II

(Acts adopted under the EC Treaty/Euratom Treaty whose publication is not obligatory)

DECISIONS

COMMISSION

COMMISSION DECISION

of 20 April 2009

determining the Community position for a decision of the management entities under the Agreement between the Government of the United States of America and the European Community on the coordination of energy-efficiency labelling programmes for office equipment on the revision of the imaging equipment specifications in Annex C, part VII, to the Agreement

(2009/347/EC)

THE COMMISSION OF THE EUROPEAN COMMUNITIES,

Having regard to the Treaty establishing the European Community,

Having regard to Council Decision 2006/1005/EC of 18 December 2006 concerning conclusion of the Agreement between the Government of the United States of America and the European Community on the coordination of energy-efficiency labelling programmes for office equipment [1], and in particular Article 4(3) thereof,

Whereas:

(1) The Agreement provides for the European Commission, together with the United States Environmental Protection Agency (EPA), to develop Tier II of the imaging equipment specification, thereby amending Annex C of the Agreement.

(2) The position of the Community with regard to amendment of the specifications is to be determined by the Commission.

(3) The measures provided for in this Decision take account of the opinion given by the European ENERGY STAR Board referred to in Article 8 of Regulation (EC) No 106/2008 of the European Parliament and of the Council of 15 January 2008 on a Community energy-efficiency labelling programme for office equipment [2].

(4) As of 1 July 2009, the imaging equipment specification in Annex C, part VII, should be repealed and replaced by the specifications annexed to this Decision,

HAS DECIDED AS FOLLOWS:

Sole Article

The position to be adopted by the European Community for a decision by the Management Entities under the Agreement between the Government of the United States of America and the European Community on the coordination of energy-efficiency labelling programmes for office equipment on revising the imaging equipment specifications in Annex C, part VII, to the Agreement shall be based on the attached draft decision.

Done at Brussels, 20 April 2009.

For the Commission

Andris PIEBALGS

Member of the Commission

[1] OJ L 381, 28.12.2006, p. 24.

[2] OJ L 39, 13.2.2008, p. 1.

ANNEX

DRAFT DECISION

of […]

of the management entities under the Agreement between the Government of the United States of America and the European Community on the coordination of energy-efficiency labelling programmes for office equipment on the revision of the imaging equipment specifications in Annex C, part VII, to the Agreement

THE MANAGEMENT ENTITIES,

Having regard to the Agreement between the Government of the United States and the European Community on the coordination of energy-efficiency labelling programmes for office equipment, and in particular Article XII thereof,

Whereas the first tier of the imaging equipment specifications in Annex C, part VII, effective since 1 April 2007, should be repealed and replaced by a second tier of specifications,

HAVE DECIDED AS FOLLOWS:

The imaging equipment specifications in Annex C, part VII, to the Agreement are repealed and replaced by the specifications in the Annex to this Decision with effect from 1 July 2009.

The Decision, done in duplicate, shall be signed by the Co-chairs. The Decision shall be applicable as from 1 July 2009.

Signed in Washington DC, […]

…

on behalf of the Unites States Environmental Protection Agency

Signed in Brussels, […]

…

on behalf of the European Community

ANNEX

ANNEX C, PART VII, TO THE AGREEMENT

VII. IMAGING EQUIPMENT SPECIFICATIONS

The following imaging equipment specifications are applicable as of 1 July 2009.

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 a 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 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 to 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 a coated medium 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:

11. Parallel colour EP — A marking technology that uses multiple light sources and multiple photoconductors to increase the maximum colour printing speed.

12. 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.

13. 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.

14. Inkjet (IJ) — A marking technology where images are formed by depositing colorant in small drops directly onto 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.

15. High performance IJ — An IJ marking technology in high-performance business applications that usually employ electrophotographic marking technology. High performance IJ differs from conventional IJ in that it has nozzle arrays that span the width of a page and/or the ability to dry the ink on the media through additional media-heating mechanisms.

16. 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.

17. Stencil — A marking technology that transfers images onto the print media from a stencil that is fitted around an inked drum.

18. 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 onto 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

19. 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.

20. 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.

21. 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.

22. 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 the result of manual intervention by a user, it is often referred to as manual off, and when it is the result of automatic or predetermined stimuli (e.g. a delay time or clock), it is often referred to as auto off.

23. 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).

24. 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 manual action by the user, 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, partners 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.

25. Standby — The lowest power consumption mode that cannot be switched off (influenced) by the user and which 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]. Standby is the product's minimum power mode.

Note: For imaging equipment products addressed by these specifications, the standby power level, or the minimum power mode, usually occurs in off mode, but can occur in ready or sleep. A product cannot exit standby and reach a lower power state unless it is physically disconnected from the main electricity supply as a result of manual manipulation.

Product size formats

26. 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.

27. 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.

28. 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

29. 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.

30. 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.

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

32. Digital front-end (DFE) — A functionally integrated server that hosts other computers and applications and acts as an interface to imaging equipment. A DFE provides greater functionality to the imaging product. A DFE is defined as either:

Type 1 DFE: A DFE that draws its DC power from its own AC power supply (internal or external), which is separate from the power supply that powers the imaging equipment. This DFE may draw its AC power directly from a wall outlet, or it may draw it from the AC power associated with the imaging product's internal power supply.

Type 2 DFE: A DFE that draws its DC power from the same power supply as the imaging equipment with which it operates. Type 2 DFEs must have a board or assembly with a separate processing unit that is capable of initiating activity over the network and can be physically removed, isolated, or disabled using common engineering practices to allow power measurements to be made.

[1] IEC 62301 — Household electrical appliances — Measurement of standby power (2005).

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 graphical user-interface (UI);

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

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

33. 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 these specifications contains additional power allowances for certain functional adders. Examples of functional adders include wireless interfaces and scanning capability.

34. 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 'ENERGY STAR Qualified Imaging Equipment Operational Mode Test Procedure' available at www.energystar.gov/products.

35. 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.

36. Model — An imaging equipment product that is sold or marketed under a unique model number or marketing name. A model may comprise a base unit or a base unit and accessories.

37. 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 is 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 metres per minute according to the conversion below:

X ipm = 16 × [maximum media width (metres) × maximum imaging speed (length-metres/minute)].

In all cases, the converted speed in ipm should be rounded to the nearest integer (e.g. 14,4 ipm rounds to 14 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.

38. 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 criterion 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 D.2.

B. **Qualifying products**

These ENERGY STAR specifications are intended to cover personal, business, and commercial imaging equipment products but not industrial products (e.g. products directly connected to three-phase power). Units must be capable of being powered from a wall outlet or from a data or network connection, using the international standard nominal voltage supplies listed in Section D.4. In order to qualify as ENERGY STAR, an imaging equipment product must be defined in Section A and meet one of the product descriptions in Table 1 or 2 below.

Table 1

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)	High performance IJ	Standard	Monochrome	TEC 3
	High performance IJ	Standard	Colour	TEC 4
	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
	Thermal transfer	Standard	Colour	TEC 4
	Thermal transfer	Standard	Monochrome	TEC 3

Product area	Marking technology	Size format	Colour capability	TEC table
Printers	High performance IJ	Standard	Monochrome	TEC 1
	High performance IJ	Standard	Colour	TEC 2
	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 2

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 and monochrome	OM 1
	EP	Large	Colour and monochrome	OM 1
	Solid ink	Large	Colour	OM 1
	Thermal transfer	Large	Colour and monochrome	OM 1
Fax machines	Inkjet	Standard	Colour and monochrome	OM 2
Mailing machines	Direct thermal	N/A	Monochrome	OM 4
	EP	N/A	Monochrome	OM 4
	Inkjet	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 and monochrome	OM 1
	EP	Large	Colour and monochrome	OM 1
	Inkjet	Standard	Colour and monochrome	OM 2
	Inkjet	Large	Colour and monochrome	OM 3
	Solid ink	Large	Colour	OM 1
	Thermal transfer	Large	Colour and monochrome	OM 1

Product area	Marking technology	Size format	Colour capability	OM table
Printers	Direct Thermal	Large	Monochrome	OM 8
	Direct Thermal	Small	Monochrome	OM 5
	Dye Sublimation	Large	Colour and mono-chrome	OM 8
	Dye Sublimation	Small	Colour and mono-chrome	OM 5
	EP	Large	Colour and mono-chrome	OM 8
	EP	Small	Colour	OM 5
	Impact	Large	Colour and mono-chrome	OM 8
	Impact	Small	Colour and mono-chrome	OM 5
	Impact	Standard	Colour and mono-chrome	OM 6
	Inkjet	Large	Colour and mono-chrome	OM 3
	Inkjet	Small	Colour and mono-chrome	OM 5
	Inkjet	Standard	Colour and mono-chrome	OM 2
	Solid Ink	Large	Colour	OM 8
	Solid Ink	Small	Colour	OM 5
	Thermal Transfer	Large	Colour and mono-chrome	OM 8
	Thermal Transfer	Small	Colour and mono-chrome	OM 5
Scanners	N/A	Large, small and standard	N/A	OM 7

C. **Energy-efficiency specifications for qualifying products**

Only those products listed in Section B above that meet the following criteria may qualify as ENERGY STAR. Effective dates are provided in Section F.

Products sold with an external power supply: To qualify as ENERGY STAR under the present imaging equipment version 1.1 specifications, imaging equipment products manufactured on or after 1 July 2009 using a single-voltage external AC-AC or AC-DC power supply must use an ENERGY STAR-qualified external power supply, or one that meets the ENERGY STAR external power supply (EPS) version 2.0 requirements when tested by the ENERGY STAR test method. The ENERGY STAR specification and test method for single-voltage external AC-AC and AC-DC power supplies may be found at www.energystar.gov/products.

Products designated to operate with a type 1 DFE: To qualify as ENERGY STAR under the present imaging equipment version 1.1 specifications, an imaging equipment product manufactured on or after 1 July 2009 that is sold with a type 1 DFE must use a DFE that meets the ENERGY STAR Imaging equipment digital front-end power supply efficiency requirements listed in Section C.3.

Products designated to operate with a type 2 DFE: For an imaging equipment product sold with a type 2 DFE and manufactured on or after 1 July 2009 to qualify as ENERGY STAR under the present imaging equipment version 1.1 specifications, manufacturers should subtract the DFE's energy consumption in ready mode for TEC products or exclude it when measuring sleep and standby for OM products. Section C.1 provides further detail on adjusting TEC values for DFEs for TEC products and Section C.2 provides further detail for excluding DFEs from OM sleep and standby levels.

It is the intent of EPA and the European Commission that, whenever possible, the power associated with the DFE (type 1 or type 2) should be excluded or subtracted from the TEC energy and OM power measurements.

Products sold with an additional cordless handset: To qualify, fax machines or MFDs with fax capability manufactured on or after 1 July 2009 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 high performance IJ marking technologies addressed by the TEC approach in Section C.1 must meet the following duplexing requirements, based on monochrome product speed:

Colour copiers, MFDs, and printers	
Monochrome 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.

Monochrome copiers, MFDs, and printers	
Monochrome 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 listed in Section B, Table 1, above must not exceed the corresponding limits below.

For imaging products with a type 2 DFE, the energy consumption of the DFE, calculated as in the example below, should be excluded when comparing the product's measured TEC value with the limits listed below. The DFE must not interfere with the ability of the imaging product to enter or exit its lower-power modes. In order to be excluded, the DFE must meet the definition in Section A.32 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 50 W in ready mode. 50 W × 168 hours/week = 8,4 kWh/week, which is then subtracted from the tested TEC value: 24,5 kWh/week — 8,4 kWh/week = 16,1 kWh/week. 16,1 kWh/week is then compared to the following limits.

Note: In all of the following equations, × = monochrome product speed (ipm).

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, mono high performance IJ	
Monochrome product speed (ipm)	Maximum TEC (kWh/week)
≤ 15	1 kWh
15 < x ≤ 40	(0,10 kWh/ipm)x – 0,5 kWh
40 < x ≤ 82	(0,35 kWh/ipm)x – 10,3 kWh
> 82	(0,70 kWh/ipm)x – 39 kWh

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, colour high performance IJ	
Monochrome product speed (ipm)	Maximum TEC (kWh/week)
≤ 32	(0,10 kWh/ipm)x + 2,8 kWh
32 < x ≤ 58	(0,35 kWh/ipm)x – 5,2 kWh
> 58	(0,70 kWh/ipm)x – 26 kWh

TEC Table 3

Product(s): MFDs	
Size format(s): Standard size	
Marking technologies: DT, mono DS, mono EP, mono TT, mono high performance IJ	
Monochrome product speed (ipm)	Maximum TEC (kWh/week)
≤ 10	1,5 kWh
10 < x ≤ 26	(0,10 kWh/ipm)x + 0,5 kWh
26 < x ≤ 68	(0,35 kWh/ipm)x – 6 kWh
> 68	(0,70 kWh/ipm)x – 30 kWh

TEC Table 4

Product(s): MFDs	
Size format(s): Standard size	
Marking technologies: Colour DS, colour TT, colour EP, SI, colour high performance IJ	
Monochrome product speed (ipm)	Maximum TEC (kWh/week)
≤ 26	(0,10 kWh/ipm)x + 3,5 kWh
26 < x ≤ 62	(0,35 kWh/ipm)x – 3 kWh
> 62	(0,70 kWh/ipm)x – 25 kWh

2. ENERGY STAR eligibility criteria — OM

To qualify as ENERGY STAR, the power consumption values for imaging equipment listed in Section C, Table 2, above must not exceed the corresponding limits below. For products that meet the sleep-mode power requirement in ready mode, no further automatic power reductions are required to meet the sleep limit. Additionally, for products that meet the standby-power requirements in ready or sleep mode, no further automatic power reductions are required to qualify as 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 with the combined marking-engine and functional-adder limits below and when comparing the measured standby level with the standby 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 be excluded, the DFE must meet the definition in Section A.32 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 in Tables A through C 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 adjustable only 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 in Tables A through C may be user-adjustable.

Table A

Maximum default delay times to sleep for small-format and standard-size OM products, excluding mailing machines (in minutes)

Monochrome 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 B

Maximum default delay times to sleep for large-format OM products, excluding mailing machines (in minutes)

Monochrome 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	60	60	60	15
51 +	60	60	60	15

Table C

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 limit in Table D below for each product type.

Table D

Maximum standby power level for OM products (in watts)

Product type	Standby
All OM products	1

The eligibility criteria in OM Tables 1 through 8 further 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 plus the 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 are 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 in functional-adder allowances. Since OM Table 2 sets a sleep mode marking-engine limit of 1,4 W, to determine qualification under ENERGY STAR, the manufacturer would add together the sleep mode marking-engine limit and the applicable functional-adder allowances to determine the maximum power consumption permitted for qualification of the base product: 1,4 W + 0,6 W. If the power consumption of the printer in sleep mode is measured at or below 2,0 W, then the printer would meet the ENERGY STAR sleep limit.

Table 3

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, RS232, and/or fax modem.		
	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	0,7
	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.		

Type	Details	Functional adder allowances (W)	
		Primary	Secondary
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 or non-CCFL lamps	—	0,5
	The presence of a scanner that uses cold cathode fluorescent lamp (CCFL) technology or a technology other than CCFL, such as light-emitting diode (LED), halogen, hot-cathode fluorescent tube (HCFT), xenon, or tubular fluorescent (TL) technologies. This adder is applied only once, regardless of the lamp size or the number of lamps/bulbs employed.		
	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 W per 1 GB
	The internal capacity available in the imaging product for storing data. This adder applies to all volumes of internal memory and should be scaled accordingly. For example, a unit with 2,5 GB of memory would receive an allowance of 2.5 W while a unit with 0,5 GB would receive an allowance of 0.5 W.		
	Power-supply (PS) size, based on PS output rating (OR) *Note:* This adder ONLY applies to products which fall under OM Tables 2 and 6.	—	For PSOR > 10 W, 0,02 × (PSOR — 10 W)
	This adder applies to only those imaging products which fall under OM Tables 2 and 6. 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 a power supply allowance of 0,02 × (36-10) = 0,02 × 26 = 0,52 W. 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 3 A of 24 V and 1,5 A of 5 V output has a total PSOR of (3 × 24) + (1,5 × 5) = 79,5 W, and an allowance of 1,39 W.		

For the adder allowances shown in Table 3 above, distinctions are made between '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 Table 3 above, 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 the 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.

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	30

OM Table 2

Product(s): Fax machines, MFDs, printers	
Size format(s): Standard size	
Marking technologies: Colour IJ, mono IJ	
	Sleep (W)
Marking engine	1,4

OM Table 3

Product(s): MFDs, printers	
Size format(s): Large format	
Marking technologies: Colour IJ, mono IJ	
	Sleep (W)
Marking engine	15

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	7

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	9

OM Table 6

Product(s): Printers	
Size format(s): Standard size	
Marking technologies: Colour impact, mono impact	
	Sleep (W)
Marking engine	4,6

OM Table 7

Product(s): Scanners	
Size format(s): Large format, small format, standard size	
Marking technologies: N/A	
	Sleep (W)
Scanning engine	4,3

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	14

3. DFE efficiency requirements

The following efficiency requirements are for digital front-end equipment as defined in Section A of these specifications.

Power supply efficiency requirements

Type 1 DFE using an internal AC-DC power supply: A DFE that gets its DC power from its own internal AC-DC power source must meet the following power supply efficiency requirement: 80 % minimum efficiency at 20 %, 50 %, and 100 % of rated output and power factor ≥ 0,9 at 100 % of rated output.

Type 1 DFE using an external power supply: A DFE that gets its DC power from its own external power supply (as defined by the ENERGY STAR V2.0 Programme Requirements for Single Voltage AC-AC and AC-DC External Power Supplies) must be ENERGY STAR-qualified or meet the no-load and active-mode efficiency levels specified in the ENERGY STAR V2.0 Programme Requirements for Single Voltage AC-AC and AC-DC External Power Supplies. The ENERGY STAR specification and qualified product list can be found at: www.energystar.gov/powersupplies

Test procedures

Manufacturers are required to perform tests and self-certify those models that meet the ENERGY STAR guidelines.

— In performing these tests, the partner agrees to use the applicable test procedures provided in Table 4 below.

— The test results for qualifying products must be reported to EPA or the European Commission, as appropriate.

Additional testing and reporting requirements are provided below.

Models capable of operating at multiple voltage/frequency combinations: Manufacturers must test their products based on the market(s) in which the models will be sold and promoted as ENERGY STAR-qualified. EPA and its ENERGY STAR country partners have agreed upon a table with three voltage/frequency combinations for testing purposes. Please refer to Section D.4 for details regarding international voltage/frequency combinations for each market.

For products that are sold as ENERGY STAR in multiple international markets, and are therefore rated at multiple input voltages, the manufacturer must test and report the required power consumption or efficiency values at all relevant voltage/frequency combinations. For example, a manufacturer that ships the same model to the United States and Europe must carry out measurements, meet the specification, and report test values at both 115 volts/60 Hz and 230 volts/50 Hz in order to qualify the model as ENERGY STAR in both markets. If a model qualifies as ENERGY STAR at only one voltage/frequency combination (e.g. 115 volts/60 Hz), then it may only be qualified and promoted as ENERGY STAR in those regions that support the tested voltage/frequency combination (e.g. North America and Taiwan).

Table 4

Type 1 DFE test procedures

Specification requirement	Test protocol	Source
Power supply efficiency	Internal power supply (IPS)	IPS: http://efficientpowersupplies.epri.com/
	External power supply (EPS) ENERGY STAR test	EPS: www.energystar.gov/powersupplies/

D. **Testing guidelines**

The specific instructions for testing the energy efficiency of imaging equipment products are given 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 will 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 the submission of test data for a single, representative model. Likewise, models that are unchanged or 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 were 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 the mains, USB, IEEE1394, Power-over-Ethernet, the 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 will be conducted by the manufacturer or its authorised representative on a single unit of a model.

(a) For products listed in Section B, Table 1, of these specifications, if the initial unit tested has TEC test results that meet the eligibility criteria but are within 10 % of the limit, one additional unit of the same model must also be tested. Manufacturers must report values for both units. To qualify as ENERGY STAR, both units must meet the ENERGY STAR specification.

(b) For products listed in Section B, Table 2, of these specifications, if the initial unit tested has OM test results that meet the eligibility criteria but are within 15 % of the limits in any of the specified operating modes for that product type, then two more units must be tested. To qualify as ENERGY STAR, all three units must meet the ENERGY STAR specification.

Submission 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 will be outlined shortly following publication of the final specifications. 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 intention of this requirement is to show that products are being tested as shipped and recommended for use.

Models capable of operating at multiple voltage/frequency combinations

Manufacturers must 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 are therefore rated at multiple input voltages, the manufacturer must test and report the required power consumption or efficiency values at all relevant voltage/frequency combinations. For example, a manufacturer that ships the same model to the United States and Europe must carry out measurements, 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 as defined in Section B, Table 1.

(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 D.4 below.

Testing in simplex

Products will be tested in simplex mode. Originals for copying must be simplex images.

Test image

The test image is Test pattern A from ISO/IEC standard 10561:1999. It must 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 must 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 must be sent to the product in a PDL.

Testing in monochrome

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

Auto-off and network enabling

The product must 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 must be consistent with the as-shipped configuration, including those in operating manuals, on websites, 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 must be disabled prior to the test. Printers and MFDs that are capable of being network-connected as-shipped [1] must be connected to a network. The type of network connection (or other data connection if the product is not capable of being networked) is at the discretion of the manufacturer, and the type used must 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 must 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) must 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 must 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 will otherwise be 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 product speed used to determine the job size for the test is 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 is to 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 be tested with one image per job. The number of images per job to be used for all other IE products is to be computed according to the following three steps. For convenience, Table 8 provides the resultant images per job computation for each integral product speed up through 100 images per minute (ipm).

(i) Calculate the number of jobs per day. The number of jobs per day varies with product speed:

— for units with a speed of eight ipm or less, use eight jobs per day;

— for units with a speed between eight and 32 ipm, the number of jobs per day is equal to the speed. For example, a 14 ipm unit uses 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 [2] from Table 5. For example, a 14 ipm unit uses $0{,}50 \times 14^2$, or 98 images per day.

[1] The type of network connection must be reported. Common types are Ethernet, 802.11 and Bluetooth. Common non-network data connection types are USB, serial, and parallel.

[2] Interim images/day in Table 37.

Table 5

Imaging equipment job table

Product type	Rating to use	Formula (images per day)
Monochrome (except fax)	monochrome speed	0,50 × ipm^2
Colour (except fax)	monochrome speed	0,50 × 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 should be reported as 15 images per job, rather than rounding to 16 images per job.

For copiers below 20 ipm, there should 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 10 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 6 and 7 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 are to 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. If 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 is to be maintained at all times, including for the job that is dropped.

MFDs without print capability are to be treated as copiers for all purposes of this test procedure.

(i) Procedure for printers, digital duplicators and MFDs with print capability, and fax machines

Table 6

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 Testing interval time	Off
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 Active1 time	Recovery, active, ready, sleep
6	Ready	Repeat step 5.	Job2 energy Active2 time	Same as above

Step	Initial state	Action	Record (at end of step)	Possible states measured
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.
— The 'Zero meter' instruction may be carried out 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 period of 15 minutes is from job initiation. The unit must show increased energy consumption within five seconds of zeroing the meter and timer; it may be necessary to initiate 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 is to be sent separately; they may all be part of the same document, but should 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 D.2(b)).

For fax machines that only use one image per job, the page is to 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 should 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 7

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 have elapsed.	Job1 energy	Recovery, active, ready, sleep, auto-off
			Active1 time	

Step	Initial state	Action	Record (at end of step)	Possible states measured
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.
— The 'Zero meter' instruction may be carried out 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 period of 15 minutes is from 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 from 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 A.32.

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 is to 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 must 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 comprising two clusters each day with the unit going into its lowest power mode in between (as during a lunch break), as illustrated in Figure 2 further below. It is assumed that weekends have no usage, and no manual switching-off is done.

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

The following two equations are used for all product types:

Average job energy = (Job2 + Job3 + Job4)/3

Daily job energy = (Job1 × 2) + [(Jobs per day — 2) × Average job energy)]

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

Daily sleep energy = [24 hours — ((Jobs per day/4) + (Final time × 2))] × Sleep power

Daily energy = Daily job energy + (2 × Final energy) + Daily sleep energy

TEC = (Daily energy × 5) + (Sleep power × 48)

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

Daily auto-off energy = [24 hours — ((Jobs per day/4) + (Final time × 2))] × Auto-off power

Daily energy = Daily job energy + (2 × Final energy) + Daily auto-off energy

TEC = (Daily energy × 5) + (Auto-off power × 48)

The specifications of the metering equipment and ranges used in each measurement must be reported. Measurements must be conducted so as to result in a total potential error in 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 8

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	21	21	221	10,50	10	210
2	8	2	0,25	1	8	22	22	242	11,00	11	242
3	8	5	0,56	1	8	23	23	265	11,50	11	253
4	8	8	1,00	1	8	24	24	288	12,00	12	288
5	8	13	1,56	1	8	25	25	313	12,50	12	300
6	8	18	2,25	2	16	26	26	338	13,00	13	338
7	8	25	3,06	3	24	27	27	365	13,50	13	351
8	8	32	4,00	4	32	28	28	392	14,00	14	392
9	9	41	4,50	4	36	29	29	421	14,50	14	406
10	10	50	5,00	5	50	30	30	450	15,00	15	450
11	11	61	5,50	5	55	31	31	481	15,50	15	465
12	12	72	6,00	6	72	32	32	512	16,00	16	512
13	13	85	6,50	6	78	33	32	545	17,02	17	544
14	14	98	7,00	7	98	34	32	578	18,06	18	576
15	15	113	7,50	7	105	35	32	613	19,14	19	608
16	16	128	8,00	8	128	36	32	648	20,25	20	640
17	17	145	8,50	8	136	37	32	685	21,39	21	672
18	18	162	9,00	9	162	38	32	722	22,56	22	704
19	19	181	9,50	9	171	39	32	761	23,77	23	736
20	20	200	10,00	10	200	40	32	800	25,00	25	800

Speed	Jobs/ Day	Interim images/ Day	Interim images/ Job	Images/ Job	Images/ Day
41	32	841	26,27	26	832
42	32	882	27,56	27	864
43	32	925	28,89	28	896
44	32	968	30,25	30	960
45	32	1 013	31,64	31	992
46	32	1 058	33,06	33	1 056
47	32	1 105	34,52	34	1 088
48	32	1 152	36,00	36	1 152
49	32	1 201	37,52	37	1 184
50	32	1 250	39,06	39	1 248
51	32	1 301	40,64	40	1 280
52	32	1 352	42,25	42	1 344
53	32	1 405	43,89	43	1 376
54	32	1 458	45,56	45	1 440
55	32	1 513	47,27	47	1 504
56	32	1 568	49,00	49	1 568
57	32	1 625	50,77	50	1 600
58	32	1 682	52,56	52	1 664
59	32	1 741	54,39	54	1 728
60	32	1 800	56,25	56	1 792
61	32	1 861	58,14	58	1 856
62	32	1 922	60,06	60	1 920
63	32	1 985	62,02	62	1 984
64	32	2 048	64,00	64	2 048
65	32	2 113	66,02	66	2 112
66	32	2 178	68,06	68	2 176
67	32	2 245	70,14	70	2 240
68	32	2 312	72,25	72	2 304
69	32	2 381	74,39	74	2 368
70	32	2 450	76,56	76	2 432

Speed	Jobs/ Day	Interim images/ Day	Interim images/ Job	Images/ Job	Images/ Day
71	32	2 521	78,77	78	2 496
72	32	2 592	81,00	81	2 592
73	32	2 665	83,27	83	2 656
74	32	2 738	85,56	85	2 720
75	32	2 813	87,89	87	2 784
76	32	2 888	90,25	90	2 880
77	32	2 965	92,64	92	2 944
78	32	3 042	95,06	95	3 040
79	32	3 121	97,52	97	3 104
80	32	3 200	100,00	100	3 200
81	32	3 281	102,52	102	3 264
82	32	3 362	105,06	105	3 360
83	32	3 445	107,64	107	3 424
84	32	3 528	110,25	110	3 520
85	32	3 613	112,89	112	3 584
86	32	3 698	115,56	115	3 680
87	32	3 785	118,27	118	3 776
88	32	3 872	121,00	121	3 872
89	32	3 961	123,77	123	3 936
90	32	4 050	126,56	126	4 032
91	32	4 141	129,39	129	4 128
92	32	4 232	132,25	132	4 224
93	32	4 325	135,14	135	4 320
94	32	4 418	138,06	138	4 416
95	32	4 513	141,02	141	4 512
96	32	4 608	144,00	144	4 608
97	32	4 705	147,02	157	4 704
98	32	4 802	150,06	150	4 800
99	32	4 901	153,14	153	4 896
100	32	5 000	156,25	156	4 992

Figure 2

TEC measurement procedure

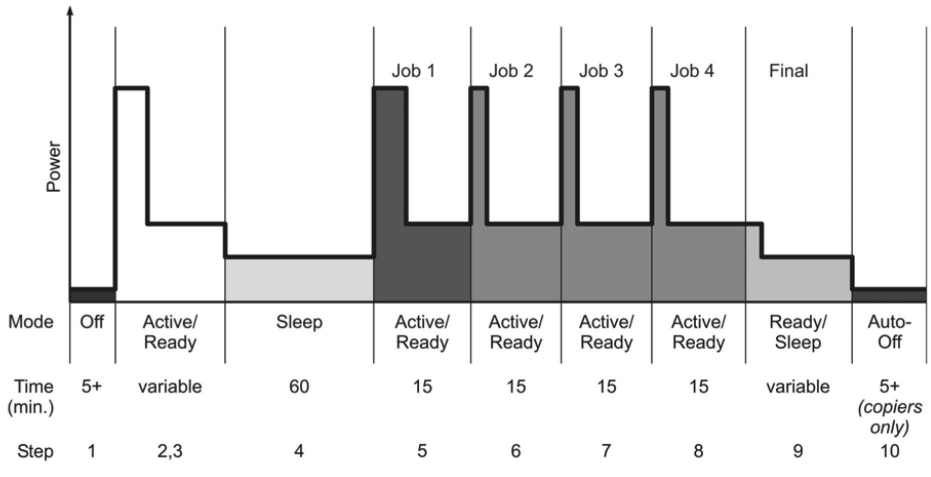

Figure 2 shows the measurement procedure in graphic form. Note that products with short default delay times may include periods of sleep within the four job measurements, or auto-off within the sleep measurement in step 4. Also, print-capable products with just one sleep mode will not have a sleep mode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

Figure 3

A typical day

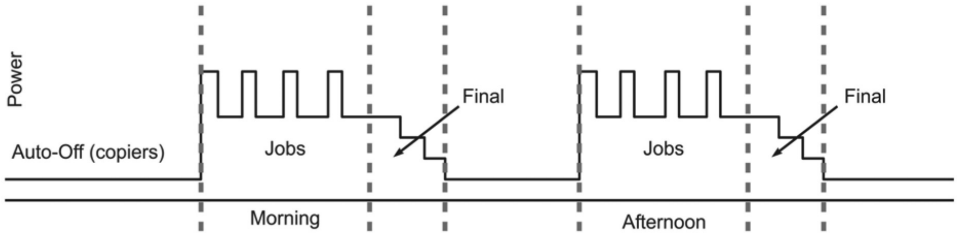

Figure 3 shows a schematic example of an eight-ipm copier that performs four jobs in the morning and four jobs in the afternoon, has two 'final' periods and an auto-off mode for the remainder of the workday and all of the weekend. An assumed 'lunchtime' period is implied but not explicit. The figure 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 B, Table 2.

(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]) must 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 must be reported.

The product should 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 must 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 must 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) must be installed prior to this test.

Anti-humidity features may be turned off if they are user-controllable.

For fax machines, a page should 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 should be sent via phone line. On fax machines without a document feeder, the page should be placed on the platen.

([1]) The type of network connection must be reported. Common network types are Ethernet, WiFi (802.11), and Bluetooth. Common data (non-network) connection types are USB, serial, and parallel.

If a product has an auto-off mode enabled as shipped, it must be enabled prior to performing the test.

Speed

When conducting power measurements under this test procedure, the product should produce images at the speed resulting from its default settings as shipped. However, the manufacturer's reported maximum claimed simplex speed for making monochrome images on standard-sized paper is to 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 D.4.

The harmonics requirement used during testing 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 Section D.4. 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 is to be left in place for the test; however, the measurement should not reflect active battery charging beyond maintenance charging (i.e. the battery should be fully charged before beginning the test).

Products with external power supplies are to 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) must utilise a suitable AC-powered source for the DC power. This AC-powered source's energy consumption is to 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 is to 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 9 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 must 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 9

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 these 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 made in parallel, 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.

Additional measurement for products with a digital front-end (DFE)

This step applies only to products that have a DFE as defined in Section A.32.

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 is to 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 must 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 apply 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 ([1]):	North America/Taiwan:	115 (± 1 %) volts AC, 60 Hz (± 1 %)
	Europe/Australia/New Zealand:	230 (± 1 %) volts AC, 50 Hz (± 1 %)
	Japan:	100 (± 1 %) volts AC, 50 Hz (± 1 %)/60 Hz (± 1 %)
		Note: For products rated for > 1,5 kW maximum power, the voltage range is ± 4 %
Total harmonic distortion (THD) (voltage):	< 2 % THD (< 5 % for products 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)

([1]) Supply voltage: Manufacturers must test their products based on the market in which the partner intends to sell the products as ENERGY STAR qualified. For equipment 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 ships 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 must 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.

([1]) True power is defined as (volts) × (amps) × (power factor), and is typically reported as watts. Apparent power is defined as (volts) × (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, so true power is always less than apparent power. Accumulated energy measurements sums power measurements over a period of time and so also need to be based on measurements of true power.

Resolution: For direct power measurements, the resolution of metering equipment must 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.' [1]

In addition, the measurement instrument must 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 the 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 set-up.

Accuracy

Measurements made with these procedures must in all cases have an accuracy of 5 % or better, though manufacturers will usually achieve better than this. Test procedures may specify greater accuracy than 5 % for some measurements. With knowledge of the power levels of current imaging products and the meters available, manufacturers can calculate the maximum error based on the reading and the range utilised for the reading. For measurements of 0,50 W or less, the required accuracy is 0,02 W.

Calibration

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

E. **User interface**

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

F. **Effective date**

The date that manufacturers may begin to qualify products as ENERGY STAR under the present version 1.1 specifications will be defined as the effective date of the agreement. Any previously executed agreement on the subject of ENERGY STAR-qualified imaging equipment will be terminated as of 30 June 2009.

Qualifying and labelling products under this version 1.1: the version 1.1 specifications will commence on 1 July 2009. All products, including models originally qualified under previous imaging equipment specifications, with a date of manufacture on or after 1 July 2009, must meet the new version 1.1 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.

Elimination of grandfathering: EPA and the European Commission will not allow grandfathering under the present version 1.1 ENERGY STAR specifications. 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 specifications in effect at the time of manufacture of the product.

[1] IEC 62301 — Household electrical appliances — Measurement of standby power (2005).

G. **Future specification revisions**

EPA and the European Commission reserve the right to change the specifications should technological and/or market changes affect their usefulness to consumers, industry, or the environment. In keeping with current policy, revisions to the specifications are arrived at through stakeholder discussions and are expected to occur approximately 2 to 3 years from the effective date of version 1.1. 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 specifications recognise the most energy-efficient models in the marketplace and reward those manufacturers who have made efforts to further improve energy efficiency. Some of the issues to consider addressing in the next specifications include:

(a) Colour testing: Based on submitted test data, future consumer preferences, and engineering advancements, EPA and the European Commission may modify the specifications 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 the specifications 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 the specifications 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.

(d) Additional energy impacts: EPA and the European Commission are interested in providing consumers with choices that significantly reduce greenhouse gas emissions compared to typical alternative choices. EPA and the European Commission will be seeking input from stakeholders on methods to document and quantify the environmental impacts under which manufacturing, transportation, product design or the use of consumables can lead to a product with the same or even better overall greenhouse gas impact as products earning the ENERGY STAR based on greenhouse gas emission from energy use alone. We are exploring ways to effectively address these issues and may amend these specifications as warranted based on sufficient supporting information. EPA and the European Commission will work closely with stakeholders on any revisions and ensure revisions are aligned with ENERGY STAR programme guiding principles.

(e) Reporting data at 230V: EPA and the European Commission may consider that for those products marketed in different markets, one of which includes a 230 V market, data from testing at the 230 V level should be acceptable as sufficient for the multiple markets. This suggestion is based on the observation that if a product meets the 230 V specifications, it will meet the standards at the lower voltage levels.

(f) Expanding duplexing requirements: EPA and the European Commission may reassess the presence of duplexing on the current range of products, and consider how the optional requirements could be made more stringent. Revisiting the duplexing requirements to ensure greater coverage of duplexing would potentially result in reduced paper usage, which has been found to be the largest lifecycle impact of a printer.

(g) Revising TEC test procedure: EPA and the European Commission may revisit the TEC test methodology to make usage assumptions more transparent or add requirements to the specification that power consumption be measured and reported in some distinct modes that would allow for values relevant to actual usage patterns.

(h) Power states: EPA and the European Commission may consider revising the definition of certain power terms (e.g. standby) or adding new power management approaches (e.g. weekend sleep) in order to maintain consistency with international criteria and to obtain the highest achievable energy savings for imaging equipment.