



ENERGY STAR® Program Requirements Product Specification for Computers

Eligibility Criteria Final Draft, Version 9.0

1 Following is the **Final Draft, Version 9** ENERGY STAR Product Specification for Computers. A product
2 shall meet all of the identified criteria if it is to earn the ENERGY STAR.

3 **1 DEFINITIONS**

4 A) Product Types:

- 5 1) Computer: A device which performs logical operations and processes data. For the purposes of
6 this specification, computers include both stationary and portable units, including Desktop
7 Computers, Integrated Desktop Computers, Notebook Computers, Small-Scale Servers, Thin
8 Clients, and Workstations. Although computers are capable of using input devices and displays,
9 such devices are not required to be included with the computer upon shipment. Computers are
10 composed of, at a minimum:
- 11 a) A central processing unit (CPU) to perform operations. If no CPU is present, then the device
12 must function as a client gateway to a server which acts as a computational CPU;
 - 13 b) User input devices such as a keyboard, mouse, or touchpad; and
 - 14 c) An Integrated Display screen and/or the ability to support an external display screen to output
15 information.
- 16 2) Desktop Computer: A Computer whose main unit is designed to be located in a permanent
17 location, often on a desk or on the floor. Desktop computers are not designed for portability and
18 are designed for use with an external display, keyboard, and mouse. Desktop computers are
19 intended for a broad range of home and office applications, including point of sale applications.
- 20 a) Integrated Desktop Computer: A Desktop Computer in which the computing hardware and
21 display are integrated into a single housing, and which is connected to ac mains power
22 through a single cable. Integrated Desktop Computers come in one of two possible forms: (1)
23 a system where the display and computer are physically combined into a single unit; or (2) a
24 system packaged as a single system where the display is separate but is connected to the
25 main chassis by a dc power cord and both the computer and display are powered from a
26 single power supply. As a subset of Desktop Computers, Integrated Desktop Computers are
27 typically designed to provide similar functionality as Desktop systems.
- 28 3) Notebook Computer: A Computer designed specifically for portability and to be operated for
29 extended periods of time both with and without a direct connection to an ac mains power source.
30 Notebook Computers include an Integrated Display, a non-detachable mechanical keyboard
31 (using physical, moveable keys), and pointing device.
- 32 a) Mobile Thin Client: A Computer meeting the definition of a Thin Client, designed specifically
33 for portability, and meeting the definition of a Notebook Computer. These products are
34 considered to be Notebook Computers for the purposes of this specification.
 - 35 b) Two-In-One Notebook: A Computer which resembles a traditional Notebook Computer with a
36 clam shell form factor but has a detachable display which can act as an independent
37 Slate/Tablet when disconnected. The keyboard and display portions of the product must be
38 shipped as an integrated unit. Two-In-One Notebooks are considered Notebooks in the
39 remainder of this specification and are therefore not referenced explicitly.

- 40 c) Mobile Workstation: A Computer which meets the definition of Notebook Computer and is
41 designed for use in professional workflows such as architecture, engineering, computer aided
42 drafting, product development, financial applications, scientific applications, and/or content
43 creation. It must also meet all of the following criteria:
- 44 (1) Has a mean time between failures (MTBF) of at least 13,000 hours;
- 45 (2) Certification by 4 or more Independent Software Vendor (ISV) product certifications in
46 professional workflows (see examples above). These certifications can be in process,
47 but partner shall ensure they are completed within 6 months of the date the product
48 becomes available on the market;
- 49 (3) Supports at least 32 gigabytes of system memory; and
- 50 (4) Supports either:
- 51 (a) At least one integrated or discrete GPU with frame buffer bandwidth of 96
52 gigabytes per second or greater; or
- 53 (b) A total of 4 gigabytes or more of system memory with a bandwidth of 134
54 gigabytes per second or greater and an integrated GPU.
- 55 d) Multi-Screen Notebook: A Computer which resembles a traditional Notebook Computer with a
56 clam shell form factor but has a secondary display with touch and/or pen capability that can
57 be used as a touch screen keyboard in place of a traditional mechanical keyboard. These
58 products are considered to be Notebook Computers for purposes of this specification.
- 59 e) Ruggedized Notebook: A Computer which meets the definition of a Notebook Computer that
60 meets either MIL-STD 810H or IP66 (IEC 60529) and contains multiple expansion slots for
61 expandability.

62 **Note:** The EPA has proposed the definition for ruggedized notebooks, which aligns with the industry
63 proposed definition from Draft 2. This definition supports a proposed ruggedized notebook adder in Table
64 7 below.

- 65 4) Slate/Tablet: A computing device designed for portability that meets all of the following criteria:
- 66 a) Includes an integrated display with a diagonal size greater than 7.0 inches and less than 17.4
67 inches;
- 68 b) Lacking an integrated, physical attached keyboard in its as-shipped configuration;
- 69 c) Includes and primarily relies on touchscreen input; (with optional keyboard);
- 70 d) Includes and primarily relies on a wireless network connection (e.g., Wi-Fi, 3G, etc.); and
- 71 e) Includes and is primarily powered by an internal battery (with connection to the mains for
72 battery charging, not primary powering of the device).
- 73 5) Portable All-In-One Computer: A computing device designed for portability that meets all of the
74 following criteria:
- 75 a) Includes an integrated display with a diagonal size greater than or equal to 17.4 inches;
- 76 b) Lacking keyboard integrated into the physical housing of the product in its as-shipped
77 configuration;
- 78 c) Includes and primarily relies on touchscreen input; (with optional keyboard);
- 79 d) Includes wireless network connection (e.g. Wi-Fi, 3G, etc.); and
- 80 e) Includes an internal battery
- 81 6) E-Reader: A device designed for display and consumption of static images. The display is
82 characterized by a low refresh rate and a display made of bistable materials where no energy is
83 needed to maintain a visible image, only to alter the image.

- 84 7) Small-scale Server: A Computer that typically uses desktop components in a desktop form factor
85 but is designed primarily to be a storage host for other computers. Small-scale Servers are
86 designed to perform functions such as providing network infrastructure services (e.g., archiving)
87 and hosting data/media. These products are not designed to process information for other
88 systems or run web servers as a primary function. A Small-scale Server has the following
89 characteristics:
- 90 a) Designed in a pedestal, tower, or other form factor similar to those of desktop computers
91 such that all data processing, storage, and network interfacing is contained within one
92 box/product;
- 93 b) Designed to operate 24 hours/day, 7 days/week, with minimal unscheduled downtime (on the
94 order of hours/year);
- 95 c) Capable of operating in a simultaneous multi-user environment serving several users through
96 networked client units; and
- 97 d) Designed for an industry accepted operating system for home or low-end server applications
98 (e.g., Windows Home Server, Mac OS X Server, Linux, UNIX, Solaris).
- 99 8) Thin Client: An independently-powered Computer that relies on a connection to remote
100 computing resources (e.g., computer server, remote workstation) to obtain primary functionality.
101 Main computing functions (e.g., program execution, data storage, interaction with other Internet
102 resources) are provided by the remote computing resources. Thin Clients covered by this
103 specification are (1) limited to devices with no rotational storage media integral to the computer
104 and (2) designed for use in a permanent location (e.g. on a desk) and not for portability.
- 105 a) Integrated Thin Client: A Thin Client in which computing hardware and display are
106 connected to ac mains power through a single cable. Integrated Thin Client computers
107 come in one of two possible forms: (1) a system where the display and computer are
108 physically combined into a single unit; or (2) a system packaged as a single system
109 where the display is separate but is connected to the main chassis by a dc power cord
110 and both the computer and display are powered from a single power supply. As a subset
111 of Thin Clients, Integrated Thin Clients are typically designed to provide similar
112 functionality as Thin Client systems.
- 113 b) Ultra-thin Client: A Computer with lesser local resources than a standard Thin Client that
114 sends raw mouse and keyboard input to a remote computing resource and receives back
115 raw video from the remote computing resource. Ultra-thin clients cannot interface with
116 multiple devices simultaneously nor run windowed remote applications due to the lack of
117 a user-discernible client operating system on the device (i.e., beneath firmware, user
118 inaccessible).
- 119 9) Workstation: A high-performance, Computer used for professional workflows such as
120 architecture, engineering, computer aided drafting, product development, financial applications,
121 scientific applications and/or content creation. Workstations covered by this specification (a) are
122 marketed as a workstation; (b) do not support altering frequency or voltage beyond the CPU and
123 GPU manufacturers' as-shipped operating specifications; and (c) have system hardware that
124 supports an error-correcting mechanism that detects and corrects data errors with dedicated
125 circuitry on and across the CPU, interconnect, and system memory. In addition, a workstation
126 must have 4 or more Independent Software Vendor (ISV) product certifications in professional
127 workflows (see examples above). These certifications can be in process, but partner shall ensure
128 they are completed within 6 months of the date the product becomes available on the market.
- 129 10) Rack-mounted Workstation: A Workstation that is designed to be natively rack mounted as
130 described in IEC 60297-3-101:2004. The rack-mounted workstation may be accessed locally by
131 direct connection to the workstation and display or accessed remotely across a network by one or
132 more users.
- 133 B) Product Category: A second-order classification or sub-type within a product type that is based on
134 product features and installed components. Product categories are used in this specification to
135 determine certification and test requirements.

136 C) Computer Components:

- 137 1) Central Processing Unit (CPU): A central processing unit, also called a central processor, main
138 processor or just processor, is the electronic circuitry that executes, including but not limited to,
139 floating point or integer-based instructions comprising a computer program. Many processors
140 contain multiple Cores to perform these instructions.
- 141 2) Core: A single functional unit of a CPU that handles software instructions such as arithmetic,
142 floating point, and other data manipulation.
- 143 3) System on Chip (SoC): An integrated circuit that integrates most or all components (CPU,
144 memory, IO, graphics, storage) of a full computer system or other electronic system on a single
145 silicon substrate or package.
- 146 4) Graphics Processing Unit (GPU): An integrated circuit, separate from the CPU, designed to
147 accelerate the rendering of either 2D and/or 3D content to displays. A GPU may be mated with a
148 CPU, on the system board of the computer or elsewhere to offload display capabilities from the
149 CPU.
- 150 5) Discrete Graphics (dGfx): A graphics processor (GPU) which must contain a local memory
151 controller interface and local graphics-specific memory.
- 152 6) Integrated Graphics (iGfx): A graphics solution that does not contain Discrete Graphics.
- 153 7) Display: A commercially-available product with a display screen and associated electronics, often
154 encased in a single housing, that as its primary function displays visual information from (1) a
155 computer, workstation or server via one or more inputs (e.g., VGA, DVI, HDMI, DisplayPort, IEEE
156 1394, USB), (2) external storage (e.g., USB flash drive, memory card), or (3) a network
157 connection.
- 158 a) Enhanced-performance Integrated Display: An integrated Computer Display that has all
159 of the following features and functionalities:
- 160 (1) A contrast ratio of at least 60:1 at a horizontal viewing angle of at least 85°, with or
161 without a screen cover glass;
- 162 (2) A native resolution greater than or equal to 2.3 megapixels (MP); and
- 163 (3) A color gamut of at least sRGB as defined by IEC 61966-2-1. Shifts in color space
164 are allowable as long as 99% or more of defined sRGB colors are supported.
- 165 8) External Power Supply (EPS): Also referred to as External Power Adapter. An external power
166 supply circuit that is used to convert household electric current into dc current or lower-voltage ac
167 current to operate a consumer product.
- 168 9) Internal Power Supply (IPS): A component internal to the computer casing and designed to
169 convert ac voltage from the mains to dc voltage(s) for the purpose of powering the computer
170 components. For the purposes of this specification, an internal power supply shall be contained
171 within the computer casing but be separate from the main computer board. The power supply
172 shall connect to the mains through a single cable with no intermediate circuitry between the
173 power supply and the mains power. In addition, all power connections from the power supply to
174 the computer components, with the exception of a DC connection to a display in an Integrated
175 Desktop Computer, shall be internal to the computer casing (i.e., no external cables running from
176 the power supply to the computer or individual components). Internal dc-to-dc converters used to
177 convert a single dc voltage from an external power supply into multiple voltages for use by the
178 computer are not considered internal power supplies.
- 179 10) System Memory Bandwidth: The rate at which data can be read or stored into computer system's
180 memory, expressed in gigabytes per second (GB/s).

181 D) Operational Modes:

- 182 1) Active State: The power state in which the computer is carrying out useful work in response to a
183 prior or concurrent user input or b) prior or concurrent instruction over the network. Active State
184 includes active processing, seeking data from storage, memory, or cache, including Idle State
185 time while awaiting further user input and before entering low power modes.
- 186 2) Idle State: The power state in which the operating system and other software have completed
187 loading, a user profile has been created, activity is limited to those basic applications that the
188 system starts by default, and the computer is not in Sleep Mode. Idle State is composed of two
189 sub-states: Short Idle and Long Idle.
- 190 a) Long Idle: The mode where the computer has reached an Idle condition (i.e., 15 minutes
191 after OS boot or after completing an active workload or after resuming from Sleep Mode)
192 and the main Computer Display has entered a low-power state where screen contents
193 cannot be observed (i.e., backlight has been turned off) but remains in the working mode
194 (ACPI G0/S0). If power management features are enabled as-shipped in the scenario
195 described in this definition, such features shall engage prior to evaluation of Long Idle
196 (e.g., display is in a low power state, HDD may have spun-down), but the Computer is
197 prevented from entering Sleep Mode. P_{LONG_IDLE} represents the average power measured
198 when in the Long Idle Mode.
- 199 b) Short Idle: The mode where the computer has reached an Idle condition (i.e., 5 minutes
200 after OS boot or after completing an active workload or after resuming from Sleep Mode),
201 the screen is on, and Long Idle power management features have not engaged (e.g.
202 HDD is spinning and the Computer is prevented from entering sleep mode). P_{SHORT_IDLE}
203 represents the average power measured when in the Short Idle Mode.
- 204 3) Off Mode: The lowest power mode which cannot be switched off (influenced) by the user and that
205 may persist for an indefinite time when the appliance is connected to the main electricity supply
206 and used in accordance with the manufacturer's instructions. For systems where ACPI standards
207 are applicable, Off Mode correlates to ACPI System Level S5 state.
- 208 4) Sleep Mode: A low power mode that the computer enters automatically after a period of inactivity
209 or by manual selection. A computer with Sleep capability can quickly "wake" in response to
210 network connections or user interface devices from initiation of wake event to a readable display.
211 For systems where ACPI standards are applicable, Sleep Mode most commonly correlates to
212 ACPI System Level S3 (suspend to RAM) state or, for workstations without resume-time limits,
213 ACPI System Level S4 (hibernate). P_{SLEEP} represents the average power measured when in the
214 Sleep Mode.
- 215 5) Alternative Low Power Mode (ALPM): A low power mode that the computer enters automatically
216 after a period of inactivity or by manual selection that is defined by the display turning off and the
217 computer entering a state of reduced functionality. A computer with Alternative Low Power Mode
218 must maintain immediate responsiveness to network connections or user interface devices. P_{ALPM}
219 represents the average power measured when in the Alternative Low Power Mode.

220 E) Networking and Additional Capabilities:

- 221 1) Additional Internal Storage: Any and all internal hard disk drives (HDD) or solid-state drives (SSD)
222 installed beyond the primary storage device where the operating system is installed in the
223 products as-shipped state. This definition does not include external drives.
- 224 2) Energy Efficient Ethernet (EEE): A technology which enables reduced power consumption of
225 Ethernet interfaces during times of low data throughput. Specified by IEEE 802.3az.

226 **Note:** The EPA has removed the Full Network Proxy definition as it no longer impacts mode weighting
227 selection for any product type in Version 9.0.

- 228 3) Constant Network Connectivity: A capability that allows the wake of system operating system or
229 software to facilitate communication and downloads from the network (e.g. instant messaging,
230 email, management and maintenance tasks, etc.)

- 231 4) Network Interface: The components (hardware and software) whose primary function is to make
 232 the computer capable of communicating over one or more network technologies. Examples of
 233 Network Interfaces are IEEE 802.3 (Ethernet) and IEEE 802.11 (Wi-Fi).
- 234 5) Wake Event: A user, scheduled, or external event or stimulus that causes the computer to
 235 transition from Sleep Mode or Off Mode to an active state of operation. Examples of wake events
 236 include, but are not limited to: movement of the mouse, keyboard activity, controller input, real-
 237 time clock event, or a button press on the chassis, and in the case of external events, stimulus
 238 conveyed via a remote control, network, modem, etc.
- 239 6) Wake On LAN (WOL): Functionality which allows a computer to transition from Sleep Mode or Off
 240 Mode to an Active State of operation when directed by a network Wake Event via Ethernet.
- 241 7) Switchable Graphics: Functionality that allows Discrete Graphics to be disabled when not
 242 required in favor of Integrated Graphics.
- 243 Note: This functionality allows lower power and lower capability integrated GPUs to render the
 244 display while on battery or when the output graphics are not overly complex while then allowing
 245 the more power consumptive but more capable discrete GPU to provide rendering capability
 246 when required.
- 247 F) Marketing and Shipment Channels:
- 248 1) Enterprise Channels: Sales channels typically used by large and medium-sized business,
 249 government, educational, or other organizations to purchase computers for use in managed
 250 client/server environments.
- 251 2) Model Name: A marketing name that includes reference to the computer model number, product
 252 description, or other branding references.
- 253 3) Model Number: A unique marketing name or identification reference that applies to a specific
 254 hardware and software configuration (e.g., operating system, processor type, memory, GPU), and
 255 is either pre-defined or selected by a customer.
- 256 G) Product Family: A high-level description referring to a group of computers sharing one
 257 chassis/motherboard combination that often contains hundreds of possible hardware and software
 258 configurations. Product models within a family differ from each other according to one or more
 259 characteristics or features that either (1) have no impact on product performance with regard to
 260 ENERGY STAR certification criteria, or (2) are specified herein as acceptable variations within a
 261 product family. For Computers, acceptable variations within a product family include:
- 262 1) Color;
- 263 2) Housing; and
- 264 3) Electronic components other than the chassis/motherboard, such as the processor,
 265 memory, GPU, etc.

266 **2 SCOPE**

267 **2.1 Included Products**

- 268 2.1.1 Products that meet the definition of a Computer and one of the following Product Type definitions,
 269 as specified herein, are eligible for ENERGY STAR certification, with the exception of products
 270 listed in Section 2.2:
- 271 i. Desktop Computers and Integrated Desktop Computers;
- 272 ii. Notebook Computers;
- 273 iii. Slates/Tablets;
- 274 iv. Portable All-In-One Computers;

- 275 v. Workstations; and
- 276 vi. Thin Clients.

277 **2.2 Excluded Products**

278 2.2.1 Products that are covered under other ENERGY STAR product specifications are not eligible for
279 certification under this specification. The list of specifications currently in effect can be found at
280 www.energystar.gov/products.

281 2.2.2 The following products are not eligible for certification under this specification:

- 282 i. Docking Stations;
- 283 ii. Game Consoles;
- 284 iii. E-Readers;
- 285 iv. Handheld gaming devices, typically battery powered and intended for use with an integral
286 display as the primary display;
- 287 v. Mobile Thin Clients not meeting the definition of Notebook Computer;
- 288 vi. Personal Digital Assistant devices (PDAs);
- 289 vii. Point of Sale (POS) products that do not use internal components common to Notebook,
290 Desktop, or Integrated Desktop Computers, including a processor, motherboard, and
291 memory;
- 292 viii. Slate/Tablet based POS products;
- 293 ix. Handheld Computers and Slates/Tablets which contain cellular voice capability;
- 294 x. Open Pluggable Specification (OPS) modules;
- 295 xi. Ultra-thin Clients; and
- 296 xii. Small-scale Servers.

297

298 **3 CERTIFICATION CRITERIA**

299 **3.1 Significant Digits and Rounding**

- 300 3.1.1 All calculations shall be carried out with directly measured (unrounded) values.
- 301 3.1.2 Unless otherwise specified in this specification, compliance with specification limits shall be
302 evaluated using directly measured or calculated values without any benefit from rounding.
- 303 3.1.3 Directly measured or calculated values that are submitted for reporting on the ENERGY STAR
304 website shall be rounded to the nearest significant digit as expressed in the corresponding
305 specification limit.

306 **3.2 General Requirements**

- 307 3.2.1 Power supply test data and test reports from testing entities recognized by EPA to perform power
308 supply testing shall be accepted for the purpose of certifying the ENERGY STAR product.
- 309 3.2.2 Internal Power Supply (IPS) Requirements: IPSs used in Computers eligible under this
310 specification must meet the following requirements when tested using the *Generalized Internal*
311 *Power Supply Efficiency Test Protocol, Rev. 6.7.1* (available at
312 [https://www.plugloadsolutions.com/docs/collatrl/print/Generalized_Internal_Power_Supply_Efficie](https://www.plugloadsolutions.com/docs/collatrl/print/Generalized_Internal_Power_Supply_Efficiency_Test_Protocol_R6.7.1.pdf)
313 [ncy_Test_Protocol_R6.7.1.pdf](https://www.plugloadsolutions.com/docs/collatrl/print/Generalized_Internal_Power_Supply_Efficiency_Test_Protocol_R6.7.1.pdf)).

- 314 i. IPS with maximum rated output power less than 75 watts shall meet minimum efficiency
 315 requirements as specified in Table 1.
- 316 ii. IPS with maximum rated output power greater than or equal to 75 watts shall meet both
 317 minimum efficiency requirements and minimum power factor requirements, as specified in
 318 Table 1 and Table 2 as applicable.

319 **Table 1: Requirements for Internal Power Supplies with Rated Output of 500 Watts and Below**

Loading Condition (Percentage of Nameplate Output Current)	Minimum Efficiency	Minimum Power Factor
10%	0.80	
20%	0.82	-
50%	0.85	0.90
100%	0.82	-

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321 **Table 2: Requirements for Internal Power Supplies with Rated Output Above 500 Watts**

Loading Condition (Percentage of Nameplate Output Current)	Minimum Efficiency	Minimum Power Factor
10%	0.80	
20%	0.87	-
50%	0.90	0.90
100%	0.87	-

322 3.2.3 External Power Supply (EPS) Requirements: Single- and Multiple-voltage EPSs shall meet the
 323 Level VI or higher performance requirements under the International Efficiency Marking Protocol
 324 when tested according to the Uniform Test Method for Measuring the Energy Consumption of
 325 External Power Supplies, Appendix Z to 10 CFR Part 430.

- 326 i. Single-voltage EPSs shall include the Level VI or higher marking.
- 327 ii. Adaptive EPSs meeting Level VI or higher shall include the Level VI or higher marking.
- 328 iii. Additional information on the Marking Protocol is available
 329 at <http://www.regulations.gov/#!documentDetail;D=EERE-2008-BT-STD-0005-0218>

330 3.2.4 Energy Efficient Ethernet (EEE) Requirements: All products which contain one or more Ethernet
 331 ports with a bandwidth of 1Gb/s or higher shall have EEE enabled as-shipped in each of these
 332 ports in their as-shipped configuration.

333

334 **3.3 Power Management Requirements**

335 3.3.1 Products shall include power management features in their “as-shipped” condition as specified in
 336 Table 3, subject to the following conditions:

- 337 i. For Thin Clients, the Wake-on-LAN (WOL) requirement shall apply for products designed to
 338 receive software updates from a centrally managed network while in Sleep Mode or in Off
 339 Mode. Thin Clients whose standard software upgrade framework does not require off-hours
 340 scheduling are exempt from the WOL requirement.
- 341 ii. For Notebooks, WOL may be automatically disabled when the product is disconnected from
 342 ac mains power.

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- iii. For all products with WOL, directed packet filters shall be enabled and set to an industry standard default configuration.
 - iv. Products that do not support Sleep Mode by default are only subject to the Display Sleep Mode requirement.

Table 3: Power Management Requirements

Mode or Mode Transition	Requirement	Desktops	Integrated Desktops	Portable All-In-Ones	Notebooks	Slates/Tablets	Thin Clients	Workstations
System Sleepⁱ/Alternative Low Power Mode	(1) Sleep/Alternative Low Power Mode shall be set to activate after no more than 30 minutes of user inactivity. (2) The speed of any active 1 Gb/s or faster Ethernet network links shall be reduced when transitioning to Sleep Mode or Off Mode. Or the links shall enter Energy Efficient Ethernet state when transitioning to Alternative Low Power Mode	Yes	Yes	Yes	Yes	N/A	Yes	Yes
Display Sleep Mode	(1) Display Sleep Mode shall be set to activate after no more than 15 minutes of user inactivity.	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Wake on LAN (WOL)	(1) Computers with Ethernet capability shall provide users with an option to enable and disable WOL for Sleep Mode. (2) Computers with Ethernet capability that are shipped through enterprise channels shall either: (a) be shipped with WOL enabled by default for Sleep Mode, when the computer is operating on ac mains power; or (b) provide users with the ability to enable WOL that is accessible from both the client operating system user interface and over the network ⁱⁱ .	Yes	Yes	Yes	Yes	N/A	Yes	Yes
Wake Management	(1) Computers with Ethernet capability that are shipped through enterprise channels shall: (a) be capable of both remote (via network) and scheduled (via real-time clock) wake events from Sleep Mode, and (b) provide clients with the ability to centrally manage (via vendor tools) any wake management settings that are configured through hardware settings if the manufacturer has control over such features.	Yes	Yes	Yes	Yes	N/A	Yes	Yes

349 **3.4 User Information Requirements**

350 3.4.1 Products shall be shipped with informational materials to notify customers of the following:

- 351 i. A description of power management settings that have been enabled by default,
- 352 ii. A description of the timing settings for various power management features, and
- 353 iii. Instructions for properly waking the product from Sleep Mode.

354 3.4.2 Products shall be shipped with one or more of the following:

- 355 i. A list of default power management settings.
- 356 ii. A note stating that default power management settings have been selected for compliance
357 with ENERGY STAR (within 15 min of user inactivity for the display, within 30 min for the
358 computer, if applicable per Table 3), and are recommended by the ENERGY STAR program
359 for optimal energy savings.
- 360 iii. Information about ENERGY STAR and the benefits of power management, to be located at
361 or near the beginning of the hard copy or electronic user manual, or in a package or box
362 insert.

363 3.4.3 Provisions 3.4.1 and 3.4.2 may be met through use of either electronic or printed product
364 documentation, provided it adheres to all of the following:

- 365 i. Documentation is shipped with the product (e.g., in a printed manual or insert, on included
366 optical media, in a file installed with the software load shipped to the customer) or available
367 electronically on the manufacturer's website. In the latter case, instructions for accessing the
368 information on the website shall be provided in the product package or on the Desktop or
369 home screen; and
- 370 ii. Documentation is included either (a) only with ENERGY STAR certified Computers; or (b) as
371 part of the standard documentation if and only if accompanied by EPA-approved customer
372 guidance on how to identify if their computer configuration is ENERGY STAR certified.

373 **3.5 Requirements for Desktop, Integrated Desktop, and Notebook Computers**

374 3.5.1 Resume Time Requirement: Notebook computers are required to wake from sleep or an
375 alternative low power mode with a latency of less than or equal to 5 seconds from initiation of
376 wake event to system becoming fully usable including rendering of display. Desktop and
377 Integrated Desktop Computers shall meet this same requirement, but with a latency of less than
378 or equal to 10 seconds. Manufacturers shall self-declare that the product can meet this
379 requirementⁱⁱⁱ. Resume time requirements do not apply to mobile workstations, workstations, or
380 thin clients.

381 **Note:** The EPA has removed a footnote from Section 3.5 from the Draft 2 specification referencing Full
382 Network Connectivity to align with the removal of Full Network Connectivity terminology throughout the
383 specification.

384 3.5.2 Calculated Annual Typical Energy Consumption (E_{TEC}) for Desktop, Integrated Desktop, and
385 Notebook Computers per Equation 1 shall be less than or equal to the maximum TEC
386 requirement (E_{TEC_MAX}) per Equation 2, subject to the following requirements:

ⁱ Where Sleep Mode is supported by the unit under test by default and Sleep Mode power is used as part of the TEC equation for certification.

ⁱⁱⁱ For purposes of ENERGY STAR third-party certification, these requirements shall not be reviewed when products are initially certified nor during subsequent verification testing. Rather, EPA reserves the right to request supporting documentation at any time.

- 387 i. The Additional Internal Storage adder allowance ($TEC_{STORAGE}$) shall be applied if there are
 388 more than one internal storage devices present in the product, in which case it shall only be
 389 applied once.
- 390 ii. The Integrated Display adder allowance ($TEC_{INT_DISPLAY}$) applies only for Integrated Desktops
 391 and Notebooks and may be applied for each display. For Enhanced-performance Integrated
 392 Displays, the adder is calculated as presented in Table 7 and Equation 3.
- 393 iii. For Notebooks, Desktops, and Integrated Desktops that use an Alternative Low Power Mode
 394 in place of System Sleep Mode and Long Idle Mode, power in Alternative Low Power Mode
 395 (P_{ALPM}) may be used in place of both the power in Sleep (P_{SLEEP}) and the power in Long Idle
 396 (P_{LONG_IDLE}) in Equation 1 if the Alternative Low Power Mode measured power is less than or
 397 equal to 10 watts. In such instances, $(P_{SLEEP} \times T_{SLEEP})$ and $(P_{LONG_IDLE} \times T_{LONG_IDLE})$
 398 are replaced by $(P_{ALPM} \times T_{SLEEP})$ and $(P_{ALPM} \times T_{LONG_IDLE})$; Equation 1 remains
 399 otherwise unchanged.
- 400 iv. Notebooks, Desktops, and Integrated Desktops with switchable graphics may not apply the
 401 Discrete Graphics allowance, $TEC_{GRAPHICS}$, from Table 7 in Equation 2. However, for Desktop
 402 and Integrated Desktop systems that provide automated Switchable Graphics enabled by
 403 default, an allowance equal to 7 kilowatt hours (Desktop or Integrated Desktop) may be
 404 applied. This capability is manufacturer-declared.

405 **Note:** The EPA has corrected the allowance value in subsection iv. above which was previously shown as
 406 7 watts but should be shown as 7 kilowatt hours.

407 **Equation 1: TEC Calculation (E_{TEC}) for Desktop, Integrated Desktop,**
 408 **and Notebook Computers**
 409

410
$$E_{TEC} = \frac{8760}{1000} \times (P_{OFF} \times T_{OFF} + P_{SLEEP} \times T_{SLEEP} + P_{LONG_IDLE} \times T_{LONG_IDLE}$$

 411
$$+ P_{SHORT_IDLE} \times T_{SHORT_IDLE})$$

412 *Where:*

- 413 ▪ P_{OFF} = Measured power consumption in Off Mode (W);
- 414 ▪ P_{SLEEP} = Measured power consumption in Sleep Mode (W);
- 415 ▪ P_{LONG_IDLE} = Measured power consumption in Long Idle Mode
 416 (W);
- 417 ▪ P_{SHORT_IDLE} = Measured power consumption in Short Idle Mode
 418 (W); and
- 419 ▪ T_{OFF} , T_{SLEEP} , T_{LONG_IDLE} , and T_{SHORT_IDLE} are mode weightings as
 420 specified in Table 4 (for Desktops, Integrated Desktops) or
 421 Table 5 (for Notebooks).

422 **Table 4: Mode Weightings for Desktops and Integrated Desktop Computers**

Mode	Mode Weighting I
T_{OFF}	15%
T_{SLEEP}	45%
T_{LONG_IDLE}	10%
T_{SHORT_IDLE}	30%

423 **Note:** The EPA has revised the column labels in Table 4 to remove the previous obsolete reference to
 424 Conventional mode weightings.

425 **Table 5: Mode Weightings for Notebook Computers**

Mode Weighting	Conventional
T _{OFF}	10%
T _{SLEEP}	60%
T _{LONG_IDLE}	10%
T _{SHORT_IDLE}	20%

426 **Equation 2: E_{TEC_MAX} Calculation for Desktop, Integrated Desktop, and Notebook Computers**

427
$$E_{TEC_MAX} = (TEC_{BASE} + TEC_{MEMORY} + TEC_{GRAPHICS} + TEC_{STORAGE} + TEC_{INT_DISPLAY} + TEC_{SWITCHABLE} +$$

 428
$$TEC_{MOBILEWORKSTATION} + TEC_{>1G\ to\ <10GLAN} + TEC_{10GLAN})$$

429 *Where:*

- 430 ▪ *TEC_{BASE} is the Base allowance specified in Table 6; and,*
- 431 ▪ *TEC_{GRAPHICS} is the discrete graphics allowance as specified in*
 432 *Table 7, with the exception of systems with integrated graphics,*
 433 *which do not receive an allowance, or Desktops and Integrated*
 434 *Desktops with switchable graphics enabled by default, which*
 435 *receive an allowance through TEC_{SWITCHABLE}; and*
- 436 ▪ *TEC_{MEMORY}, TEC_{STORAGE}, TEC_{INT_DISPLAY}, TEC_{SWITCHABLE},*
 437 *TEC_{MOBILEWORKSTATION}, TEC_{>1G to <10GLAN} and TEC_{10GLAN} are*
 438 *adder allowances as specified in Table 7.*

439 **Table 6: Base TEC (TEC_{BASE}) Allowances for Notebooks, Desktops, and Integrated Desktops**
 440

Category	Power Supply Rated Output	Base Allowance
Notebook	All Outputs	7.8
Integrated Desktop – Category 1	< 120 watts	8.5
Integrated Desktop – Category 2	≥ 120 watts	18.9
Desktop	All Outputs	40.5

441

442 **Note:** The EPA received compelling stakeholder feedback in response to the Draft 2 specification stating
 443 that the previously proposed base allowances were not allowing enough selection of qualifying products
 444 for higher performance notebooks and integrated desktops. The EPA took the additional suggested
 445 functional adders in Table 7 along with a slight decrease in overall base allowance stringency to arrive at
 446 the proposed base allowances above.

447 In addition to the revisions to the existing base allowances, stakeholders requested splitting integrated
 448 desktops into two categories, based on whether they have notebook or desktop based hardware inside.
 449 The 120 watt nameplate power rating is being used as a proxy to differentiate notebook-based from
 450 desktop-based integrated desktops and two new base allowance levels are proposed to cover each type.

451 | The result of the base allowances above and the functional adders below are pass rates between 30-44%
452 | in each category in Table 6 above.

453
454

455 **Table 7: Functional Adder Allowances for Desktop, Integrated Desktop, Thin Client, and Notebook**
 456 **Computers**

Function		Desktop	Integrated Desktop	Notebook
TEC_{MEMORY} (kWh)^{iv}			$0.15 \times GB$	$0.12 \times GB$
TEC_{GRAPHICS} (kWh)^{v,vi}			$29.4 \times \tanh(0.008 \times FB_BW - 0.03) + 11 + (0.011 \times FB_BW)$	$14.7 \times \tanh(0.008 \times FB_BW - 0.03) + 5.5 + (0.0055 \times FB_BW)$
TEC_{SWITCHABLE} (kWh)^{vii}			7.0	N/A
TEC_{STORAGE} (kWh)^{viii}	3.5" HDD		12.0	0.8
	2.5" HDD		2.1	
	Hybrid HDD/SSD		0.8	0.4
	SSD (including M.2 port solutions)		0.4	
TEC_{INT_DISPLAY} (kWh)^{ix}	$A < 190$	N/A	$[(3.43 \times r) + (0.148 \times A) + 1.30] \times (1 + EP + T)$	$8.76 \times 0.20 \times (1 + EP + T) \times (0.43 \times r + 0.0263 \times A)$
	$190 \leq A < 210$		$[(3.43 \times r) + (0.018 \times A) + 26.1] \times (1 + EP + T)$	
	$210 \leq A < 315$		$[(3.43 \times r) + (0.078 \times A) + 13.2] \times (1 + EP + T)$	
	$A \geq 315$		$[(3.43 \times r) + (0.156 \times A) - 11.3] \times (1 + EP + T)$	
TEC_{MOBILEWORKSTATION} (kWh)^x			N/A	4.4
TEC_{>1G to <10GLAN} (kWh)^{xi}			4.0	N/A
TEC_{10GLAN} (kWh)^{xii}			18.0	N/A
TEC_{MUX} (kWh)^{xiii}		N/A	12.2	5.2
TEC_{RUGGED} (kWh)^{xiv}			N/A	5.6

457

iv **TEC_{MEMORY} Adder:** GB applies per GB installed in the system.

v **TEC_{GRAPHICS} Adder:** Applies to only the first dGfx installed in the system, but not Switchable Graphics.

vi **FB_BW:** Is the display frame buffer bandwidth in gigabytes per second (GB/s). This is a manufacturer declared parameter and should be calculated as follows: (Data Rate [Mhz] × Frame Buffer Data Width [bits]) / (8 × 1000)

vii **TEC_{SWITCHABLE} Incentive:** Applies to automated switching that is enabled by default in Desktops and Integrated Desktops.

viii **TEC_{STORAGE} Adder:** Applies once if system has an Additional Internal Storage device.

ix **TEC_{INT_DISPLAY} Adder:** EP is the Enhanced Performance Display allowance calculated per Equation 3; T is touch functionality calculated per Equation 4; r is the Screen resolution in megapixels; and A is viewable screen area in square inches. This adder may be applied for each display if there are multiple displays in the system which are enabled as-shipped and in testing.

x **TEC_{MOBILEWORKSTATION} Adder:** Applies once if the system meets the full Mobile Workstation definition in Section 1.

xi **TEC_{>1G to <10GLAN} Adder:** Applies once if system contains an Ethernet port with rated throughput greater than 1Gb/s but less than 10 Gb/s.

xii **TEC_{10GLAN} Adder:** Applies once if the system contains a 10 Gb/s Ethernet port.

xiii **TEC_{MUX}:** Only applies to products with both integrated and discrete graphics that are driven by a MUX device on the motherboard.

xiv **TEC_{RUGGED}:** Applies only to Notebook Computers that meet the Ruggedized Notebook Computer definition.

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Note: As part of the stakeholder feedback on the Draft 2 specification, the EPA has made the following proposed changes to functional adders in Table 7:

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462
463
464

Revisions to existing adders: EPA has modified the memory and storage adders for notebooks, integrated desktops and desktops to balance the proposed changes to the base allowances in Table 6. EPA has also revised the integrated display adders to account for a new touch display adder (*T*) calculated in Equation 4 below. Finally, the EPA has revised the mobile workstation adder to align with the revised notebook base allowance in Table 6.

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Proposed new adders: Based on additional data and justification provided by stakeholders, the EPA is proposing a new functional adder for MUX devices within integrated desktops and notebooks as well as an adder for ruggedized notebooks.

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EPA also received stakeholder feedback to include new functional adders for DP/HDMI technology in integrated desktops and extending the existing $TEC_{>1G\ to\ <10GLAN}$ adder to notebooks, but decided against including these adders as the Agency did not receive sufficient supporting data to justify their inclusion.

471
472

Equation 3: Calculation of Allowance for Enhanced-performance Integrated Displays

473
474

$$EP = 0.3 \text{ for all Enhanced Performance Displays}$$

475
476

Equation 4: Calculation of Allowance for Integrated Displays with Touch Functionality

477

$$T = 0.17 \text{ for all Displays with Touch Functionality}$$

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479
480

Note: Based on stakeholder feedback and supporting data showing the additional energy use of touch functionality in integrated computer displays, the EPA is proposing the touch display adder above which aligns with the ENERGY STAR Version 8 Displays touch functionality adder.

481

3.6 Requirements for Slates/Tablets and Portable All-In-One Computers

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3.6.1 Slates/Tablets and Portable All-In-One Computers shall follow **all** of the requirements for Notebook Computers in Section 3.5 above, including calculations of the following:

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485

i. Calculated Typical Energy Consumption (E_{TEC}), using Equation 1 with the Notebook Computer Mode Weightings from Table 5.

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487
488

ii. Calculated Maximum Allowed Typical Energy Consumption (E_{TEC_MAX}), using Equation 2 with the appropriate base Notebook Computer allowance from Table 6, and applicable Notebook Computer functional adder allowances from Table 7.

489

3.7 Requirements for Workstations

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3.7.1 Weighted power consumption (P_{TEC}) as calculated per Equation 5 shall be less than or equal to the maximum weighted power consumption requirement (P_{TEC_MAX}) as calculated per Equation 6.

493

Equation 5: P_{TEC} Calculation for Workstations

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495

$$P_{TEC} = P_{OFF} \times T_{OFF} + P_{SLEEP} \times T_{SLEEP} + P_{LONG_IDLE} \times T_{LONG_IDLE} + P_{SHORT_IDLE} \times T_{SHORT_IDLE}$$

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Where:

- P_{OFF} = Measured power consumption in Off Mode (W);
- P_{SLEEP} = Measured power consumption in Sleep Mode (W);
- P_{LONG_IDLE} = Measured power consumption in Long Idle Mode (W);
- P_{SHORT_IDLE} = Measured power consumption in Short Idle Mode (W); and
- T_{OFF} , T_{SLEEP} , T_{LONG_IDLE} , and T_{SHORT_IDLE} are mode weightings as specified in Table 8.

505

Table 8: Mode Weightings for Workstations

T_{OFF}	T_{SLEEP}	T_{LONG_IDLE}	T_{SHORT_IDLE}
10%	35%	20%	35%

506

507

Equation 6: P_{TEC_MAX} Calculation for Workstations

$$P_{TEC_MAX} = 0.28 \times (P_{MAX} + N_{HDD} \times 5)$$

508

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512

Where:

- P_{MAX} = Measured maximum power consumption (W)
- N_{HDD} = Number of installed hard disk drives (HDD) or solid-state drives (SSD)

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514

3.7.2 **Active State Benchmark:** To be ENERGY STAR certified, a Workstation must be submitted for certification with the following information disclosed in full:

515
516

i. LINPAC benchmark test results, compiler optimizations, and total energy consumed over the duration of the test; and

517
518

ii. SPECviewperf benchmark test results, configuration options, total duration of the test, and total energy consumed over the duration of the test.

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3.7.3 **Desktop Workstations:** Products marketed as workstations may be ENERGY STAR certified under the Desktop requirements in Section 3.5 instead of the Workstation requirements in Section 3.7, at the Partner’s option. EPA will identify Workstations certified as Desktops as “Desktops” in all ENERGY STAR marketing materials, on certified product lists, etc.

523 3.8 Requirements for Thin Clients

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525
526

3.8.1 Calculated Typical Energy Consumption (E_{TEC}) per Equation 1 shall be less than or equal to the Maximum TEC Requirement (E_{TEC_MAX}), as calculated per Equation 7, subject to the following requirements.

527

i. Allowances can only be applied if the corresponding adders are enabled by default.

528

ii. Thin Clients shall utilize the mode weightings in Table 9 when calculating E_{TEC} .

529

iii. For Thin Clients that lack a discrete System Sleep Mode, Long Idle State power (P_{LONG_IDLE}) may be used in place of Sleep Mode Power (P_{SLEEP}) in Equation 1 so long as the system meets the Thin Client TEC allowance. In such instances, ($P_{SLEEP} \times T_{SLEEP}$), is replaced by ($P_{LONG_IDLE} \times T_{SLEEP}$); Equation 1 remains otherwise unchanged.

530

531

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534

Table 9: Mode Weightings for Thin Clients

T_{OFF}	T_{SLEEP}	T_{LONG_IDLE}	T_{SHORT_IDLE}
45%	5%	15%	35%

535 **Equation 7: Calculation of E_{TEC_MAX} for Thin Clients**

536
$$E_{TEC_MAX} = TEC_{BASE} + TEC_{GRAPHICS} + TEC_{WOL} + TEC_{INT_DISPLAY}$$

537 *Where:*

- 538 ▪ *TEC_{BASE} is the Base Allowance specified in Table*
- 539 *Table 11;*
- 540 ▪ *TEC_{GRAPHICS} is the Discrete Graphics allowance specified in*
- 541 *Table 11 if applicable;*
- 542 ▪ *TEC_{WOL} is the Wake-on-LAN allowance specified in Table*
- 543 *Table 11 if applicable;*
- 544 ▪ *TEC_{INT_DISPLAY} is the Integrated Display allowance for Integrated*
- 545 *Desktops specified in Table 7 if applicable; and*

546 **Table 11: Adder Allowances for Thin Clients**

Adder	Allowance (kWh)
TEC _{BASE}	31
TEC _{GRAPHICS}	36
TEC _{WOL}	2

547
548
549 **Note:** Products intended for sale in the US market are subject to minimum toxicity and recyclability
550 requirements. Please see ENERGY STAR® Program Requirements for Computers: Partner Commitments
551 for details.

552 **4 TESTING**

553 **4.1 Test Methods**

554 4.1.1 When testing Computer products, the test methods identified in Table 12 shall be used to
555 determine ENERGY STAR certification.

556 **Table 12: Test Methods for ENERGY STAR Certification**

Product Type or Component	Test Method
All	ENERGY STAR Test Method for Computers, Rev. November 2024

557 **Note:** The EPA received feedback on updating the existing ENERGY STAR Test Method for Computers
558 to reference the latest IEC 62623:2022 edition. Given that this specification revision is in the Final Draft
559 stage, EPA has decided to delay this update until a future revision. EPA, in conjunction with the
560 Department of Energy, will consider if this update may be made as an updated test method reference or
561 as part of a Version 10 revision.

562
563 EPA also updated the test method reference to allow manufacturers to test with a recommended adaptor
564 rather than an in-box adaptor for adaptors larger than 30W for slates and tablets.

565 **4.2 Number of Units Required for Testing**

566 4.2.1 Representative Models shall be selected for testing per the following requirements:

- 567 i. For certification of an individual product configuration, the unique configuration that is
568 intended to be marketed and labeled as ENERGY STAR is considered the Representative
569 Model.
- 570 ii. For certification of a Product Family of all product types, with the exception of Workstations,
571 product configurations that represent the worst-case power consumption for each product
572 category within the family are considered Representative Models. When submitting Product
573 Families, manufacturers continue to be held accountable for any efficiency claims made
574 about their products, including those not tested or for which data were not reported. This
575 includes ensuring that all models shipped as ENERGY STAR certified within the product
576 family maintain the same power management settings when testing the Representative
577 Model(s).

578 4.2.2 Note: EPA has removed the language which was previously labeled subsection 4.2.1.iii from
579 Version 8 which covered systems that met multiple performance categories and how those
580 should be tested and certified, as EPA has proposed the removal of performance categories in
581 the Version 9 specification. For certification of a Product Family of Workstations under the
582 Workstation or Desktop product type, the product configuration that represents the worst-case
583 power consumption with a single GPU within the family is considered the Representative Model.

584
585 Note: Workstations that meet ENERGY STAR requirements with a single graphics device may
586 also have a configuration with more than one graphics device be ENERGY STAR certified,
587 provided the additional hardware configuration is identical with the exception of the additional
588 graphics device(s). The use of multiple graphics includes, but is not limited to, driving multiple
589 displays and ganging for high performance, multi-GPU configurations (e.g. ATI Crossfire, NVIDIA
590 SLI). In such cases, and until such time as SPECviewperf® supports multiple graphics threads,
591 manufacturers may submit the test data for the workstation with the single graphics device for
592 both configurations without retesting the system

593 4.2.3 A single unit of each Representative Model shall be selected for testing.

594 4.2.4 All units/configurations for which a Partner is seeking ENERGY STAR certification, must meet the
595 ENERGY STAR requirements. However, if a Partner wishes to certify configurations of a model
596 for which non-ENERGY STAR certified alternative configurations exist, the Partner must assign
597 the certified configurations an identifier in the model name/number that is unique to ENERGY
598 STAR certified configurations. This identifier must be used consistently in association with the
599 certified configurations in marketing/sales materials and on the ENERGY STAR list of certified
600 products (e.g. model A1234 for baseline configurations and A1234-ES for ENERGY STAR
601 certified configurations).

602 **Note:** There may be cases—as described in the paragraph above—where not all
603 units/configurations will meet ENERGY STAR requirements. If so, the worst-case configuration
604 for test will be the worst-case certified configuration, and not one of the presumably even higher-
605 energy consuming non-certified configurations.

606 4.3 International Market Certification

607 4.3.1 Products shall be tested for certification at the relevant input voltage/frequency combination for
608 each market in which they will be sold and promoted as ENERGY STAR.

609 **Note:** Partner must ensure that all configurations certified as ENERGY STAR continue to meet
610 the certification criteria through subsequent firmware, software, or other changes to the certified
611 product.

612 4.4 Customer Software and Management Service Pre-Provisioning

613 4.4.1 If a manufacturing Partner is hired by a customer to load a custom image on an ENERGY STAR
614 certified computer, the Partner shall take the following steps:

- 615 i. Inform the customer that their product may not meet ENERGY STAR with the custom image.
616 A sample notification letter is available on the ENERGY STAR Web site.

- 617 ii. Encourage the customer to test the product for ENERGY STAR compliance.
- 618 iii. Encourage the customer, should the product no longer meet ENERGY STAR, to make use of
- 619 EPA's free technical assistance that can assist with Power Management performance, which
- 620 can be found at www.energystar.gov/fedofficeenergy.

621 **5 USER INTERFACE**

- 622 5.1.1 Manufacturers are encouraged to design products in accordance with the user interface standard
- 623 IEEE 1621: Standard for User Interface Elements in Power Control of Electronic Devices
- 624 Employed in Office/Consumer Environments. For details, see <http://eetd.LBL.gov/Controls>.

625 **6 EFFECTIVE DATE**

- 626 6.1.1 Effective Date: The Version 9 ENERGY STAR Computers specification shall take effect on
- 627 October 27, 2025. To be ENERGY STAR certified, a product model shall meet the ENERGY
- 628 STAR specification in effect on its date of manufacture. The date of manufacture is specific to
- 629 each unit and is the date on which a unit is considered to be completely assembled.

630 **Note:** The EPA intends to finalize the Version 9 specification in mid-January 2025 with an effective date

631 of October 27, 2025.

- 632 6.1.2 Future Specification Revisions: EPA reserves the right to change this specification should
- 633 technological and/or market changes affect its usefulness to consumers, industry, or the
- 634 environment. In keeping with current policy, revisions to the specification are arrived at through
- 635 stakeholder discussions. In the event of a specification revision, please note that the ENERGY
- 636 STAR certification is not automatically granted for the life of a product model.

637 **7 CONSIDERATIONS FOR FUTURE REVISIONS**

- 638 7.1.1 **Active Mode**: EPA will continue to monitor developments in test methodology that addresses
- 639 active mode, where the computer is actively performing tasks, and assess whether these
- 640 measurements warrant inclusion into the ENERGY STAR Computers specification.