

## Annex 2

# Working Document on Ecodesign Requirements for Computers

## Chapter 1 Subject Matter and Scope

1. This Regulation establishes ecodesign requirements for computers.
2. The scope of this Implementing Measure covers:
  - Desktop computers
  - Notebook computers
  - Integrated Desktop computers
  - Workstations
  - Thin clients

**Explanatory notes:** Whilst the preparatory study did not include Work Stations and Thin clients it is proposed to include these products in the scope of the regulation as it is possible that these may transition to the domestic sector over the coming years, and applicable criteria exist under the ENERGY STAR programme.

## Chapter 2 Definitions

The following definitions shall apply:

1. “Computer” means a device which performs logical operations and processes data. Computers are composed of, at a minimum: (1) a central processing unit (CPU) to perform operations; (2) user input devices such as a keyboard, mouse, digitizer or game controller; and (3) a computer monitor screen to output information. For the purposes of this measure, computers include both stationary and portable units, including Desktop computers, integrated Desktop computers, Notebook computers, thin clients, and workstations. Although computers must be capable of using input devices and computer displays, as noted in numbers 2 and 3 above, computer systems do not need to include these devices on shipment to meet this definition.

2. “Computer Monitor” means a commercially-available, electronic product with a display screen and its associated electronics encased in a single housing that is capable of displaying output information from a computer via one or more inputs, such as VGA, DVI and/or IEEE 1394. The computer monitor must be capable of being powered by a separate AC wall outlet or a battery unit that is sold with an AC adapter. This definition is intended to cover standard monitors designed for use with computers with a viewable diagonal screen size greater than 30.5cm (12 inches) but not exceeding 76.2cm (30 inches).
3. “Desktop Computer” means a computer where the main unit is intended to be located in a permanent location, often on a desk or on the floor. Desktops are not designed for portability and utilize an external computer display, keyboard, and mouse. Desktops are designed for a broad range of home and office applications.
4. “Integrated Desktop Computer” means a Desktop system in which the computer and computer display function as a single unit which receives its ac power through a single cable. Integrated Desktop computers come in one of two possible forms: (1) a system where the computer display and computer are physically combined into a single unit; or (2) a system packaged as a single system where the computer display is separate but is connected to the main chassis by a dc power cord and both the computer and computer display are powered from a single power supply. As a subset of Desktop computers, integrated Desktop computers are typically designed to provide similar functionality as Desktop systems.
5. “Notebook Computer”, sometimes referred to as a “laptop”, means a computer designed specifically for portability and to be operated for extended periods of time either with or without a direct connection to an ac power source. Notebooks must utilize an integrated computer display and be capable of operation off of an integrated battery or other portable power source. In addition, most Notebooks use an external power supply and have an integrated keyboard and pointing device. Notebook computers are typically designed to provide similar functionality to Desktops, including operation of software similar in functionality as that used in Desktops. Docking stations are considered accessories and their power consumption is not considered under these requirements. Tablet PCs, which may use touch-sensitive screens along with or instead of other input devices, are considered Notebook Computers.
6. “Thin Client” means an independently-powered computer that relies on a connection to remote computing resources to obtain primary functionality. Main computing (e.g., programme execution, data storage, interaction with other Internet resources, etc.) takes place using the remote computing resources. Thin Clients covered by these requirements are limited to devices with no rotational storage media integral to the computer. The main unit of a Thin Client covered by this specification must be intended for location in a permanent location (e.g. on a desk) and not for portability.

7. “Workstation” means a high-performance, single-user computer typically used for graphics, CAD, software development, financial and scientific applications among other compute intensive tasks. To be considered a workstation, a computer must:
  - Be marketed as a workstation;
  - Have a mean time between failures (MTBF) of at least 15,000 hours based on either Bellcore TR-NWT-000332, issue 6, 12/97 or field collected data; and
  - Support error-correcting code (ECC) and/or buffered memory.
  - In addition, a workstation must meet three of the following six optional characteristics:
    - Have supplemental power support for high-end graphics (i.e., PCI-E 6-pin 12V supplemental power feed);
    - System is wired for greater than x4 PCI-E on the motherboard in addition to the graphics slot(s) and/or PCI-X support;
    - Does not support Uniform Memory Access (UMA) graphics;
    - Includes 5 or more PCI, PCIe or PCI-X slots;
    - Capable of multi-processor support for two or more processors (must support physically separate processor packages/sockets, i.e., not met with support for a single multi core processor); and/or
    - Be qualified by at least 2 Independent Software Vendor (ISV) product certifications; these certifications can be in process, but must be completed within 3 months of qualification.
8. “Discrete Graphics Processing Unit (GPU)” means a graphics processor with a local memory controller interface and a local, graphics-specific memory.
9. “Internal Power Supply” means a component internal to the computer casing and designed to convert ac voltage from the mains to dc voltage(s) for the purpose of powering the computer components. For the purposes of these requirements, an internal power supply must be contained within the computer casing but be separate from the main computer board. The power supply must connect to the mains through a single cable with no intermediate circuitry between the power supply and the mains power. In addition, all power connections from the power supply to the computer components, with the exception of a DC connection to a computer display in an Integrated Desktop Computer, must be internal to the computer casing (i.e, no external cables running from the power supply to the computer or individual components). Internal dc-to-dc converters used to convert a single dc voltage from an external power supply into multiple voltages for use by the computer are not considered internal power supplies.
10. "External Power Supply" is defined as in Commission Regulation (EC) No 278/2009
11. “Wake Event” means a user, scheduled, or external event or stimulus that causes the computer to transition from Sleep or Off to active mode of operation. Examples of wake events include, but are not limited to: movement of the mouse, keyboard activity, controller input, real-time clock event, or a button press on the chassis, and

in the case of external events, stimulus conveyed via a remote control, network, modem, etc.

12. “Wake On LAN (WOL)” means functionality which allows a computer to wake from Sleep or Off when directed by a network request via Ethernet (a network interface, see IEEE 802.3).
13. “Off Mode” means the power consumption level in the lowest power mode which cannot be switched off (influenced) by the user and that may persist for an indefinite time when the appliance is connected to the main electricity supply and used in accordance with the manufacturer’s instructions. For systems where ACPI standards are applicable, Off Mode correlates to ACPI System Level S5 state.
14. “Sleep Mode” means a low power state that the computer is capable of entering automatically after a period of inactivity or by manual selection. A computer with sleep capability can quickly “wake” in response to network connections or user interface devices with a latency of  $\leq 5$  seconds from initiation of wake event to system becoming fully usable including rendering of display. For systems where ACPI standards are applicable, Sleep mode most commonly correlates to ACPI System Level S3 (suspend to RAM) state.
15. “Idle State” means a state in which the operating system and other software have completed loading, a user profile has been created, the machine is not asleep, and activity is limited to those basic applications that the system starts by default.
16. “Typical Energy Consumption (TEC)” means a method of testing and comparing the energy performance of computers, which focuses on the typical electricity consumed by a product while in normal operation during a representative period of time. For Desktop computers and Notebook computers, the key criterion of the TEC approach is a value for typical annual electricity use, measured in kilowatt-hours (kWh), using measurements of average operational mode power levels scaled by an assumed typical usage model (duty cycle). For Workstations, requirements are based on a TEC power value calculated from operational mode power levels, maximum power, and an assumed duty cycle.

**Explanatory notes:** The definitions are based on ENERGY STAR albeit with certain adjustments, including the following:

- Small-scale servers and game consoles are excluded from the scope. This are dealt with in the framework of a dedicated preparatory study.

### **Chapter 3**

#### **Ecodesign Requirements**

Computers shall meet the ecodesign requirements set out in Annex I. Compliance with the ecodesign requirements shall be measured in accordance with the methods set out in Annex II.

#### **Chapter 4**

##### **Amendment to Regulation (EC) No 1275/2008**

Annex I, point 2 to Regulation (EC) No 1275/2008 is replaced by the text set out in Annex IV to this Regulation.

**Explanatory notes:** In line with the approach taken in the case of Regulation (EC) No 642/2009 it is proposed to take out the subject matter of this Regulation from the scope of the 'Standby Regulation' and rewrite the applicable requirements related to off mode in the specific Regulation applying to this particular product group. Standby mode requirements, as defined in the 'Standby Regulation' are replaced by requirements focusing only on off mode. It is proposed not to change the off mode requirements, except for an additional allowance for the WOL function, if the products is shipped with WOL enabled.

#### **Chapter 5**

##### **Conformity assessment**

The conformity assessment procedure referred to in Article 8 of Directive 2005/32/EC shall be the internal design control system set out in Annex IV of that Directive or the management system for assessing conformity set out in Annex V of that Directive.

#### **Chapter 6**

##### **Verification procedure for market surveillance purposes**

Surveillance checks shall be carried out in accordance with the verification procedure set out in Annex II.

#### **Chapter 7**

##### **Revision**

No later than 5 years after the entry into force of this Regulation the Commission shall review it in the light of technological progress and present the result of this review to the Consultation Forum.

#### **Chapter 8**

## Entry into force

This Regulation shall enter into force on the twentieth day following that of its publication in the Official Journal of the European Union.

Points 3(a), 3(b) and 3(c) of Annex I shall apply as from the date referred to in the first paragraph.

Points 1(a), 1(c), 2(a) and 2(b) of Annex I shall apply as from 6 months after the date referred to in the first paragraph and until Points 1(b) and 1(d) of Annex I start to apply.

Points 3(a), 4(a) 6(a), 6(b), 7 (a), 7(c), 7(e)and 7(g) of Annex I shall apply as from 6 months after the date referred to in the first paragraph.

Points 3(d), 3(e), 3(f) and 6(c) of Annex I shall apply as from 07 January 2013.

Points 1(b), 1(d), 7(b), and 7(d) of Annex I shall apply as from 31 January 2013.

Points 1(e), 1(f), 2(c), 7(f) and 7(h) of Annex I shall apply as from 31 January 2014.

This Regulation shall be binding in its entirety and directly applicable in all Member States.

**Explanatory notes:** Since the first tier requirements are based on the 'mode' approach and the second tier on TEC it is necessary to indicate that the first tier will cease to apply once the second tier begins. Otherwise products would have to comply with both and the benefits of TEC could not be realised. The timing for the introduction of requirements was chosen with the aim of taking off the market the least performing products and was based on the forecast of compliance rates with the ENERGY STAR programme (scenario without an Ecodesign measure) shown below:

	Tier I	Tier II
	ENERGY STAR Computers v4.0	ENERGY STAR Computers v5.0
Computer Product	Jan-11	Jan-13
All Computers	89%	95%
Notebook All	74%	79%
Notebook Category A	95%	95%
Notebook Category B	66%	76%
Notebook Category C	66%	67%
Desktop All	95%	95%
Desktop Category A	89%	89%
Desktop Category B	95%	95%
Desktop Category C	95%	95%
Desktop Category D	89%	91%

## Chapter 9 Benchmarks

The best current performances of computers on the market for each power mode (per category) are shown in the table below:

		<b>Idle Mode</b>	<b>Sleep Mode</b>	<b>Off Mode</b>	<b>TEC</b>	
		<b>(W)</b>	<b>(W)</b>	<b>(W)</b>	<b>(kWh/year)</b>	
Desktop Computer	Category A	9.6	0.6	0.7	39.5	
	Category B	17.5	1.5	0.7	68.2	
	Category C	38.9	1.9	0.9	144.7	
	Category D	27.2	2.0	0.0	109.2	
Notebook Computer	Category A	4.2	0.7	0.4	13.8	
	Category B	9.8	1.0	0.5	30.3	
	Category C	16.2	1.9	0.9	49.2	
Integrated Computer	Category A	27.9	1.0	1.3	104.4	
	Category B	44.9	2.3	1.5	165.6	
	Category C	<i>n/d</i>	<i>n/d</i>	<i>n/d</i>	<i>n/d</i>	
	Category D	34.4	1.4	0.8	125.0	
Thin Client	Category A	<i>n/d</i>	<i>n/d</i>	<i>n/d</i>	--	
	Category B	<i>n/d</i>	<i>n/d</i>	<i>n/d</i>	--	
					<b>P TEC</b>	<b>P Max</b>
					<b>(W)</b>	<b>(W)</b>
Workstation		60.6	3.2	1.4	43.0	187.4

**Explanatory notes:** These values were taken from the EU ENERGY STAR database between 4<sup>th</sup> and 27th August 2009. At this point, there were no Category C Integrated Computers or Thin Clients registered on the database.

## ANNEX I

### Ecodesign requirements

Please see Annex 3 for category definitions used for determining on mode and TEC requirements.

	<b>Tier 1</b>	<b>Tier II</b>
<b>1. IDLE STATE / TEC</b>		
Desktop and integrated Desktop computer	<p>a) 6 months after this Regulation has come into force:</p> <p>The idle power consumption shall not exceed:</p> <ul style="list-style-type: none"> <li>• Category A = 50.00 W</li> <li>• Category B = 65.00 W</li> <li>• Category C = 95.00 W</li> </ul>	<p>b) By 31 January 2013:</p> <p>The TEC (kWh/y) shall not exceed:</p> <ul style="list-style-type: none"> <li>• Category A = 148.00</li> <li>• Category B = 175.00</li> <li>• Category C = 209.00</li> <li>• Category D = 234.00</li> </ul> <p>Where TEC (E<sub>TEC</sub>) in units of kWh, representing annual energy consumption, is determined using the formula below:  <b>E<sub>TEC</sub> = (8760/1000) * (0.55*P<sub>off</sub> + 0.05*P<sub>sleep</sub> + 0.40*P<sub>idle</sub>)</b>                      where all P<sub>x</sub> are power values in watts.</p> <p>The following Capability Adjustments apply:</p> <ul style="list-style-type: none"> <li>• Memory                             <ul style="list-style-type: none"> <li>○ 1 kWh per GB over base, where base memory is:                                     <ul style="list-style-type: none"> <li>○ Category A/B/C = 2 GB</li> <li>○ Category D = 4 GB</li> </ul> </li> </ul> </li> <li>• Premium Graphics (for Discrete GPUs with specified Frame Buffer Widths)                             <ul style="list-style-type: none"> <li>○ Category A/B (FB Width ≤ 128-bit) = 35 kWh</li> <li>○ Category A/B/C/D (FB Width &gt; 128-bit) = 50 kWh</li> </ul> </li> <li>• Additional Internal Storage                             <ul style="list-style-type: none"> <li>○ 25 kWh</li> </ul> </li> </ul>

Notebook computer	<p>c) 6 months after this Regulation has come into force:</p> <p>The idle power consumption shall not exceed:</p> <ul style="list-style-type: none"> <li>• Category A: = 14.00 W</li> <li>• Category B: = 22.00 W</li> <li>• Category C: = 31.00 W</li> </ul> <p>This is in line with ENERGY STAR Computers v4.0 requirements for idle state, but with additional Category C.</p>	<p>d) By 31 January 2013:</p> <p>The TEC (kWh/y) shall not exceed:</p> <ul style="list-style-type: none"> <li>• Category A: = 40.00</li> <li>• Category B: = 53.00</li> <li>• Category C: = 88.50</li> </ul> <p>Where TEC (<math>E_{TEC}</math>) in units of kWh, representing annual energy consumption, is determined using the formula below:  <b><math>E_{TEC} = (8760/1000) * (0.60 P_{off} + 0.10 P_{sleep} + 0.30 P_{idle})</math></b>  where all <math>P_x</math> are power values in watts.</p> <p>The following Capability Adjustments apply:</p> <ul style="list-style-type: none"> <li>• Memory <ul style="list-style-type: none"> <li>○ 0.4 kWh (per GB, over 4 GB)</li> </ul> </li> <li>• Premium Graphics (for Discrete GPUs with specified Frame Buffer Widths) <ul style="list-style-type: none"> <li>○ Category B (FB Width &gt; 64-bit): 3 kWh</li> </ul> </li> <li>• Additional Internal Storage <ul style="list-style-type: none"> <li>○ 3 kWh</li> </ul> </li> </ul>
Workstation	none	<p>e) By 31 January 2014:</p> <p>The <math>P_{TEC}</math> (W) shall not exceed:</p> <ul style="list-style-type: none"> <li>• <b><math>P_{TEC} = 0.28 * [P_{max} + (\#HDD * 5)]</math></b>  where all <math>P_x</math> are power values in watts and #HDD = number of hard disk drives, and the <math>P_{TEC}</math> value is determined by:</li> <li>• <math>P_{TEC} = 0.35 * P_{off} + 0.10 * P_{sleep} + 0.55 * P_{idle}</math></li> </ul>
Thin client	none	<p>f) By 31 January 2014:</p>

		<p>The idle power consumption shall not exceed:</p> <ul style="list-style-type: none"> <li>• Category A: = 12.00 W</li> <li>• Category B: = 15.00 W</li> </ul>
<b>2. SLEEP MODE</b>		
Desktop and integrated Desktop computer, and Notebook computer	<p>a) 6 months after this Regulation has come into force:</p> <p>The sleep mode power consumption shall not exceed:</p> <ul style="list-style-type: none"> <li>• 4.00 W</li> </ul> <p>but with an additional allowance of 0.70 W for WOL, where the product is shipped with WOL enabled.</p>	none
Notebook computer	<p>b) 6 months after this Regulation has come into force:</p> <p>The sleep mode power consumption shall not exceed:</p> <ul style="list-style-type: none"> <li>• 1.70 W</li> </ul> <p>but with an additional allowance of 0.70 W for WOL, where the product is shipped with WOL enabled.</p>	none
Workstation	none	none
Thin client	none	<p>c) By 31 January 2014:</p> <p>The sleep mode power consumption shall not exceed:</p> <ul style="list-style-type: none"> <li>• 2.00 W</li> </ul> <p>but with an additional allowance of 0.70 W for WOL, where the product is shipped with WOL enabled.</p>
<b>3. OFF MODE</b>		
All computers	<p>On the day this Regulation comes into force :</p> <p>a) Power consumption in ‘off</p>	<p>By 7 January 2013 :</p> <p>d) Power consumption in ‘off mode’ shall not exceed 0.50 W.</p>

	<p>mode' shall not exceed 1.00 W.</p> <p>b) Equipment shall provide off mode and/or another condition which does not exceed the applicable power consumption requirements for off mode when the equipment is connected to the mains power source.</p> <p>c) Where the product is shipped with WOL enabled, equipment must comply with Point 3.(a) and 3(b) but with an additional allowance of 0.70 W for the WOL.</p>	<p>e) Equipment shall provide off mode and/or another condition which does not exceed the applicable power consumption requirements for off mode when the equipment is connected to the mains power source.</p> <p>f) Where the product is shipped with WOL enabled, equipment must comply with Point 3.2.(a) and 3.2.(b) but with an additional allowance of 0.70 W for the WOL.</p>
<b>4. INTERNAL POWER SUPPLY EFFICIENCY</b>		
All computers	<p>a) 6 months after this Regulation has come into force:</p> <p>All internal power supplies shall not perform at less than:</p> <ul style="list-style-type: none"> <li>• 85% efficiency at 50% of rated output</li> <li>• 82% efficiency at 20% and 100% of rated output</li> <li>• Power Factor = 0.9 at 100% of rated output.</li> </ul>	
<b>5. EXTERNAL POWER SUPPLY EFFICIENCY</b>		
All computers	Where a computer has an external power supply, this must comply with the EuP external power supply Regulation No 278/2009.	
<b>6. POWER MANAGEMENT ENABLING</b>		
All computers excluding thin client	<p>a) 6 months after this Regulation has come into force:</p> <p>Computers shall:</p> <ul style="list-style-type: none"> <li>• Be shipped with a sleep mode which is set to activate within 30 minutes of user inactivity.</li> <li>• Reduce the speed of any active 1 Gb/s Ethernet network links when transitioning to Sleep or Off.</li> </ul>	
All computers	<p>b) 6 months after this Regulation has come into force:</p> <p>Computers with Ethernet</p>	<p>c) By 07 January 2013:</p> <ul style="list-style-type: none"> <li>• When the computer is not providing the main function,</li> </ul>

	<p>capability shall:</p> <ul style="list-style-type: none"> <li>• Have the ability to enable and disable WOL for Sleep mode.</li> <li>• Computers shall also:</li> <li>• Be shipped with the display sleep mode set to activate within 10 minutes of user inactivity.</li> </ul>	<p>or when other energy-using product(s) are not dependent on its functions, it shall offer a power management function, or a similar function, that switches equipment after the shortest possible period of time appropriate for the intended use of the equipment, automatically into:</p> <ul style="list-style-type: none"> <li>• off mode, or</li> <li>• another condition which does not exceed the applicable power consumption requirements for off mode when the equipment is connected to the mains power source.</li> </ul> <p>The power management function shall be activated before delivery.</p>
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**7. INFORMATION REQUIREMENTS**

<p>All computers</p>	<p>a) 6 months after this Regulation has come into force, manufacturers shall report the following additional information, and publish this information in an openly available website and in technical/user documentation provided with the product:</p> <ul style="list-style-type: none"> <li>• Off consumption (Watts)</li> <li>• Internal/external power supply efficiency.</li> </ul>	<p>b) By 31 January 2013, manufacturers shall report the following <u>additional information</u>, and publish this information in an openly available website and in technical/user documentation provided with the product:</p> <ol style="list-style-type: none"> <li>1. User information on the advantages of power management in line with ENERGY STAR v5.0 requirements.</li> </ol>
<p>Desktop computer, integrated Desktop computer, Notebook</p>	<p>c) 6 months after this Regulation has come into force:</p> <ul style="list-style-type: none"> <li>• Idle state consumption (Watts),</li> <li>• Sleep mode consumption (Watts),</li> <li>• Product category.</li> </ul>	<p>d) By 31 January 2013, manufacturers shall report the following <u>additional information</u>, and publish this information in an openly available website and in technical/user documentation provided with the product:</p> <ul style="list-style-type: none"> <li>• TEC value (kWh),</li> </ul>

Workstation	e) As above for all computers	<p>f) By January 2014, manufacturers shall report the following <u>additional information</u>, and publish this information in an openly available website and in technical/user documentation provided with the product:</p> <ul style="list-style-type: none"> <li>• P<sub>TEC</sub> value (kWh)</li> <li>• Max power consumption (Watts)</li> <li>• Idle state power (Watts)</li> <li>• Sleep mode power (Watts)</li> <li>• Off mode power (Watts)</li> </ul>
Thin client	g) As above for all computers	<p>h) By 30 January 2014, manufacturers shall report the following <u>additional information</u>, and publish this information in an openly available website and in technical/user documentation provided with the product:</p> <ul style="list-style-type: none"> <li>• Idle state consumption (Watts),</li> <li>• Sleep mode consumption (Watts).</li> <li>• Product category</li> </ul>

**Explanatory notes:**

**Power consumption requirements:** First stage requirements to be applicable 6 months after the entry into force of the Regulation are in line with ENERGY STAR Computers V 4.0. Second stage requirements to be applicable by 31 January 2013 are in line with ENERGY STAR Computers V 5.0. The following exceptions should be noted:

- For the first stage requirements for notebooks an additional Category C has been added to account for the higher specification products. The definition is based upon ENERGY STAR v5.0. The  $\leq 31W$  idle requirement is derived from the v5.0 TEC Category C requirement) with an additional 5% allowance added to account for the calculated differences in stringency between ENERGY STAR V4.0 and ENERGY STAR V5.0.
- Requirements for thin-clients and work stations enter into force only in one stage in January 2014.
- Requirements for the availability of 'off mode' are harmonised with those laid down in Regulation 1275/2008 with the exception of an additional allowance for WOL. Standby as defined in Regulation 1275/2008 is not relevant for computers.

- Requirements for the efficiency of the internal power supply are based on ENERGY STAR V5.0 for both Tier 1 and 2. Historical performance to more stringent power supply requirements has shown that improvements in power supply efficiency can be achieved very rapidly when specified under ENERGY STAR. This provides the justification for this parameter to be introduced in Tier 1.
- Requirements for the efficiency on the external power supply are based on Regulation No 278/2009.
- Power management requirements for Tier 1 are based on ENERGY STAR V5.0 with one exception – it is proposed to shorten the time for activation of the display sleep mode from 15 to 10 minutes.

**Information requirements:** These are in line with the approach taken in the Ecodesign regulations that were adopted so far and correspond to the requirements of Annex I.

## Annex II

### Measurements and Verification Procedure for Market Surveillance

For the purposes of conformity assessment the following procedures should be used:

<b>Product Type</b>	<b>Measured parameter</b>	<b>Reference</b>
Desktop, Notebook and Integrated Computers	ETEC (from measurements of Off Mode, Sleep Mode, and Idle State)	ENERGY STAR Computer Test Method (Version 5.0), Section III Appendix A
Workstations	PTEC (from measurements of Off Mode, Sleep Mode, Idle State, and Maximum Power)	ENERGY STAR Computer Test Method (Version 5.0), Section III - IV
Thin Clients	Off Mode, Sleep Mode, and Idle State	ENERGY STAR Computer Test Method (Version 5.0) , Section III
All computers	Internal Power Supply Efficiency	Test methods referred to under ENERGY STAR Program Requirements for Computers V5.0
All computers	External Power Supply Efficiency	Regulation No 278/2009 - Ecodesign requirements for no-load condition electric power consumption and average active efficiency of external power supplies

## Verification procedure

When performing the market surveillance checks referred to in Directive 2005/32/EC, Article 3(2), the authorities of the Member State shall apply the following verification procedure for the requirements set out in Annex I :

1. Authorities of the Member State shall test one single unit.  
For power consumption requirements formulated in TEC or larger than 1,00 W, Member State authorities shall test one single unit.
2. The model shall be considered to comply with the applicable provisions set out in Annex I, if the result for the applicable limit values do not exceed them by more than 10 %;
3. If the results referred to in point 2 are not achieved, three additional units of the same model shall be tested.
4. After three additional units of the same model have been tested, the model shall be considered to comply with the requirements set out in Annex I, if the average of the results for the latter three units for the applicable limit values does not exceed them by more than 10 %.
5. If the results referred above are not achieved, the model shall be considered not to comply with the requirements.

For power consumption requirements smaller than, or equal to, 1,00 W, Member State authorities shall test one single unit.

6. The model shall be considered to comply with the applicable provisions set out in Annex I if the results for the applicable limit values do not exceed them by more than 0,10 W.
7. Otherwise, three more units shall be tested. The model shall be considered to comply with this Regulation if the average of the results of the latter three tests for the applicable limit values does not exceed them by more than 0,10 W.
8. Otherwise, the model shall be considered not to comply.
9. For the purposes of checking conformity with the requirements, the authorities of the Member States shall use the procedure set out in Annex II and reliable, accurate and reproducible measurement procedures, which take into account the generally recognised state of the art measurement methods, including methods set in documents the reference numbers of which have been published for that purpose in the *Official Journal of the European Union*. EN 23.7.2009 Official Journal of the European Union L 191/51

**Annex 3**  
**Computer Categories**

**Desktop and  
Integrated Desktop Computers**

Category	Tier I	Tier II
<b>A</b>	All Desktop computers that do not meet the definition of either Category B or Category C below will be considered under Category A.	All Desktop computers and integrated Desktop computers that do not meet the definition of Category B, Category C, or Category D below will be considered under Category A.
<b>B</b>	Desktops must have: <ul style="list-style-type: none"> <li>• Multi-core processor(s) or greater than 1 discrete processor; and</li> <li>• Minimum of 1 gigabyte of system memory.</li> </ul>	Desktop computers and integrated Desktop computers must have: <ul style="list-style-type: none"> <li>• Equal to 2 Physical Cores; and</li> <li>• Greater than or equal to 2 gigabytes (GB) of System Memory.</li> </ul>
<b>C</b>	Desktops must have: <ul style="list-style-type: none"> <li>• Multi-core processor(s) or greater than 1 discrete processor; and</li> <li>• A GPU with greater than 128 megabytes of dedicated, non-shared memory.<sup>1</sup></li> </ul>	Desktop computers and integrated Desktop computers must have: <ul style="list-style-type: none"> <li>• Greater than 2 Physical Cores.</li> <li>• In addition to the requirement above, models must be configured with a minimum of 1 of the following 2 characteristics: <ul style="list-style-type: none"> <li>• Greater than or equal to 2 gigabytes (GB) of System Memory; and/or</li> <li>• A Discrete GPU.</li> </ul> </li> </ul>
<b>D</b>	Not defined	Desktop computers and integrated Desktop computers must have: <ul style="list-style-type: none"> <li>• Greater than or equal to 4 Physical Cores.</li> </ul> In addition to the requirement above, models must be configured with a minimum of 1 of the following 2 characteristics: <ul style="list-style-type: none"> <li>• Greater than or equal to 4</li> </ul>

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<sup>1</sup> Category definitions based on ENERGY STAR Program Requirements for Computers: Version 4.0.

		gigabytes (GB) of System Memory; and/or <ul style="list-style-type: none"> <li>• A Discrete GPU with a Frame Buffer Width greater than 128-bit.</li> </ul>
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### Notebook Computers

Category	Tier I	Tier II
<b>A</b>	All Notebook computers that do not meet the definition of Category B or Category C below will be considered under Category A.	All Notebook computers that do not meet the definition of Category B or Category C below will be considered under Category A.
<b>B</b>	Notebooks must have: <ul style="list-style-type: none"> <li>• A discrete GPU with a Frame Buffer Width greater than 128-bit</li> </ul>	Notebooks must have: <ul style="list-style-type: none"> <li>• A Discrete GPU.</li> </ul>
<b>C</b>	Notebooks must have: <ul style="list-style-type: none"> <li>• Greater than or equal to 2 Physical Cores;</li> <li>• Greater than or equal to 2 gigabytes (GB) of System Memory; and</li> <li>• A Discrete GPU with a Frame Buffer Width greater than 128-bit.</li> </ul>	Notebooks must have: <ul style="list-style-type: none"> <li>• Greater than or equal to 2 Physical Cores;</li> <li>• Greater than or equal to 2 gigabytes (GB) of System Memory; and</li> <li>• A Discrete GPU with a Frame Buffer Width greater than 128-bit.</li> </ul>

### Thin clients

Category	Tier I	Tier II
<b>A</b>	Not defined	All Thin Clients that do not meet the definition of Category B, below, will be considered under Category A.
<b>B</b>	Not defined	Thin Clients must: <ul style="list-style-type: none"> <li>• Support local multimedia encode/decode.</li> </ul>

**List of energy-using products covered by Annex I, point 3 to Regulation (EC) No 1275/2008:**

Information technology equipment intended primarily for use in the domestic environment, but excluding computers as defined in Commission Regulation (EC) No XXX/2010.