



ITI Thin Client Request for ENERGY STAR Computers Version 7.0 Draft 1

As we discussed in Ver. 7.0 “Draft #1”, there was confusion as to the Adders that should be applied to Desktop Thin Clients. And there is still uncertainty as to the Adder Values that can be applied. Examples where clarity is required include:

In Draft #1 Table #10 there is a 36 kWh Adder specified for $TEC_{GRAPHICS}$ and Table #8 specifies 7 each Adders for $TEC_{GRAPHICS}$ (beginning with 36 kWh for G1 up to 130 kWh for G7). Given the significant reduction in the BASE TEC limit for Desktop Thin Clients of 31 kWh, Thin Client manufacturers will need the flexibility provided in Table #8 enabling use of the applicable $TEC_{GRAPHICS}$ Adders (beginning with 36 kWh for G1 up to 130 kWh for G7).

The Equation 6: Calculation of E_{TEC_MAX} for Thin Clients does not include a TEC Adder for Memory. And given the significant reduction in the BASE TEC limit for Desktop Thin Clients of 31 kWh, Thin Client manufacturers will need the 0.8 kWh per GB of installed Memory.

The list of Functional Adders in Table #8 does not include the 2 kWh Adder for TEC WOL. However as discussed and given the significant reduction in the BASE TEC limit for Desktop Thin Clients, the 2 kWh Adder for TEC WOL is definitely required.

Additionally adders for Thin Clients do not include an Adder for Fiber Optic Network Interface Controller (NIC). Fiber Optic NICs are required by many Government and Commercial customers for security purposes. And as we have noted in previous discussions with EPA Fiber Optic NICs require additional power to provide this capability. Given the significant reduction in the BASE TEC limit for Desktop Thin Clients of 31 kWh, Thin Client manufacturers will need an additional adder for Thin Clients configured with a Fiber Optic NICs. We are proposing that the adder for Thin Clients configured with a Fiber Optic NIC be set at 20 kWh.

Given the issues outlined above, we propose that the Base TEC value for Thin Clients be increased from the proposed value of 31 kWh to 35 kWh, adding an adder of 20 kWh for Fiber Optic NICs, and confirmation of the adders that can be applied for Desktop Thin Clients. Consistent with this request, we have revised EPA’s Draft #1 to identify the energy efficiency requirements that we believe should apply to Thin Clients in the Ver. 7.0 Computer Program Requirements (changes to Draft #1 are highlighted in red text below).

Request: Please confirm that the above summary accurately reflects the energy efficiency requirements for Thin Clients for the Ver. 7.0 Computer Program Requirements.

Once EPA has confirmed the energy efficiency requirements that should be used for Thin Clients, we will provide EPA with an assessment of the impact to Thin Clients on the market.

Energy Efficiency Requirements for Thin Clients (with required edits in red text):

Equation 2: E_{TEC_MAX} Calculation for Desktop, Integrated Desktop, Thin Clients, Integrated Thin Clients, and Notebook Computers

$$E_{TEC_MAX} = (1 + ALLOWANCE_{PSU}) \times (TEC_{BASE} + TEC_{MEMORY} + TEC_{GRAPHICS} + TEC_{STORAGE} + TEC_{INT_DISPLAY} + TEC_{SWITCHABLE} + TEC_{EEE})$$



Where:

- $ALLOWANCE_{PSU}$ is an allowance provided to power supplies that meet the optional more stringent efficiency levels specified in Table 5; power supplies that do not meet the requirements receive an allowance of 0;
- TEC_{BASE} is the Base allowance specified in Table 6, ~~or~~ Table 7, or Table 10; and,
- $TEC_{GRAPHICS}$ is the discrete graphics allowance as specified in Table 8, with the exception of systems with integrated graphics, which do not receive an allowance, or Desktops and Integrated Desktop, **Thin Clients**, or **Integrated Thin Clients** with switchable graphics enabled by default, which receive an allowance through $TEC_{SWITCHABLE}$; and
- TEC_{MEMORY} , $TEC_{STORAGE}$, $TEC_{INT_DISPLAY}$, $TEC_{SWITCHABLE}$, and TEC_{EEE} are adder allowances as specified in Table 8.

Table 8: Functional Adder Allowances for Desktop, Integrated Desktop, Thin Client, **Mobile Thin Client, and Notebook Computers**

Function		Desktop, Integrated Desktop, Thin Client, Integrated Thin Client	Notebook, Mobile Thin Client
TEC_{MEMORY} (kWh) ^{vi}		0.8	0.4
$TEC_{GRAPHICS}$ (kWh) ^{vii}	G1 ($FB_BW \leq 16$)	36	16
	G2 ($16 < FB_BW \leq 32$)	51	20
	G3 ($32 < FB_BW \leq 64$)	64	25
	G4 ($64 < FB_BW \leq 96$)	83	29
	G5 ($96 < FB_BW \leq 128$)	105	35
	G6 ($FB_BW > 128$; Frame Buffer Data Width < 192 bits)	115	44
	G7 ($FB_BW > 128$; Frame Buffer Data Width \geq 192 bits)	130	55
$TEC_{SWITCHABLE}$ (kWh) ^{ix}		$0.5 \times G1$	N/A
TEC_{EEE} (kWh) ^x		$8.76 \times 0.2 \times (0.15 + 0.35)$	N/A
$TEC_{STORAGE}$ (kWh) ^{xi}		26	2.6
$TEC_{INT_DISPLAY}$ (kWh) ^{xii}		$8.76 \times 0.35 \times (1+EP) \times (4xr + 0.05xA)$	$8.76 \times 0.30 \times (1+0.4xEP) \times (0.43xr + 0.0263xA)$



- vi TEC_{MEMORY} Adder: Applies per GB installed in the system.
- vii $TEC_{GRAPHICS}$ Adder: Applies to only the first dGfx installed in the system, but not Switchable Graphics.
- viii 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] \times Frame Buffer Data Width [bits]) / (8 \times 1000)
- ix $TEC_{SWITCHABLE}$ Incentive: Applies to automated switching that is enabled by default in Desktops and Integrated Desktops.
- x TEC_{EEE} : Applies per IEEE 802.3az-compliant (Energy Efficient Ethernet) Gigabit Ethernet port.
- xi $TEC_{STORAGE}$ Adder: Applies once if system has more than one Additional Internal Storage element.
- xii $TEC_{INT_DISPLAY}$ Adder: EP is the Enhanced Performance Display allowance calculated per Equation 3; r is the Screen resolution in megapixels; and A is viewable screen area in square inches.

3.9 Requirements for Thin Clients

3.9.1 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 6, subject to the following requirements.

- i. Allowances can only be applied if the corresponding adders are enabled by default.
- ii. Thin Clients can utilize the proxy weightings in Table 3 when calculating E_{TEC} .
- 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, ($P_{SLEEP} \times$), is replaced by ($P_{LONG_IDLE} \times T_{SLEEP}$); Equation 1 remains otherwise unchanged.

Equation 6: Calculation of E_{TEC_MAX} for Thin Clients

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

$$E_{TEC_MAX} = (1 + ALLOWANCE_{PSU}) \times (TEC_{BASE} + TEC_{MEMORY} + TEC_{GRAPHICS} + TEC_{STORAGE} + TEC_{INT_DISPLAY} + TEC_{SWITCHABLE} + TEC_{EEE} + TEC_{WOL})$$

Where:

- TEC_{BASE} is the Base Allowance specified in Table ;
- $TEC_{GRAPHICS}$ is the Discrete Graphics allowance specified in Table 10 8 if applicable;
- TEC_{WOL} is the Wake-on-LAN allowance specified in Table 10 if applicable;



- *TEC_{INT_DISPLAY} is the Integrated Display allowance for Integrated Desktops specified in Table 8 if applicable; and*
- *TEC_{EEE} is the Energy Efficiency Ethernet incentive for Desktops specified in Table 8 if applicable, per IEEE 802.3az-compliant (Energy Efficient Ethernet) Gigabit Ethernet port.*

Table 10: Adder Allowances for Thin Clients

Adder	Allowance (kWh)
TEC_{BASE}	35
TEC_{WOL}	2
Fiber Optics NIC	20