ENERGY STAR®
Product Specification for Imaging Equipment

Eligibility Criteria
Draft 1, Version 3.0

Following is the Draft 1, Version 3.0 ENERGY STAR Product Specification for Imaging Equipment. A product shall meet all of the identified criteria if it is to earn the ENERGY STAR.

1 DEFINITIONS

A) Product Types:

1) Printer: A product whose primary function is to generate paper output from electronic input. A printer is capable of receiving information from single-user or networked computers, or other input devices (e.g., digital cameras). This definition is intended to cover products that are marketed as printers and printers that can be field-upgraded to meet the definition of an MFD.

2) Scanner: A product whose primary function is to convert paper originals into electronic images that can be stored, edited, converted, or transmitted, primarily in a personal computing environment. This definition is intended to cover products that are marketed as scanners.

3) Copier: A product whose sole function is to produce paper duplicates from paper originals. This definition is intended to cover products that are marketed as copiers, and upgradeable digital copiers (UDCs).

4) Facsimile (Fax) Machine: A product whose primary functions are (1) to scan paper originals for electronic transmission to remote units, and (2) to receive electronic transmissions for conversion to paper output. A fax machine may also be capable of producing paper duplicates. Electronic transmission is primarily over a public telephone system, but may also be via a computer network or the Internet. This definition is intended to cover products that are marketed as fax machines.

5) Multifunction Device (MFD): A product that performs the core functions of a Printer and Scanner. An MFD may have a physically integrated form factor, or it may consist of a combination of functionally integrated components. MFD copy functionality is considered to be distinct from single-sheet convenience copying functionality sometimes offered by fax machines. This definition includes products marketed as MFDs and “multi-function products” (MFPs).

Note: EPA proposes the above simplified definition for MFDs as a combination of Printer and Scanner to reflect the disappearance of standalone copiers from the market as well as the proposal, in Section 3.4.3 to include the OM scanner adder allowance directly in the MFD base allowance.

6) Digital Duplicator: A product sold as a fully-automated duplicator system through the method of stencil duplicating with digital reproduction functionality. This definition is intended to cover products that are marketed as digital duplicators.

7) Mailing Machine: A product whose primary function is to print postage onto mail pieces. This definition is intended to cover products that are marketed as mailing machines.

8) Professional Imaging Product: A printer or MFD marketed as intended for producing deliverables for sale, with the following features:

a) Supports paper with basis weight greater than or equal to 141 g/m$^{2;}$

b) A3-capable;

c) Monochrome product speed equal to or greater than 86 ipm;

d) Color product speed equal to or greater than 50 ipm (if product is color capable);

e) Print resolution of 600 × 600 dots per inch or greater for each color; and

Three of the following additional features, included standard with the Imaging Equipment product or as an accessory:

f) Paper capacity equal to or greater than 8,000 sheets;

g) Digital front-end (DFE);

h) Hole punch;

i) Case binding or ring binding;

j) Memory storage equal to or greater than 1,024 MB.

k) Third-party color certification (e.g., GRACol®, Japan Color Digital Printing Certification; if product is color capable); and

l) Coated paper compatibility.

Note: EPA proposes the above definition for Professional Imaging Products based on industry recommendations to differentiate heavy-duty products which are intended to produce copies for sale. EPA proposes to use tailored test and energy requirements for these products. EPA further clarified the industry definition by listing examples of color certification and expressing the memory requirement in terms of megabytes. More than 80% of currently ENERGY STAR certified Professional Imaging Products have internal memory greater than 1,024 MB, compared to 22% of all ENERGY STAR certified Imaging Equipment. EPA believes that this definition better differentiates these heavy-duty products than that presented in the Discussion Document, which stakeholders indicated could encompass some non-professional products.

B) Marking Technologies:

1) Direct Thermal (DT): A marking technology characterized by the burning of dots onto coated print media that is passed over a heated print head. DT products do not use ribbons.

2) Dye Sublimation (DS): A marking technology characterized by the deposition (sublimation) of dye onto print media as energy is supplied to heating elements.

3) Electro-photographic (EP): A marking technology characterized by the illumination of a photoconductor in a pattern representing the desired output 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 print media, and fusing to cause the output to become durable. For purposes of this specification, Color EP products simultaneously offer three or more unique toner colors, while Monochrome EP products simultaneously offer one or two unique toner colors. This definition includes Laser, Light Emitting Diode (LED), and Liquid Crystal Display (LCD) illumination technologies.

4) Impact: A marking technology characterized by the formation of the desired output image by transferring colorant from a “ribbon” to the print media via an impact process. This definition includes Dot Formed Impact and Fully Formed Impact.

5) Ink Jet (IJ): A marking technology characterized by the deposition of colorant in small drops directly to the print media in a matrix manner. For purposes of this specification, Color IJ products offer two or more unique colorants at one time, while Monochrome IJ products offer one colorant at a time. This definition includes Piezo-electric (PE) IJ, IJ Sublimation, and Thermal IJ. This definition does not include High Performance IJ.

6) High Performance IJ: An IJ marking technology that includes nozzle arrays that span the width of a page and/or the ability to dry ink on the print media via supplemental media heating mechanisms. High-performance IJ products are used in business applications usually served by electro-photographic marking products.

7) Solid Ink (SI): A marking technology characterized by ink that is solid at room temperature and liquid when heated to the jetting temperature. This definition includes both direct transfer and offset transfer via an intermediate drum or belt.

8) Stencil: A marking technology characterized by the transfer of images onto print media from a stencil that is fitted around an inked drum.

9) Thermal Transfer (TT): A marking technology characterized by the deposition of small drops of solid colorant (usually colored waxes) in a melted/fluid state directly to 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.

C) Operational Modes:

1) On Mode:

a) Active State: The power state in which a product is connected to a power source and is actively producing output, as well as performing any of its other primary functions.

b) Ready State: The power state in which a product is not producing output, has reached operating conditions, has not yet entered into any lower-power modes, and can enter Active State with minimal delay. All product features can be enabled in this state, and the product is able to return to Active State by responding to any potential inputs, including external electrical stimulus (e.g., network stimulus, fax call, or remote control) and direct physical intervention (e.g., activating a physical switch or button).

2) Off Mode: 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 State. 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.[1]

3) Sleep Mode: A reduced power state that a product enters either automatically after a period of inactivity (i.e., Default Delay Time), in response to user manual action (e.g., at a user-set time of day, in response to a user activation of a physical switch or button), or in response to external electrical stimulus (e.g., network stimulus, fax call, remote control). For products evaluated under the TEC test method, Sleep Mode permits operation of all product features (including maintenance of network connectivity), albeit with a possible delay to transition into Active State. For products evaluated under the OM test method, Sleep Mode permits operation of a single active network interface, as well as a fax connection if applicable, albeit with a possible delay to transition into Active State.

1 For the purposes of this specification “mains” or the “main electricity supply” refers to the input power source, including a dc power supply for products that operate solely off dc power.

Note: To avoid confusion relating to the Standby power requirement and definition, EPA has redefined it as an Off Mode power requirement and proposes to remove the Standby definition. As before, products that do not have an Off Mode shall meet the Off requirement in Sleep Mode, and those that do not have Off mode or Sleep Mode shall meet the Off requirements in Ready State.

D) Media Format:

1) Large Format: Products designed for A2 media and larger, including those designed to accommodate continuous form media greater than or equal to 406 mm wide. Large-format products may also be capable of printing on standard-size or small-format media.

2) Standard Format: Products designed for standard-sized media (e.g., Letter, Legal, Ledger, A3, A4, B4), including those designed to accommodate continuous form media between 210 mm and 406 mm wide. Standard-size products may also be capable of printing on small-format media.

a) A3-capable: Standard Format products with a paper path width equal to or greater than 275 mm.

3) Small Format: Products designed for media sizes smaller than those defined as Standard (e.g., A6, 4”x6”, microfilm), including those designed to accommodate continuous form media less than 210 mm wide.

4) Continuous Form: Products that do not use a cut-sheet media format and that are designed for applications such as printing of bar codes, labels, receipts, banners, and engineering drawings. Continuous Form products can be Small, Standard, or Large Format.

E) Additional Terms:

1) Automatic Duplexing: The capability of an MFD or printer to produce images on both sides of an output sheet, without manual manipulation of output as an intermediate step. A product is considered to have automatic duplexing capability only if all accessories needed to produce a duplex output are included with the product upon shipment.

2) Data Connection: A connection that permits the exchange of information between the Imaging Equipment and one external powered device or storage medium.

3) 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, Auto-off) following completion of its primary function.

4) Recovery Time: The time it takes for a device to return from a Sleep or Off Mode to a Ready State.

Note: A stakeholder requested that EPA require maximum recovery times from sleep, as long recovery times may encourage stakeholders to disable energy saving settings. The stakeholder also requested that EPA harmonize with Germany’s Blue Angel in setting recovery time requirements. Therefore, EPA has defined recovery time as Blue Angel does and proposed equivalent requirements for Typical Electricity Consumption (TEC) products (in Section 3.3.4, below).

5) 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 Equipment.

a) A DFE offers three or more of the following advanced features:

i. Network connectivity in various environments;
ii. Mailbox functionality;
iii. Job queue management;

iv. Machine management (e.g., waking the Imaging Equipment from a reduced power state);
v. Advanced graphic user-interface (UI);
vi. Ability to initiate communication with other host servers and client computers (e.g., scanning to email, polling remote mailboxes for jobs); or
vii. Ability to post-process pages (e.g., reformatting pages prior to printing).

b) 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 Equipment's internal power supply. A Type 1 DFE may be sold standard with the Imaging Equipment product or as an accessory.

c) 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.

d) Auxiliary Processing Accelerator (APA): A computing expansion add-in card installed in a general-purpose add-in expansion slot of the DFE (e.g., GPGPU installed in a PCI slot).

6) Network Connection: A connection that permits the exchange of information between the Imaging Equipment and one or more external powered devices.

7) Functional Adder: A data or network interface or other component that adds functionality to the marking engine of an Imaging Equipment product and provides a power allowance when qualifying products according to the OM method.

8) Operational Mode (OM): For the purposes of this specification, a method of comparing product energy performance via an evaluation of power (measured in watts) in various operating states, as specified in Section 9 of the ENERGY STAR Imaging Equipment Test Method.

9) Typical Electricity Consumption (TEC): For the purposes of this specification, a method of comparing product energy performance via an evaluation of typical electricity consumption (measured in kilowatt-hours) during normal operation over a specified period of time, as specified in Section 8 of the ENERGY STAR Imaging Equipment Test Method.

10) Marking Engine: The fundamental engine of an Imaging Equipment product that drives image production. A marking engine relies upon functional adders for communication ability and image processing. Without functional adders and other components, a marking engine cannot acquire image data for processing and is non-functional.

11) Base Product: The most fundamental configuration of a particular Product Model, which possesses the minimum number of functional adders available. Optional components and accessories are not considered part of a base product.

12) Accessory: A piece of peripheral equipment that is not necessary for the operation of the Base Product, 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 product as part of a package or configuration.

13) Product Model: An Imaging Equipment product that is sold or marketed under a unique model number or marketing name. A product model may be comprised of a base product or a base product plus accessories.

14) Product Family: A group of product models that are (1) made by the same manufacturer, (2) subject to the same ENERGY STAR qualification criteria, and (3) of a common basic design. Product models within a family differ from each other according to one or more characteristics or features that either (1) have no impact on product performance with regard to ENERGY STAR qualification criteria, or (2) are specified herein as acceptable variations within a product family. For Imaging Equipment, acceptable variations within a product family include:

a) Color,

b) Housing,

c) Input or output paper-handling accessories,

d) Electronic components not associated with the marking engine of the Imaging Equipment product, including Type 1 and Type 2 DFEs.

2 SCOPE

2.1 Included Products

2.1.1 Commercially-available products that meet one of the Imaging Equipment definitions in Section 1.A) and are capable of being powered from (1) a wall outlet, (2) a data or network connection, or (3) both a wall outlet and a data or network connection, are eligible for ENERGY STAR qualification, with the exception of products listed in Section 2.2.

2.1.2 An Imaging Equipment product must further be classified as either "TEC" or "OM" in Table 1, below, depending on the method of ENERGY STAR evaluation.

Table 1: Evaluation Methods for Imaging Equipment

Equipment Type	Media Format	Marking Technology	ENERGY STAR Evaluation Method
Digital Duplicator	Standard	Stencil	TEC
Mailing Machine	All	DT, EP, IJ, TT	OM
Multifunction Device (MFD)	Standard	High Performance IJ, DT, DS, EP, SI, TT	TEC
		IJ, Impact	OM
	Large	High Performance IJ, DT, DS, EP, IJ, SI, TT	OM
Printer	Standard	High Performance IJ, DT, DS, EP, SI, TT	TEC
		IJ, Impact	OM
	Large or Small	DT, DS, EP, Impact, IJ, SI, TT	OM
	Large	High Performance IJ	OM
	Small	High Performance IJ	TEC
Scanner	All	N/A	OM

2.2 Excluded Products

2.2.1 Products that are covered under other ENERGY STAR product specifications are not eligible for qualification under this specification. The list of specifications currently in effect can be found at www.energystar.gov/products.

2.2.2 Products that satisfy one or more of the following conditions are not eligible for ENERGY STAR qualification under this specification:

i. Products that are designed to operate directly on three-phase power;
ii. Professional Imaging Products
iii. Standalone Copiers; and
iv. Standalone Fax Machines.

Note: EPA received comment from multiple stakeholders supporting the proposal to add copiers and fax machines to the list of excluded products and has therefore removed them from Table 1 above. EPA noted that there has been a precipitous drop in shipments, which the Agency believes has reduced the incentive for manufacturers to invest in efficiency in these product categories.

EPA is proposing a definition for Professional Imaging Products in this Draft 1 specification as well as test method clarifications specific to Professional Imaging Products in the Draft 2 test procedure. However, as the test data must still be collected to the new test method, EPA is maintaining the current scope in Draft 1. EPA intends this move to be temporary until International Organization for Standardization (ISO) Standard 21632 **"**Graphic technology -- Determination of the energy consumption of digital printing devices including transitional and related modes**"** is finalized along with recommended job structures that can form a TEC metric for Professional Imaging Products.

EPA welcomes feedback on all the Professional Imaging Product proposals, including definition and test method, as well as current data on their energy consumption using the latest draft of ISO 21632. Finally, EPA welcomes feedback on the following questions pertaining to a job structure/usage profile that would allow EPA to convert the modal results from the test method into an annual energy consumption metric for evaluation against requirements.

EPA proposes including the following modes tested under ISO 21632 in the usage profile. Is there a reason to exclude any of the below from the usage profile?

a. Startup (Test print);
b. Maintenance;
c. Active State (Production);
d. Idles State (Print-ready); or
e. Sleep Mode?

2. ISO 21632 requires testing two jobs, with a third one in case of inconsistency between Jobs 1 and 2. Should EPA test additional jobs? Should EPA duplicate the results of Jobs 1, 2, or 3 to model additional daily jobs without requiring additional testing of unique jobs?

3. ISO 21632 requires a minimum job duration of 5 minutes (e.g., 500 pages for a 100 ipm product). Because the product achieves a steady-state power draw during this time, the energy measurements results from these 5 minute jobs can be scaled to model the energy consumption of longer jobs. What is the typical job/daily/monthly print volume? One group of stakeholders averaged monthly volumes (AMV) across a group of products to estimate AMV ≈ 4.35*s* for monochrome and AMV ≈ 1.96*s* for color, where *s* is the product speed in ipm. Weekly volume would equal 1004*s*, while annual volume would equal 52,200*s*. To calculate Active State energy consumption over weekly and annual periods, one would multiply the results from the 5-minute job by 200.8 and 10,440, respectively. EPA welcomes comment on these assumptions.

4. How many days per week and weeks per year are Professional Imaging Products typically operating?

5. How should the best quality and best productivity combinations be factored into the test (e.g., should the results be averaged, or should a product be required to meet the ENERGY STAR requirements under each scenario?

EPA welcomes stakeholder feedback on these issues, which will help inform a potential job structure/usage profile.

3 QUALIFICATION CRITERIA

3.1 Significant Digits and Rounding

3.1.1 All calculations shall be carried out with directly measured (unrounded) values.

3.1.2 Unless otherwise specified, compliance with specification limits shall be evaluated using directly measured or calculated values without any benefit from rounding.

3.1.3 Directly measured or calculated values that are submitted for reporting on the ENERGY STAR website shall be rounded to the nearest significant digit as expressed in the corresponding specification limit.

3.2 General Requirements

3.2.1 External Power Supply (EPS): Single- and Multiple-voltage EPSs shall meet the Level VI or higher performance requirements under the International Efficiency Marking Protocol when tested according to the Uniform Test Method for Measuring the Energy Consumption of External Power Supplies, Appendix Z to 10 CFR Part 430.

i. Single-voltage EPSs shall include the Level VI or higher marking.
ii. Multiple-voltage EPSs meeting Level VI or higher shall include the Level VI or higher marking.
iii. Additional information on the Marking Protocol is available at http://www.regulations.gov/#!documentDetail;D=EERE-2008-BT-STD-0005-0218.
iv. The above requirements shall not apply to any EPSs shipped with a Digital Front End (DFE).

Note: EPA has revised the EPS requirement to Level VI, harmonizing with the increased stringency of U.S. federal energy conservation standards for EPSs.

3.2.2 Additional Cordless Handset: Fax machines and MFDs with fax capability that are sold with additional cordless handsets shall 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 Equipment product is qualified as ENERGY STAR. The ENERGY STAR specification and test method for telephony products may be found at www.energystar.gov/products.

3.2.3 Functionally Integrated MFD: If an MFD consists of a set of functionally integrated components (i.e., the MFD is not a single physical device), the sum of the measured energy or power consumption for all components shall be less than the relevant MFD energy or power consumption requirements for ENERGY STAR qualification.

3.2.4 DFE Requirements: The Typical Electricity Consumption (TEC_{DFE}) of a Type 1 or Type 2 DFE sold with an Imaging Equipment product at the time of sale shall be calculated using Equation 1 for a DFE without Sleep Mode or Equation 2 for a DFE with Sleep Mode. The resulting TEC_{DFE} value shall be less than or equal to the maximum TEC_{DFE} requirement specified in Table 2 for the given DFE type.

Note: EPA proposes to change all TEC requirements to Kilowatt-hours per Year (kWh/year) to address issues with reporting accuracy and comparisons between other ENERGY STAR products (which typically report in kWh/year).

i. The TEC value or Ready State power of a DFE that meets the maximum TEC_{DFE} requirements should be excluded or subtracted from the TEC energy and OM power measurements of the Imaging Equipment product as appropriate.
ii. Section 3.3.2 provides further detail on subtracting TEC_{DFE} values from TEC products;
iii. Section 3.4.2 provides further detail for excluding DFEs from OM Sleep and Standby levels.
iv. DFEs that fail to meet these requirements will not only not have their power subtracted from that of the Imaging Equipment product as a whole, but will disqualify the product from ENERGY STAR. Therefore, such DFEs may not be sold with ENERGY STAR qualified Imaging Equipment.

Equation 1: TEC_{DFE} Calculation for Digital Front Ends without Sleep Mode

$$TEC_{DFE} = \frac{8736 \times P_{DFE\_READY}}{1000}$$

Where:

- *TEC_{DFE} is the typical yearly energy consumption for DFEs, expressed in kilowatt-hours (kWh) and rounded to the nearest 0.1 kWh for reporting;*
- *P_{DFE_READY} is Ready State power measured in the test procedure in watts.*

Note: EPA proposes to change all TEC requirements to kilowatt-hours per Year (kWh/year) to address issues with reporting accuracy and comparisons between other ENERGY STAR products (which typically report in kWh/year). EPA has therefore multiplied all existing requirements by 52, the number of weeks in a year.

Equation 2: TEC_{DFE} Calculation for Digital Front Ends with Sleep Mode

$$TEC_{DFE} = \frac{52 \times \left[\left(45 \times P_{DFE\_READY}\right) + \left(123 \times P_{DFE\_SLEEP}\right)\right]}{1000}$$

Where:

- *TEC_{DFE} is the typical yearly energy consumption for DFEs, expressed in kilowatt-hours (kWh) and rounded to the nearest 0.1 kWh for reporting;*
- *P_{DFE_READY} is the DFE Ready State power measured in the test procedure in watts.*
- *P_{DFE_SLEEP} is the DFE Sleep Mode power measured in the test procedure in watts.*

Table 2: Maximum TEC_{DFE} Requirements for Type 1 and Type 2 DFEs

DFE Category	Category Description	Maximum TEC_{DFE} (kWh/year)	
		Type 1 DFE	Type 2 DFE
A	All DFEs that do not meet the definition of Category B will be considered under Category A for ENERGY STAR qualification.	364	156
B	To qualify under Category B DFEs must have: 2 or more physical CPUs or 1 CPU and ≥ 1 discrete Auxiliary Processing Accelerators (APAs)	624	156

Note: EPA proposes to change all TEC requirements to kilowatt-hours per year (kWh/yr) to address issues with reporting accuracy and comparisons between other ENERGY STAR products (which typically report in kWh/yr).

Moreover, EPA has proposed more stringent requirements for TEC Imaging Equipment products that are shipped with a DFE. The proposed requirements offer the best differentiation while reflecting the performance of a good selection of products from a range of partners. TEC_{DFE} values must fall below the maximum value in Table 2 for a product to qualify.

3.2.5 Default Delay Time: Measured Default Delay Time to Sleep ($t_{DEFAULT}$) shall be less than or equal to the Required Default Delay Time to Sleep ($t_{DEFAULT\_REQ}$) requirement specified in Table 3, subject to the following conditions:

i. 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.
ii. Default Delay Time does not apply to OM products that can meet Sleep Mode requirements in Ready State.
iii. The Default Delay Time to Sleep may not be adjusted by the user to be greater than the Maximum Delay Times to Sleep Adjustable by the User, as specified in Table 4.

Table 3: Required Default Delay Time to Sleep for OM and TEC Products

Monochrome Product Speed, *s*, as Calculated in the Test Method (ipm or mppm)	Required Default Delay Time to Sleep, $t_{DEFAULT\_REQ}$ for MFDs, Scanners, Mailing Machines, and Digital Duplicators with Copying Capability (minutes)*	Required Default Delay Time to Sleep, $t_{DEFAULT\_REQ}$, for Printers and Digital Duplicators without Copying Capability (minutes)*
$s \leq 10$	15	5
$10 < s \leq 20$	30	15
$20 < s \leq 30$	45	30
$30 < s \leq 50$	45	45
$s > 50$	45	45

*Measured Default Delay Time to Sleep (t_{SLEEP}) shall be less than or equal to the Required Default Delay Time to Sleep (t_{SLEEP_REQ}), as specified in Section 3.2.5.

Note: EPA proposes to harmonize the default delay time requirements with those in the Blue Angel requirements, and extend them to all Imaging Equipment products (both TEC and OM). The Blue Angel requirements are equivalent to the current ENERGY STAR requirements for OM printers and MFDs at the lower print speeds, so most OM printers and MFDs would continue to meet the new requirements. However, the Blue Angel requirements are more stringent at the higher print speeds (45-minute maximum versus 60). Therefore, harmonizing with the Blue Angel requirements will strengthen the criteria for higher-speed products.

The Default Delay Time to Sleep was already reported for OM and TEC products through the Qualified Product Exchange (QPX), but EPA has made the collection of this parameter explicit in the Draft 2 test method. In the process, to avoid confusion, EPA has renamed the variable to $t_{DEFAULT}$ from t_{SLEEP}.

Table 4: Maximum Delay Times to Sleep Adjustable by the User

All Devices with a Monochrome Product Speed, *s*	Maximum Delay Times for Sleep Mode Adjustable by the User (min)
$s \leq 30$	60
$s > 30$	120

Note: The Version 2.0 specification has a 4-hour Maximum Machine Delay Time requirement for OM products only. To ensure additional energy savings, EPA proposes to apply a more stringent requirement to both OM and TEC products that is harmonized with Germany's Blue Angel requirement of 1 or 2 hours depending on product speed. Also, EPA proposes to rename this requirement to "Maximum Delay Times to Sleep Adjustable by the User" to make the nature of this requirement clearer.

3.3 Requirements for Typical Electricity Consumption (TEC) Products

3.3.1 Automatic Duplexing Capability:

i. For all MFDs and printers subject to the TEC test method, automatic duplexing capability shall be integral to the base product for products with speed equal to or greater than those specified in Table 5. Printers whose intended function is to print on special single-sided media for the purpose of single sided printing (e.g., release coated paper for labels, direct thermal media, etc.) are exempt from this requirement.

Table 5: Automatic Duplexing Requirements for all TEC MFDs and Printers

Product Type	Product Speed (ipm)
Color	16
Monochrome	11

Note: Most TEC products have duplexing capability, and for products that do not, manufacturers offer similar models with duplexing. Duplexing offers both environmental benefits and increased savings to the consumer via reduced paper consumption. EPA noted that 38% of monochrome products and 69% of color products on the ENERGY STAR certified product list at the affected speeds would meet this requirement.

EPA has also eliminated the option for products at some speeds to meet the requirement through an optional accessory, as an analysis of the certified products showed that less than 5% of products were complying through such an accessory.

3.3.2 Typical Electricity Consumption: Calculated Typical Electricity Consumption (TEC_{2017}) per Equation 3 or Equation 4 shall be less than or equal to the Maximum TEC Requirement (TEC_{REQ}) specified in Table 6.

Note: EPA is proposing to remove the A3 adder from the specification. With the reduced print volume assumed under the TEC_{2017} metric and corresponding contribution of sleep mode power, there no longer appears to be differentiation in performance between A3 and non-A3 models.

i. For Imaging Equipment with a Type 2 DFE that meet the Type 2 DFE maximum TEC_{DFE} requirement in Table 2, the measured energy consumption of the DFE shall be divided by 0.80 to account for internal power supply losses and then excluded when comparing the product's measured TEC value to TEC_{MAX} and for reporting.
ii. The DFE shall not interfere with the ability of the Imaging Equipment to enter or exit its lower-power modes.
iii. The energy use of a DFE can only be excluded if it meets the Type 2 DFE definition in Section 1 and is a separate processing unit that is capable of initiating activity over the network.

Example: A printer's total TEC result is 1274 kWh/year and its Type 2 TEC_{DFE} value calculated in Section 3.2.4 is 468 kWh/year. The TEC_{DFE} value is then divided by 0.80 to account for internal power supply losses with the Imaging Equipment in Ready State, resulting in 585 kWh/year. The power supply adjusted value is subtracted from the tested TEC value: 1274 kWh/year – 585 kWh/year = 689 kWh/year. This 689 kWh/year result is then compared to the relevant TEC_{MAX} to determine qualification.

iv. For printers, digital duplicators with print capability, and MFDs with print capability, TEC shall be calculated per Equation 3.

Equation 3: TEC Calculation for Printers, Fax Machines, Digital Duplicators with Print Capability, and MFDs with Print Capability

$$TEC_{2017} = 52 \times \left[5 \times \left(E_{JOB\_DAILY} + (2 \times E_{FINAL}) + \left[24 - \frac{N_{JOBS}}{16} - (2 \times t_{FINAL}) \right] \times \frac{E_{SLEEP}}{t_{SLEEP}} \right) + 48 \times \frac{E_{SLEEP}}{t_{SLEEP}} \right],$$

Where:

- *TEC_{2017} is the typical yearly energy consumption for printers, fax machines, digital duplicators with print capability, and MFDs with print capability, expressed in kilowatt-hours (kWh) and rounded to the nearest 0.1 kWh for reporting;*
- *E_{JOB_DAILY} is the daily job energy, as calculated per Equation 5, in kWh;*
- *E_{FINAL} is the final energy, as measured in the test procedure, converted to kWh;*
- *N_{JOBS} is the number of jobs per day, as calculated in the test procedure,*
- *t_{FINAL} is the final time to Sleep, as measured in the test procedure, converted to hours;*
- *E_{SLEEP} is the Sleep energy, as measured in the test procedure, converted to kWh; and*
- *t_{SLEEP} is the Sleep time, as measured in the test procedure, converted to hours.*

Note: As noted in the Draft 1 test method, EPA has reviewed measured paper use shared by manufacturers which indicate that number of pages assumed in the test method is higher than real world use. EPA encourages stakeholders to provide any additional data that would support a more accurate gauge of average paper use. Using the data currently provided by stakeholders, EPA proposes to decrease the contribution of the On Mode in the TEC by a factor of 4, dividing the energy contributions from all jobs (E_{JOB_DAILY}) by a factor of 4 in Equation 5 and increasing the duration of Sleep Mode by reducing the assumed time spent in On Mode from N_{JOBS}/4 (as each job is assumed to take 15 minutes or ¼ hours) to N_{JOBS}/16 in Equation 3. This change will take into account the reduced paper consumption and the impact on other modes in the TEC calculations.

v. For digital duplicators without print capability and MFDs without print capability, TEC shall be calculated per Equation 4.

Equation 4: TEC Calculation for Digital Duplicators without Print Capability and MFDs without Print Capability

$$TEC_{2017} = 52 \times \left[5 \times \left(E_{JOB\_DAILY} + (2 \times E_{FINAL}) + \left[24 - \frac{N_{JOBS}}{16} - (2 \times t_{FINAL}) \right] \times \frac{E_{AUTO}}{t_{AUTO}} \right) + 48 \times \frac{E_{AUTO}}{t_{AUTO}} \right],$$

Where:

- *TEC is the typical yearly energy consumption for digital duplicators without print capability and MFDs without print capability, expressed in kilowatt-hours (kWh) and rounded to the nearest 0.1 kWh for reporting;*
- E_{JOB_DAILY} *is the daily job energy, as calculated per Equation 5, in kWh;*
- E_{FINAL} *is the final energy, as measured in the test procedure, converted to kWh;*
- N_{JOBS} *is the number of jobs per day, as calculated in the test procedure;*
- t_{FINAL} *is the final time to Sleep, as measured in the test procedure, converted to hours per year;*
- E_{AUTO} *is the Auto-off energy, as measured in the test procedure, converted to kWh; and*
- t_{AUTO} *is the Auto-off time, as measured in the test procedure, converted to hours per year.*

vi. Daily Job Energy shall be calculated per Equation 5.

Equation 5: Daily Job Energy Calculation for TEC Products

$$E_{JOB\_DAILY} = \frac{1}{4}\left[2 \times E_{JOB1} + (N_{JOBS} - 2) \times \frac{E_{JOB2} + E_{JOB3} + E_{JOB4}}{3}\right] \text{Table 6},$$

Where:

- E_{JOB_DAILY} *is the daily job energy, expressed in kilowatt-hours (kWh);*
- E_{JOBi} *is the energy of the* i^{th} *job, as measured in the test procedure, converted to kWh; and*
- N_{JOBS} *is the number of jobs per day, as calculated in the test procedure.*

Table 6: TEC Requirement

Color Capability	Monochrome Product Speed, *s*, as Calculated in the Test Method (ipm)	TEC_{REQ} (kWh/year, to the nearest 0.1 kWh/year for reporting)
Monochrome Non-MFD	s ≤ 20	13.1
	20 < s ≤ 40	0.7 × s – 1.6
	40 < s ≤ 60	0.7 × s – 1.6
	60 < s ≤ 135	2.6 × s – 117.5
	s > 135	10.2 × s – 1151.1
Monochrome MFD	s ≤ 20	16.6
	20 < s ≤ 40	0.6 × s + 4.0
	40 < s ≤ 60	0.9 × s – 8.3
	60 < s ≤ 80	1.6 × s – 51.0
	s > 80	3.8 × s – 229.2
Color Non-MFD	s ≤ 20	13.9
	20 < s ≤ 40	0.9 × s – 5.0
	40 < s ≤ 60	0.4 × s + 15.5
	s > 60	6.0 × s – 326.1
Color MFD	s ≤ 20	14.8
	20 < s ≤ 40	0.9 × s – 4.1
	40 < s ≤ 60	0.6 × s + 8.2
	60 < s ≤ 80	2.2 × s – 89.4
	s > 80	9.7 × s – 696.9

Note: EPA is proposing to revise the efficiency requirements to better reflect top performers in the marketplace. The latest shipment data available to EPA estimate that the ENERGY STAR market penetration is roughly 100%. The revised requirements ensure that the ENERGY STAR specification continues to highlight highly efficient imaging equipment while ensuring a good selection of qualifying products.

In developing the above efficiency requirements, EPA used a dataset comprised of the full ENERGY STAR product list, which has been included in the data and analysis package accompanying this draft specification. EPA analyzed each of the four categories individually, targeting the top quartile of the market for each. Based on the current dataset, 25% of mono MFD products, 26% of color MFD, 24% of mono printers, and 24% of color printers meet the proposed requirements. This includes a variety of manufacturers. Scatterplots of the levels with the models in the dataset were also provided in the data package for stakeholder reference. EPA has estimated that the average per product shipment weighted savings of this proposal are 20 kWh/year.

In addition to considering the qualification rates of models within each of the four categories, EPA reviewed the proposed levels to ensure that there would be qualifying productin the most common speed bins (print speeds between 21 and 60 ipm). Within each bin, EPA found that the range of pass rates were between 22 and 28%, which is in the top quartile range that ENERGY STAR targets when setting a specification.

3.3.3 Additional Test Results Reporting Requirements:

i. DFE model name/number, Ready State power, Sleep Mode power, and TEC_{DFE} shall be reported for any Type 1 DFE sold with an Imaging Equipment product, including those not tested with the Imaging Equipment product as part of the highest energy using configuration per Section 1.1.1iii.

3.3.4 Recovery Time: Recovery Time, t_R as calculated per Equation 6, shall be less than the Maximum Recovery Time, t_{R_MAX}, subject to the following requirements:

i. For models with a shorter Default Delay Time to Sleep as found in Table 7, t_{R_MAX} shall be calculated per Equation 7.
ii. For models with a longer Default Delay Time to Sleep as found in Table 7, t_{R_MAX} shall be calculated per Equation 8.
iii. For models with a Default Delay Time to Sleep greater than any found in Table 7, t_{R_MAX} shall not be subject to a Recovery Time requirement.
iv. Recovery times from various modes (Active 0, Active 1, Active 2 times) shall be reported for all products tested using the TEC test method.

Equation 6: Recovery Time

$$t_R = t_{Active1} - t_{Active2},$$

Where:

- t_R *is Recovery Time;*
- $t_{Active1}$ *is the time from Sleep Mode to the first sheet exiting the unit, in minutes, as measured per the test method; and*
- $t_{Active2}$ *is the time from Ready Mode to the first sheet exiting the unit, in minutes, as measured per the test method.*

Table 7: Determination of Maximum Recovery Time (Minutes)

Print Speed, *s* (ipm)	Maximum Default Delay Time to Sleep to Permit Applicability of Shorter Recovery Time in Equation 7 (min)	Maximum Default Delay Time to Sleep to Permit Applicability of Longer Recovery Time in Equation 8 (min)
$0 < s \leq 5$	5	10
$5 < s \leq 10$	10	15
$10 < s \leq 20$	10	20
$20 < s \leq 30$	10	45
$30 < s \leq 40$	10	45
$s > 40$	15	60

Equation 7: Maximum Recovery Time for Models with Shorter Default Delay Times to Sleep, as Indicated in Table 4

$$t_{R\_MAX} = \min(0.42 \times s + 5, 30),$$

Where:

- t_{R_MAX} *is Maximum Recovery Time, in seconds;*
- s *is the product speed; and*
- min *is the minimum function (i.e., the Maximum Recovery Time shall be the lesser of* $0.42 \times s + 5$ *or 30 seconds).*

Equation 8: Maximum Recovery Time for Models with Longer Default Delay Times to Sleep, as Indicated in Table 4

$$t_{R\_MAX} = \min(0.51 \times s + 15, 60),$$

Where:

- t_{R_MAX} *is Maximum Recovery Time, in seconds;*
- s *is the product speed; and*
- min *is the minimum function (i.e., the Maximum Recovery Time shall be the lesser of* $0.51 \times s + 15$ *or 60 seconds).*

Note: EPA is proposing a Recovery Time requirement consistent with Germany's Blue Angel, to help ensure that products have a quick wake-up from Sleep Mode, which will result in retention of the Default Delay Time to Sleep settings, and energy savings. The requirement is tiered such that products with a shorter Default Delay Time to Sleep, which are expected to go to sleep more often, must have a shorter Recovery Times. Products that have Default Delay Times to Sleep longer than any found in Table 7 are not subject to the Recovery Time requirement as they would be expected to be used infrequently enough or remain in Idle Mode long enough that longer Recovery Times would not be inconvenient.

EPA has found that most ENERGY STAR certified Imaging Equipment products already meet these Recovery Times. Therefore, EPA proposes a harmonized maximum recovery time requirement for both OM and TEC products.

3.4 Requirements for Operational Mode (OM) Products

3.4.1 Multiple Sleep Modes: If a product is capable of automatically entering multiple successive Sleep Modes, the same Sleep Mode shall be used to determine qualification under the Default Delay Time to Sleep requirements specified in Section 3.2.5 and the Sleep Mode power consumption requirements specified in Section 3.4.3.

3.4.2 DFE Requirements: For Imaging Equipment with a Type 2 DFE that relies on the Imaging Equipment for its power, and that meets the appropriate maximum TEC_{DFE} requirement found in Table 2, the DFE power shall be excluded subject to the following conditions:

i. Ready State power of the DFE, as measured in the test method, shall be divided by 0.60 to account for internal power supply losses.

- Sleep Mode Requirements: If the resultant power in Paragraph i, above, is less than or equal to the Ready State or Sleep Mode power of the Imaging Equipment product as a whole, then the power shall be excluded from the measured Ready State or Sleep Mode power of the Imaging Equipment product as a whole when comparing to the Sleep Mode requirements in Section 3.4.3, below, and for reporting.

  Otherwise, the Sleep Mode power of the DFE, as measured in the test method, shall be divided by 0.60 and excluded from the Ready or Sleep Mode power of the Imaging Equipment for comparing to the requirements, and for reporting.

- Standby Requirements: If the resultant power in Paragraph i, above, is less than or equal to the Ready State, Sleep Mode, or Off Mode power of the Imaging Equipment as a whole, then the power shall be excluded from the Ready State, Sleep Mode, or Off Mode power of the Imaging Equipment product as a whole when comparing to the Standby requirements in Section 3.4.4, below, and for reporting.

  Otherwise, the Sleep Mode power of the DFE, as measured in the test method, shall be divided by 0.60 and excluded from the Ready State, Sleep Mode, or Off Mode power of the Imaging Equipment for comparing to the requirements, and for reporting.

ii. The DFE must not interfere with the ability of the Imaging Equipment to enter or exit its lower-power modes.
iii. In order to take advantage of this exclusion, the DFE must meet the Type 2 DFE definition in Section 1 and be a separate processing unit that is capable of initiating activity over the network.

Examples: Product 1 is an Imaging Equipment product whose Type 2 DFE has no distinct sleep mode. The Type 2 DFE has measured Ready State and Sleep Mode power both equal to 30 watts. The measured Sleep Mode power of the product is 53 watts. When subtracting 50 watts (30 watts / 0.60) from the measured Sleep Mode power of the product, 53 watts, the resulting 3 watts is the Sleep Mode power of the product for use in the criteria limits below.

Product 2 is an Imaging Equipment product whose Type 2 DFE goes to sleep when the Imaging Equipment goes to sleep during testing. The Type 2 DFE has measured DFE Ready State and Sleep Mode power equal to 30 watts and 5 watts, respectively. The measured Sleep Mode power of the product is 12 watts. When subtracting 50 watts (30 watts / 0.60) from the measured Sleep Mode power of the product, 12 watts, the result is -38 watts. In this case, instead subtract 8.33 watts (5 watts / 0.60) from the measured Sleep Mode power of the product, 12 watts, resulting in 3.67 watts which is used in the criteria limits below.

3.4.3 Sleep Mode Power Consumption: Measured Sleep Mode power consumption (P_{SLEEP}) shall be less than or equal to the maximum Sleep Mode power consumption requirement (P_{SLEEP_MAX}) determined per Equation 9, subject to the following conditions:

i. Only those interfaces that are present and used during the test, including any fax interface, may be considered functional adders.
ii. Product functionality offered through a DFE shall not be considered a functional adder.
iii. A single interface that performs multiple functions may be counted only once.
iv. Any interface that meets more than one interface type definition shall be classified according to the functionality used during the test.
v. For products that meet the Sleep Mode power requirement in Ready State, no further automatic power reductions are required to meet Sleep Mode requirements.

Equation 9: Calculation of Maximum Sleep Mode Power Consumption Requirement for OM products

$$P_{SLEEP\_MAX} = P_{MAX\_BASE} + \sum_{1}^{n} Adder_{INTERFACE} + \sum_{1}^{m} Adder_{OTHER}$$

Where:

- *P_{SLEEP_MAX} is the maximum Sleep Mode power consumption requirement, expressed in watts (W), and rounded to the nearest 0.1 watt for reporting;*
- *P_{MAX_BASE} is the maximum Sleep Mode power allowance for the base marking engine, as determined per Table 8, in watts;*
- *$Adder_{INTERFACE}$ is the power allowance for the interface functional adders used during the test, including any fax capability, and as selected by the manufacturer from Table 9, in watts;*
- *n is the number of allowances claimed for interface functional adders used during the test, including any fax capability, and is less than or equal to 2;*
- *$Adder_{OTHER}$ is the power allowance for any non-interface functional adders in use during the test, as selected by the manufacturer from Table 8, in watts; and*
- *m is the number of allowances claimed for any non-interface functional adders in use during the test, and is unlimited.*

666 **Table 8: Sleep Mode Power Allowance for Base Marking Engine**

Product Type	Media Format	Marking Technology				P_{MAX_BASE} (watts)
		Impact	Ink Jet	All Other*	Not Applicable	
Mailing Machine	N/A		x	x		5.0
MFD	Standard	x	x			1.1
	Large		x			5.4
				x		8.7
Printer	Small	x	x	x		4.0
	Standard	x	x			0.6
	Large	x		x		2.5
			x			4.9
Scanner	Any				x	2.5

667 * "All Other" category includes High Performance Ink Jet.

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Note: EPA conducted a review of the OM product database and the associated savings possible with new, more rigorous levels. Based on a combination of factors, namely the modest improvement in efficiency that is possible, the small amount of energy use associated with these products, and the relatively low sales volume, EPA is not proposing new ENERGY STAR levels at this time. The only change made to the base allowances is the consolidation of the scanner adder within the base allowance for MFD products. This change is made in conjunction with the change to the MFD definition. Standalone copiers and fax machines were removed from the Table 8, due to the exclusion from scope.

Stakeholders have expressed interest in ENERGY STAR harmonizing with programs such as Germany's Blue Angel for other aspects of the imaging specification. EPA is aware that there are other efficiency related requirements in the European Union and is interested in stakeholder feedback regarding harmonizing with those requirements, specifically as they relate to OM products, in the interest of international harmonization.

669 **Table 9: Sleep Mode Power Allowances for Functional Adders**

Adder Type	Connection Type	Max. Data Rate, *r* (Mbit/ second)	Details	Functional Adder Allowance (watts)
Interface	Wired	r < 20	Includes: USB 1.x, IEEE 488, IEEE 1284/Parallel/ Centronics, RS232	0.2
		20 ≤ r < 500	Includes: USB 2.x, IEEE 1394/ FireWire/i.LINK, 100Mb Ethernet	0.4
		r ≥ 500	Includes: USB 3.x,1G Ethernet	0.5
		Any	Includes: Flash memory-card/smart-card readers, camera interfaces, PictBridge	0.2
	Fax Modem	Any	**Applies to Fax Machines and MFDs only.**	0.2
	Wireless, Radio-frequency (RF)	Any	Includes: Bluetooth, 802.11	2.0
	Wireless, Infrared (IR)	Any	Includes: IrDA.	0.1

Adder Type	Connection Type	Max. Data Rate, *r* (Mbit/ second)	Details	Functional Adder Allowance (watts)
Cordless Handset	N/A	N/A	Capability of the Imaging Equipment to communicate with a cordless handset. Applied only once, regardless of the number of cordless handsets the product is designed to handle. Does not address the power requirements of the cordless handset itself.	0.8
Memory	N/A	N/A	Applies to the internal capacity available in the Imaging Equipment for storing data. Applies to all volumes of internal memory and should be scaled accordingly for RAM. This adder does not apply to hard disk or flash memory.	0.5/GB
Power Supply	N/A	N/A	Applies to both internal and external power supplies of Mailing Machines and Standard Format products using Inkjet and Impact marking technologies with nameplate output power (P_{OUT}) greater than 10 watts.	0.02 x (P_{OUT} – 10.0)
Touch Panel Display	N/A	N/A	Applies to both monochrome and color touch panel displays.	0.2
Internal Disk Drives	N/A	N/A	Includes any high-capacity storage product, including hard-disk and solid-state drives. Does not cover interfaces to external drives.	0.15

Note: As noted above, the OM product requirements are not changed in the Draft 1, Version 3.0 specification and this is true for the adders as well. The adder for scanners has been layered into the base allowance for MFD products and has therefore been removed from Table 9 above.

In addition, EPA would like to solicit feedback on the applicability of maintaining the Cordless Handset and Internal Disk Drive adder. A search of the ENERGY STAR database did not identify products that use this adder, suggesting it is not needed within the specification. Further, regression analysis on the Internal Desk Drive adder did not identify a significant power need when this adder was present. If these adders are no longer applicable, EPA will remove them to simplify the specification.

3.4.4 Off Mode Power Consumption Off Mode power, as measured in the test procedure, shall be less than or equal to the Maximum Off Mode power specified in Table 10, subject to the following conditions.

i. For products that do not have an Off Mode, Sleep Mode power, as measured in the test procedure, shall be less than or equal to the Maximum Off Mode power.
ii. For products that do not have an Off Mode or Sleep Mode, Ready State power, as measured in the test procedure, shall be less than or equal to the Maximum Off Mode power.
iii. The Imaging Equipment shall meet the Off Mode Power requirement independent of the state of any other devices (e.g., a host PC) connected to it.

Table 10: Maximum Off Mode Power Requirement

Product Type	Maximum Off Mode Power (watts)
All OM Products	0.3

Note: To avoid confusion relating to the Standby power requirement and definition, EPA has redefined it as an Off Mode power requirement and proposes to remove the Standby definition. As before, products that do not have an Off Mode shall meet the Off Mode requirement in Sleep Mode, and those that do not have Off mode or Sleep Mode, shall meet Off Mode in Ready State.

Furthermore, EPA proposes to revise this requirement in line with the 2019 mandatory requirement in the EU, 0.3 watts. The European Commission is conducting a review of its 2019 requirement (http://www.ecostandbyreview.eu), and the draft conclusion is that a 0.3 W requirement is feasible. Furthermore, the study reviewed large format printers, which are currently excluded from the 0.5-watt requirement, and found that most (71%) could meet a 0.3 W requirement.

Note: Products intended for sale in the US market are subject to minimum toxicity and recyclability requirements. Please see ENERGY STAR Program Requirements for Imaging Equipment: Partner Commitments for details.

4 TESTING

4.1 Test Methods

4.1.1 When testing Imaging Equipment products, the test methods identified in Table 11 shall be used to determine qualification for ENERGY STAR.

Table 11: Test Methods for ENERGY STAR Qualification

Product Type	Test Method
All Products	ENERGY STAR Imaging Equipment Test Method, Rev. March-2018

4.2 Number of Units Required for Testing

4.2.1 Representative Models shall be selected for testing per the following requirements:

i. For qualification of an individual product model, a product configuration equivalent to that which is intended to be marketed and labeled as ENERGY STAR is considered the Representative Model;
ii. For qualification of a product family that does not include a Type 1 DFE, the highest energy using configuration within the family shall be considered the Representative Model. Any subsequent testing failures (e.g., as part of verification testing) of any model in the family will have implications for all models in the family.

iii. For qualification of a product family that includes Type 1 DFE, the highest energy using configuration of the Imaging Equipment and highest energy using DFE within the family shall be tested for qualification purposes. Any subsequent testing failures (e.g., as part of verification testing) of any model in the family and all Type 1 DFEs sold with the Imaging Equipment, including those not tested with the Imaging Equipment product, will have implications for all models in the family. Imaging Equipment products that do not incorporate a Type 1 DFE may not be added to this product family for qualification and must be qualified as a separate family without a Type 1 DFE.

4.2.2 A single unit of each Representative Model shall be selected for testing.

4.3 International Market Qualification

4.3.1 Products shall be tested for qualification at the relevant input voltage/frequency combination for each market in which they will be sold and promoted as ENERGY STAR.

5 USER INTERFACE

5.1.1 Manufacturers are encouraged to design products in accordance with the user interface standard IEEE 1621: Standard for User Interface Elements in Power Control of Electronic Devices Employed in Office/Consumer Environments. For details, see http://eta.LBL.gov/Controls.

6 EFFECTIVE DATE

6.1.1 Effective Date: The Version 3 ENERGY STAR Imaging Equipment specification shall take effect on **TBD**. To qualify for ENERGY STAR, a product model shall meet the ENERGY STAR specification in effect on its date of manufacture. The date of manufacture is specific to each unit and is the date on which a unit is considered to be completely assembled.

6.1.2 Future Specification Revisions: EPA reserves the right to change this 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. In the event of a specification revision, please note that the ENERGY STAR qualification is not automatically granted for the life of a product model.

6.1.3 Items for Consideration in a Future Revision: