



ENERGY STAR®

Imaging Equipment Version 3.0 Draft 2 Specification, Draft 3 Imaging Equipment Test Method, and Draft 1 Professional Imaging Equipment Test Method Webinar

July 30, 2018





Webinar Details

- Webinar slides and related materials will be available on the Imaging Equipment Product Development Web page:
 - https://www.energystar.gov/products/spec/imaging_equipment_specification_version_3_0.pdf
- To use your telephone after joining GoToWebinar:
 - Call in:** +1 (877) 423-6338 (U.S.)
+1 (571) 281-2578 (International)
 - Code:** 198-920 #
 - Phone lines will remain open during discussion
 - Please mute line unless speaking
 - Please do not put call on hold



Webinar Agenda

1. Introductions and ENERGY STAR Process
2. Draft 2, Version 3.0 Specification
3. Draft 3 Imaging Equipment Test Method
4. Draft 1 Professional Imaging Equipment Test Method
5. Timeline and Open Discussion



Introductions

Time	Topic
1:00–1:15	Introductions and Specification Development Recap
1:15–2:15	Draft 2 Specification
2:15–2:30	Draft 3 Imaging Equipment Test Method
2:30–2:45	Draft 1 Professional Imaging Equipment Test Method
2:45–3:00	Timeline and Open Discussion



Introductions

Ryan Fogle

U.S. Environmental Protection Agency

Jeremy Domm

U.S. Department of Energy

Matt Malinowski

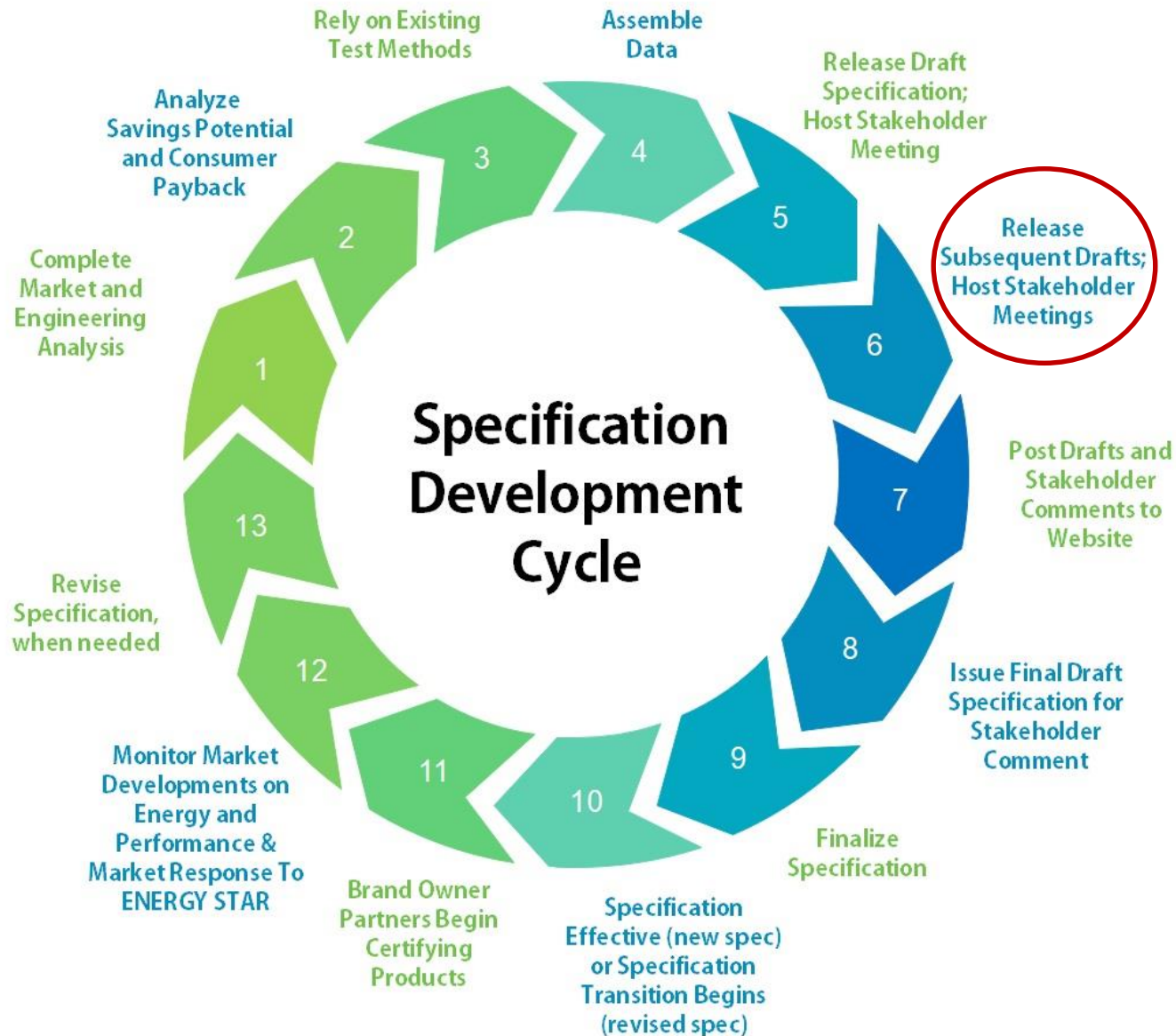
ICF

Zenia Montero

ICF

John Clinger

ICF





Milestones to Date

Milestone	Date
<i>Specification Launch and Discussion Document</i>	<i>February 22, 2017</i>
<i>Launch Webinar</i>	<i>March 1, 2017</i>
<i>Draft 1 Test Method</i>	<i>August 14, 2017</i>
<i>Draft 2 Test Method and Draft 1 Specification</i>	<i>March 16, 2018</i>
<i>Draft 2 Specification, Draft 3 Test Method, and Draft 1 Professional Imaging Equipment Test Method</i>	<i>July 23, 2018</i>
Draft 2 Specification, Draft 3 Test Method, and Draft 1 Professional Imaging Equipment Test Method Webinar	Today, July 30, 2018



Time	Topic
1:00–1:15	Introductions and Specification Development Recap
1:15–2:15	Draft 2 Specification
2:15–2:30	Draft 3 Imaging Equipment Test Method
2:30–2:45	Draft 1 Professional Imaging Equipment Test Method
2:45–3:00	Timeline and Open Discussion



Introduction

- General Requirements
- Professional Products
- TEC Products
- OM Products



General Requirements



Summary of Feedback – DFEs

- Lower energy requirements for Type 1, Category B DFEs will lead to use of lower-compute-performance DFEs
 - Will not keep up with the engine of Imaging Equipment and increase total system energy usage
- Add a third category for high performance systems based on server processors



Proposal – DFEs

- Higher-speed DFEs necessary to support Professional Imaging Equipment
- New definition for Professional DFEs based on ENERGY STAR server definition:

- d) Professional Digital Front-end (DFE): A DFE which meets all of the following criteria:
- i. Is sold with a product defined above as a Professional Imaging Product;
 - ii. has processor performance per socket² equal to or greater than 20;
 - iii. provides support for error-correcting code (ECC) and/or buffered memory (including both buffered dual in-line memory modules (DIMMs) and buffered on board (BOB) configurations).
 - iv. is packaged and sold with one or more ac-dc or dc-dc power supplies; and
 - v. is designed such that all processors have access to shared system memory.

Proposal – DFEs

- Only a reporting requirement for professional DFEs due to limited data at present
- Requirements for remaining DFE types reverted to kWh/week:

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

DFE Category	Category Description	Maximum TEC_{DFE} (kWh/week)	
		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 certification.	7	3
B	To qualify under Category B DFEs must have: 2 or more physical CPUs or 1 CPU and ≥ 1 discrete Auxiliary Processing Accelerators (APAs)	12	3



Professional Imaging Product Requirements



Summary of Feedback – Professional Imaging Products: Definition

- Need to be able to clearly differentiate from office equipment
- Require weight greater than either 180 or 200 kg
- Clarify that the monochrome product speed requirement shall not apply to color products



Proposal – Professional Imaging Products

- Adopted the additional weight requirement at 180 kg
- Clarified the speed criteria:
 - c) If product is monochrome, monochrome product speed equal to or greater than 86 ipm;

 - d) If product is color, color product speed equal to or greater than 50 ipm;
- No separate requirements for Professional Imaging Products
 - Continue to treat as TEC products;
 - Separate requirements referencing Professional Test Procedure to be included in Version 3.1



TEC Product Requirements



Summary of Feedback – TEC Requirement: Dataset

- Do not exclude older V2.0 models if still on the market
- Include non-certified products
- Do not exclude models that have the same print speed, TEC, and other data as other models
- Remove duplicates
- Manufacturers provided supplemental industry data



Proposal – TEC Requirement: Dataset

- Revised the dataset to include the latest ENERGY STAR certified model data, across all years
- Removed models that were:
 - OM, or TEC copiers and fax machines
 - Sold Only Outside the United States
 - With document less than standard (210 mm)
 - With no color information



Proposal – TEC Requirement: Dataset (continued)

- Removed multiple entries for product family models
 - Members of the same product family based on Product Type, Speed, Color, Size, and TEC Test Procedure Measurements (i.e., not just the final TEC result)
 - Some Brand Owners qualify product family models separately while others do so under one parent model
- EPA also coordinated with 13 manufacturers, who reviewed the dataset and provided some corrections:
 - Removed models no longer being sold
 - Made corrections to the data
 - Added non-certified models

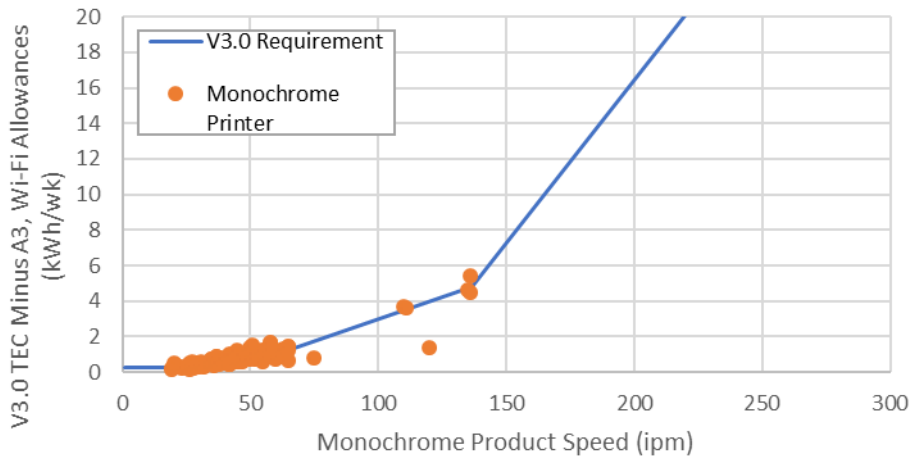
Proposal – TEC Requirement

Table 6: TEC Requirement

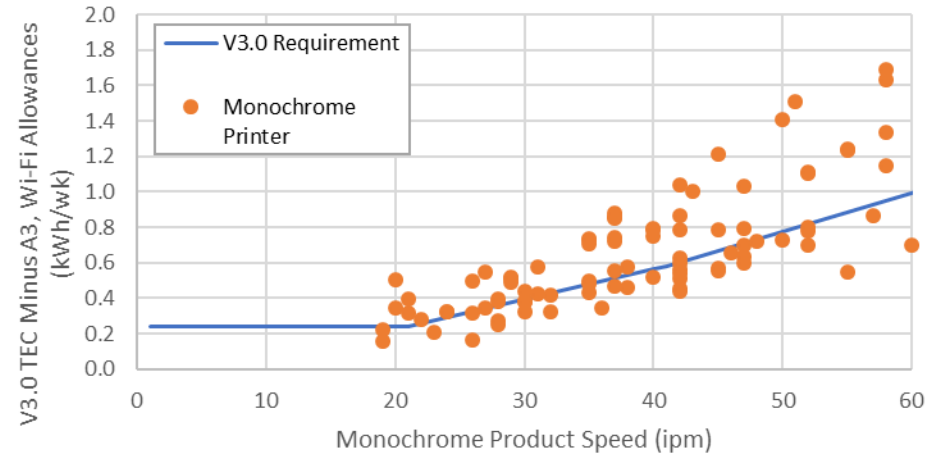
Color Capability	Monochrome Product Speed, s , as Calculated in the Test Method (ipm)	TEC _{REQ} (kWh/wk, to the nearest 0.01 kWh/wk for reporting)
Monochrome Non-MFD	$s \leq 20$	0.242
	$20 < s \leq 40$	$0.017 \times s - 0.115$
	$40 < s \leq 60$	$0.022 \times s - 0.320$
	$60 < s \leq 135$	$0.050 \times s - 2.028$
	$s > 135$	$0.183 \times s - 20.116$
Monochrome MFD	$s \leq 20$	0.263
	$20 < s \leq 40$	$0.018 \times s - 0.115$
	$40 < s \leq 60$	$0.013 \times s + 0.090$
	$60 < s \leq 80$	$0.036 \times s - 1.313$
	$s > 80$	$0.087 \times s - 5.444$
Color Non-MFD	$s \leq 20$	0.275
	$20 < s \leq 40$	$0.032 \times s - 0.397$
	$40 < s \leq 60$	$0.002 \times s + 0.833$
	$s > 60$	$0.100 \times s - 5.145$
Color MFD	$s \leq 20$	0.254
	$20 < s \leq 40$	$0.021 \times s - 0.187$
	$40 < s \leq 60$	$0.013 \times s + 0.141$
	$60 < s \leq 80$	$0.056 \times s - 2.482$
	$s > 80$	$0.167 \times s - 11.473$

Monochrome Non-MFD

TEC Mono Printer and Digital Duplicator

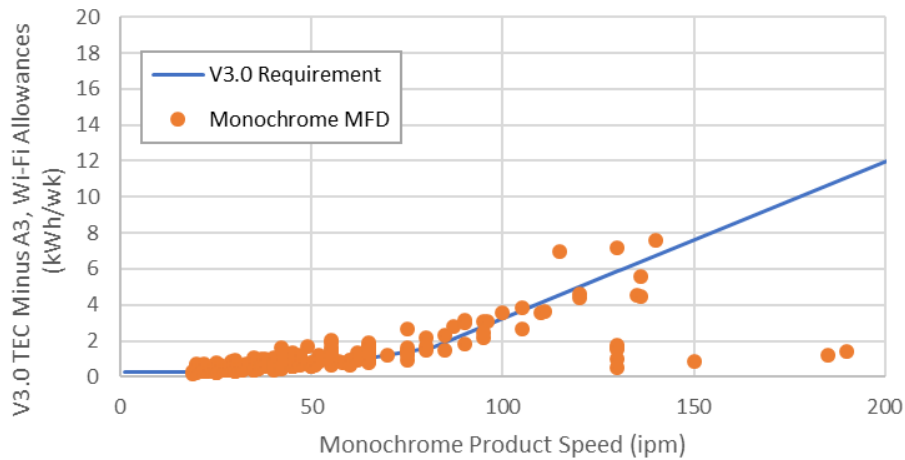


TEC Mono Printer and Digital Duplicator - Detail

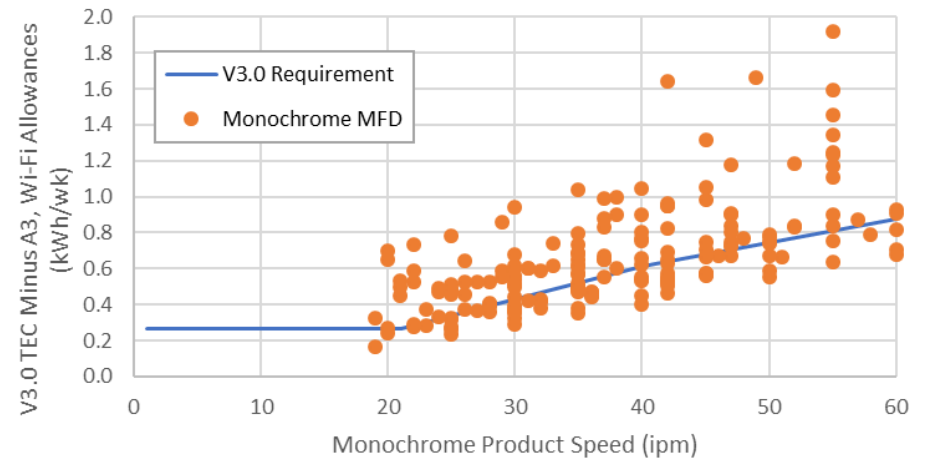


Monochrome MFD

TEC Mono MFD and Digital Duplicator

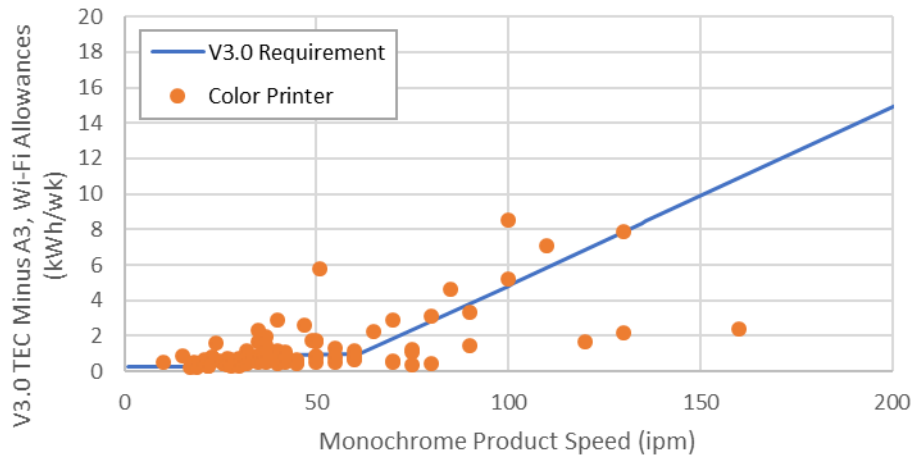


TEC Mono MFD and Digital Duplicator - Detail

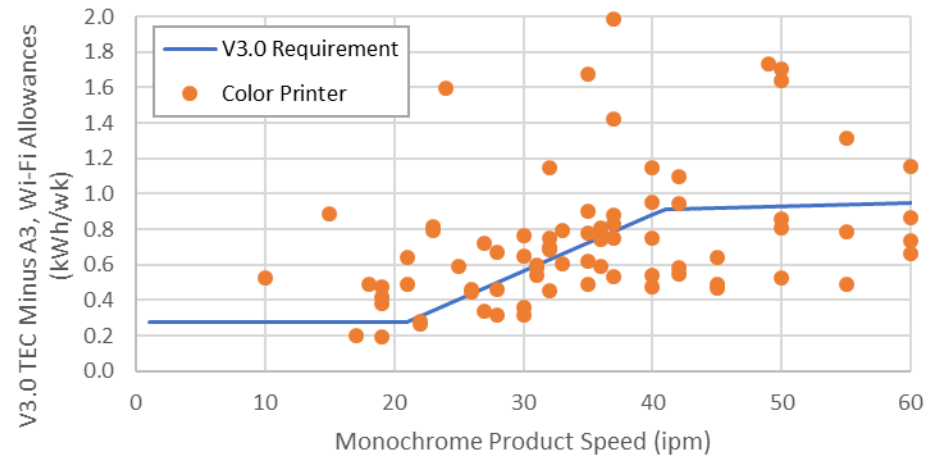


Color Non-MFD

TEC Color Printer

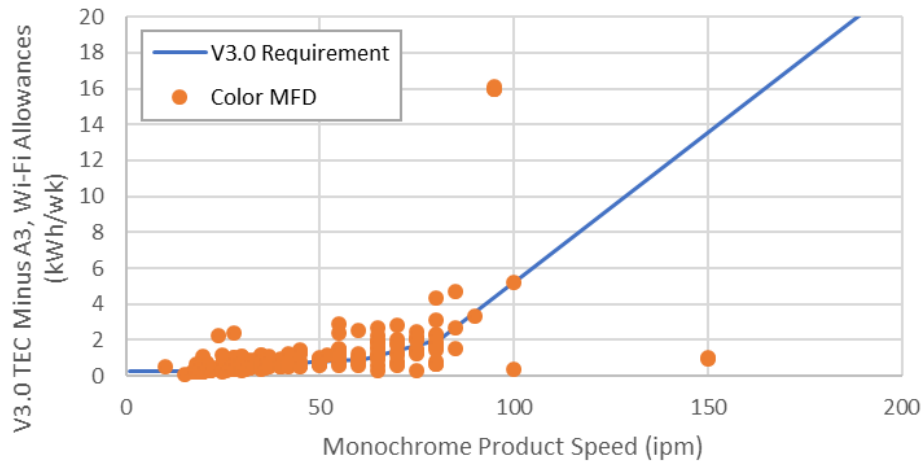


TEC Color Printer - Detail

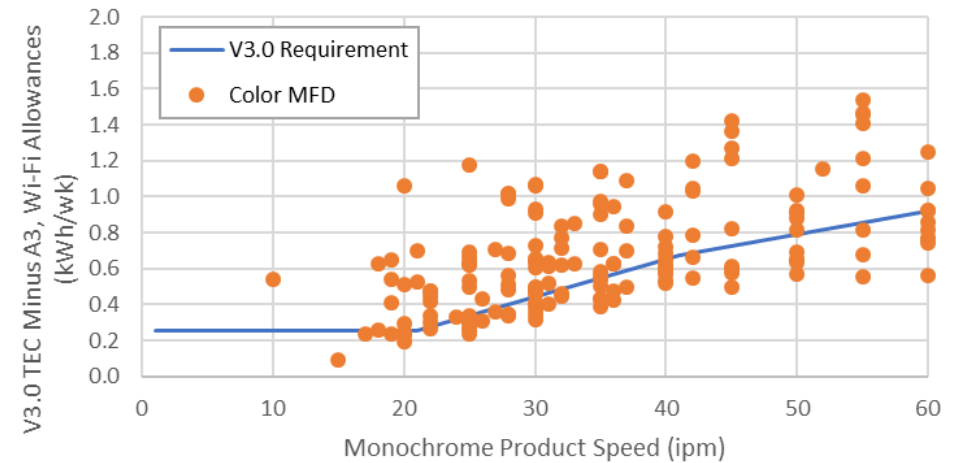


Color MFD

TEC Color MFD and Digital Duplicator



TEC Color MFD and Digital Duplicator - Detail





Summary of Feedback and Proposal – TEC Reporting

- Revert reporting TEC to a weekly basis (kWh/week), not kWh/year



- Reverted the measure to kWh/week
 - Avoid customer confusion
 - Enable historical comparisons
- Proposed to continue showing both kWh/week and kWh/year on the ENERGY STAR Product Finder and Public Dataset



Summary of Feedback and Proposal– TEC Requirement: A3 Adder

- A3 models require more power than A4 due to device configuration
- Maintain the current A3 adder



- Following updates to the dataset, there was a difference in pass rates between A3 and A4 models
- 0.05 kWh/week adder balanced the pass rate



Summary of Feedback and Proposal– TEC Requirement: Wi-Fi Adder

- Since Wi-Fi uses more power than USB, ENERGY STAR should include a Wi-Fi adder for TEC products



- Updated dataset included only 20 TEC models with Wi-Fi
 - Additional models expected in the future
 - Models with Wi-Fi and USB (tested with Wi-Fi disconnected under the current test method) had higher pass rate than models with Wi-Fi and no USB (tested with Wi-Fi connected)
- 0.1 kWh/wk allowance (~0.6 W) balanced pass rates
 - Within the range of Wi-Fi allowances in other ENERGY STAR specifications



Proposal – TEC Requirement

Equation 6: Maximum TEC Requirement Calculation

$$TEC_{MAX} = TEC_{REQ} + Adder_{A3} + Adder_{Wi-Fi},$$

Where:

- TEC_{MAX} is the maximum TEC requirement in kilowatt-hours per week (kWh/wk), rounded to the nearest 0.1 kWh/wk for reporting;
- TEC_{REQ} is the TEC requirement specified in Table 5, in kWh;
- $Adder_{A3}$ is a 0.05 kWh/wk allowance provided for A3-capable products; and
- $Adder_{Wi-Fi}$ is a 0.1 kWh/wk allowance provided for products where Wi-Fi is the interface functional adder used during the test.



Summary of Feedback – TEC Requirement: Duplexing

Remove duplexing requirement at lower speeds (color at 16-20 images per minute (ipm) and mono at 11-25 ipm):

- Not harmonized with Blue Angel
 - Half of affected products do not meet
 - Customers do not need automatic duplexing
- Low-end, low-speed TEC products have low print volumes
 - Limits the amount of energy to be saved with duplexing
 - Request for analysis/methodology



TEC Requirement: Duplexing

- EPA's original analysis found significant unit savings of embedded energy due to Draft 1 requirements
- However, only five color and 15 monochrome models would be affected, reducing the total savings
 - For about half of these models that EPA reviewed, limited duplex options available or the upgrade would incur significant cost.

Proposal – TEC Requirement: Duplexing

- Keep current speed bins
- Require duplexing by default (harmonized with Blue Angel)
- Eliminate duplexing through optional accessory at intermediate speed bins ($19 < s < 35$ ipm color; $24 < s < 37$ ipm monochrome (not used by many products))

Automatic Duplexing Capability: For all MFDs and printers subject to the TEC test method, automatic duplexing capability shall be integral to the base product and enabled by default 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	> 19
Monochrome	> 24

Summary of Feedback and Proposal – Recovery Time

- Remove recovery time requirement:
 - New test would be burdensome
 - Print speed difference between letter and A4 makes the requirement more stringent than Blue Angel
 - Requirement would require new technologies to meet



- EPA continues to propose recovery time requirement:
 - Already measured as part of TEC test
 - Little difference in results between A4 and letter tests
 - 75% of currently certified unique TEC models can meet



Summary of Feedback and Proposal – Recovery Time Equation

- The time subtracted from $t_{Active1}$ should be $t_{Active0}$, not $t_{Active2}$.



- The quantity $t_{Active0}$ is measured immediately after the TEC model is placed in Ready State, so it is a more reliable measure of response time from that State.

Equation 7: Recovery Time

$$t_R = t_{Active1} - t_{Active0},$$



OM Product Requirements



Proposal – OM Adders

- No feedback on Cordless Handset and Internal Disk Drive OM adders, but no longer seem necessary
- Propose removing them from Table 9: Sleep Mode Power Allowances



Discussion

- EPA appreciates any feedback and relevant data on these topics:
 - General Requirements (DFEs and Professional Products)
 - TEC Product Requirements
 - OM Product Requirements



Introductions

Time	Topic
1:00–1:15	Introductions and Specification Development Recap
1:15–2:15	Draft 2 Specification
2:15–2:30	Draft 3 Imaging Equipment Test Method
2:30–2:45	Draft 1 Professional Imaging Equipment Test Method
2:45–3:00	Timeline and Open Discussion



Introduction

- Measurement Uncertainty
- Paper Size and Taiwan Market
- Network Connection: USB
- TEC Test Procedure Measurement of Active Times in Seconds



Proposal – Measurement Uncertainty

- Relax uncertainty requirement to 0.02 W between 0.5 and 1 W
- Consistent with IEC 62301 Ed. 2

G) Measurement Uncertainty¹:

- 1) Measurements of greater than or equal to 1 W shall have an uncertainty of 2% or better at the 95% confidence level.
- 2) Measurements of less than 1 W shall have an uncertainty of 0.02 W or better at the 95% confidence level.



Summary of Feedback – Paper Size and Taiwan Market

- Remove the separate paper requirement for Taiwan, to avoid a separate test in addition to US
- Include letter-size/75g/m² paper, which is used in Taiwan government offices

Proposal – Paper Size and Taiwan Market

- Test with either A4/70 g/m² or 8.5"×11"/75 g/m² paper
 - Will allow manufacturers to use the same conditions as in North America for models sold in both Taiwan and North America, while allowing others with models specific to Taiwan to test them with more typical paper

Table 4: Paper Size and Weight Requirements

Market	Paper Size	Basis Weight (g/m ²)
North America	8.5" × 11"	75
Taiwan	A4	70
	8.5" × 11"	75
Europe / Australia / New Zealand	A4	80
Japan	A4	64



Proposal – Network Connections: USB

- Added clarification to ensure that products are tested in a repeatable fashion
 - The speed of the USB port has been found to impact power draw

- D) Network Connections: Products that are capable of being network-connected as-shipped shall be connected to a network.
- 1) Products shall be connected to only one network or data connection for the duration of the test.
 - a) Only one computer may be connected to the UUT, either directly or via a network.
 - b) The UUT shall be connected using a port with the full specifications recommended for the UUT (e.g., Universal Serial Bus (USB) 3.1 if applicable, even if backwards-compatible with USB 2.0).



Summary of Feedback – Measurement of Active Times

- Active Times in the TEC Test Procedures should be in seconds, not in minutes

Proposal – Measurement of Active Times

- Require measurement of Active0, Active1, and Active2 times in the TEC test methods in Table 8 and Table 9 in seconds
- The time is typically shorter than 1 minute and is furthermore displayed in seconds in the ENERGY STAR public dataset.

**Table 8: TEC Test Procedure for Printers,
Digital Duplicators with Print Capability, and MFDs with Print Capability**

Step	Initial State	Action	Record (at end of step)	Unit of Measure	Possible States Measured
1	Off	Connect the UUT to the meter. Ensure the unit is powered and in Off Mode. Zero the meter; measure energy over 5 minutes or more. Record both energy and time.	Off energy	Watt-hours (Wh)	Off
			Testing Interval time	Minutes (min)	
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 Table 11. Measure and record time to first sheet exiting unit.	Active0 time	Seconds (s)	–



Discussion

- EPA appreciates any feedback and relevant data on these topics:
 - USB
 - Paper Size and Taiwan Market
 - TEC Test Procedure Measurement of Active Times in Seconds



Introductions

Time	Topic
1:00–1:15	Introductions and Specification Development Recap
1:15–2:15	Draft 2 Specification
2:15–2:30	Draft 3 Imaging Equipment Test Method
2:30–2:45	Draft 1 Professional Imaging Equipment Test Method
2:45–3:00	Timeline and Open Discussion



Introduction

- Separate Test Method
- Departures from ISO 21632
- References to Section 4.5.4 of ISO 21632

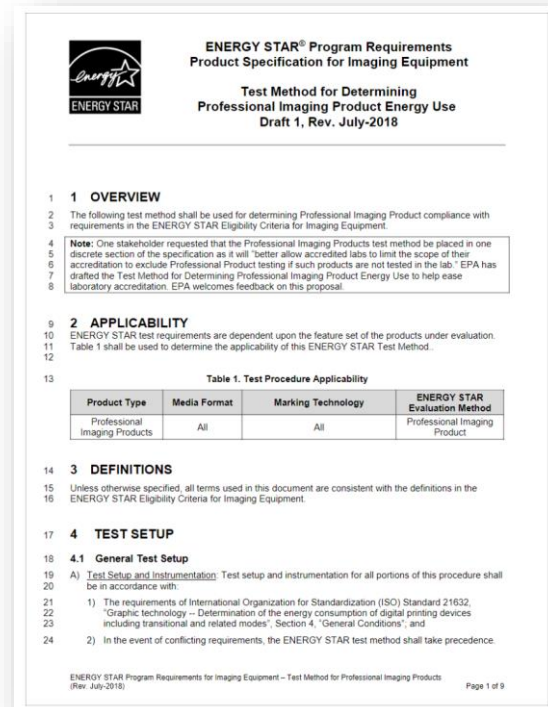


Summary of Feedback and Proposal – Separate Test Method

- Place Professional Imaging Products test method in one discrete section of the specification
- Will “allow accredited labs to limit the scope of their accreditation to exclude Professional Product testing”



- Reached out to one CB
- Drafted a separate test method for Professional Imaging Products to help ease laboratory accreditation





Summary of Feedback – Departures from ISO 21632

- Test Professional Imaging Products with default settings, and other conditions from ENERGY STAR test method rather than ISO 21632
- Single-phase Professional Imaging Products are more similar to TEC products (ENERGY STAR) than three-phase products (ISO 21632)



Proposal – Departures from ISO 21632

Topic	ISO 21632	Proposed Departure
Pre-Test UUT Configuration for Professional Imaging Products	<ul style="list-style-type: none">Two required machine combinations, best-quality (BQ) and best productivity (BP) (Section 4.1)	<ul style="list-style-type: none">One BQ/BP test
Color	<ul style="list-style-type: none">BQ Combination: All colorants of the system shall be used (Section 4.1)	<ul style="list-style-type: none">Tested under the default (as-shipped) setting with four colors
Product Speed	<ul style="list-style-type: none">Production print (BP) - The printing mode selected by the manufacturer or user of the UUT for use when acceptable print quality is required at high speed.	<ul style="list-style-type: none">Highest speed as claimed by the manufacturer per the criteria in V3.0 Draft Section 4.1(K)



Proposal – Departures from ISO 21632

Topic	ISO 21632	Proposed Departure
Ambient Temperature and Relative Humidity	<ul style="list-style-type: none"> Ambient Temperature: 20 °C - 25 °C Relative Humidity: 45% - 60 % (Section 4.1) 	<ul style="list-style-type: none"> Ambient Temperature: 23°C ± 5°C Relative Humidity: 10% - 80%
Paper Specification	<ul style="list-style-type: none"> BQ Combination: Substrate selected for achieving the best possible saleable print quality (Section 4.1) 	<ul style="list-style-type: none"> One Test A4 or 8.5" x 11" (depending on market) 127.9g/m², 85lb, or equivalent
Service/Maintenance Modes	<ul style="list-style-type: none"> The energy (kWh) consumed for each operation shall be measured and reported. The frequency with which each maintenance operation is required to be performed and recorded. (Section 4.3.3.1) 	<ul style="list-style-type: none"> Tested with default settings Without disabling the automatic adjustment function of color or registration (if it is incorporated in the default setting) Manual processes excluded to ensure repeatability



Summary of Feedback – References to Section 4.5.4 of ISO 21632

- The proposed test method for Professional Imaging Products should be as specified in Section 4.5.4 (Combined Test Flow) of ISO 21632.
 - The test method should include Job 1 energy and the average of Jobs 2 and 3, along with Off Mode and Sleep Mode.
- A streamlined test procedure
- Keep the main provisions of ISO 21632
 - e.g., skip test print, sleep, 5% consistency check between jobs, etc.



Proposal – References to Section 4.5.4 of ISO 21632

- Reference **Section 4.5.4** of ISO 21632, which in turn references specific preceding sections of the standard
- No longer reference Section 4.4 Measuring Conditions (covered by test setup instructions based on ENERGY STAR)



Timeline and Open Discussion

Time	Topic
1:00–1:15	Introductions and Specification Development Recap
1:15–2:15	Draft 2 Specification
2:15–2:30	Draft 3 Imaging Equipment Test Method
2:30–2:45	Draft 1 Professional Imaging Equipment Test Method
2:45–3:00	Timeline and Open Discussion



Timeline

- Q4 2018: Final Version 3.0 Test Methods and Specification
 - Subsequent V3.1 with separate requirements for Professional Imaging Products
- Q3 2019: Version 3.0 specification effective



Final Questions or Comments



Written Comment Submission

Please send any data and written feedback on the drafts to imagingequipment@energystar.gov no later than **August 23, 2018**.

Unless marked as confidential, comments will be posted on the Imaging Equipment Version 3.0 product development page at https://www.energystar.gov/products/spec/imaging_equipment_specification_version_3_0_pd.

Also accessible through www.energystar.gov/revisedspecs.



Thank You!

Ryan Fogle
EPA, ENERGY STAR
(202) 343-9153
Fogle.Ryan@epa.gov

Jeremy Dommu
DOE
(202) 586-9870
Jeremy.Dommu@ee.doe.gov

Matt Malinowski
ICF
(202) 862-2693
Matt.Malinowski@icf.com