

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 ± 3 Hz
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 ⁽¹⁾.

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.

⁽¹⁾ IEC 62301 – Household electrical appliances – Measurement of standby power. 2005.

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:

$$X \text{ ipm} = 16 \times [\text{Maximum media width (meters)} \times \text{Maximum imaging speed (length-meters/minute)}]$$

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 standard feature 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. $50W \times 168 \text{ hours/week} = 8.4 \text{ kWh/week}$, which is then subtracted from the tested TEC value: $24.5 \text{ kWh/week} - 8.4 \text{ kWh/week} = 16.1 \text{ kWh/week}$. 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
$12 < \text{ipm} \leq 50$	$(0.20 \text{ kWh/ipm})x - 1 \text{ kWh}$	TBD
$> 50 \text{ ipm}$	$(0.80 \text{ kWh/ipm})x - 31 \text{ kWh}$	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	$(0.20 \text{ kWh/ipm})x + 2 \text{ kWh}$	TBD
> 50	$(0.80 \text{ kWh/ipm})x - 28 \text{ kWh}$	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	$(0.20 \text{ kWh/ipm})x + 2 \text{ kWh}$	TBD
$20 < \text{ipm} \leq 69$	$(0.44 \text{ kWh/ipm})x - 2,8 \text{ kWh}$	TBD
> 69	$(0.80 \text{ kWh/ipm})x - 28 \text{ kWh}$	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	$(0.20 \text{ kWh/ipm})x + 5 \text{ kWh}$	TBD
32 < ipm ≤ 61	$(0.44 \text{ kWh/ipm})x - 2,8 \text{ kWh}$	TBD
> 61	$(0.80 \text{ kWh/ipm})x - 25 \text{ kWh}$	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	0.3	0.2
	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.		
	B. Wired ≥ 20 MHz and < 500 MHz	0.5	0.2
	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.		
	C. Wired ≥ 500 MHz	1.5	0.5
	A physical data- or network-connection port present on the imaging product that is capable of a transfer rate ≥ 500 MHz. Includes 1G Ethernet.		
	D. Wireless	3.0	0.7
	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.		
	E. Wired card/camera/storage	0.5	0.1
	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).		
	G. Infrared	0.2	0.2
A data- or network-connection interface present on the imaging product that is designed to transfer data via infrared technology. Includes IrDA.			
Other	Storage	—	0.2
	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.		
	Scanners with CCFL lamps	—	2.0
	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.		
	Scanners with non-CCFL lamps	—	0.5
	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.		
	PC-based system (cannot print/copy/scan without use of significant PC resources)	—	-0.5
	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.		
	Cordless handset	—	0.8
	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.		
Memory	—	1.0 W per 1 GB	

Type	Details	Functional Adder Allowances (W)	
		Primary	Secondary
	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 $0.05 \times (36-10) = 0.05 \times 26 = 1.3$ 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 $(3 \times 24) + (1.5 \times 5) = 79.5$ W, and an allowance of 3 475 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⁽¹⁾ 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.

⁽¹⁾ 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.

- 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* ⁽¹⁾ from Table 34. For example, a 14 ipm unit shall use 0.50×14^2 , 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	$0.50 \times \text{ipm}^2$
Colour (except fax)	monochrome speed	$0.50 \times \text{ipm}^2$

- (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

⁽¹⁾ Interim Images/Day in Table 37.

Table 37

TEC Test Procedure – Printers, Digital Duplicators and MFDs with Print Capability, and Fax Machines

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	—

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.

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

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

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.

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:

$$\text{Average Job Energy} = (\text{Job2} + \text{Job3} + \text{Job4}) / 3$$

$$\text{Daily Job Energy} = (\text{Job1} \times 2) + [(\text{Jobs per Day} - 2) \times \text{Average Job Energy}]$$

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

$$\text{Daily Sleep Energy} = [24 \text{ hours} - ((\text{Jobs per day} / 4) + (\text{Final Time} \times 2))] \times \text{Sleep Power}$$

$$\text{Daily Energy} = \text{Daily Job Energy} + (2 \times \text{Final Energy}) + \text{Daily Sleep Energy}$$

$$\text{TEC} = (\text{Daily Energy} \times 5) + (\text{Sleep Power} \times 48)$$

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

$$\text{Daily Auto-off Energy} = [24 \text{ hours} - ((\text{Jobs per day} / 4) + (\text{Final Time} \times 2))] \times \text{Auto-off Power}$$

$$\text{Daily Energy} = \text{Daily Job Energy} + (2 \times \text{Final Energy}) + \text{Daily Auto-off Energy}$$

$$\text{TEC} = (\text{Daily Energy} \times 5) + (\text{Auto-off Power} \times 48)$$

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	Speed	Jobs/Day	Interim Images/Day	Interim Images/Job	Images/Job	Images/Day
1	8	1	0.06	1	8	51	32	1301	40.64	40	1280
2	8	2	0.25	1	8	52	32	1352	42.25	42	1344
3	8	5	0.56	1	8	53	32	1405	43.89	43	1376
4	8	8	1.00	1	8	54	32	1458	45.56	45	1440
5	8	13	1.56	1	8	55	32	1513	47.27	47	1504
6	8	18	2.25	2	16	56	32	1568	49.00	49	1568
7	8	25	3.06	3	24	57	32	1625	50.77	50	1600
8	8	32	4.00	4	32	58	32	1682	52.56	52	1664
9	9	41	4.50	4	36	59	32	1741	54.39	54	1728
10	10	50	5.00	5	50	60	32	1800	56.25	56	1792
11	11	61	5.50	5	55	61	32	1861	58.14	58	1856
12	12	72	6.00	6	72	62	32	1922	60.06	60	1920
13	13	85	6.50	6	78	63	32	1985	62.02	62	1984
14	14	98	7.00	7	98	64	32	2048	64.00	64	2048
15	15	113	7.50	7	105	65	32	2113	66.02	66	2112
16	16	128	8.00	8	128	66	32	2178	68.06	68	2176
17	17	145	8.50	8	136	67	32	2245	70.14	70	2240
18	18	162	9.00	9	162	68	32	2312	72.25	72	2304
19	19	181	9.50	9	171	69	32	2381	74.39	74	2368
20	20	200	10.00	10	200	70	32	2450	76.56	76	2432
21	21	221	10.50	10	210	71	32	2521	78.77	78	2496
22	22	242	11.00	11	242	72	32	2592	81.00	81	2592
23	23	265	11.50	11	253	73	32	2665	83.27	83	2656
24	24	288	12.00	12	288	74	32	2738	85.56	85	2720
25	25	313	12.50	12	300	75	32	2813	87.89	87	2784
26	26	338	13.00	13	338	76	32	2888	90.25	90	2880
27	27	365	13.50	13	351	77	32	2965	92.64	92	2944
28	28	392	14.00	14	392	78	32	3042	95.06	95	3040
29	29	421	14.50	14	406	79	32	3121	97.52	97	3104
30	30	450	15.00	15	450	80	32	3200	100.00	100	3200
31	31	481	15.50	15	465	81	32	3281	102.52	102	3264
32	32	512	16.00	16	512	82	32	3362	105.06	105	3360
33	32	545	17.02	17	544	83	32	3445	107.64	107	3424
34	32	578	18.06	18	576	84	32	3528	110.25	110	3520
35	32	613	19.14	19	608	85	32	3613	112.89	112	3584
36	32	648	20.25	20	640	86	32	3698	115.56	115	3680
37	32	685	21.39	21	672	87	32	3785	118.27	118	3776
38	32	722	22.56	22	704	88	32	3872	121.00	121	3872
39	32	761	23.77	23	736	89	32	3961	123.77	123	3936
40	32	800	25.00	25	800	90	32	4050	126.56	126	4032
41	32	841	26.27	26	832	91	32	4141	129.39	129	4128
42	32	882	27.56	27	864	92	32	4232	132.25	132	4224
43	32	925	28.89	28	896	93	32	4325	135.14	135	4320
44	32	968	30.25	30	960	94	32	4418	138.06	138	4416
45	32	1013	31.64	31	992	95	32	4513	141.02	141	4512
46	32	1058	33.06	33	1056	96	32	4608	144.00	144	4608
47	32	1105	34.52	34	1088	97	32	4705	147.02	157	4704
48	32	1152	36.00	36	1152	98	32	4802	150.06	150	4800
49	32	1201	37.52	37	1184	99	32	4901	153.14	153	4896
50	32	1250	39.06	39	1248	100	32	5000	156.25	156	4992

Figure 2

TEC Measurement Procedure

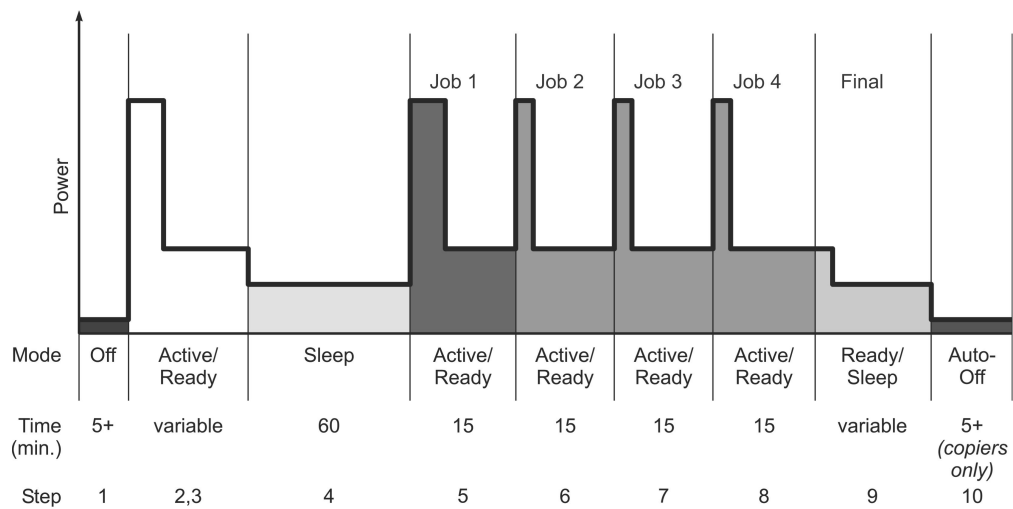


Figure 2 shows a graphic form of the measurement procedure. Note that products with short default-delay times may include periods of Sleep within the four job measurements, or Auto-off within the Sleep measurement in Step 4. Also, print-capable products with just one Sleep mode will not have a Sleep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

Figure 3

A Typical Day

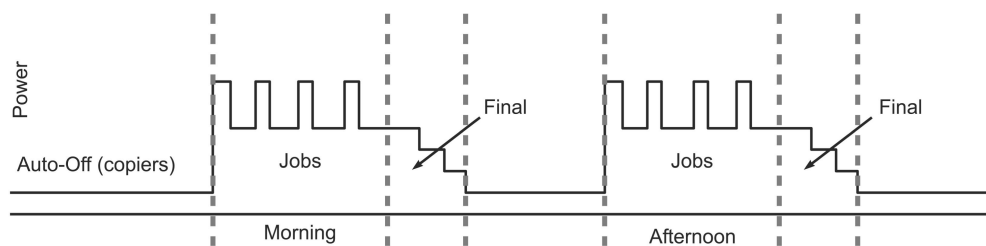


Figure 3 shows a schematic example of an eight-ipm copier that performs four jobs in morning, four jobs in afternoon, has two 'final' periods and an Auto-off mode for the remainder of the workday and all of the weekend. An assumed 'lunchtime' period is implied but not explicit. The figure is **not** 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 ⁽¹⁾ 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).

⁽¹⁾ 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.

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

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

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.

(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:

Supply Voltage (*):	North America/Taiwan: Europe/Australia/New Zealand: Japan:	115 (± 1 %) Volts AC, 60 Hz (± 1 %) 230 (± 1 %) Volts AC, 50 Hz (± 1 %) 100 (± 1 %) Volts AC, 50 Hz (± 1 %)/60 Hz (± 1 %) <i>Note: For products rated for > 1.5 kW maximum power, the voltage range is ± 4 %</i>
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 %	

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

(* 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.

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/m ²
Europe/Australia/New Zealand:	A4	80 g/m ²
Japan:	A4	64 g/m ²

(b) Test Equipment

The goal of the test procedures is to accurately measure the TRUE power consumption ⁽¹⁾ 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.' ⁽²⁾

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.

⁽¹⁾ True power is defined as (volts)x(amperes)x(power factor), and is typically reported as Watts. Apparent power is defined as (volts)x(amperes), and is usually expressed in terms of VA or volt-amperes. 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 sum power measurements over a period of time and so also need to be based on measurements of true power.

⁽²⁾ IEC 62301 – Household Electrical Appliances – Measurement of Standby Power 2005.

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.