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COMMISSION REGULATION (EU) No 617/2013

of 26 June 2013

**implementing Directive 2009/125/EC of the European Parliament and of the Council with regard to
ecodesign requirements for computers and computer servers**

(Text with EEA relevance)

(OJ L 175, 27.6.2013, p. 13)

Amended by:

		Official Journal		
		No	page	date
► <u>M1</u>	Commission Regulation (EU) 2016/2282 of 30 November 2016	L 346	51	20.12.2016
► <u>M2</u>	Commission Regulation (EU) 2019/424 of 15 March 2019	L 74	46	18.3.2019

▼B**COMMISSION REGULATION (EU) No 617/2013****of 26 June 2013****implementing Directive 2009/125/EC of the European Parliament
and of the Council with regard to ecodesign requirements for
computers and computer servers****(Text with EEA relevance)***Article 1***Subject matter and scope****▼M2**

1. This Regulation establishes ecodesign requirements for the placing on the market of computers.

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2. This Regulation shall apply to the following products that can be powered directly from the mains alternating current (AC) including via an external or internal power supply:

- (a) desktop computers;
- (b) integrated desktop computers;
- (c) notebook computers (including tablet computers, slate computers and mobile thin clients);
- (d) desktop thin clients;
- (e) workstations;
- (f) mobile workstations;
- (g) small-scale servers.

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3. This Regulation shall not apply to the following product groups:

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- (e) game consoles;
- (f) docking stations.

*Article 2***Definitions**

The following definitions shall apply:

- (1) ‘Computer’ means a device which performs logical operations and processes data, is capable of using input devices and outputting information to a display, and normally includes a central processing unit (CPU) to perform operations. If no CPU is present, then the device must function as a client gateway to a computer server which acts as a computational processing unit;

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- (3) 'External power supply' means a device which has the following characteristics:
- (a) is designed to convert alternating current (AC) power input from the mains power source input into lower voltage direct current (DC) or AC output;
 - (b) is able to convert to only one DC or AC output voltage at a time;
 - (c) is intended to be used with a separate device that constitutes the primary load;
 - (d) is contained in a physical enclosure separate from the device that constitutes the primary load;
 - (e) is connected to the device that constitutes the primary load via a removable or hard-wired male/female electrical connection, cable, cord or other wiring; and
 - (f) has nameplate output power not exceeding 250 Watts;

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- (4) 'Internal power supply' means a component designed to convert AC voltage from the mains to DC voltage(s) for the purpose of powering the computer and has the following characteristics:
- (a) is contained within the computer casing but is separate from the main computer board;
 - (b) the power supply connects to the mains through a single cable with no intermediate circuitry between the power supply and the mains power; and
 - (c) all power connections from the power supply to the computer components, with the exception of a DC connection to a display in an integrated desktop computer, are internal to the computer casing.

Internal DC-to-DC converters used to convert a single DC voltage from an external power supply into multiple voltages for use by a computer are not considered internal power supplies;

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- (5) 'Desktop computer' means a computer where the main unit is intended to be located in a permanent location and is not designed for portability and which is designed for use with an external display and external peripherals such as a keyboard and mouse.

The following categories of desktop computers are defined for the purposes of this Regulation:

- (a) 'Category A' desktop computer means a desktop computer that does not meet the definition of Category B, Category C or Category D desktop computer;
- (b) 'Category B' desktop computer means a desktop computer with:

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- (i) two physical cores within the CPU; and
 - (ii) a minimum of two gigabytes (GB) of system memory;
- (c) ‘Category C’ desktop computer means a desktop computer with:
- (i) three or more physical cores within the CPU; and
 - (ii) a configuration of a minimum of one of the following two characteristics:
 - a minimum of two gigabytes (GB) of system memory, and/or
 - a discrete graphics card (dGfx);
- (d) ‘Category D’ desktop computer means a desktop computer with:
- (i) a minimum four physical cores in the CPU; and
 - (ii) a configuration of a minimum of one of the following two characteristics:
 - a minimum of four gigabytes (GB) of system memory, and/or
 - a discrete graphics card (dGfx) meeting the G3 (with FB Data Width > 128-bit), G4, G5, G6 or G7 classification;
- (6) ‘Integrated desktop computer’ means a computer in which the computer and the 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 product where the display and the computer are physically combined into a single unit; or (2) a product where the display is separated from the computer but it is connected to the main chassis by a direct current (DC) power cord. An integrated desktop computer is intended to be located in a permanent location and is not designed for portability. Integrated desktop computers are not primarily designed for the display and reception of audiovisual signals.

The following categories of integrated desktop computers are defined for the purposes of this Regulation:

- (a) ‘Category A’ integrated desktop computer means an integrated desktop computer that does not meet the definition of Category B, Category C or Category D integrated desktop computer;
- (b) ‘Category B’ integrated desktop computer means an integrated desktop computer with:
 - (i) two physical cores in the CPU; and
 - (ii) a minimum of two gigabytes (GB) of system memory;

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- (c) ‘Category C’ integrated desktop computer means an integrated desktop computer with:
- (i) three or more physical cores in the CPU; and
 - (ii) a configuration of a minimum of one of the following two characteristics:
 - a minimum of two gigabytes (GB) of system memory, and/or
 - a discrete graphics card (dGfx);
- (d) ‘Category D’ integrated desktop computer means an integrated desktop computer with:
- (i) a minimum of four physical cores in the CPU; and
 - (ii) a configuration of a minimum of one of the following two characteristics:
 - a minimum of four gigabytes (GB) of system memory, and/or
 - a discrete graphics card (dGfx) meeting the G3 (with FB Data Width > 128-bit), G4, G5, G6 or G7 classification;
- (7) ‘Notebook computer’ 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. Notebook computers utilise an integrated display, with a viewable diagonal screen size of at least 22,86 cm (9 inches), and are capable of operation on an integrated battery or other portable power source.

Notebook computers also include the following subtypes:

- (a) ‘Tablet computer’ means a product which is a type of notebook computer that includes both an attached touch-sensitive display and an attached physical keyboard;
- (b) ‘Slate computer’ means a type of notebook computer that includes an integrated touch-sensitive display but does not have a permanently attached physical keyboard;
- (c) ‘Mobile thin client’ means a type of notebook computer that relies on a connection to remote computing resources (e.g. computer server, remote workstation) to obtain primary functionality and has no rotational storage media integral to the product.

The following categories of notebook computers are defined for the purposes of this Regulation:

- (a) ‘Category A’ notebook computer means a notebook computer that does not meet the definition of Category B or Category C notebook computer;
- (b) ‘Category B’ notebook computer means a notebook computer with at least one discrete graphics card (dGfx);
- (c) ‘Category C’ notebook computer means a notebook computer with at least the following characteristics:

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- (a) a minimum two physical cores in the CPU;
- (b) a minimum two gigabytes (GB) of system memory; and
- (c) a discrete graphics card (dGfx) meeting the G3 (with FB Data Width > 128-bit), G4, G5, G6 or G7 classification;

Products that would otherwise meet the definition of notebook computer but have idle state power demand of less than 6 W are not considered to be notebook computers for the purposes of this Regulation;

- (8) ‘Desktop thin client’ means a computer that relies on a connection to remote computing resources (e.g. computer server, remote workstation) to obtain primary functionality and has no rotational storage media integral to the product. The main unit of a desktop thin client must be intended for use in a permanent location (e.g. on a desk) and not for portability. Desktop thin clients can output information to either an external or, where included with the product, an internal display;
- (9) ‘Workstation’ means a high-performance, single-user computer primarily used for graphics, Computer Aided Design, software development, financial and scientific applications among other compute intensive tasks, and which has the following characteristics:
 - (a) has a mean time between failures (MTBF) of at least 15 000 hours;
 - (b) has error-correcting code (ECC) and/or buffered memory;
 - (c) meets three of the following five characteristics:
 - (1) has supplemental power support for high-end graphics (i.e. peripheral component interconnect (PCI)-E 6-pin 12 V supplemental power feed);
 - (2) its system is wired for greater than x4 PCI-E on the motherboard in addition to the graphics slot(s) and/or PCI-X support;
 - (3) does not support uniform memory access (UMA) graphics;
 - (4) includes five or more PCI, PCI-E or PCI-X slots;
 - (5) is capable of multi-processor support for two or more CPU (must support physically separate CPU packages/sockets, i.e. not met with support for a single multi core CPU);
- (10) ‘Mobile workstation’ means a high-performance, single-user computer primarily used for graphics, Computer Aided Design, software development, financial and scientific applications among other compute intensive tasks, excluding game play, and which is 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. Mobile workstations utilise an integrated display and are capable of operation on an integrated battery or other portable power source. Most mobile workstations use an external power supply and most have an integrated keyboard and pointing device.

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A mobile workstation has the following characteristics:

- (a) has a mean time between failures (MTBF) of at least 13 000 hours;
 - (b) has at least one discrete graphics card (dGfx) meeting the G3 (with FB Data Width > 128-bit), G4, G5, G6 or G7 classification;
 - (c) supports the inclusion of three or more internal storage devices;
 - (d) supports at least 32 GB of system memory;
- (11) ‘Small-scale server’ means a type of computer that typically uses desktop computer components in a desktop form factor but is designed primarily to be a storage host for other computers and to perform functions such as providing network infrastructure services and hosting data/media, and which has the following characteristics:
- (a) is designed in a pedestal, tower, or other form factor similar to those of desktop computers such that all data processing, storage, and network interfacing is contained within one box;
 - (b) is designed to be operational 24 hours per day and 7 days per week;
 - (c) is primarily designed to operate in a simultaneous multi-user environment serving several users through networked client units;
 - (d) where placed on the market with an operating system, the operating system is designed for home server or low-end server applications;
 - (e) is not placed on the market with a discrete graphics card (dGfx) meeting any classification other than G1;

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- (17) ‘Game console’ means a mains-powered standalone device which is designed to provide video game playing as its primary function. A game console is typically designed to provide output to an external display as the main game-play display. Game consoles typically include a CPU, system memory and a graphics processing unit(s) (GPU), and may contain hard drives or other internal storage options, and optical drives. Game consoles typically utilise handheld controllers or other interactive controllers as their primary input device rather than an external keyboard or mouse. Game consoles do not typically include conventional personal computing operating systems but instead utilise console-specific operating systems. Handheld gaming devices, with an integrated display as the primary game-play display, and which primarily operate on an integrated battery or other portable power source rather than via a direct connection to an AC power source, are considered to be a type of game console;

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- (18) ‘Docking station’ means a discrete product designed to be connected to a computer in order to perform functions such as expanding connectivity or consolidating connections to peripheral devices. Docking stations may also facilitate charging of internal batteries in the connected computer;
- (19) ‘Central Processing Unit (CPU)’ means a component in a computer that controls the interpretation and execution of instructions. CPUs may contain one or more physical processors known as ‘execution cores’. An execution core means a processor that is physically present. Additional ‘virtual’ or ‘logical’ processors derived from one or more than one execution core are not physical cores. More than one execution core may be contained in a processor package occupying a single CPU physical socket. The total number of execution cores in the CPU is the sum of the execution cores provided by the devices connected to all the CPU physical sockets;
- (20) ‘Discrete Graphics Card’ (dGfx) means a discrete internal component containing one or more graphics processing units (GPUs) with a local memory controller interface and local graphics-specific memory and falling into one of the following categories:
- (a) G1 ($FB_BW \leq 16$);
 - (b) G2 ($16 < FB_BW \leq 32$);
 - (c) G3 ($32 < FB_BW \leq 64$);
 - (d) G4 ($64 < FB_BW \leq 96$);
 - (e) G5 ($96 < FB_BW \leq 128$);
 - (f) G6 ($FB_BW > 128$ (with FB Data Width < 192 -bit));
 - (g) G7 ($FB_BW > 128$ (with FB Data Width ≥ 192 -bit));

‘Frame buffer bandwidth’ (FB _BW) means the amount of data that is processed per second by all GPUs on a dGfx, which is calculated using the following formula:

$$\text{Frame buffer bandwidth} = (\text{Data Rate} \times \text{Data Width}) / (8 \times 1\,000)$$

Where:

- (a) frame buffer bandwidth is expressed in GigaBytes/second (GB/s);
- (b) data rate is the effective memory data frequency in MHz;
- (c) data width is the memory frame buffer (FB) data width, expressed in bits (b);
- (d) ‘8’ converts the calculation into Bytes;

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- (e) dividing by 1 000 converts Mega into Giga;

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- (21) ‘Internal storage’ means a component internal to the computer which provides non-volatile storage of data;

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- (22) ‘Product type’ means desktop computer, integrated desktop computer, notebook computer, desktop thin client, workstation, mobile workstation, small-scale server, game console, docking station, internal power supply or external power supply;

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- (23) ‘Display sleep mode’ means the power mode the display product enters after receiving a signal from a connected device or an internal stimulus (such as a timer or occupancy sensor). The display product may also enter this mode by virtue of a signal produced by user input. The product must wake on receiving a signal from a connected device, a network, a remote control, and/or an internal stimulus. While the product is in this mode, it is not producing a visible picture, with the possible exception of user-oriented or protective functions such as product information or status displays, or sensor-based functions.

For the purposes of the Annexes, additional definitions are laid down in Annex I.

▼ M2*Article 3***Ecodesign requirements**

The ecodesign requirements for computers are set out in Annex II.

Compliance of computers with the applicable ecodesign requirements shall be measured in accordance with the methods set out in Annex III.

▼ B*Article 4***Amendment to Regulation (EC) No 1275/2008**

Point 2 of Annex I to Regulation (EC) No 1275/2008 is replaced by the following:

- ‘2. Information technology equipment intended primarily for use in the domestic environment, but excluding desktop computers, integrated desktop computers and notebook computers as defined in Commission Regulation (EU) No 617/2013 (*).

(*) OJ L 175, 27.6.2013, p. 13.’

*Article 5***Application of Regulation (EC) No 278/2009**

Article 2(1)(g) of Regulation (EC) No 278/2009 is replaced by the following:

- ‘(g) it is intended for use with electrical and electronic household and office equipment as referred to in Article 2(1) of Regulation (EC) No 1275/2008 or with computers as defined in Commission Regulation (EU) No 617/2013 (*).

(*) OJ L 175, 27.6.2013, p. 13.’

▼ B*Article 6***Conformity assessment**

The conformity assessment procedure referred to in Article 8 of Directive 2009/125/EC shall be the internal design control system set out in Annex IV to that Directive or the management system for assessing conformity set out in Annex V to that Directive.

*Article 7***Market surveillance and verification procedure**

Market surveillance shall be carried out in accordance with the rules specified in Directive 2009/125/EC.

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Checking of computers for compliance with the applicable ecodesign requirements shall be carried out in accordance with the verification procedure set out in point 2 of Annex III to this Regulation.

▼ B*Article 8***Indicative benchmarks**

The indicative benchmarks for best-performing products and technology available on the market at the time of entry into force of this Regulation are identified in Annex IV.

*Article 9***Revision**

The Commission shall review this Regulation and present the results of this review to the Ecodesign Consultation Forum no later than three and a half years after its entry into force in the light of technological progress.

In the light of rapid technological development, this review shall consider developments in the Energy Star programme, and opportunities to tighten ecodesign requirements, to significantly reduce or to eliminate the energy allowances, in particular for discrete graphics cards (dGfx), to update definitions/scope, and the potential to address energy consumption of integrated displays.

Furthermore, the review shall specifically consider different life-cycle phases, the feasibility of establishing and applying the Ecodesign requirements on other significant environmental aspects such as noise, material use efficiency, including requirements on durability, dismantlability, recyclability, standardised interfaces for rechargers, as well as information requirements on the content of certain Critical Raw Materials and minimum number of loading cycles and battery replacement issues.

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Article 10

Entry into force and application

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 and 6.1 of Annex II shall apply as from the entry into force of the Regulation.

Points 1.1, 1.3, 2, 4, 5.1, 5.2, 6.2.1, 6.2.2, 6.2.3, 6.2.4, 6.2.5, 6.2.6, 7.1, 7.2 and 7.3 of Annex II shall apply as from 1 July 2014.

Points 1.2 and 1.4 of Annex II shall apply as from 1 January 2016.

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



ANNEX I

Definitions applicable for the purposes of the Annexes

1. ‘Annual total energy consumption (E_{TEC})’ means the electricity consumed by a product over specified periods of time across defined power modes and states;
2. ‘Off mode’ means the power demand level in the low power mode which cannot be switched off (influenced) by a user, other than through the movement of a mechanical switch, and which may persist for an indefinite period of time when the appliance is connected to the main electricity supply and used in accordance with the manufacturer’s instructions. Where Advanced Configuration and Power Interface (ACPI) standards are applicable, off mode usually correlates to ACPI system level G2/S5 (‘soft off’) state;

‘ P_{off} ’ represents off mode power in Watts as measured according to the procedures indicated in Annex II;

3. ‘Lowest power state’ means the state or mode with the lowest power demand found in a computer. This state or mode may be entered or left by either a mechanical means (e.g. by turning off the computer’s power through the movement of a mechanical switch) or via automatic means.;
4. ‘Sleep mode’ means a low power mode that a computer is capable of entering automatically after a period of inactivity or by manual selection. In this mode the computer will respond to a wake event. Where Advanced Configuration and Power Interface (ACPI) standards are applicable, sleep mode usually correlates to ACPI system level G1/S3 (suspend to RAM) state;

‘ P_{sleep} ’ represents sleep mode power in Watts as measured according to the procedures indicated in Annex II;

5. ‘Idle state’ means a state of a computer in which the operating system and other software have completed loading, a user profile has been created, the computer is not in sleep mode, and activity is limited to those basic applications that the operating system starts by default;

‘ P_{idle} ’ represents idle state power in Watts as measured according to the procedures indicated in Annex II;

6. ‘Additional Internal Storage’ means any and all internal storage devices, including hard disk drives (HDD), solid state drives (SSD) and hybrid hard drives (HHD), included within a computer beyond the first;
7. ‘Television tuner’ means a discrete internal component that allows a computer to receive television signals;
8. ‘Audio card’ (‘sound card’) means a discrete internal component that processes input and output audio signals to and from a computer;
9. ‘Wake event’ means a user, scheduled, or external event or stimulus that causes the computer to transition from sleep mode or off mode to an active mode of operation. Wake event includes, but is not limited to, the following events:

(i) movement of the mouse;

(ii) keyboard activity;

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- (iii) controller input;
 - (iv) real-time clock event;
 - (v) a button press on the chassis; and
 - (vi) in the case of external events, stimulus conveyed via a remote control, network or modem;
10. ‘Active mode’ means the state in which a computer is carrying out useful work in response to (a) prior or concurrent user input or (b) a prior or concurrent instruction over the network. This state includes active processing, seeking data from storage, memory or cache, including idle state time while awaiting further user input and before entering low power modes;
11. ‘Wake On LAN (WOL)’ means a functionality which allows a computer to transition from sleep mode or off mode (or another similar low power mode) when directed by a network request via Ethernet;
12. ‘UMA’ means uniform memory access;
13. ‘Information or status display’ means a continuous function providing information or indicating the status of the computer on a display, including clocks.



ANNEX II

Ecodesign requirements and timetable

1. E _{TEC}																																		
Desktop computer and integrated desktop computer	<p>1.1. From 1 July 2014</p> <p>1.1.1. The annual total energy consumption (E_{TEC} in kWh/year) shall not exceed:</p> <p>(a) Category A computer: 133,00;</p> <p>(b) Category B computer: 158,00;</p> <p>(c) Category C computer: 188,00;</p> <p>(d) Category D computer: 211,00.</p> <p>E_{TEC} shall be determined using the following formula:</p> $E_{TEC} = (8\,760/1\,000) \times (0,55 \times P_{off} + 0,05 \times P_{sleep} + 0,40 \times P_{idle}).$ <p>For computers that lack a discrete sleep mode, but have idle state power demand less than or equal to 10,00 W, power in idle state (P_{idle}) may be used in place of sleep (P_{sleep}) in the above equation, such that the formula is replaced by</p> $E_{TEC} = (8\,760/1\,000) \times (0,55 \times P_{off} + 0,45 \times P_{idle})$ <p>All P_x are power values in the indicated mode/state as defined in the definition section, measured in Watts (W) according to the procedures indicated in Annex III.</p> <p>1.1.2. The following capability adjustments apply:</p> <p>(a) memory: 1 kWh/year per GB over base, where base memory is 2 GB (for category A, B and C computers) and 4 GB (for category D computers);</p> <p>(b) additional internal storage: 25 kWh/year;</p> <p>(c) discrete television tuner: 15 kWh/year;</p> <p>(d) discrete audio card: 15 kWh/year;</p> <p>(e) discrete graphics card (dGfx) for the first and each additional discrete graphics card (dGfx):</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 60%;"></th> <th style="width: 20%;">dGfx category</th> <th style="width: 20%;">TEC allowance (kWh/year)</th> </tr> </thead> <tbody> <tr> <td rowspan="7">First discrete graphics card (dGfx)</td> <td>G1</td> <td>34</td> </tr> <tr> <td>G2</td> <td>54</td> </tr> <tr> <td>G3</td> <td>69</td> </tr> <tr> <td>G4</td> <td>100</td> </tr> <tr> <td>G5</td> <td>133</td> </tr> <tr> <td>G6</td> <td>166</td> </tr> <tr> <td>G7</td> <td>225</td> </tr> <tr> <td rowspan="7">Each additional discrete graphics card (dGfx)</td> <td>G1</td> <td>20</td> </tr> <tr> <td>G2</td> <td>32</td> </tr> <tr> <td>G3</td> <td>41</td> </tr> <tr> <td>G4</td> <td>59</td> </tr> <tr> <td>G5</td> <td>78</td> </tr> <tr> <td>G6</td> <td>98</td> </tr> <tr> <td>G7</td> <td>133</td> </tr> </tbody> </table>		dGfx category	TEC allowance (kWh/year)	First discrete graphics card (dGfx)	G1	34	G2	54	G3	69	G4	100	G5	133	G6	166	G7	225	Each additional discrete graphics card (dGfx)	G1	20	G2	32	G3	41	G4	59	G5	78	G6	98	G7	133
	dGfx category	TEC allowance (kWh/year)																																
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	<p>1.1.3. The capability adjustments for discrete graphics cards (dGfx), discrete television tuner and discrete audio card mentioned in point 1.1.2 and point 1.2.2 only apply to cards and tuner that are enabled during testing of desktop computers or integrated computers.</p> <p>1.1.4. Category D desktop computers and integrated desktop computers meeting all of the following technical parameters are exempt from the provisions specified in points 1.1.1 and 1.1.2 and their revisions specified in point 1.2:</p> <p>(a) a minimum of six physical cores in the central processing unit (CPU); and</p> <p>(b) discrete graphics card(s) (dGfx) providing total frame buffer bandwidths above 320 GB/s; and</p> <p>(c) a minimum 16 GB of system memory; and</p> <p>(d) a PSU with a rated output power of at least 1 000 W.</p> <p>1.2. From 1 January 2016</p> <p>1.2.1. The following revisions to the annual total energy consumption specified in point 1.1.1 apply:</p> <p>The annual total energy consumption (E_{TEC} in kWh/year) shall not exceed:</p> <p>(a) Category A computer: 94,00;</p> <p>(b) Category B computer: 112,00;</p> <p>(c) Category C computer: 134,00;</p> <p>(d) Category D computer: 150,00.</p> <p>1.2.2. The following revisions to the capability adjustments for discrete graphics cards (dGfx) specified in point 1.1.2(e) apply:</p> <table border="1" data-bbox="603 1048 1401 1733"> <thead> <tr> <th></th> <th>dGfx category</th> <th>TEC allowance (kWh/year)</th> </tr> </thead> <tbody> <tr> <td rowspan="7">First discrete graphics card (dGfx)</td> <td>G1</td> <td>18</td> </tr> <tr> <td>G2</td> <td>30</td> </tr> <tr> <td>G3</td> <td>38</td> </tr> <tr> <td>G4</td> <td>54</td> </tr> <tr> <td>G5</td> <td>72</td> </tr> <tr> <td>G6</td> <td>90</td> </tr> <tr> <td>G7</td> <td>122</td> </tr> <tr> <td rowspan="7">Each additional discrete graphics card (dGfx)</td> <td>G1</td> <td>11</td> </tr> <tr> <td>G2</td> <td>17</td> </tr> <tr> <td>G3</td> <td>22</td> </tr> <tr> <td>G4</td> <td>32</td> </tr> <tr> <td>G5</td> <td>42</td> </tr> <tr> <td>G6</td> <td>53</td> </tr> <tr> <td>G7</td> <td>72</td> </tr> </tbody> </table>		dGfx category	TEC allowance (kWh/year)	First discrete graphics card (dGfx)	G1	18	G2	30	G3	38	G4	54	G5	72	G6	90	G7	122	Each additional discrete graphics card (dGfx)	G1	11	G2	17	G3	22	G4	32	G5	42	G6	53	G7	72
	dGfx category	TEC allowance (kWh/year)																																
First discrete graphics card (dGfx)	G1	18																																
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	G7	72																																
Notebook computer	<p>1.3. From 1 July 2014</p> <p>1.3.1. The annual total energy consumption (E_{TEC} in kWh/year) shall not exceed:</p> <p>(a) Category A computer: 36,00;</p> <p>(b) Category B computer: 48,00;</p> <p>(c) Category C computer: 80,50;</p>																																	



E_{TEC} shall be determined using the following formula:

$E_{TEC} = (8\,760/1\,000) \times (0,60 \times P_{off} + 0,10 \times P_{sleep} + 0,30 \times P_{idle})$ where all P_x are power values in the indicated mode/state as defined in the definition section, measured in Watts (W) according to the procedures indicated in Annex III.

1.3.2. The following capability adjustments apply:

- (a) memory: 0,4 kWh/year per GB over base, where base memory is 4 GB;
- (b) additional internal storage: 3 kWh/year;
- (c) discrete television tuner: 2,1 kWh/year;
- (d) discrete graphics card (dGfx) (for the first and each additional discrete graphics card (dGfx))

	dGfx category	TEC allowance (kWh/year)
First discrete graphics card (dGfx)	G1	12
	G2	20
	G3	26
	G4	37
	G5	49
	G6	61
	G7	113
Each additional discrete graphics card (dGfx)	G1	7
	G2	12
	G3	15
	G4	22
	G5	29
	G6	36
	G7	66

1.3.3. The capability adjustments for discrete graphics cards (dGfx) and discrete television tuner mentioned in point 1.3.2 and point 1.4.2 only apply to cards and tuner that are enabled during testing of notebook computers.

1.3.4. Category C notebook computers meeting all of the following technical parameters are exempt from the provisions specified in points 1.3.1 and 1.3.2 and their revisions specified in point 1.4:

- (a) a minimum of four physical cores in the central processing unit (CPU); and
- (b) discrete graphics card(s) (dGfx) providing total frame buffer bandwidths above 225 GB/s; and
- (c) a minimum 16 GB of system memory.

1.4. **From 1 January 2016**

1.4.1. The following revisions to the annual total energy consumption specified in point 1.3.1 apply:

The annual total energy consumption (E_{TEC} in kWh/year) shall not exceed:

- (a) Category A computer: 27.00;
- (b) Category B computer: 36.00;
- (c) Category C computer: 60.50;

▼ B

	1.4.2. The following revisions to the capability adjustments for discrete graphics cards (dGfx) specified in point 1.3.2(d) apply:	
	dGfx category	TEC allowance (kWh/year)
First discrete graphics card (dGfx)	G1	7
	G2	11
	G3	13
	G4	20
	G5	27
	G6	33
	G7	61
Each additional discrete graphics card (dGfx)	G1	4
	G2	6
	G3	8
	G4	12
	G5	16
	G6	20
	G7	36

2. SLEEP MODE

Desktop computer, integrated desktop computer and notebook computer	2. From 1 July 2014
	2.1. A product shall provide sleep mode and/or another condition that provides the functionality of sleep mode and which does not exceed the applicable power demand requirements for a sleep mode.
	2.2. Power demand in sleep mode shall not exceed 5,00 W in desktop computers and integrated desktop computers and 3,00 W in notebook computers.
	2.3. Desktop computers and integrated desktop computers where idle state power demand is less than or equal to 10,00 W are not required to have a discrete system sleep mode.
	2.4. Where a product is placed on the market with a WOL functionality enabled in sleep mode: (a) an additional allowance of 0,70 W can be applied; (b) it must be tested with a WOL functionality both enabled and disabled and must comply with both requirements.
2.5. Where a product is placed on the market without Ethernet capability, it shall be tested without WOL enabled.	

3. LOWEST POWER STATE

Desktop computer, integrated desktop computer and notebook computer	3. As of the entry into force of the Regulation
	3.1. Power demand in the lowest power state shall not exceed 0,50 W.
	3.2. A product shall provide a power state or mode which does not exceed the applicable power demand requirements for the lowest power state when it is connected to the mains power source.
3.3. Where a product is placed on the market with an information or status display, an additional allowance of 0,50 W can be applied.	

▼ B

4. OFF MODE

Desktop computer, integrated desktop computer and notebook computer	<p>4. From 1 July 2014</p> <p>4.1. Power demand in off mode shall not exceed 1,00 W.</p> <p>4.2. A product shall provide off mode and/or another condition which does not exceed the applicable power demand requirements for off mode when it is connected to the mains power source.</p> <p>4.3. Where a product is placed on the market with a WOL functionality enabled in off mode:</p> <p>(a) an additional allowance of 0,70 W can be applied;</p> <p>(b) it must be tested with a WOL functionality both enabled and disabled and must comply with both requirements.</p> <p>4.4. Where a product is placed on the market without Ethernet capability, it shall be tested without WOL enabled.</p>
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5. INTERNAL POWER SUPPLY EFFICIENCY

Desktop computer, integrated desktop computer, desktop thin client, workstation, and small-scale server	<p>5.1. From 1 July 2014</p> <p>All computer internal power supplies shall not perform at less than:</p> <p>(a) 85 % efficiency at 50 % of rated output power;</p> <p>(b) 82 % efficiency at 20 % and 100 % of rated output power;</p> <p>(c) power factor = 0,9 at 100 % of rated output power.</p> <p>Internal power supplies with a maximum rated output power of less than 75 W are exempt from the power factor requirement.</p>
Computer servers	► <u>M2</u> ◀

6. POWER MANAGEMENT ENABLING

Desktop computer, integrated desktop computer and notebook computer	<p>6.1. As of the entry into force of the Regulation</p> <p>The computer shall offer a power management function, or a similar function which, when the computer is not providing the main function or when other energy-using products are not dependent on its functions, automatically switches the computer into a power mode that has a lower power demand than the applicable power demand requirement for sleep mode.</p> <p>6.2. From 1 July 2014</p> <p>► <u>M1</u> 6.2.1. The computer shall reduce the speed of any active 1 Gigabit per second (Gb/s) or higher ethernet network link when transitioning to sleep or off-with-WOL mode. ◀</p> <p>6.2.2. When in sleep mode, the response to ‘wake events’, such as those via network connections or user interface devices, should happen with a latency of ≤ 5 seconds from the initiation of a wake event to the system becoming fully usable including rendering of display.</p>
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▼ B

	<p>6.2.3. The computer shall be placed on the market with the display sleep mode set to activate within 10 minutes of user inactivity.</p> <p>6.2.4. A computer with Ethernet capability shall have the ability to enable and disable a WOL function, if available, for sleep mode. A computer with Ethernet capability shall have the ability to enable and disable WOL for off mode if WOL from off mode is supported.</p> <p>6.2.5. Where a distinct sleep mode or another condition that provides sleep mode functionality exists, the mode shall be set to activate within 30 minutes of user inactivity. This power management function shall be activated before placing the product on the market.</p> <p>6.2.6. Users shall be able to easily activate and deactivate any wireless network connection(s) and users shall be given a clear indication with a symbol, light or equivalent, when wireless network connection(s) have been activated or deactivated.</p>
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7. INFORMATION TO BE PROVIDED BY MANUFACTURERS

<p>Desktop computer, integrated desktop computer, and notebook computer</p>	<p>7.1. From 1 July 2014</p> <p>7.1.1. Manufacturers shall provide in the technical documentation and make publicly available on free-access websites the following information:</p> <ul style="list-style-type: none"> (a) product type and category as defined in Article 2 (one and only one category); (b) manufacturer's name, registered trade name or registered trade mark, and the address at which they can be contacted; (c) product model number; (d) year of manufacture; (e) E_{TEC} value (kWh) and capability adjustments applied when all discrete graphics cards (dGfx) are disabled and if the system is tested with switchable graphics mode with UMA driving the display; (f) E_{TEC} value (kWh) and capability adjustments applied when all discrete graphics cards (dGfx) are enabled; (g) idle state power demand (Watts); (h) sleep mode power demand (Watts); (i) sleep mode with WOL enabled power demand (Watts) (where enabled); (j) off mode power demand (Watts); (k) off mode with WOL enabled power demand (Watts) (where enabled); (l) internal power supply efficiency at 10 %, 20 %, 50 % and 100 % of rated output power; (m) external power supply efficiency; (n) noise levels (the declared A-weighted sound power level) of the computer;
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▼ B

	<p>(o) the minimum number of loading cycles that the batteries can withstand (applies only to notebook computers);</p> <p>(p) the measurement methodology used to determine information mentioned in points (e) to (o);</p> <p>(q) sequence of steps for achieving a stable condition with respect to power demand;</p> <p>(r) description of how sleep and/or off mode was selected or programmed;</p> <p>(s) sequence of events required to reach the mode where the equipment automatically changes to sleep and/or off mode;</p> <p>(t) the duration of idle state condition before the computer automatically reaches sleep mode, or another condition which does not exceed the applicable power demand requirements for sleep mode;</p> <p>(u) the length of time after a period of user inactivity in which the computer automatically reaches a power mode that has a lower power demand requirement than sleep mode;</p> <p>(v) the length of time before the display sleep mode is set to activate after user inactivity;</p> <p>(w) user information on the energy-saving potential of power management functionality;</p> <p>(x) user information on how to enable the power management functionality;</p> <p>(y) for products with an integrated display containing mercury, the total content of mercury as X,X mg;</p> <p>(z) test parameters for measurements:</p> <ul style="list-style-type: none"> — test voltage in V and frequency in Hz, — total harmonic distortion of the electricity supply system, — information and documentation on the instrumentation, set-up and circuits used for electrical testing. <p>7.1.2. If a product model is placed on the market in multiple configurations the product information required under point 7.1.1 may be reported once per product category (as defined in Article 2), for the highest power-demanding configuration available within that product category. A list of all model configurations that are represented by the model for which the information is reported shall be included in the information provided.</p>
Notebook computer	<p>7.2. From 1 July 2014</p> <p>If a notebook computer is operated by battery/ies that cannot be accessed and replaced by a non-professional user, in addition to the information specified in point 7.1, manufacturers shall provide in the technical documentation, and make available on free-access websites and on the external packaging of the notebook computer, the following information ‘The battery[ies] in this product cannot be easily replaced by users themselves’.</p> <p>The information provided on the external packaging of the notebook computer shall be clearly visible and legible and it shall be provided in all the official languages of the country where the product is marketed.</p>
► <u>M2</u> Workstation, mobile workstation, desktop thin client and small-scale server ◀	<p>7.3. From 1 July 2014</p> <p>7.3.1. Manufacturers shall provide in the technical documentation and make publicly available on free-access websites the following information:</p> <p>(a) product type as defined in Article 2 (one and only one category);</p> <p>(b) manufacturer’s name, registered trade name or registered trade mark, and the address at which they can be contacted;</p>

▼ B

- (c) product model number;
- (d) year of manufacture;
- (e) internal/external power supply efficiency;
- (f) test parameters for measurements:
 - test voltage in V and frequency in Hz,
 - total harmonic distortion of the electricity supply system,
 - information and documentation on the instrumentation, set-up and circuits used for electrical testing.
- (g) maximum power (Watts);
- (h) idle state power (Watts);
- (i) sleep mode power (Watts);
- (j) off mode power (Watts);
- (k) noise levels (the declared A-weighted sound power level of the computer;
- (l) the measurement methodology used to determine information mentioned in points (e) to (k).

7.3.2. If a product model is placed on the market in multiple configurations the product information required under point 7.3.1 may be reported once per product category (as defined in Article 2), for the highest power-demanding configuration available within that product category. A list of all model configurations that are represented by the model for which the information is reported shall be included in the information provided.

▼ M1

ANNEX III

Measurements by market surveillance authorities and product compliance verification by market surveillance authorities

The verification tolerances defined in this Annex relate only to the verification of the measured parameters by Member State authorities and shall not be used by the manufacturer or importer as an allowed tolerance to establish the values in the technical documentation or in interpreting these values with a view to achieving compliance or to communicate better performance by any means.

1. MEASUREMENTS

For the purposes of compliance and verification of compliance with the applicable requirements of this Regulation, measurements and calculations shall be made using harmonised standards, the reference numbers of which have been published in the *Official Journal of the European Union*, or using other reliable, accurate and reproducible methods which take into account the generally recognised state of the art, and produce results deemed to be of low uncertainty.

Computers placed on the market without an operating system capable of supporting an Advanced Configuration and Power Interface (ACPI) system or similar, shall be tested with an ACPI (or similar) supporting operating system.

2. PRODUCT COMPLIANCE VERIFICATION BY MARKET SURVEILLANCE AUTHORITIES

When verifying the compliance of a product model with the requirements laid down in Annex II to this Regulation pursuant to Article 3(2) of Directive 2009/125/EC, for the requirements referred to in this Annex, the authorities of the Member States shall apply the following procedure:

- (1) The Member State authorities shall verify one single unit of the model or model configuration.
- (2) The model or model configuration shall be considered to comply with the applicable requirements if:
 - (a) the values given in the technical documentation pursuant to point 2 of Annex IV to Directive 2009/125/EC (declared values), and, where applicable, the values used to calculate these values, are not more favourable for the manufacturer or importer than the results of the corresponding measurements carried out pursuant to paragraph (g) thereof; and
 - (b) the declared values meet any requirements laid down in this Regulation, and any required product information published by the manufacturer or importer does not contain values that are more favourable for the manufacturer or importer than the declared values; and
 - (c) when the Member State authorities test the unit of the model, or model configuration according to parts 3 to 5 of this Annex, the determined values (the values of the relevant parameters as measured in testing and the values calculated from these measurements) comply with the respective verification tolerances given in parts 3 and 4 of this Annex, and the unit meets the requirements for power management enabling given in part 5 of this Annex.
- (3) If the results referred to in point 2(a) or (b) are not achieved, the model and all model configurations that are covered by the same product information (according to Annex II points 7.1.2 and 7.3.2) shall be considered not to comply with this Regulation.

▼ M1

- (4) If the result referred to in point 2(c) is not achieved, the Member State authorities shall select for testing three additional units of the same model or one or more model configurations that are covered by the same product information (according to Annex II points 7.1.2 and 7.3.2).
- (5) The model or model configuration shall be considered to comply with the applicable requirements if, for these three units, the arithmetical mean of the determined values complies with the respective tolerances given in parts 3 and 4 of this Annex, and if the units all meet the requirements for power management enabling given in part 5 of this Annex.
- (6) If the result referred to in point 5 is not achieved, the model and all model configurations that are covered by the same product information (provided pursuant to Annex II points 7.1.2 and 7.3.2) shall be considered not to comply with this Regulation.
- (7) The Member State authorities shall provide all relevant information to the authorities of the other Member States and to the Commission without delay after a decision being taken on the non-compliance of the model according to points 3 and 6.

The Member State authorities shall use the measurement and calculation methods set out in this Annex.

The Member State authorities shall only apply the verification tolerances that are set out in parts 3 and 4 of this Annex and shall only use the procedure described in points 1 to 7 for the requirements referred to in this Annex. No other tolerances shall be applied.

3. E_{TEC}, SLEEP MODE, OFF MODE AND LOWEST POWER STATE:

- (1) For power demand requirements larger than 1,00 W, or where energy consumption requirements formulated in TEC result in a power demand requirement larger than 1,00 W in at least one power mode, the model configuration shall be considered to comply with the applicable requirements set out in points 1.1, 1.2, 1.3, 1.4, 2.2 and 2.3 of Annex II if the test results do not exceed the respective verification tolerances given in the table below.

Verification tolerances for power demand requirements larger than 1,00 W

Requirements set out	Verification tolerances
Points 1.1, 1.2, 1.3, 1.4 and 2.3 of Annex II	The determined value shall not exceed the declared value by more than 7 %.
Point 2.2 of Annex II (with and without the additional allowance listed in point 2.4)	The determined value shall not exceed the declared value by more than 7 %.

The additional allowances provided for in point 2.4 of Annex II can be added to the requirement specified in point 2.2 if the model configuration is placed on the market with a WOL functionality enabled in sleep mode. The model configuration should be tested with WOL functionality both enabled and disabled and should comply with both requirements. The model configuration placed on the market without ethernet capability shall be tested without WOL enabled.

- (2) For power demand requirements less than or equal to 1,00 W, the model configuration shall be considered to comply with the applicable requirements set out in point 3.1 and 4.1 of Annex II if the test results do not exceed the respective verification tolerances given in the table below.

▼ **M1****Verification tolerances for power demand requirements of 1,00 W and smaller**

Requirements set out	Verification tolerances
Point 3.1 of Annex II (with and without the additional allowance specified in point 3.3)	The determined value shall not exceed the declared value by more than 0,10 W.
Point 4.1 of Annex II (with and without the additional allowances listed in point 4.3)	The determined value shall not exceed the declared value by more than 0,10 W.

The additional allowance provided for in point 3.3 of Annex II can be added to the requirement specified in point 3.1 if the model configuration is placed on the market with an ‘information or status display’.

The additional allowance provided for in point 4.3 of Annex II can be added to the requirement set out in point 4.1 if the model configuration is placed on the market with a WOL functionality enabled in off mode. The model configuration should be tested with WOL functionality both enabled and disabled and should comply with both requirements. The model configuration placed on the market without ethernet capability shall be tested without WOL enabled.

4. INTERNAL POWER SUPPLY EFFICIENCY

The model shall be considered to comply with the requirements set out in point 5 of Annex II if the test results do not exceed the respective verification tolerances given in the table below.

Verification tolerances for internal power supply efficiency

Requirements set out	Verification tolerances
The arithmetical mean of the efficiency at load conditions as defined in Annex II falls below the applicable requirements for average active efficiency.	The determined value shall not be lower than the declared value by more than 2 %.
The arithmetical mean of the power factor as defined in Annex II falls below the applicable requirements for the power factor.	The determined value shall not be lower than the declared value by more than 10 %.

5. POWER MANAGEMENT ENABLING

When verifying compliance with the requirements set out in point 6.1 of Annex II, Member State authorities shall use the applicable procedure to measure the power demand after the power management function or a similar function has switched the equipment into the applicable power mode.

When verifying compliance with the requirements set out in points 6.2.1 to 6.2.6 of Annex II, the model configuration shall be considered to comply with the applicable requirements set out in:

- point 6.2.1, if the speed of any active 1 gigabit per second (Gb/s) or higher ethernet network link of a desktop computer, integrated desktop computer or notebook computer is reduced when the computer transitions to sleep or off-with-WOL mode;

▼ M1

- point 6.2.2, if a desktop computer, integrated desktop computer or notebook computer becomes fully usable, including rendering of any connected display, within 5 seconds after a wake event is initiated during sleep mode;
- point 6.2.3, if a display connected to a desktop computer, integrated desktop computer or notebook computer enters sleep mode within 10 minutes of user inactivity;
- point 6.2.4, if a WOL function for sleep and off mode can be enabled and disabled;
- point 6.2.5, if a desktop computer, integrated desktop computer or notebook computer enters sleep mode within 30 minutes of user inactivity;
- point 6.2.6, if users are able to easily activate and deactivate any wireless network connections and users are given a clear indication through a symbol, light or equivalent when wireless network connections have been activated or deactivated.

▼B*ANNEX IV***Indicative benchmarks**

The following indicative benchmarks are identified for the purpose of Part 3, point 2 of Annex I to Directive 2009/125/EC.

They refer to the best available technology at the time of drafting this Regulation.

The best current performance for computers on the market is:

- E_{TEC} varies by category — see table below;
- Sleep mode 0,4 W;
- Off mode 0,0 W.

Table **E_{TEC} best current performance**

		E_{TEC} (kWh/year) ⁽¹⁾
Desktop computer and integrated desktop computer	Category A	33,4
	Category B	28,7
	Category C	75,8
	Category D	63,5
Notebook computer	Category A	10,9
	Category B	18,1
	Category C	26,3

⁽¹⁾ Latest data as at 20 March 2012.