sleep levels and report this data. Two Sleep levels are typically used in large-format copiers and MFDs that use high-heat marking technologies. For products lacking this mode, disregard Steps 4 and 5.
- Steps 4 and 6 – Default-delay time measurements are to be measured in parallel fashion, cumulative from the start of Step 4. For example, a product set to enter a Sleep level in 15 minutes and enter a second Sleep level 30 minutes after entering the first Sleep level will have a 15-minute default-delay time to the first level and a 45-minute default-delay time to the second level.
- Steps 6 and 7 – Most OM products do not have a distinct Auto-off mode. For products lacking this mode, disregard Steps 6 and 7.
- Step 8 – If the unit has no power switch, wait until it enters its lowest power mode and note this detail when reporting the product test data.
Step | Initial State | Action | Record |
1 | Off | Plug the unit into meter. Turn on unit. Wait until unit indicates it is in Ready mode. | — |

2 | Ready | Print, copy, or scan a single image. | — |
3 | Ready | Measure Ready power. | Ready power |
4 | Ready | Wait default delay-time to Sleep. | Sleep default-delay time |
5 | Sleep | Measure Sleep power. | Sleep power |
6 | Sleep | Wait default delay time to Auto-off. | Auto-off default-delay time |
7 | Auto-off | Measure Auto-off power. | Auto-off power |
8 | Off | Manually turn device off. Wait until unit is off. | — |
9 | Off | Measure Off power. | Off power |
(i) Additional Measurement for Products with a Digital Front End (DFE)
This step applies only to products that have a DFE as defined in Section VII.A.29.
If the DFE has a separate mains power cord, regardless of whether the cord and controller are internal or external to the imaging product, a five-minute energy measurement of the DFE alone shall be made while the main product is in Ready mode. The unit must be connected to a network if network-capable as shipped.
If the DFE does not have a separate mains power cord, the manufacturer shall document the ac power required for the DFE when the unit as a whole is in a Ready mode. This will most commonly be accomplished by taking an instantaneous power measurement of the dc input to the DFE and increasing this power level to account for losses in the power supply.
(e) References
IEC 62301:2005. Household Electrical Appliances – Measurement of Standby Power
4. Test Conditions and Equipment for ENERGY STAR Imaging Equipment Products
The following test conditions shall be applied to the OM and TEC Test Procedures. These cover copiers, digital duplicators, fax machines, mailing machines, multifunction devices, printers, and scanners.
Below are the ambient test conditions that must be established when performing the energy or power measurements. These are necessary to ensure that variance in ambient conditions does not affect the test results, and that test results are reproducible. Specifications for test equipment follow the test conditions.
(a) Test Conditions
General Criteria:
(Reference IEC 62301: Household Electrical Appliances – Measurement of Standby Power, Sections 3.2, 3.3)
Supply Voltage []: | North America/Taiwan: | 115 (±1 %) Volts AC, 60 Hz (±1 %) |
Europe/Australia/New Zealand: | 230 (±1 %) Volts AC, 50 Hz (±1 %) |
Japan: | 100 (±1 %) Volts AC, 50 Hz (±1 %)/60 Hz (±1 %) |
| Note: For products rated for > 1.5 kW maximum power, the voltage range is ±4 % |
Total Harmonic Distortion (THD) (Voltage): | < 2 % THD (< 5 % for products which are rated for > 1.5 kW maximum power) |
Ambient Temperature: | 23 °C ±5 °C |
Relative Humidity: | 10 – 80 % |
Paper Specifications:
For all TEC tests and for OM tests that require the use of paper, the paper size and basis weight shall be appropriate to the intended market, per the following table.
Paper Size and Weight
Market | Size | Basis Weight |
North America/Taiwan: | 8.5″ × 11″ | 75 g/m2 |
Europe/Australia/New Zealand: | A4 | 80 g/m2 |
Japan: | A4 | 64 g/m2 |
(b) Test Equipment

The goal of the test procedures is to accurately measure the TRUE power consumption [23] of the product. This necessitates the use of a True RMS power or energy meter. There are many such meters available, and manufacturers need to exercise care in selecting an appropriate model. The following factors must be considered when selecting a meter and conducting the test.

Frequency Response: Electronic equipment that contains switching power supplies introduces harmonics (odd harmonics typically up to the 21st). If these harmonics are not accounted for in power measurement, the result will be inaccurate. EPA recommends that manufacturers use meters that have a frequency response of at least 3 kHz; this will account for harmonics up to the 50th, and is recommended by IEC 555.

Resolution: For direct power measurements, resolution of metering equipment shall be consistent with the following requirements of IEC 62301:

"The power measurement instrument shall have a resolution of:

- 0.01 W or better for power measurements of 10 W or less.
- 0.1 W or better for power measurements of greater than 10 W up to 100 W
- 1 W or better for power measurements of greater than 100 W." [24]

In addition, the measurement instrument shall have a resolution of 10 W or better for power measurements greater than 1.5 kW. Measurements of accumulated energy should have resolutions which are generally consistent with these values when converted to average power. For accumulated energy measurements, the figure of merit for determining required accuracy is the maximum power value during the measurement period, not the average, since it is the maximum that determines the metering equipment and setup.

Accuracy

Measurements made with these procedures shall in all cases have an accuracy of 5 % or better, though manufacturers will usually achieve better than this. Test procedures may specify greater accuracy than 5 % for some measurements. With knowledge of the power levels of current imaging products and the meters available, manufacturers can calculate the maximum error based on the reading and the range utilised for the reading. For measurements of 0.50 W or less, the required accuracy is 0.02 W.

Calibration

Meters must have been calibrated within the last 12 months to ensure accuracy.

E. User Interface

Manufacturers are strongly recommended to design products in accordance with IEEE 1621: Standard for User Interface Elements in Power Control of Electronic Devices Employed in Office/Consumer Environments. This standard was developed to make power controls more consistent and intuitive across all electronic devices. For details on the development of this standard, see http://eetd.lbl.gov/controls.

F. Effective Date

The date that manufacturers may begin to qualify products as ENERGY STAR under the Version 1.0 specification, will be defined as the effective date of the agreement. Any previously executed agreement on the subject of ENERGY STAR qualified imaging equipment shall be terminated effective March 31, 2007.

Qualifying and Labelling Products under Version 1.0:

The Version 1.0 specification shall commence on April 1, 2007, with the exception of digital duplicators. All products, including models originally qualified under previous imaging equipment specifications, with a date of manufacture on or after the effective date, must meet the new Version 1.0 requirements in order to qualify for ENERGY STAR (including additional manufacturing runs of models originally qualified under previous specifications). The date of manufacture is specific to each unit and is the date (e.g., month and year) on which a unit is considered to be completely assembled.

(a) Tier I – Tier I shall commence on April 1, 2007. Tier I applies to all products described in Section VII.B of this specification.

(b) Tier II – Tier II shall commence on April 1, 2009. Tier II will apply to the maximum TEC levels for all TEC products, as well as to Standby levels for Large-format OM products and mailing machines. In addition, the definitions, products addressed, the manner in which they are addressed, and levels included for all products under this Version 1.0 specification may be reconsidered. EPA will inform stakeholders of plans to make such changes at most six months following the effective date of Tier I.
(c) Digital Duplicators – Tier I of the Version 1.0 specification becomes effective for digital duplicators upon finalisation of the agreement between the European Community and the US EPA.
Elimination of Grandfathering:
EPA and the European Commission will not allow grandfathering under this Version 1.0 ENERGY STAR specification. ENERGY STAR qualification under previous Versions is not automatically granted for the life of the product model. Therefore, any product sold, marketed, or identified by the manufacturing partner as ENERGY STAR must meet the current specification in effect at the time of manufacture of the product.
G. Future Specification Revisions
EPA and the European Commission reserve 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 stakeholder discussions. EPA and the European Commission will periodically assess the market in terms of energy efficiency and new technologies. As always, stakeholders will have an opportunity to share their data, submit proposals, and voice any concerns. EPA and the European Commission will strive to ensure that the specification recognises the most energy efficient models in the marketplace and reward those manufacturers who have made efforts to further improve energy efficiency.
(a) Colour Testing: Based on submitted test data, future consumer preferences, and engineering advancements, EPA and the European Commission may modify this specification at some point in the future to include colour-imaging in the test method.
(b) Recovery Time: EPA and the European Commission will closely monitor incremental and absolute recovery times as reported by partners testing to the TEC method, as well as partner-submitted documentation regarding recommended default delay settings. EPA and the European Commission will consider modification of this specification to address recovery time should it become apparent that manufacturer practices are resulting in user disabling of power management modes.
(c) Addressing OM Products Under TEC: Based on submitted test data, opportunities for greater energy savings, and engineering advancements, EPA and the European Commission may modify this specification at some point in the future to address products that are currently treated by the OM approach under the TEC approach, including Large-format and Small-format products, as well as products that employ IJ technology.
VIII. COMPUTER SPECIFICATIONS – REVISED FOR 2007
The following Computer specification shall be applicable as of 20 July 2007.
Below is the Version 4.0 product specification for ENERGY STAR qualified computers. A product must meet all of the identified criteria to earn the ENERGY STAR.
1. DEFINITIONS
Below are the definitions of the relevant terms in this document.
A. Computer: A device which performs logical operations and processes data. Computers are composed of, at a minimum: (1) a central processing unit (CPU) to perform operations; (2) user input devices such as a keyboard, mouse, digitiser or game controller; and (3) a display screen to output information. For the purposes of this specification, computers include both stationary and portable units, including desktop computers, gaming consoles, integrated computers, notebook computers, tablet PCs, desktop-derived servers and workstations. Although computers must be capable of using

input devices and displays, as noted in numbers 2 and 3 above, computer systems do not need to include these devices on shipment to meet this definition.

Components

B. Display: A commercially-available, electronic product with a display screen and its associated electronics encased in a single housing, or within the computer housing (e.g., notebook or integrated computer), that is capable of displaying output information from a computer via one or more inputs, such as a VGA, DVI, and/or IEEE 1394. Examples of display technologies are the cathode-ray tube (CRT) and liquid crystal display (LCD).

C. External Power Supply: A component contained in a separate physical enclosure external to the computer casing and designed to convert line voltage ac input from the mains to lower dc voltage(s) for the purpose of powering the computer. An external power supply must connect to the computer via a removable or hard-wired male/female electrical connection, cable, cord or other wiring.

D. Internal Power Supply: A component internal to the computer casing and designed to convert ac voltage from the mains to dc voltage(s) for the purpose of powering the computer components. For the purposes of this specification, an internal power supply must be contained within the computer casing but be separate from the main computer board. The power supply must connect to the mains through a single cable with no intermediate circuitry between the power supply and the mains power. In addition, all power connections from the power supply to the computer components must be internal to the computer casing (i.e., no external cables running from the power supply to the computer or individual components). Internal dc-to-dc converters used to convert a single dc voltage from an external power supply into multiple voltages for use by the computer are not considered internal power supplies.

Computer Types

E. Desktop Computer: A computer where the main unit is intended to be located in a permanent location, often on a desk or on the floor. Desktops are not designed for portability and utilise an external monitor, keyboard, and mouse. Desktops are designed for a broad range of home and office applications including, email, web browsing, word processing, standard graphics applications, gaming, etc.

F. Desktop-Derived Server: A desktop-derived server is a computer that typically uses desktop components in a tower form factor, but is designed explicitly to be a host for other computers or applications. For the purposes of this specification, a computer must be marketed as a server and have the following characteristics to be considered a desktop-derived server:

- Designed and placed on the market as a Class B product per EuroNorm EN55022:1998 under the EMC Directive 89/336/EEC and has no more than single processor capability (1 socket on board);
- Designed in a pedestal, tower, or other form factor similar to those of desktop computers such that all data processing, storage, and network interfacing is contained within one box/product;
- Designed to operate in a high-reliability, high-availability application environment where the computer must be operational 24 hours/day and 7 days/week, and unscheduled downtime is extremely low (on the order of hours/year);
- Capable of operating in a simultaneous multi-user environment serving several users through networked client units;

and

- Shipped with an industry accepted operating system for standard server applications (e.g., Windows NT, Windows 2003 Server, Mac OS X Server, OS/400, OS/390, Linux, Unix and Solaris).

Desktop-derived servers are designed to perform functions such as processing information for other systems, providing network infrastructure services (e.g., archiving), data hosting and running web servers.

This specification does not cover mid-range or large servers, defined for purposes of this specification as:

- Designed and placed on the market as a Class A product per EuroNorm EN55022:1998 under the EMC Directive 89/336/EEC and designed and capable of having a single or dual processor capability (1 or more sockets on board);
- Placed on the market as a Class B product, but hardware upgraded from a Class A product, per EuroNorm EN55022:1998 under the EMC Directive 89/336/EEC and designed capable of having a single or dual processor capability (1 or more sockets on board);
and
- Designed and placed on the market as a Class B product per EuroNorm EN55022:1998 under the EMC Directive 89/336/EEC and designed and capable of having a minimum dual processor capability (2 sockets on board).

G. Game Consoles: Stand alone computers whose primary use is to play video games. For the purposes of this specification, game consoles must use a hardware architecture based on typical computer components (e.g., processors, system memory, video architecture, optical and/or hard drives, etc.). The primary input for game consoles are special hand held controllers rather than the mouse and keyboard used by more conventional computer types. Game consoles are also equipped with audio visual outputs for use with televisions as the primary display, rather than an external monitor or integrated display. These devices do not typically use a conventional operating system, but often perform a variety of multimedia functions such as: DVD/CD playback, digital picture viewing, and digital music playback.

H. Integrated Computer: A desktop system in which the computer and display function as a single unit which receives its ac power through a single cable. Integrated computers come in one of two possible forms: (1) a system where the display and computer are physically combined into a single unit; or (2) a system packaged as a single system where the display is separate but is connected to the main chassis by a dc power cord and both the computer and display are powered from a single power supply. As a subset of desktop computers, integrated computers are typically designed to provide similar functionality as desktop systems.

I. Notebook and Tablet Computers: A computer designed specifically for portability and to be operated for extended periods of time without a direct connection to an ac power source. Notebooks and tablets must utilise an integrated monitor and be capable of operation off an integrated battery or other portable power source. In addition, most notebooks and tablets use an external power supply and have an integrated keyboard and pointing device, though tablets use touch-sensitive screens. Notebook and tablet computers are typically designed to provide similar functionality to desktops except within a portable device. For the purposes of this specification, docking stations are considered accessories and therefore, the performance levels associated with notebooks presented in Table 41 of Section 3, below, do not include them.

J. Workstation: For the purposes of this specification, to qualify as a workstation, a computer must:
- Be marketed as a workstation;
- Have a mean time between failures (MTBF) of at least 15000 hours based on either Bellcore TR-NWT–000332, issue 6, 12/97 or field collected data;
and
- Support error-correcting code (ECC) and/or buffered memory.

In addition, a workstation must meet three of the following six optional characteristics:
- Have supplemental power support for high-end graphics (i.e., PCI-E 6-pin 12V supplemental power feed);
- System is wired for greater than x4 PCI-E on the motherboard in addition to the graphics slot(s) and/or PCI-X support;
- Does not support Uniform Memory Access (UMA) graphics;
- Includes 5 or more PCI, PCIe or PCI-X slots;
- Capable of multi-processor support for two or more processors (must support physically separate processor packages/sockets, i.e., not met with support for a single multi core processor);

and/or
- Be qualified by at least 2 Independent Software Vendor (ISV) product certifications; these certifications can be in process, but must be completed within 3 months of qualification.
Operational Modes
K. Idle State: For purposes of testing and qualifying computers under this specification, this is the state in which the operating system and other software have completed loading, the machine is not asleep, and activity is limited to those basic applications that the system starts by default.
L. Sleep Mode: A low power state that the computer is capable of entering automatically after a period of inactivity or by manual selection. A computer with sleep capability can quickly "wake" in response to network connections or user interface devices. For the purposes of this specification, Sleep mode correlates to ACPI System Level S3 (suspend to RAM) state, where applicable.
M. Standby Level (Off Mode): The power consumption level in the lowest power mode which cannot be switched off (influenced) by the user and that may persist for an indefinite time when the appliance is connected to the main electricity supply and used in accordance with the manufacturer's instructions. For purposes of this specification, Standby correlates to ACPI System Level S4 or S5 states, where applicable.
Networking and Power Management
N. Network Interface: The components (hardware and software) whose primary function is to make the computer capable of communicating over one or more network technologies. For purposes of testing to this specification, Network Interface refers to the IEEE 802.3 wired Ethernet interface.
O. Wake Event: A user, programmed, or external event or stimulus that causes the computer to transition from Sleep or Standby to active mode of operation. Examples of wake events include, but are not limited to: movement of the mouse, keyboard activity, or a button press on the chassis, and in the case of external events, stimulus conveyed via a remote control, network, modem, etc.
P. Wake On LAN (WOL): Functionality which allows a computer to wake from Sleep or Standby when directed by a network request.
2. QUALIFYING PRODUCTS
Computers must meet the computer definition as well as one of the product type definitions provided in Section 1, above, to qualify as ENERGY STAR. Please note that EPA and the European Commission will explore additional computer types, such as thin clients, for potential Tier 2 requirements. The following table provides a list of the types of computers that are (and are not) eligible for ENERGY STAR.
Products Covered by Version 4.0 Specification | Products Not Covered by Version 4.0 Specification |
(a) Desktop Computers (b) Game Consoles (c) Integrated Computer Systems (d) Notebook Computers/Tablet PCs (e) Desktop-Derived Servers (f) Workstations | (g) Mid-Range and Large Servers (as defined in Section 1) F.) (h) Thin Clients/Blade PCs (c) Handhelds and PDAs |
3. ENERGY EFFICIENCY AND POWER MANAGEMENT CRITERIA
Computers must meet the requirements below to qualify as ENERGY STAR. Effective dates for Tier 1 and Tier 2 are covered in Section 5 of this specification.
A. Tier 1 Requirements – Effective July 20, 2007
1. Power Supply Efficiency Requirements
Computers Using an Internal Power Supply: 80 % minimum efficiency at 20 %, 50 %, and 100 % of rated output and Power Factor > 0.9 at 100 % of rated output.
Computers Using an External Power Supply: Must be ENERGY STAR qualified or meet the no-load and active mode efficiency levels provided in the ENERGY STAR Program Requirements for Single Voltage Ac-Ac and Ac-Dc External Power Supplies. The ENERGY STAR specification and qualified product list can be found at www.energystar.gov/powersupplies. Note: This performance requirement also applies to multiple voltage output external power supplies as tested in accordance to the Internal Power Supply test method referenced in Section 4, below.
2. Operational Mode Efficiency Requirements

Desktop Categories for Idle Criteria: For the purposes of determining Idle state levels, desktops (including integrated computers, desktop-derived servers and game consoles) must qualify under Categories A, B, or C as defined below:
Category A: All desktop computers that do not meet the definition of either Category B or Category C below will be considered under Category A for ENERGY STAR qualification.
Category B: To qualify under Category B desktops must have:
- Multi-core processor(s) or greater than 1 discrete processor;
and
- Minimum of 1 gigabyte of system memory.
Category C: To qualify under Category C desktops must have:
- Multi-core processor(s) or greater than 1 discrete processor;
and
- A GPU with greater than 128 megabytes of dedicated, non-shared memory.
In addition to the requirements above, models qualifying under Category C must be configured with a minimum of 2 of the following 3 characteristics:
- Minimum of 2 gigabytes of system memory;
- TV tuner and/or video capture capability with high definition support;
and/or
- Minimum of 2 hard disk drives.
Notebook Categories for Idle Criteria: For the purposes of determining Idle state levels, notebooks and tablets must qualify under Categories A or B as defined below:
Category A: All notebook computers that do not meet the definition of Category B below will be considered under Category A for ENERGY STAR qualification.
Category B: To qualify under Category B notebooks must have:
- A GPU with a minimum of 128 megabytes of dedicated, non-shared memory.
Workstation Levels: Workstation levels will be determined using a simplified Typical Electricity Consumption (TEC) approach to allow manufacturers energy trade offs between different operating modes, based on a given weighting factor for each mode. The final level will be based on the TEC power level (PTEC) which will be determined by the following formula:
PTEC = 0.1 * PStandby + 0,2 * PSleep + 0,7 * PIdle
where PStandby is the power measured in Standby, PSleep is the power measured in Sleep, and in PIdle is the power measured in Idle. This PTEC value will then be compared to the TEC budget which is determined by a fixed percentage of the maximum power of the system, including an adder for installed hard drives as indicated in the equation in Table 41. The test procedure for determining the maximum power of workstations can be found in Section 4 of Appendix A.
Power Level Requirements: The following tables indicate the required power allowances for the Tier 1 specification. Table 41 gives the baseline requirements, while Table 42 gives additional power allowances for WOL. For those products that meet the WOL enabling requirement for either Sleep or Standby, a model must meet the energy level provided in Table 41 summed with the appropriate allowances from Table 42. Note: Products whose Sleep levels meet the Standby power requirements do not need to have a distinct Standby (Off mode), and may qualify for this specification using only Sleep mode.
Table 41
Tier 1 Energy Efficiency Requirements
Product Type | Taier 1 Requirements |
Desktops, Integrated Computers, Desktop-Derived Servers and Gaming Consoles | Standby (Off Mode): ≤ 2.0 W Sleep Mode: ≤ 4.0 W Idle State: Category A: ≤ 50.0 W Category B: ≤ 65.0 W Category C: ≤ 95.0 W Note: Desktop-derived servers (as defined in section 1 F.) are exempt from the Sleep level above. |

Notebooks and Tablets | Standby (Off Mode): ≤ 1.0 W Sleep Mode: ≤ 1.7 W Idle State: Category A: ≤ 14.0 W Category B: ≤ 22.0 W |
Workstations | TEC Power (PTEC): ≤ 0.35 * [PMax + (# HDDs * 5)] W Note: Where Pmax is the maximum power drawn by the system as tested per the test procedure in Section 4 of Appendix A, and #HDD is the number of installed hard drives in the system. |
Table 42
Tier 1 Capability Adder for Sleep and Standby
Capability | Additional Power Allowance |
Wake On LAN (WOL) | +0,7 W for Sleep +0,7 W for Standby |
Qualifying Computers with Power Management Capabilities: The following requirements should be followed when determining whether models should be qualified with or without WOL:
Standby: Computers should be tested and reported as shipped for Standby. Models that will be shipped with WOL enabled for Standby should be tested with WOL enabled and will qualify using the extra allowance for Standby found in Table 42 above. Likewise, products shipped with WOL disabled for Standby must be tested with WOL disabled and must meet the baseline requirement for Standby found in Table 41.
Sleep: Computers should be tested and reported as shipped for Sleep. Models sold through enterprise channels, as defined in the Tier 1 Power Management Requirements (Section 3.A.3), shall be tested, qualified, and shipped WOL enabled. Products going directly to consumers through normal retail channels are not required to be shipped with WOL enabled from Sleep, and may be tested, qualified, and shipped with WOL either enabled or disabled. Those models sold both through enterprise channels and directly to consumers must test and meet both the levels with and without WOL. Systems where any additional management services are, at the customer's request, pre-provisioned by the manufacturer, do not need to test the systems with these functions in an active state providing the function is not actually activated until there is specific action by the end user (i.e., manufacturer should test in pre-provisioned state and does not have to consider the power use after full provisioning occurs on site).
3. Power Management Requirements
Shipment Requirement: Products must be shipped with the display's Sleep mode set to activate within 15 minutes of user inactivity. All products, except for desktop-derived servers which are exempt from this requirement, must be shipped with a Sleep mode which is set to activate within 30 minutes of user inactivity. Products may have more than one low power mode but these proposed criteria address Sleep mode as defined in this specification. Computers shall reduce the speed of any active 1 Gb/s Ethernet network links when transitioning to Sleep or Standby.
All computers, regardless of distribution channel, shall have the ability to enable and disable WOL for Sleep mode. Systems shipped through enterprise channels must have Wake On LAN (WOL) enabled from the Sleep mode when operating on ac power (i.e. notebooks may automatically disable WOL when operating on their portable power sources). For the purpose of this specification, "enterprise channels" are defined as sales channels normally used by large and medium-sized business, government organisations, and educational institutions, with the intent of identifying machines that will be used in managed client/server environments. For all computers with WOL enabled any directed packet filters shall be enabled and set to an industry standard default configuration. Until one (or more) standards are agreed upon, partners are asked to provide their direct packet filter configurations to EPA for publication on the Website to stimulate discussion and development of standard configurations. Systems in which the Sleep mode maintains full network connectivity, providing the same fully connected network state found in Idle, can be considered to meet the WOL enabling requirement and may qualify using the corresponding WOL capability adder.
All machines shipped to enterprise customers shall be capable of both remote and scheduled wake events from Sleep mode. Manufacturers shall ensure, where the manufacturer has control (i.e.,

configured through hardware settings rather than software settings), that these settings can be managed centrally, as the client wishes, with tools provided by the manufacturer.
User Information Requirement: In order to ensure that purchasers/users are properly informed on the benefits of power management, the manufacturer will include with each computer, one of the following:
- Information on ENERGY STAR and the benefits of power management in either a hard copy or electronic copy of the user manual. This information should be near the front of the user guide;
or
- A package or box insert on ENERGY STAR and the benefits of power management.
Either option must at least include the following information:
- Notice that the computer has been shipped enabled for power management and what the time settings are;
and
- How to properly wake the computer from Sleep mode;
B. Tier 2 Requirements - Effective January 1, 2009
1a. Tier 2 Energy Efficiency Performance Metric
All computers will be required to meet the following minimum performance per unit energy metric:
Energy Efficiency Performance Software and Associated Levels: TBD
- OR -
1b. Provisional Tier 2 Idle State Requirements
If an energy efficiency performance metric and associated performance levels are not ready to go into effect by January 1, 2009, a provisional Tier 2 specification will automatically go into effect and will remain in effect until such a benchmark is established. This provisional Tier 2 will include revised Idle state levels for all computer types (those included in Tier 1 as well as others as appropriate [e.g., thin clients]) with the intention of capturing the top 25 % performers in energy efficiency.
Additional topics, including the following, will also be re-examined under a provisional Tier 2:
- Idle levels for notebooks and integrated computers that incorporate the energy use of the displays;
- Quantitative distinctions between desktop categories (e.g., megabytes of video memory, number of processor cores, megabytes of system memory) to ensure that these distinctions remain current;
- Sleep levels for desktop-derived servers;
and
- Allowances for additional management tools, such as service processors in Sleep and Standby, which may aid in the adoption of computer power management.
In the case of the implementation of a provisional Tier 2, EPA and the European Commission will re-examine these new topics and finalise new levels at least six months prior to the effective date for Tier 2.
2. Power Management Requirements
In addition to the requirements provided under Tier 1, above, ENERGY STAR qualified computers must maintain full network connectivity while in Sleep mode, according to a platform-independent industry standard. All computers shall reduce their network link speeds during times of low data traffic levels in accordance with any industry standards that provide for quick transitions among link rates.
C. Voluntary Requirements
User Interface: Although not mandatory, manufacturers are strongly recommended to design products in accordance with the Power Control User Interface Standard – IEEE 1621 (formally known as "Standard for User Interface Elements in Power Control of Electronic Devices Employed in Office/Consumer Environments"). Compliance with IEEE 1621 will make power controls more consistent and intuitive across all electronic devices. For more information on the standard see http://eetd.LBL.gov/Controls.
4. TEST PROCEDURES

Manufacturers are required to perform tests and self-certify those models that meet the ENERGY STAR guidelines.
- In performing these tests, partner agrees to use the test procedures provided in Table 43, below.
- The test results must be reported to EPA or the European Commission, as appropriate.
Additional testing and reporting requirements are provided below.
A. Number of Units Required for Idle Testing: Manufacturers may initially test a single unit for qualification. If the initial unit tested meets the maximum power level for Idle but falls within 10 % of that level, one additional unit of the same model with an identical configuration must also be tested. Manufacturers shall report Idle values for both units. To qualify as ENERGY STAR, both units must meet the maximum Idle level for that product category. Note: This additional testing is only required for Idle qualification – only one unit is required to be tested for Sleep and Standby. The following example further illustrates this approach:
Category A desktops must meet an Idle level of 50 watts or less, making 45 Watts the 10 % threshold for additional testing. The following scenarios could then occur when testing a model for qualification:
- If the first unit is measured at 44 watts, no more testing is needed and the model qualifies (44 watts is 12 % more efficient than the specification and is therefore "outside" the 10 % threshold).
- If the first unit is measured at 45 watts, no more testing is needed and the model qualifies (45 watts is exactly 10 % more efficient than the specification).
- If the first unit is measured at 47 watts, then an additional unit must be tested to determine qualification (47 Watts is only 6 % more efficient than the specification and is "within" the 10 % threshold).
- If the two units are then tested at 47 and 51 watts, the model does not qualify as ENERGY STAR– even though the average is 49 watts– because one of the values (51) exceeds the ENERGY STAR specification.
- If the two units are then tested at 47 and 49 watts, the model does qualify as ENERGY STAR because both values meet the ENERGY STAR specification of 50 watts.
B. Models Capable of Operating at Multiple Voltage/Frequency Combinations: Manufacturers shall test their products based on the market(s) in which the models will be sold and promoted as ENERGY STAR qualified. EPA and its ENERGY STAR Country Partners have agreed upon a table with three voltage/frequency combinations for testing purposes. Please refer to the Test Conditions in the Test Procedure (Appendix A) for details regarding international voltage/frequency combinations for each market.
For products that are sold as ENERGY STAR in multiple international markets and, therefore, rated at multiple input voltages, the manufacturer must test at and report the required power consumption or efficiency values at all relevant voltage/frequency combinations. For example, a manufacturer that is shipping the same model to the United States and Europe must measure, meet the specification, and report test values at both 115 Volts/60 Hz and 230 Volts/50 Hz in order to qualify the model as ENERGY STAR in both markets. If a model qualifies as ENERGY STAR at only one voltage/frequency combination (e.g., 115 Volts/60 Hz), then it may only be qualified and promoted as ENERGY STAR in those regions that support the tested voltage/frequency combination (e.g., North America and Taiwan).
Table 43
Test Procedures for Measuring Operational Modes
Specification Requirement | Test Protocol | Source |
Standby (Off Mode), Sleep Mode, Idle State and Maximum Power | ENERGY STAR Computer Test Method (Version 4.0) | Appendix A |
Power Supply Efficiency | IPS: Internal Power Supply Efficiency Protocol EPS: ENERGY STAR Test Method for External Power Supplies | IPS: www.efficientpowersupplies.org EPS: www.energystar.gov/powersupplies |

C. Qualifying Families of Products: Models that are unchanged or that differ only in finish from those sold in a previous year may remain qualified without the submission of new test data assuming the specification remains unchanged. If a product model is offered in the market in multiple configurations or styles, as a product "family" or series, the partner may report and qualify the product under a single model number, as long as all of the models within that family or series meet either of the following requirements:
- Computers that are built on the same platform and are identical in every respect except for housing and colour may be qualified through submission of test data for a single, representative model.
- If a product model is offered in the market in multiple configurations, the partner may report and qualify the product under a single model number that represents the highest power configuration available in the family, rather than reporting each and every individual model in the family. In this case, the highest configuration would consist of: the highest power processor, the maximum memory configuration, the highest power GPU, etc. For desktop systems which meet the definition for multiple desktop categories (as defined in section 3.A.2) depending on the specific configuration, manufacturers will have to submit the highest power configuration for each category under which they would like the system to qualify. For example, a system that could be configured either as a Category A or a Category B desktop would require a submittal of the highest power configuration for both categories in order to qualify as ENERGY STAR. If a product could be configured to meet all three categories, it would then have to submit data for the highest power configuration in all categories. Manufacturers will be held accountable for any efficiency claims made about all other models in the family, including those not tested or for which data was not reported.
5. EFFECTIVE DATE
The date that manufacturers may begin to qualify products as Energy Star, under this Version 4.0 specification, will be defined as the effective date of the agreement. Any previously executed agreement on the subject of Energy Star qualified computers shall be terminated effective July 19, 2007.
1. Qualifying Products Under Tier 1 of the Version 4.0 Specification: The first phase of this specification will commence on July 20, 2007. All products, including models originally qualified under Version 3.0, with a date of manufacture on or after July 20, 2007, must meet the new (Version 4.0) requirements in order to qualify for Energy Star. The date of manufacture is specific to each unit and is the date (e.g., month and year) of which a unit is considered to be completely assembled.
2. Qualifying Products Under Tier 2 of the Version 4.0 Specification: The second phase of this specification, Tier 2, will commence on January 1, 2009. All products, including models originally qualified under Tier 1, with a date of manufacture on or after 1 January 2009, must meet the Tier 2 requirements in order to qualify for Energy Star.
3. Elimination of Grandfathering: EPA and the European Commission will not allow grandfathering under this Version 4.0 Energy Star specification. Energy Star qualification under previous versions is not automatically granted for the life of the product model. Therefore, any product sold, marketed, or identified by the manufacturing partner as Energy Star must meet the current specification in effect at the time of manufacture of the product.
6. FUTURE SPECIFICATION REVISIONS
EPA and the European Commission reserve the right to revise the specification should technological and/or market changes affect its usefulness to consumers or industry or its impact on the environment. In keeping with current policy, revisions to the specification will be discussed with stakeholders. In the event of a specification revision, please note that ENERGY STAR qualification is not automatically granted for the life of a product model. To qualify as ENERGY STAR, a product model must meet the ENERGY STAR specification in effect on the model's date of manufacture.
7. APPENDIX A: ENERGY STAR TEST PROCEDURE FOR DETERMINING THE POWER USE OF COMPUTERS IN STANDBY, SLEEP, IDLE AND MAXIMUM POWER

The following protocol should be followed when measuring power consumption levels of computers for compliance with the Standby, Sleep, and Idle levels provided in Annex VIII, Section 3) A) (2). Partners must measure a representative sample of the configuration as shipped to the customer. However, the Partner does not need to consider power consumption changes that may result from component additions, BIOS and/or software settings made by the computer user after sale of product. This procedure is intended to be followed in order and the mode being tested is labelled where appropriate.

I. Definitions

Unless otherwise specified, all terms used in this document are consistent with the definitions contained in Annex VIII, Section 1).

UUT

UUT is an acronym for "unit under test", which in this case refers to the computer being tested.

UPS

UPS is an acronym for "Uninterruptible Power Supply", which refers to a combination of converters, switches and energy storage means, for example batteries, constituting a power supply for maintaining continuity of load power in case of input power failure.

II. Testing Requirements

Approved Meter

Approved meters will include the following attributes [25]:

- Power resolution of 1 mW or better;
- An available current crest factor of 3 or more at its rated range value;

and

- Lower bound on the current range of 10mA or less.

The following attributes in addition to those above are suggested:

- Frequency response of at least 3 kHz;

and

- Calibration with a standard that is traceable to the U.S. National Institute of Standards and Technology (NIST).

It is also desirable for measurement instruments to be able to average power accurately over any user selected time interval (this is usually done with an internal math's calculation dividing accumulated energy by time within the meter, which is the most accurate approach). As an alternative, the measurement instrument would have to be capable of integrating energy over any user selected time interval with an energy resolution of less than or equal to 0.1 mWh and integrating time displayed with a resolution of 1 second or less.

Accuracy

Measurements of power of 0.5 W or greater shall be made with an uncertainty of less than or equal to 2 % at the 95 % confidence level. Measurements of power of less than 0.5 W shall be made with an uncertainty of less than or equal to 0.01 W at the 95 % confidence level. The power measurement instrument shall have a resolution of:

- 0.01 W or better for power measurements of 10 W or less;
- 0.1 W or better for power measurements of greater than 10 W up to 100 W;

and

- 1 W or better for power measurements of greater than 100 W.

All power figures should be in watts and rounded to the second decimal place. For loads greater than or equal to 10 W, three significant figures shall be reported.

Test Conditions

(Reference IEC 62301: Household Electrical Appliances – Measurement of Standby Power, Sections 3.2, 3.3)

Supply Voltage: | North America/Taiwan: | 115 (±1 %) Volts AC, 60 Hz (±1 %) |
Europe/Australia/New Zealand: | 230 (±1 %) Volts AC, 50 Hz (±1 %) |

Japan: | 100 (±1 %) Volts AC, 50 Hz (±1 %)/60 Hz (±1 %) |
| Note: For products rated for > 1.5 kW maximum power, the voltage range is ±4 % |
Total Harmonic Distortion (THD) (Voltage): | < 2 % THD (< 5 % for products which are rated for > 1.5 kW maximum power) |
Ambient Temperature: | 23 °C ±5 °C |
Relative Humidity: | 10 – 80 % |
Test Configuration
Power consumption of a computer shall be measured and tested from an ac source to the UUT.
The UUT must be connected to an Ethernet network switch capable of the UUT's highest and lowest network speeds. The network connection must be live during all tests.
III. Test Procedure for Standby, Sleep and Idle for All Products
Measurement of ac power consumption of a computer should be conducted as follows:
UUT Preparation
1. Record the manufacturer and model name of the UUT.
2. Ensure that the UUT is connected to a live Ethernet (IEEE 802.3) network switch as specified in Section II., "Test Configuration", above, and that the connection is live. The computer must maintain this live connection to the switch for the duration of testing, disregarding brief lapses when transitioning between link speeds.
3. Connect an approved meter capable of measuring true power to an ac line voltage source set to the appropriate voltage/frequency combination for the test.
4. Plug the UUT into the measurement power outlet on the meter. No power strips or UPS units should be connected between the meter and the UUT. For a valid test to take place the meter should remain in place until all Standby, Sleep, and Idle power data is recorded.
5. Record the ac voltage.
6. Boot computer and wait until the operating system has fully loaded.
7. If necessary, run the initial operating system setup and allow all preliminary file indexing and other one-time/periodic processes to complete.
8. Record basic information about the computer's configuration – computer type, operating system name and version, processor type and speed, and total and available physical memory, etc [26].
9. Record basic information about the video card - video card name, resolution, amount of onboard memory, and bits per pixel [27].
10. Ensure that the UUT is configured as shipped including all accessories, power management settings, WOL enabling and software shipped by default. UUT should also be configured using the following requirements for all tests:
(a) Desktop systems (including workstations and desktop-derived servers) shipped without accessories should be configured with a standard mouse, keyboard and external monitor.
(b) Notebooks and tablets should include all accessories shipped with the system, and need not include a separate keyboard or mouse when equipped with an integrated pointing device or digitiser.
(c) Notebooks and tablets should have the battery pack(s) removed for all tests. For systems where operation without a battery pack is not a supported configuration, the test may be performed with fully charged battery pack(s) installed, making sure to report this configuration in the test results.
(d) Power to wireless radios should be turned off for all tests. This applies to wireless network adapters (e.g., 802.11) or device-to-device wireless protocols.
11. The following guidelines should be followed to configure power settings for displays (adjusting no other power management settings):
(e) For computers with external displays (most desktops): use the monitor power management settings to prevent the monitor from powering down to ensure it stays on for the full length of the Idle test as described below.
(f) For computers with integrated monitors (notebooks, tablets and integrated systems): use the power management settings to set the monitor to power down after 1 minute.

12. Shut down the computer.

Standby (Off Mode) Testing

13. With the UUT shut down and in Standby, set the meter to begin accumulating true power values at an interval of 1 reading per second. Accumulate power values for 5 additional minutes and record the average (arithmetic mean) value observed during that 5 minute period [28].

Idle Mode Testing

14. Switch on the computer and begin recording elapsed time, starting either when the computer is initially switched on, or immediately after completing any log in activity necessary to fully boot the system. Once logged in with the operating system fully loaded and ready, close any open windows so that the standard operational desktop screen or equivalent ready screen is displayed. Exactly 15 minutes after the initial boot or log in, set the meter to begin accumulating true power values at an interval of 1 reading per second. Accumulate power values for 5 additional minutes and record the average (arithmetic mean) value observed during that 5 minute period.

Sleep Mode Testing

15. After completing the Idle measurements, place the computer in Sleep mode. Reset the meter (if necessary) and begin accumulating true power values at an interval of 1 reading per second. Accumulate power values for 5 additional minutes and record the average (arithmetic mean) value observed during that 5 minute period.

16. If testing both WOL enabled and WOL disabled for Sleep, wake the computer and change the WOL from Sleep setting through the operating system settings or by other means. Place the computer back in Sleep mode and repeat step 14, recording Sleep power necessary for this alternate configuration.

Reporting Test Results

17. The test results must be reported to EPA or the European Commission, as appropriate, taking care to ensure that all required information has been included.

IV. Maximum Power Test for Workstations

The maximum power for workstations is found by the simultaneous operation of two industry standard benchmarks: Linpack to stress the core system (e.g., processor, memory, etc.) and SPECviewperf® (version 9.x or higher) to stress the system's GPU. Additional information on these benchmarks, including free downloads, can be found at the URLs found below:

Linpack | http://www.netlib.org/linpack/ |

SPECviewperf® | http://www.spec.org/benchmarks.html#gpc |

This test must be repeated three times on the same UUT, and all three measurements must fall within a ±2 % tolerance relative to the average of the three measured maximum power values.

Measurement of the maximum ac power consumption of a workstation should be conducted as follows:

UUT Preparation

1. Connect an approved meter capable of measuring true power to an ac line voltage source set to the appropriate voltage/frequency combination for the test. The meter should be able to store and output the maximum power measurement reached during the test or be capable of another method of determining maximum power.

2. Plug the UUT into the measurement power outlet on the meter. No power strips or UPS units should be connected between the meter and the UUT.

3. Record the ac voltage.

4. Boot the computer and, if not already installed, install Linpack and SPECviewperf as indicated on the above Websites.

5. Set Linpack with all the defaults for the given architecture of the UUT and set the appropriate array size "n" for maximizing power draw during the test.

6. Ensure all guidelines set by the SPEC organisation for running SPECviewperf are being met.

Maximum Power Testing

7. Set the meter to begin accumulating true power values at an interval of 1 reading per second, and begin taking measurements. Run SPECviewperf and as many simultaneous instances of Linpack as needed to fully stress the system.
8. Accumulate power values until SPECviewperf and all instances have completed running. Record the maximum power value attained during the test.
Reporting Test Results
9. The test results must be reported to EPA or the European Commission, taking care to ensure that all required information has been included.
10. Upon submittal of data, manufacturers must also include the following data:
(a) Value of the n (the array size) used for Linpack,
(b) Number of simultaneous copies of Linpack run during the test,
(c) Version of SPECviewperf run for test,
(d) All compiler optimisations used in compiling Linpack and SPECviewperf,
and
(e) A precompiled binary for end users to download and run of both SPECviewperf and Linpack. These can be distributed either through a centralised standards body such as SPEC, by the OEM or by a related third party.
V. Continuing Verification
This testing procedure describes the method by which a single unit may be tested for compliance. An ongoing testing process is highly recommended to ensure that products from different production runs are in compliance with ENERGY STAR.
[1] The maximum continuous output rating of a power supply is the value defined by the power supply manufacturer in the operating instructions provided with the product.
[2] If products will be sold in Europe or Asia, testing should also be performed at the appropriate machine-rated voltage and frequency. For example, products destined for European markets might be tested at 230 V and 50 Hz. The logo should not be displayed on products shipped to Europe or Asia if the equipment does not meet the power requirements of the Program at the local voltage and frequency conditions.
[3] Ibid.
[4] True power is defined as (volts)x(amps)x(power factor), and is typically reported as Watts. Apparent Power is defined as (volts)x(amps) and is usually expressed in terms of VA or volt-amps. The power factor for equipment with switching power supplies is always less that 1.0, so true power is always less than apparent power.
[5] The crest factor for a sinusoidal 60 Hz current waveform is always 1.4. The crest factor for a current waveform associated with a PC or monitor containing a switching power supply will always be greater than 1.4 (though typically no higher than 8). The crest factor of a current waveform is defined as the ratio of the peak current (amps) to the RMS current (amps).
[6] The crest factor of a watt meter is often provided for both current and voltage. For current it is the ratio of the peak current to the RMS current in a specific current range. When only one crest factor is given, it is usually for current. An average True RMS Wattmeter has a crest factor in the range of 2:1 to 6:1.
[7] This definition is consistent with IEC 62301: Household Electrical Appliances – Measurement of Standby power as of March 2004.
[8] Supply Voltage: Manufacturers shall test their computer monitors based on the market in which the models will be sold. Manufacturers must ensure that qualifying products marketed and sold in any region as ENERGY STAR do not exceed the power levels declared on the Qualifying Product Information (QPI) form (and stored in the ENERGY STAR database) at the standard mains voltage and frequency conditions of that region. For equipment that is sold in multiple international markets and therefore rated at multiple input voltages, the manufacturers must test at and report all relevant voltages and power consumption levels if it intends to register the product as ENERGY STAR in the

respective markets. For example, a manufacturer that is shipping the same computer monitor model to the United States and Europe must measure and report the On, Sleep, and Off power consumption at both 115 Volts/60 Hz and 230 Volts/50 Hz.
[9] Corresponding voltage values for digital only interface monitors that correspond to the brightness of the image (0 to 0.7 volts) are:0 volts (black) = a setting of 00.1 volts (darkest shade of gray analogue) = 36 digital gray0.7 volts (full white analogue) = 255 digital grayPlease note that future digital interface specifications may widen this range, but in all cases, 0 volts shall correspond to black and the maximum value shall correspond to white, with 0.1 white volts corresponding to one-seventh of the maximum value.
[10] Note that once a printer base unit is upgraded to an MFD (for example, a photocopier unit is added), the entire product must qualify according to the ENERGY STAR MFD Specification in order for the product to remain ENERGY STAR qualified
[] Including monochrome electrophotography, monochrome thermal transfer, and monochrome and colour ink jet.
[12] For printers that utilize a functionally integrated computer, whether contained within or outside of the printer cabinet, the power consumption of the computer does not have to be included when determining the Sleep Mode value of the printer unit. However, the integration of the computer must not interfere with the ability of the printer to enter or exit its Sleep Mode state. This provision is conditioned upon the manufacturer agreeing to provide potential customers with product literature that clearly states that the power consumption by the integrated computer is in addition to the power consumer by the printer unit, especially when the printer unit is in Sleep Mode.
[] Including colour electrophotography and colour thermal transfer.
[14] Section VII.B.1 of this Specification contains maximum power consumption targets for the off-mode. It is expected that most companies will meet these off-mode power consumption targets by incorporating an auto-off feature in the copier. However, it is possible and allowable under this Specification for a manufacturer to utilize a low-power mode, rather than and auto-off feature if the low-power mode power consumption is equal to or less than the off-mode power consumption targets contained in this Specification. (See Test Guidelines for more information on this issue.)
[15] For a multifunction device where the above method would give an inaccurate result (because the device is not completely warmed up after the first warm-up cycle plus 15 minutes standby time), the following procedure (in line with ASTM Standard F757-94) may be used:Turn on the MFD and allow the machine to warm up and stabilize in the ready mode (= standby mode) for two hours. During the first 105 minutes, prevent the MFD from entering the low power mode (e.g., by making one copy every 14 minutes during this period). Make the last copy at 105 minutes after the MFD was turned on. Then wait exactly 15 minutes. After 15 minutes has passed, read and record the watt-hour meter indication and the time (or start the stopwatch or timer). After 1 hour, read and record the watt-hour indication again. The difference between the two readings of the watt-hour meter is the low-power mode energy use; divide by 1 hour to obtain the average power rating
[16] For MFDs that consist of functionally integrated, but physically separate units consisting of separate print, scan, and computer components, sleep mode Watts for the total system may be increased by an amount equal to the sleep mode Watts allowed for an ENERGY STAR qualified computer.
[17] For products registered with the European Commission, Program Participants may contact the European Commission.
[18] IEC 62301 – Household electrical appliances – Measurement of standby power. 2005.
[19] The type of network connection shall be reported. Common types are Ethernet, 802.11, and Bluetooth. Common non-network data connection types are USB, Serial, and Parallel.
[20] Interim Images/Day in Table 37.
[21] The type of network connection shall be reported. Common network types are Ethernet, WiFi (802.11), and Bluetooth. Common data (non-network) connection types are USB, Serial, and Parallel.

[] Supply Voltage: Manufacturers shall test their products based on the market in which the partner intends to sell the products as ENERGY STAR qualified. For equipment that is sold in multiple international markets and therefore rated at multiple input voltages, the manufacturer must test at and report all relevant voltages and power consumption levels. For example, a manufacturer that is shipping the same printer model to the United States and Europe must measure and report the TEC or OM values at both 115 Volts/60 Hz and 230 Volts/50 Hz. If a product is designed to operate at a voltage/frequency combination in a specific market that is different from the voltage/frequency combination for that market (e.g., 230 Volts, 60 Hz in North America), the manufacturer should test the product at the regional combination that most closely matches the product's design capabilities and note this fact on the test reporting sheet.

[23] True power is defined as (volts)x(amps)x(power factor), and is typically reported as Watts. Apparent power is defined as (volts)x(amps), and is usually expressed in terms of VA or volt-amps. The power factor for equipment with switching power supplies is always less than 1.0, so true power is always less than apparent power. Accumulated energy measurements sums power measurements over a period of time and so also need to be based on measurements of true power.

[24] IEC 62301 – Household Electrical Appliances – Measurement of Standby Power 2005.

[25] Characteristics of approved meters taken from IEC 62301 Ed 1.0: Measurement of Standby Power

[26] On Windows-based machines, much of this information can be found by selecting the following: window: Start/Programs/Accessories/System Tools/System Information.

[27] On Windows-based machines, this can be found by selecting the following window: Start/Programs Accessories/System Tools/Components/Display.

[28] Laboratory-grade, full-function meters can integrate values over time and report the average value automatically. Other meters would require the user to capture a series of changing values every 5 seconds for a five minute period and then compute the average manually.