This Version of the Copier Memorandum of Understanding Incorporates Copier Amendments 1 and 2

Memorandum of Understanding between
The United States Environmental Protection Agency
and
Company Name

I. Common Agreements and Principles

A. This is a voluntary agreement between Company Name ("EPA ENERGY STAR® Partner" or "Partner") and the United States Environmental Protection Agency (EPA), by which Company Name joins the EPA ENERGY STAR® Program. The terms of this MOU shall apply to copiers sold by Partner under its own brand name(s).

B. EPA ENERGY STAR Partner and EPA agree that the primary purpose of the EPA ENERGY STAR Program is to promote the manufacturing and marketing of energy-efficient equipment, thereby potentially reducing combustion-related pollution.

C. EPA ENERGY STAR Partner and EPA agree that the use of energy-efficient equipment may also increase profits and competitiveness.

D. EPA ENERGY STAR Partner and EPA agree that the EPA ENERGY STAR Program may also improve or enhance equipment's useful lifetime, customer satisfaction, and overall product quality.

E. EPA ENERGY STAR Partner and EPA agree that publicizing the EPA ENERGY STAR Program is important to demonstrate the following: the concern of Partner for the environment, the vitality of the free enterprise system in reducing costs, and the capability of voluntary programs to achieve environmental goals.

F. EPA ENERGY STAR Partner and EPA agree that maintaining public confidence in the EPA ENERGY STAR Program is critical to achieving the shared goals of Partner and EPA.

G. EPA ENERGY STAR Partner and EPA agree that membership in the EPA ENERGY STAR Program is essential to the cooperative effort to achieve the shared goals stated above.

II. Definitions

A. 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 technologies are covered under this MOU, 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" x 11" paper and large format copiers designed to handle A2 or 17" x 22" paper or larger.

B. Copier Speed: Copies per minute (cpm) measures the reproduction speed of the copier. One copy is defined as one 8.5" x 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" x 11" letter-sized paper. For copiers sold in markets other than the U.S., copier speed shall be based on either 8.5" x 11" or A4-sized paper, depending on which is the standard in a particular market.

For large format copiers designed to handle primarily A2 or 17" x 22" paper or larger, the copier speed measured as A2- or A0-sized copies per minute shall be converted into 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 under this MOU 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.

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

2. 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.

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

4. 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).

5. 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).

C. 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.

D. 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.

E. Copier Model: For purposes of this MOU, 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.

F. Low-power Mode: For purposes of this MOU, 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 ENERGY STAR partner may choose to measure the lowest of either the energy-saver mode or the standby mode.

G. 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.

H. 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.

I. Off Mode: For purposes of this MOU, 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.[1] When measuring power in this mode, control equipment for remote servicing may be excluded.

J. Auto-off Feature: For purposes of this MOU, the auto-off feature is defined as the ability of 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.

K. 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.

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[1] Section IV.B. of this MOU contains maximum power consumption targets for the off mode. EPA expects 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 MOU for a manufacturer to utilize a low-power mode, rather than an 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 MOU. (See EPA's Testing Guidelines for copiers for more information on this issue.)

L. Default Times: The time period set by the Partner 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.

M. Recovery Time: The amount of time needed to bring the copier from the low-power mode to the standby mode.

N. 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 MOU, 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.

O. 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.

III. Entry into Force and Duration

A. This MOU enters into force when signed by both EPA and Partner.

B. Both parties agree to the following schedule for implementing the specifications contained in this MOU.

1. The first tier of the program shall commence on July 1, 1995 and conclude on June 30, 1997. Partners can qualify copier models for Tier 1 starting July 1, 1995.

2. The second tier of the program shall commence on July 1, 1997. The criteria for Tier 2 shall apply to copier models that Partner begins to ship after June 30, 1997. Tier 1 models may continue to bear the ENERGY STAR logo until the models are phased out of the market (i.e., the new specifications will not apply retroactively to previously qualified products). Models that Partner begins to ship on or after July 1, 1997 must be qualified under the new specifications outlined in Table 2 of Section IV.B., below, though Partner may choose, at its discretion, to implement the new terms prior to this date.

3. The third tier of the program shall commence on July 1, 1999. The criteria for Tier 3 shall

apply to copier models that Partner begins to ship on or after July 1, 1999. Tier 2 LARGE FORMAT COPIER models may continue to bear the ENERGY STAR logo until the models are phased out of the market (i.e., the new specifications will not apply retroactively to previously qualified products). LARGE FORMAT COPIER models that Partner begins to ship on or after July 1, 1999 must be qualified under the new specifications outlined in Table 4 of Section IV.B., below, though Partner may choose, at its discretion, to implement the new terms prior to this date.

C. The terms of this MOU shall remain in force until such time as EPA institutes new specifications or discontinues the ENERGY STAR Program. Both parties agree that as technologies and markets change, it may become desirable to change the technical specifications included in this MOU in order to keep the ENERGY STAR Program responsive and to maintain its integrity.

D. Both parties agree that this agreement can be terminated by EPA ENERGY STAR Partner or EPA at any time, and for any reason, with no penalty. However, both parties agree that termination for noncompliance would only occur in accordance with the procedures of Section VII., below.

IV. EPA ENERGY STAR Partner's Responsibilities

A. EPA ENERGY STAR Partner agrees to appoint a responsible representative of the company as liaison with EPA for the EPA ENERGY STAR Program and to notify EPA within one month of any change in liaison responsibility. (See Attachment A.)

B. Product Qualification for the ENERGY STAR Logo

1. Technical Specifications

EPA ENERGY STAR Partner agrees to introduce one or more specific copier models that meet the specifications outlined in Tables 1 through 4, below.

Table 1.
Tier 1 criteria for the ENERGY STAR Copier Program. (July 1, 1995.)

Copier Speed (copies per minute)	Off Mode (Watts)	Off Mode Default Time	Automatic Duplex Mode
$0 < cpm \leq 20$	<5	≤ 30 minutes	No
$20 < cpm \leq 44$	<40	≤ 60 minutes	Optional
$44 < cpm$	<40	≤ 90 minutes	Default

Table 2.
Tier 2 Criteria for the ENERGY STAR Copier Program. (July 1, 1997)

Copier Speed (copies per minute)	Low-Power Mode[2] (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 x cpm + 5	15 min.	Yes	≤ 15	≤ 60 min.	Optional
44 < cpm	3.85 x cpm + 5	15 min.	Recommended	≤ 20	≤ 90 min.	Optional

To qualify as ENERGY STAR compliant, copier models designed to handle primarily A2 or 17" x 22" paper or larger shall meet the specifications provided in Tables 3 and 4. All large format copier speeds shall be measured with respect to the number of A4-sized copies that are produced per minute, as described above.

Table 3.
Tier 2 Criteria for the ENERGY STAR Copier Program — LARGE FORMAT COPIERS
(effective until June 30, 1999)

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 ≤ 40	NA	NA	NA	≤ 20	≤ 30 min.	No
40 < cpm	NA	NA	NA	≤ 40	≤ 90 min.	No

For Tier 2, Partner shall ship copier models with the default time for the low-power mode set to the values stated in Tables 2 and 3 above. Partner shall set the default times for the auto-off feature to the levels specified in Tables 1, 2, and 3 above. The default times for the off mode and the low-power mode shall be measured from the time the last copy was made.

[2] The formula for copier speeds of 20 < cpm should be read as 3.85 multiplied by the number of copies per minute plus 5.0.

Table 4.
Tier 3 Criteria for the ENERGY STAR Copier Program — LARGE FORMAT COPIERS
(effective July 1, 1999)

Copier Speed (copies per minute)	Low-Power Mode[2] (watts)	Low-Power Default Time	Recovery Time 30 Seconds	Off Mode (watts)	Off Mode Default Time	Automatic Duplex Mode
0 < cpm ≤ 40	NA	NA	NA	≤ 10	≤ 30 min.	No
40 < cpm	3.85 x cpm +5	15 min.	Recommended	≤ 20	≤ 90 min.	No

For Tier 3, Partner shall ship copier models with the default time for the low-power mode set at the values stated in Table 4. Partner shall set the default times for the auto-off feature to the levels specified in Table 4 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. Partner may provide users with the ability to override this default duplex mode for single-sided copies.

2. Product Qualification

a. Low Speed Copiers

Any base unit in this copier speed range satisfying the above criteria shall qualify for the program. The ENERGY STAR logo may be applied directly to any qualifying base unit, regardless of whether it is shipped with additional accessories. Any copier model that includes a qualified base unit may be deemed an ENERGY STAR Copier model.

b. Medium Speed Copiers

The ENERGY STAR logo may be applied directly to any qualifying base unit, regardless of whether it is shipped with additional accessories. Any copier model that includes any qualified base unit may be deemed an ENERGY STAR Copier Model.

For Tier 2, it is recommended that high speed copier models may be able to recover from the low power mode within 30 seconds or less. Declaration of the recovery time shall be placed in the product literature. (See section IV.C.1.)

c. High Speed Standard-Sized Copiers and Medium and High Speed Large Format Copiers

The ENERGY STAR logo may be applied directly to any qualifying base unit, regardless of whether it is shipped with additional accessories. Any copier model that includes any qualified

base unit may be deemed an ENERGY STAR compliant copier model.

For Tier 2, it is recommended that high speed standard-sized copier models be able to recover from the low-power mode within 30 seconds or less. For Tier 3, it is recommended that medium and high speed large format copier models be able to recover from the low-power mode within 30 seconds or less. Declaration of the recovery time shall be placed in product literature. (See Section IV.C.1 of the MOU.)

3. Exceptions and Clarifications

After shipping, Partner 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 Partner, designated service representative, or customer may change the default times for the low-power mode and/or the off mode, 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. Off Mode Power Consumption

In some cases, Partner 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, Partner (or the designated service representative) may connect the anti humidity device. If Partner determines that in a certain geographical area there are chronic reliability problems associated with high humidity levels, Partner may contact the EPA program manager (as named in Attachment A) and discuss alternative solutions. For example, EPA may allow Partner to connect the anti-humidity devices in copier models that are shipped to a very humid geographical area.

c. Automatic Duplex Mode

In an individual case where the duplexing feature is causing a customer sizable inconvenience due to their particular usage patterns, the Partner (or the designated service representative) may disable this default mode at the customer's request.

d. 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 Partner, designated service representative, or customer may disable this auto-off feature. If Partner 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. Customer Education

1. Product Literature:

Partner shall provide general information to users regarding the ENERGY STAR features of the copier model. This information might include a description of the ENERGY STAR Program, a discussion of the savings associated with using the power-management features, the benefits of duplex copying, and the method for changing the settings or default times. Partner may determine the best manner through which to disseminate this general information to users. Examples of acceptable approaches include: user's manual, special brochures included in the shipping box, etc.

Partner shall also provide in the user's manual and/or other collateral sales and marketing materials three specific pieces of information regarding the auto-off feature. First, the economic and environmental benefits of using the auto-off feature shall be addressed. Second, Partner shall explain that the copier model is shipped with the auto-off feature enabled and clearly state the default time. Third, Partner shall suggest how to determine the appropriate default time (based on the user's work pattern) and provide instructions for changing the time setting. In addition, Partner may explain the process for disabling the auto-off feature (e.g., by providing written instructions and/or by including a customer support telephone number), so long as the benefits of the feature and instructions for extending the default time are discussed first.

In addition, Partner shall provide information on recommended types of recycled paper that can best be used in a particular copier, including the amount of post-consumer content in the paper.[3] Partner shall include clear statements addressing the recovery time from the low-power mode in both the user's manual and on data sheets. Brochures and advertisements shall be worded to avoid misleading interpretations.

2. Logo Usage

To help consumers become familiar with the ENERGY STAR Copier Program, the Partner shall place the ENERGY STAR logo onto qualified products, where practical.[4] The Partner shall also strive to include the ENERGY STAR logo in brochures, manuals, and advertisements, etc. for qualified products

D. Measuring Power Consumption

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[3] The U.S. Government has specified a minimum of 20% post-consumer content for all paper purchased for government use. Partner may wish to include information on this or other types of recycled paper.

[4] The ENERGY STAR logo may appear on the front of the copier model, on the control panel, or on the nameplate.

1. Partner agrees to perform tests, as necessary, to determine which products comply. Based on the results of these tests, Partner shall self-certify those products that it determines are compliant with the specifications outlined above. Partner may submit information to EPA on compliant products on a voluntary basis.

2. Power consumption shall be measured from the outlet or power supply source to the product under test. Partner must measure power consumption of either the base unit or an automatic duplexing model, as described in IV.B.2.c above. See EPA testing guidelines for more information. When measuring power consumption in the off mode, Partner shall exclude control equipment required for remote servicing.

E. At EPA's request, Partner will attempt to locate customers who have profited from the program and are willing to share information about performance and savings, as well as locate employees who have contributed to its success. This customer- or employee-supplied information is to be without reference to or endorsement of specific Partner, specific products, or other supply sources.

F. EPA ENERGY STAR Partner agrees to provide information about the EPA ENERGY STAR Program to all of its employees whose jobs are relevant to the development, marketing, sales, and service of ENERGY STAR Copier models.

G. EPA ENERGY STAR Partner understands that participation in the EPA ENERGY STAR Program does not constitute EPA endorsement of EPA ENERGY STAR Partner or its products.

H. Through its normal training process, EPA ENERGY STAR Partner agrees to develop and disseminate ENERGY STAR training materials that explain the benefits of compliant copiers to sales personnel and dealers or designated service representatives. These materials shall emphasize that the low-power and off modes conserve energy, which helps to prevent air pollution and saves money on utility bills. Dealers or designated service representatives shall also be encouraged to extend the auto-off default time up to a maximum of 4 hours before electing to disable the feature. In addition, Partner shall communicate the benefits provided by the automatic duplex mode (e.g., reduced paper costs, decreased national energy consumption, and less paper in the waste stream) to sales personnel and dealers or designated service representatives.

I. EPA ENERGY STAR Partner shall attempt, where feasible, to track dealer/designated service representative and customer reactions to the auto-off feature and other aspects of the ENERGY STAR Copier Program. Partner agrees (assuming that no confidential or competitively valuable information is disclosed) to share this information with EPA in an effort to continually improve the ENERGY STAR Copier Program and ensure its relevance in the marketplace. In turn, EPA agrees to share the information it collects (appropriately aggregated to preserve any confidential information) with all Partners.

V. EPA's Responsibilities

A. EPA agrees to designate a single liaison point for the EPA ENERGY STAR Program, and to notify Partner within one month of any change in liaison responsibilities. Please send signed MOU and other correspondence to this person. (See Attachment A.)

B. EPA agrees to accept the test data as submitted by Partner, whether it is self-determined or determined by an independent third party. EPA will not officially approve any individual test reports submitted by Partner. Therefore, Partner shall not include any misleading statements in product literature that imply a product is approved or certified by the EPA, i.e., Partner shall not make claims such as "this copier model is EPA approved," or "this copier model is EPA certified." While this is a self-certifying process, EPA reserves the right to conduct tests on products bearing the ENERGY STAR logo from either the open market or other available sources, or voluntarily received from Partner.

C. EPA agrees to make an effort to encourage consumer acceptance of copier models introduced under this agreement and bearing the ENERGY STAR logo.

D. EPA agrees to provide Partner with recognition for its public service in protecting the environment by performing analyses about the pollution prevented by corporate participants, and providing this and other program information to appropriate news media sources for publication. EPA agrees to provide materials to Partner from which Partner can create fact sheets, brochures and posters about the ENERGY STAR features of the copier model.

E. EPA agrees to promote energy-efficient equipment and inform consumers about the EPA ENERGY STAR Program and ENERGY STAR logo by writing articles and/or cooperating with the news media by sharing information, where appropriate.

F. EPA agrees to work with Partner independently and/or in conjunction with other Partners to coordinate the placement of advertisements to promote energy-efficient equipment, educate consumers about the EPA ENERGY STAR Program and logo, and provide Partner with due recognition for its public service in protecting the environment.

VI. Use of the ENERGY STAR® Logo

A. EPA agrees to loan to Partner, at no charge, materials from which Partner can create the ENERGY STAR® logo.

B. It is the responsibility of the Partner to associate EPA, the EPA ENERGY STAR logo, and the EPA ENERGY STAR Program only with those specific copier models that qualify under the terms and conditions of this MOU. As noted in Section IV above, Partner may place logo directly on qualified copier models, as well as on associated packaging, literature, and advertisements for

qualified copier models. See EPA's Logo Use Guidelines for more details and specific examples.

C. When the EPA ENERGY STAR logo is used, Partner agrees that it shall be accompanied by the following statement: "As an ENERGY STAR Partner, Company Name has determined that this copier model meets the ENERGY STAR guidelines for energy efficiency." When the ENERGY STAR logo is applied directly to the product, Partner may place this statement in the user's manual.

D. Partner shall not utilize the logo in a manner that might imply EPA endorsement of the Partner or of Partner's products, other than with regard to a product's energy efficiency.

E. EPA ENERGY STAR Partner agrees not to alter the ENERGY STAR logo.

F. If either EPA or Partner terminates this Agreement, Partner will no longer be entitled to apply the ENERGY STAR logo to newly manufactured models, and will no longer make reference to the EPA ENERGY STAR Program so as to construe continuing involvement in the program.

G. Partner understands that the ENERGY STAR name and the ENERGY STAR logo are registered marks of the United States Government as represented by the Administrator of EPA, and are subject to the provisions of Title 15, Chapter 22, United States Code, the various state laws applicable to trademarks, and this Memorandum of Understanding. As such, the Partner shall note this registered status, as appropriate. This may include: (a) inserting the registered symbol, ® , next to the name (i.e., ENERGY STAR®) each time it appears in a brochure, poster, advertisement, or other document, *or* (b) providing the following statement: "ENERGY STAR is a U.S. registered mark." Partner shall refer to the Logo Use Guidelines for a complete explanation of the proper use of the ENERGY STAR name and logo.

VII. Conflict Resolution

A. Each party agrees to assume good faith as a general principle for resolving conflicts under the EPA ENERGY STAR Program.

B. Both parties agree to informally notify each other if any problems or issues arise and to work together to provide maximum public confidence in the program.

C. Procedure for Addressing Noncompliant Products

1. If EPA receives information that one or more products certified by Partner as ENERGY STAR compliant may not meet all of the terms of this MOU, then EPA will immediately notify Partner and attempt to address and resolve the problem informally.

2. If these informal discussions do not produce a mutually agreeable resolution, EPA shall notify Partner in writing that Partner shall be terminated from the program unless it undertakes the

specific corrective actions sought by EPA. Partner agrees to reply to EPA in writing within 20 business days of receiving EPA's letter. At that time, Partner shall agree to do one of the following: (a) undertake in a timely and effective manner, the corrective actions sought by EPA; or (b) voluntarily terminate this agreement. If Partner does not respond to EPA's letter within 20 business days, or responds but does not agree to either (a) or (b), then this agreement is terminated.

D. If EPA ENERGY STAR Partner believes that EPA is not meeting all of its commitments, Partner agrees to formally notify EPA in writing. EPA agrees to respond in writing within 20 business days of receiving EPA ENERGY STAR Partner's letter. At that time, EPA will do one of the following: (a) undertake the corrective actions sought by Partner, or (b) explain why such corrective actions cannot be undertaken.

VIII. Freedom of Information Act and Confidential Business Information

Both parties understand that information provided by Partner to EPA will be treated pursuant to EPA's public information regulations under 40 Code of Federal Regulations, Part Two.

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This Version of the Copier Memorandum of Understanding Incorporates Copier Amendments 1 and 2

The undersigned hereby execute this Memorandum of Understanding on behalf of their parties. The signer of this agreement affirms that he/she has the authority to commit Partner to participation in the ENERGY STAR Copier Program.

For the U.S. Environmental Protection Agency (EPA):

Signature: _____ Date: _____

Name: Kathleen Hogan

Title: Director, Climate Protection Partnerships Division

For Company Name

Signature: _____ Date: _____

Name: _____

Title: _____

Attachment A

Please complete and return with the signed Memorandum of Understanding.

EPA Contact:

Mailing Address:
Craig Hershberg
Manager, ENERGY STAR Office Equipment
US EPA
Ariel Rios Bldg.
1200 Pennsylvania Ave., NW
(Mail Code 6202 J)
Washington, DC 20460

Overnight Delivery Address:
Craig Hershberg
Manager, ENERGY STAR Office Equipment
US EPA
1310 L Street, NW
Washington, DC 20005
(202) 343-9120

Partner's Contacts:

Primary Contact (to receive all program administrative materials):

Name:
Title:
Address:
City, State, ZIP:
Telephone Number:
Fax Number:
E-mail Address:
Location of US Headquarters (if applicable):

Marketing/PR Contact (to receive marketing and communications materials):

Name:
Title:
Address:
City, State, ZIP:
Telephone Number:
Fax Number:
E-mail Address:

Customer Service Contact (to be given to the public for further information on products):

Telephone number:
Fax Number:
Web Site:

U.S. ENVIRONMENTAL PROTECTION AGENCY
ENERGY STAR® for Office Equipment (MC: 6202J)
Washington, DC 20460
(888) STAR-YES or (202) 775-6650 phone
(202) 565-2077 fax

TESTING CONDITIONS FOR ENERGY STAR® MEASUREMENT COPIERS

Revised February 2000

In order to eliminate confusion and ensure consistency, the following protocol should be followed when measuring power under the ENERGY STAR® Copiers Program.

I. TEST CONDITIONS

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

Market	Paper Size	Voltage/ Frequency
United States	8.5" x 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

Partners shall perform tests on their products based on the market in which the product will be sold. For example, a Program Participant that is shipping a copier to Europe must determine the copier speed based on A4 paper, and then measure the power consumption using the voltage and frequency values specified for the European market. For equipment that is rated at multiple input voltages and sold in multiple international markets, the Program Participant must test at all rated voltages if it plans to display the ENERGY STAR® logo on the product in all markets.

All supplies used shall be those specified by the copier manufacturer and preconditioned for a minimum of 24 hours at room ambient temperature prior to evaluating the copier power rating.

AC power shall be supplied as a true sine wave.

II. TEST METHOD

Manufacturers should measure the **Average** power consumption of their copier products 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.

A. Off Mode Power Measurement.

Prior to the start of this test, the machine should be plugged in to a live power line but turned off and stabilized 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.

Turn on the copier, and let it go through its warm-up cycle. After it is ready to make a copy, make one copy, then wait exactly the amount of time specified for the copier to enter the off mode through the auto-off feature. For low speed copiers, wait 30 minutes, for mid-speed copiers, wait 60 minutes, and for high speed copiers, wait 90 minutes. After the appropriate delay time 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 off mode energy use; divide by 1 hour to obtain the average power rating.

B. Low-Power Mode Power Measurement.

Prior to the start of this test, the machine should have been plugged in to a live power line but turned off and stabilized 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.

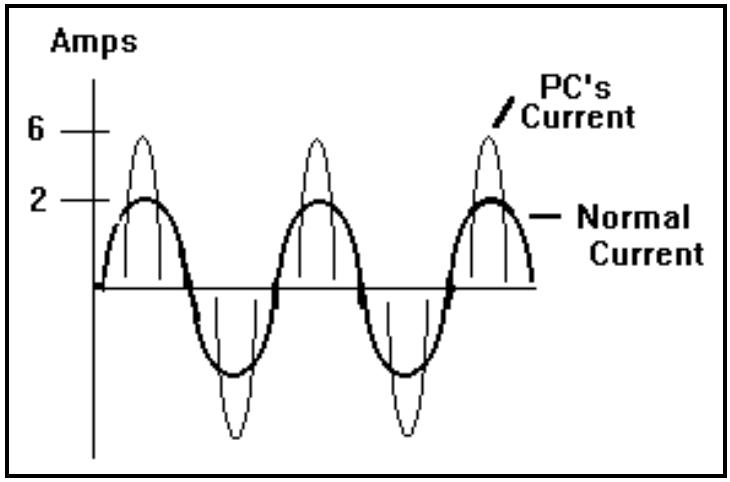
Turn on the copier, and let it go through its warm-up cycle. Make one copy, then wait exactly 15 minutes (for mid- and high-speed copiers only). After 15 minutes has passed, read and record the Watt-hour meter indication and the time (or start the stopwatch or timer). After 1 hour, read and record the 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.

III. TESTING EQUIPMENT

The goal is to accurately measure the TRUE power consumption[1] of the copier. This necessitates the use of a **True RMS** Watt-Hour Meter, one per phase, accurate to three figures. There are many Watt-hour 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

To begin, it is important to understanding that copiers which contain switching power supplies draw current in a waveform different from typical sinusoidal current.[2] Figure 1 shows the typical current waveform for office equipment with switching power supplies. While the one shown below is for a typical PC, a copier would have a similar waveform. While virtually any meter can measure a standard current waveform, it is more difficult to select a meter when irregular current waveforms are involved.



(Figure 1)

[1] 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.

[2] The crest factor for a sinusoidal 60 Hz current waveform is always 1.4. The crest factor for a current waveform associated with a copier 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).

It is critical that the meter selected be capable of reading the current drawn by the copier 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,[3] 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 copier 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-hour 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-hour 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 measurement, or the energy and power consumption will be inaccurate. Accordingly, EPA recommends that manufacturers purchase Watt-hour 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 that can be achieved. Catalogues and specification sheets for Watt-hour meters typically provide information on the accuracy of energy and power readings that can be achieved at different range settings. When measuring a product that is very close to the MOU specifications, Partners will need to set up a test that will provide greater accuracy. For example, if the resulting accuracy for a Watt-hour meter at the test settings is $\pm$ 0.5 W, then be sure the measured power consumption of the Copier is within at least 0.5 W of the MOU specification.

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[3] The crest factor of a Watt-hour 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 Watt-hour meter has a crest factor in the range of 2:1 to 6:1.

Calibration

Watt-hour meters should be calibrated every year to maintain their accuracy.

QUESTIONS AND ANSWERS REGARDING TESTING PROCEDURES FOR ENERGY STAR® COPIERS

Q: Are these testing requirements mandatory?

A: Stringency in testing is to your own advantage. It can help protect you from being accused of cheating by one of your competitors. However, the stringency and accuracy of your own testing can be determined based on your specific product. For example, if your product does not contain a switching power supply, some of the issues discussed are not relevant, and a more straightforward testing protocol could be used. Also, if you know your product is well below the MOU specifications, then you do not need to be as accurate in your measurement. If your product is closer to the MOU specifications, however, it is better to follow these guidelines.

Q: Where can I find a True RMS Watt-hour meter that will meet my requirements?

A: A true RMS Watt-hour meter can be ordered from several manufacturers. Some manufacturers that carry Watt-meters that may be appropriate include: Basic Measuring Instruments, Dranetz, RFL, and Valhalla. When you call any of these manufacturers be sure to tell them what you need the equipment for, and request their specification sheets. (As companies find adequate meters, please let us know so we can share them with other Partners.)

Q: Can I send my copier to an outside laboratory for testing?

A: Yes. It is also possible to send your copiers to an outside testing lab for measurement. You can make the decision to buy your own equipment, or pay to have it tested depending on the number of models you plan to test. Be sure to tell any lab about your accuracy requirements. A good test lab will be aware of the issues surrounding the power measurement for electronic devices such as copiers, but don't assume this is the case. You will probably want to give them copies of the EPA ENERGY STAR® testing procedure and equipment requirements.

Q: Will the voltage coming out of the wall have a harmonic distortion <3%?

A: Not always. However, a "resonant" line voltage regulator will help to regulate distortion to within 3%.

Q: Can I assume the voltage coming out of my wall socket is close to 115 V?

A: No. The voltage coming out the wall could easily vary by more than +/- 5 V from the suggested 115 Volts AC. By applying a "resonant" line voltage regulator between the wall outlet and the device under test, the input voltage can be regulated to 115 V $^{+/-}$1%.