



CABINET OF MINISTERS OF UKRAINE
RESOLUTION

No. 737 of 14 August 2019
Kyiv

**On Approval of the Technical Regulation on Ecodesign
Requirements for Computers and Computer Servers**

In accordance with [Article 5](#) of the Law of Ukraine ‘On Technical Regulations and Conformity Assessment’, the Cabinet of Ministers of Ukraine hereby **resolves**:

1. To approve the **Technical Regulation on Ecodesign Requirements for Computers and Computer Servers**, as attached to the original.
2. The State Agency on Energy Efficiency and Energy Saving shall provide for the implementation of the Technical Regulation approved by this Resolution.
3. To introduce to the [list of types of products subject to state market surveillance by state market surveillance bodies](#), approved by the Resolution of the Cabinet of Ministers of Ukraine No. 1069 of 28 December 2016 (Official Journal of Ukraine, 2017, No. 50, p. 1550; 2019, No. 36, p. 1274), amendment, as attached.
4. This Resolution shall enter into force after six months following its publication.

Prime Minister of Ukraine

VOLODYMYR GROYSMAN

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APPROVED
by the Resolution of the Cabinet of Ministers of Ukraine
No. 737 of 14 August 2019

AMENDMENT
to be introduced to the list of types of products subject to state
market surveillance by state market surveillance authorities

The **list** shall be supplemented with point 55 to read as follows:

‘55. Computers and computer servers	Resolution of the Cabinet of Ministers of Ukraine No. 737 of 14 August 2019 ‘On Approval of the Technical Regulation on Ecodesign Requirements for Computers and Computer Servers’	State Service of Ukraine on Food Safety and Consumer Protection’.
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{The text of the Technical Regulation was taken from the official website of the Cabinet of Ministers of Ukraine}

TECHNICAL REGULATION

on Ecodesign Requirements for Computers and Computer Servers

General part

1. This Technical Regulation establishes ecodesign requirements for the placing on the market of computers and computer servers.

This Technical Regulation is based on the 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.

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

- 1) desktop computers;
- 2) integrated desktop computers;
- 3) notebook computers (including tablet computers, slate computers and mobile thin clients);
- 4) desktop thin clients;
- 5) workstations;
- 6) mobile workstations;
- 7) small-scale servers;
- 8) computer servers.

3. This Technical Regulation shall not apply to:

- 1) blade system and components;
- 2) server appliances;
- 3) multi-node servers;
- 4) computer servers with more than four processor sockets;
- 5) game consoles;
- 6) docking stations.

4. For the purposes of this Technical Regulation, the terms used herein shall have the following meanings:

‘active mode’ means the state in which a computer is carrying out useful work in response to prior or concurrent user input or 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;

‘audio card’ (‘sound card’) means a discrete internal component that processes input and output audio signals to and from a computer;

‘multi-node server’ means a system composed of an enclosure where two or more independent computer servers (or nodes) are inserted, which share one or more power supplies. The combined power for all nodes is distributed through the shared power supply(ies). A multi-node server is designed and built as a single enclosure and is not designed to be hot-swappable;

‘blade system and components’ means a system composed of an enclosure (‘blade chassis’) into which different types of blade storage and servers are inserted. The enclosure provides shared resources on which the servers and storage are dependent. Blade systems are designed as a scalable solution to combine multiple computer servers or storage units in a single enclosure, and are designed for technicians to be able to easily add or replace (hot-swap) blades (e.g. blade servers) in the field;

‘information or status display’ means a continuous function providing information or indicating the status of the computer on a display, including clocks;

‘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 or computer server and has the following characteristics:

is contained within the computer or computer server casing but is separate from the main computer or computer server board;

the power supply connects to the mains through a single cable with no intermediate circuitry between the power supply and the mains power;

all power connections from the power supply to the computer or computer server 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 or computer server are not considered internal power supplies;

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

‘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;

‘dual-node server’ means a common multi-node server configuration consisting of two server nodes;

‘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, where at least one of the following criteria applies:

G1 ($FB_BW \leq 16$);

G2 ($16 < FB_BW \leq 32$);

G3 ($32 < FB_BW \leq 64$);

G4 ($64 < FB_BW \leq 96$);

G5 ($96 < FB_BW \leq 128$);

G6 ($FB_BW > 128$ (with Frame Buffer Data Width < 192 -bit));

G7 ($FB_BW > 128$ (with Frame Buffer Data Width ≥ 192 -bit));

‘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;

‘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;

‘annual total energy consumption (E_{TEC})’ means the electricity consumed by a product over specified periods of time across defined power modes and states;

‘external power supply’ means a device which meets all of the following criteria:

it is designed to convert alternating current (AC) power input from the mains power source input into lower voltage direct current (DC) or AC output;

it is able to convert to only one DC or AC output voltage at a time;

it is intended to be used with a separate device that constitutes the primary load;

it is physically separated from the device that constitutes the primary load;

it 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;

it has nameplate output power not exceeding 250 W;

‘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;

‘computer server’ means a computing product that provides services and manages networked resources for client devices, such as desktop computers, notebook computers, desktop thin clients, internet protocol (IP) telephones, or other computer servers. A computer server is typically placed on the market for use in data centres and office/corporate environments. A computer server is primarily accessed via network connections, and not through direct user input devices, such as a keyboard or a mouse. A computer server has the following characteristics:

- is designed to support computer server operating systems (OS) and/or hypervisors, and targeted to run user-installed enterprise applications;

- supports error-correcting code (ECC) and/or buffered memory (including both buffered dual in-line memory modules (DIMMs) and buffered on board (BOB) configurations));

- is placed on the market with one or more AC-DC power supply(ies);

- all processors have access to shared system memory and are independently visible to a single OS or hypervisor;

‘computer server with more than four processor sockets’ means a computer server containing more than four interfaces designed for the installation of a processor;

‘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:

- is designed in a form factor of a desktop computer, such that all data processing, storage, and network interfacing is contained within one box;

- is designed to be operational 24 hours per day and 7 days per week;

- is primarily designed to operate in a simultaneous multi-user environment serving several users through networked client units;

- where placed on the market with an operating system, the operating system is designed for home server or low-end server applications;

- is not placed on the market with a discrete graphics card (dGfx) meeting any classification other than G1;

‘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. A mobile workstation has the following characteristics:

- has a mean time between failures (MTBF) of at least 13 000 hours;
- has at least one Discrete Graphics Card (dGfx) meeting the G3 (with FB Data Width > 128-bit), G4, G5, G6 or G7 classification;
- supports the inclusion of three or more internal storage devices;
- supports at least 32 GB of system memory;

‘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: models where the display and the computer are physically combined into a single unit; or models 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 portable. Integrated desktop computers are not primarily designed for the display and reception of audiovisual signals. The following categories of integrated desktop computers within the scope of this Technical Regulation are defined:

‘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 computers;

‘Category B’ integrated desktop computer means an integrated desktop computer with:

- two physical cores in the CPU;
- a minimum of two gigabytes (GB) of system memory;

‘Category C’ integrated desktop computer means an integrated desktop computer with:

- three or more physical cores in the CPU;
- a configuration of a minimum of one of the following two criteria:
 - a minimum of two gigabytes (GB) of system memory and/or
 - a discrete graphics card (dGfx);

‘Category D’ integrated desktop computer means an integrated desktop computer with:

- a minimum of four physical cores in the CPU;
- a configuration of a minimum of one of the following two criteria:
 - 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;

‘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 include the following categories:

‘tablet computer’ means a device which is a type of notebook computer that includes both an attached touch-sensitive display and an attached physical keyboard;

‘slate computer’ means a type of notebook computer that includes an integrated touch-sensitive display but does not have a permanently attached physical keyboard;

‘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 within the scope of this Technical Regulation are defined:

‘Category A’ notebook computer means a notebook computer that does not meet the definition of Category B or Category C notebook computers;

‘Category B’ notebook computer means a notebook computer with at least one discrete graphics card (dGfx);

‘Category C’ notebook computer means a notebook computer with:
two or more physical cores in the CPU;
a minimum of two gigabytes (GB) of system memory and
a discrete graphics card (dGfx) meeting the G3 (with FB Data Width > 128-bit), G4, G5, G6 or G7 classification.

Devices 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 within the scope of this Technical Regulation;

‘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 events include, in particular, one of the following events:

movement of the mouse;
keyboard activity;
controller input;
real-time clock event;
a button press on the chassis;
in the case of external events, stimulus conveyed via a remote control, network or modem;

‘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;

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

Frame buffer bandwidth = (Data Rate x Data Width)/(8 × 1000)

where: frame buffer bandwidth is expressed in GigaBytes/second (GB/s);

data rate is the effective memory data frequency in MHz;

data width is the memory frame buffer (FB) data width, expressed in bits (b);

‘8’ converts the calculation into Bytes;

dividing by 1000 converts MegaBytes into GigaBytes.

‘UMA’ means uniform memory access;

‘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;

‘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;

‘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 may also enter this mode by virtue of a signal produced by user input. The display must wake on receiving a signal from a connected device, a network, a remote control, and/or an internal stimulus. While the display 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;

‘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:

has a mean time between failures (MTBF) of at least 15 000 hours;

has error-correcting code (ECC) and/or buffered memory;

meets three of the following five characteristics:

a) has supplemental power support for high-end graphics (i.e. peripheral component interconnect (PCI)-E 6-pin 12 V supplemental power feed);

b) its system is wired for greater than x 4 PCI-E on the motherboard in addition to the graphics slot(s) and/or PCI-X support;

- c) does not support uniform memory access (UMA) graphics;
- d) includes five or more PCI, PCI-E or PCI-X slots;
- e) is capable of multi-processor support for two or more CPU (must support physically separate CPU packages/sockets, i.e. does not meet the support for a single multi core CPU);

‘server appliance’ means a computer server bundled with a pre-installed operating system and application software that is used to perform a dedicated function or set of tightly coupled functions. A server appliance delivers services through one or more networks, and is typically managed through a web or command line interface. Server appliance hardware and software configurations are customised by a vendor to perform a specific task, including network or storage, and are not intended to execute user-supplied software;

‘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;

‘lowest power state’ means the state or mode with the lowest power demand found in a computer. This state or mode may be entered by mechanical means (e.g. by turning off the computer’s power through the movement of a mechanical switch or via automatic means);

‘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 within the scope of this Technical Regulation are defined:

‘Category A’ desktop computer means a desktop computer that does not meet the definition of Category B, Category C or Category D desktop computers;

‘Category B’ desktop computer means a desktop computer with:
two physical cores in the CPU;

a minimum of two gigabytes (GB) of system memory;

‘Category C’ desktop computer means a desktop computer with:
three or more physical cores in the CPU;

a configuration of a minimum of one of the following two criteria:

a minimum of two gigabytes (GB) of system memory and/or

a discrete graphics card (dGfx);

‘Category D’ desktop computer means a desktop computer with:
four or more physical cores in the CPU;

a configuration of a minimum of one of the following two criteria:

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;

‘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 is not portable. Desktop thin clients can output information to either an external or an internal display (where available);

‘television tuner’ means a discrete internal component that allows a computer to receive television signals;

‘product type’ means desktop computer, integrated desktop computer, notebook computer, desktop thin client, workstation, mobile workstation, small-scale server, computer server, blade system and components, multi-node server, server appliance, game console, docking station, internal power supply or external power supply;

‘Central Processing Unit (CPU)’ means a component in a computer that controls the interpretation and execution of instructions. CPU 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.

Other terms used herein shall have meanings set out in the Laws of Ukraine ‘On Technical Regulations and Conformity Assessment’, ‘On State Market Surveillance and Control of Non-Food Products’, ‘On Standardization’, ‘On General Safety of Non-Food Products’ and in the Technical Regulation Establishing a Framework for the Setting of Ecodesign Requirements for Energy-Related Products, approved by the Resolution of the Cabinet of Ministers of Ukraine No. 804 of 3 October 2018 (Official Journal of Ukraine, 2018, No. 80, p. 2678).

Ecodesign requirements

5. The ecodesign requirements for computers and computer servers are set out in Annex 1.

6. Compliance of computers and computer servers with the ecodesign requirements shall be measured and calculated in accordance with the methods set out in Annex 2.

Conformity assessment

7. Conformity of computers and computer servers with the requirements of this Technical Regulation shall be assessed by applying the internal design control

procedure or the management system for assessing conformity set out, respectively, in Annexes 3 and 4 to the Technical Regulation Establishing a Framework for the Setting of Ecodesign Requirements for Energy-Related Products, approved by the Resolution of the Cabinet of Ministers of Ukraine No 804 of 3 October 2018 (Official Journal of Ukraine, 2018, No 80, p. 2678).

State market surveillance

8. Checking of computers and computer servers for compliance with the requirements of this Technical Regulation in the course of state market surveillance shall be carried out in accordance with the requirements laid down in Annex 2.

Indicative benchmarks

9. The indicative benchmarks for best-performing computers and computer servers available on the market are laid down in Annex 3.

Correlation table

10. The correlation table of the provisions of 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 and the provisions of this Technical Regulation is set out in Annex 4.

Ecodesign requirements and timetable

Annual total energy consumption (E_{TEC})							
Desktop computers and integrated desktop computers	<p>1. One year after this Technical Regulation has come into force.</p> <p>1) The annual total energy consumption (E_{TEC} in kWh/year) shall not exceed: Category A computer: 133; Category B computer: 158; Category C computer: 188; Category D computer: 211.</p> <p>E_{TEC} shall be determined using the following formula:</p> $E_{TEC} = \left(\frac{8760}{1000}\right) \times (0,55 \times P_{off} + 0,05 \times P_{sleep} + 0,40 \times P_{idle})$ <p>For computers that lack a discrete sleep mode, but have idle state power demand less than or equal to 10 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 the following:</p> $E_{TEC} = \left(\frac{8760}{1000}\right) \times \tilde{n}(0,55 \times P_{off} + 0,45 \times P_{idle})$ <p>All P_x are power values in the indicated mode/state and measured in Watts (W) according to the methods as detailed in Annex 2 to this Technical Regulation.</p> <p>2) The following capability adjustments apply: 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); additional internal storage: 25 kWh/year; discrete television tuner: 15 kWh/year; discrete audio card: 15 kWh/year; discrete graphics card (dGfx) for the first and each additional discrete graphics card (dGfx):</p> <table border="1" style="width: 100%; margin-top: 10px;"> <thead> <tr> <th style="width: 50%;"></th> <th style="width: 25%;">dGfx category</th> <th style="width: 25%;">TEC allowance (kWh/year)</th> </tr> </thead> <tbody> <tr> <td style="height: 20px;"></td> <td></td> <td></td> </tr> </tbody> </table>		dGfx category	TEC allowance (kWh/year)			
	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

3) The capability adjustments for discrete graphics cards (dGfx), discrete television tuner and discrete audio card mentioned in subpoint 2 of point 1 and subpoint 2 of point 2 of this Annex only apply to cards and tuner that are enabled during testing of desktop computers or integrated computers.

4) Category D desktop computers and integrated desktop computers meeting all of the following technical parameters are exempt from the provisions specified in subpoint 1, 2 of point 1 of this Annex and their revisions specified in point 2 of this Annex:

the central processing unit (CPU) with a minimum of six physical cores;

discrete graphics card(s) (dGfx) providing total frame buffer bandwidths above 320 GB/s;

system memory with a minimum 16 GB;

a PSU with a rated output power of at least 1 000 W.

2. Three years after this Technical Regulation has come into force.

1) The following revisions to the annual total energy consumption specified in subpoint 1 of point 1 of this Annex apply: The annual total energy consumption (E_{TEC} in kWh/year) shall not exceed:

Category A computer: 94;

Category B computer: 112;

Category C computer: 134;

Category D computer: 150.

2) The following revisions to the capability adjustments for discrete graphics cards (dGfx) specified in subpoint 2 of point 1 apply:

	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

Notebook computers

3. One year after this Technical Regulation has come into force.

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

Category A computer: 36;

Category B computer: 48;

Category C computer: 80,50;

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

$$E_{TEC} = \left(\frac{8760}{1000} \right) \times (0,60 \times P_{off} + 0,10 \times P_{sleep} + 0,30 \times P_{idle})$$

where all P_x are power values in the indicated mode/state and measured in Watts (W) according to the methods as detailed in Annex 2.

2) The following capability adjustments apply:

memory: 0,4 kWh/year per GB over base, where base memory is 4 GB;

additional internal storage: 3 kWh/year;

discrete television tuner: 2,1 kWh/year;

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

3) The capability adjustments for discrete graphics cards (dGfx) and discrete television tuner mentioned in subpoint 2 of points 3 and 4 of this Annex only apply to cards and tuner that are enabled during testing of notebook computers.

4) Category C notebook computers must meet all of the following technical parameters, except for the provisions of subpoints 1, 2 of point 3 and their revisions specified in point 4 of this Annex:

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

4. Three years after this Technical Regulation has come into force.

1) The following revisions to the annual total energy consumption specified in subpoint 1 of point 3 of this Annex apply:

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

- Category A computer: 27;
- Category B computer: 36;
- Category C computer: 60,50.

2) The following revisions to the capability adjustments for discrete graphics cards (dGfx) specified in subpoint 2 of point 3 of this Annex 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

Sleep mode

<p>Desktop computers, integrated desktop computers and notebook computers</p>	<p>5. One year after this Technical Regulation has come into force:</p> <p>1) The equipment 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.</p> <p>2) Power demand in sleep mode shall not exceed 5 W in desktop computers and integrated desktop computers and 3 W in notebook computers.</p> <p>3) Where idle state power demand of desktop computers and integrated desktop computers is less than or equal to 10 W, they are not required to have a discrete system sleep mode.</p> <p>4) Where equipment is placed on the market with a WOL functionality enabled in sleep mode: an additional allowance of 0,70 W can be applied; equipment must be tested with a WOL functionality both enabled and disabled and must comply with both requirements.</p> <p>5) Where equipment is offered without Ethernet capability, it shall be tested with WOL functionality disabled.</p>
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Lowest power state

<p>Desktop computers, integrated desktop computers and notebook computers</p>	<p>6. From the date when this Technical Regulation has come into force:</p> <p>1) Power demand in the lowest power state shall not exceed 0,50 W.</p> <p>2) Equipment 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.</p> <p>3) Where equipment is placed on the market with an information or status display, an additional allowance of 0,50 W can be applied.</p>
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Off mode

<p>Desktop computers, integrated desktop computers and notebook computers</p>	<p>7. One year after this Technical Regulation has come into force:</p> <ol style="list-style-type: none"> 1) Power demand in off mode shall not exceed 1 W. 2) Equipment 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. 3) Where equipment is offered with a WOL functionality enabled in off mode: an additional allowance of 0,70 W can be applied; equipment must be tested with a WOL functionality both enabled and disabled and must comply with both requirements. 4) Where equipment is offered without Ethernet capability, it shall be tested with WOL functionality disabled.
<p>Internal power supply efficiency</p>	
<p>Desktop computers, integrated desktop computers, desktop thin clients, workstations, and small-scale servers</p>	<p>8. One year after this Technical Regulation has come into force:</p> <p>All computer internal power supplies must comply with at least the following criteria:</p> <ul style="list-style-type: none"> 85 % efficiency at 50 % of rated output power; 82 % efficiency at 20 % and 100 % of rated output power; power factor = 0,9 at 100 % of rated output power. <p>Internal power supplies with a maximum rated output power of less than 75 W are exempt from the power factor requirement.</p>
<p>Computer servers</p>	<p>9. One year after this Technical Regulation has come into force:</p> <ol style="list-style-type: none"> 1) All multi-output (AC-DC) power supplies must comply with the following criteria: <ul style="list-style-type: none"> 85 % efficiency at 50 % of rated output power; 82 % efficiency at 20 % and 100 % of rated output power; power factor = 0,8 at 20 % of rated output power; power factor = 0,9 at 50 % of rated output power; power factor = 0,95 at 100 % of rated output power. 2) All single output (AC-DC) power supplies with rated output of not more than 500 W must comply with the following criteria: <ul style="list-style-type: none"> 70 % efficiency at 10 % of rated output power; 82 % efficiency at 20 % of rated output power; 89 % efficiency at 50 % of rated output power; 85 % efficiency at 100 % of rated output power; power factor = 0,8 at 20 % of rated output power;

power factor = 0,9 at 50 % of rated output power;
 power factor = 0,95 at 100 % of rated output power.

3) All single output (AC-DC) power supplies with rated output greater than 500 W but not more than 1 000 W must comply with the following criteria:

75 % efficiency at 10 % of rated output power;
 85 % efficiency at 20 % and 100 % of rated output power;
 89 % efficiency at 50 % of rated output power;
 power factor = 0,65 at 10 % of rated output power;
 power factor = 0,8 at 20 % of rated output power;
 power factor = 0,9 at 50 % of rated output power;
 power factor = 0,95 at 100 % of rated output power.

4) All single output (AC-DC) power supplies with rated output of more than 1 000 W must comply with the following criteria:

80 % efficiency at 10 % of rated output power;
 88 % efficiency at 20 % and 100 % of rated output power;
 92 % efficiency at 50 % of rated output power;
 power factor = 0,8 at 10 % of rated output power;
 power factor = 0,9 at 20 % of rated output power;
 power factor = 0,9 at 50 % of rated output power;
 power factor = 0,95 at 100 % of rated output power.

Power management enabling

Desktop computers, integrated desktop computers and notebook computers

10. From the date when this Technical Regulation has come into force:

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.

11. One year after this Technical Regulation has come into force:

1) The computer shall reduce the speed of any active Ethernet network links (1 Gigabit per second (Gb/s) or more) when transitioning to sleep or off-with-WOL mode.

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.

3) The computer shall be offered with the display sleep mode set to activate within 10 minutes of user inactivity.

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.

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.

6) Users shall be able to easily activate and deactivate any wireless network connections. Users shall be given a clear indication with a symbol, light or equivalent, when wireless network connection has been activated or deactivated.

Information to be provided by manufacturers

Desktop computers, integrated desktop computers and notebook computers

12. One year after this Technical Regulation has come into force:

1) Manufacturers shall provide in the technical documentation and make publicly available on free-access websites the following information:

equipment type and category according to the requirements referred to in point 4 of this Technical Regulation (only one category);

manufacturer's name, registered trade name or registered trade mark, and the address at which they can be contacted;

equipment model number;

year of manufacture;

E_{TEC} value (kWh) and capability adjustments applied when all discrete graphics cards (dGfx) are disabled and if the system has passed the test with switchable graphics mode with UMA driving the display;

E_{TEC} value (kWh) and capability adjustments applied when all discrete graphics cards (dGfx) are enabled;

idle state power consumption (W);

sleep mode power consumption (W);

sleep mode with WOL enabled power consumption (W) (where available);

off mode power consumption (W);

off mode with WOL enabled power consumption (W) (where available);

internal power supply efficiency at 10 %, 20 %, 50 % and 100 % of rated output power;

external power supply efficiency;

noise level (the declared A-weighted sound power level) of the computer;

the minimum number of loading cycles that the batteries can withstand (applies only to notebook computers);

the measurement procedure used to determine values mentioned in the sixth, seventh, eighth, ninth, tenth, eleventh, twelfth, thirteenth, fourteenth, fifteenth and sixteenth indents of this subpoint;

sequence of steps for achieving a stable condition with respect to power demand;

description of how sleep and/or off mode was selected or programmed;

sequence of steps for reaching the mode where the equipment automatically changes to sleep and/or off mode;

the duration of idle state condition before the computer automatically reaches sleep mode, or another condition which complies with the applicable power consumption requirements for sleep mode;

the length of time after a period of inactivity in which the computer automatically reaches a power mode that has a lower power demand requirement than sleep mode;

the length of time before the display sleep mode is set to activate;

user information on the energy-saving potential of power management functionality;

user information on how to enable the power management functionality;

for products with an integrated display containing mercury, the total content of mercury as X,X mg;

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.

2) If an equipment model is placed on the market in multiple configurations the product information in accordance with subpoint 1 of point 12 of this Annex may be reported once per product category (as defined in point 4 of this Technical Regulation), for the highest power-demanding configuration available within that equipment category. The information to be provided shall include a list of all model configurations that are represented.

<p>Notebook computers</p>	<p>13. One year after this Technical Regulation has come into force:</p> <p>If a notebook computer is operated by battery(ies) that cannot be removed and replaced by a non-professional user, in addition to the information under point 12 of this Annex, 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 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 accordance with the legislation on the use of languages.</p>
<p>Workstations, mobile workstations, desktop thin clients, small-scale servers and computer servers</p>	<p>14. One year after this Technical Regulation has come into force:</p> <p>1) Manufacturers shall provide in the technical documentation and make publicly available on free-access websites the following information:</p> <p>equipment type and category according to the requirements referred to in point 4 of this Technical Regulation (only one category);</p> <p>manufacturer’s name, registered trade name or registered trade mark, and the address at which they can be contacted;</p> <p>product model number;</p> <p>year of manufacture;</p> <p>internal/external power supply efficiency;</p> <p>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>maximum power (W);</p> <p>idle state power consumption (W);</p> <p>sleep mode power consumption (W);</p> <p>off mode power consumption (W);</p> <p>noise level (the declared A-weighted sound power level) of the computer;</p> <p>the measurement procedure used to determine values mentioned in the sixth, seventh, eighth, ninth, tenth, eleventh, twelfth, thirteenth, fourteenth and fifteenth indents of this subpoint.</p>

2) If an equipment model is placed on the market in multiple configurations the product information in accordance with subpoint 1 of point 14 of this Annex may be reported once per product category (as defined in point 4 of this Technical Regulation), for the highest power-demanding configuration available within that product category. The information to be provided shall include a list of all model configurations that are represented.

Annex 2
to the Technical Regulation
on Ecodesign Requirements
for Computers and
Computer Servers

Measurements and verification procedure during state market surveillance

The verification tolerances referred to in this Annex relate only to the verification of the measured parameters by state market surveillance bodies 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 requirements of this Technical Regulation, measurements and calculations shall be made using national standards, that are identical to the harmonised European standards, 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) standards or similar, shall be tested with an ACPI (or similar standard) supporting operating system.

2. Requirements to verification during state market surveillance

When the state market surveillance authorities verify the compliance of computers and computer servers with the requirements of this Technical Regulation, they shall apply the following procedure:

- 1) One appliance per model or model configuration shall be tested.
- 2) An appliance model or model configuration shall be considered to comply with the requirements of the Technical Regulation if:
 - a) the values given in the technical documentation and the values used to calculate those values, are not more favourable for the manufacturer or importer than the results of the corresponding measurements;
 - b) the declared values meet any requirements laid down in the Technical Regulation, and the necessary equipment information provided by the manufacturer

or importer does not contain values that are more favourable for the manufacturer or importer;

c) when state market surveillance authorities test an appliance model or model configuration, the determined values (the values of the relevant parameters as measured in testing and the values calculated from these measurements) shall comply with the respective verification tolerances referred to in points 3 and 4 of this Annex, and the appliance shall comply with the tolerances given in point 5 of this Annex.

3) If the results referred to in subpoint (a) or (b) of point 2 are not achieved, the model and all the model configurations referred to in the appliance information shall be considered not to comply with the requirements of this Technical Regulation.

4) If the result referred to in subpoint (c) of point 2 is not achieved, the state market surveillance authorities shall select three additional appliances of the same model, or one or more model configurations, for testing.

5) A model or a model configuration shall be considered to comply with the requirements if, for these three appliances, the arithmetical mean complies with the verification tolerances referred to in points 3 and 4 of this Annex, and the appliance complies with the requirements given in point 5 of this Annex.

6) If the result referred to in subpoint 5 of this point is not achieved, a model and model configurations shall be considered not to comply with the requirements of this Technical Regulation.

The state market surveillance authorities shall use the measurement and calculation methods set out in this Annex.

The state market surveillance authorities shall only apply the verification tolerances that are set out in points 3 and 4 of this Annex and shall use the procedure described in subpoints 1 to 6 of point 2 of this Annex. No other tolerances, such as those set out in the national standards that are identical to the harmonised European standards or in any other measurement method, shall be applied.

3. E_{TEC} , sleep mode, off mode and lowest power state:

1) Where the power demand requirements exceed 1 W, or where energy consumption requirements formulated in TEC parameter result in a power demand requirement larger than 1 W in at least one power mode, the model configuration shall be considered to comply with the requirements laid down in points 1 to 4 and subpoints 2, 3 of point 5 of Annex 1 if the test results do not exceed the verification tolerances listed below.

Verification tolerances for power demand requirements
exceeding 1 W

Requirements	Verification tolerances
Points 1, 2, 3, 4 and subpoint 3 of point 5 of Annex 1 to this Technical Regulation	The determined value shall not exceed the declared value by more than 7 %
Subpoint 2 of point 5 of Annex 1 to this Technical Regulation (with and without additional values referred to in subpoint 4 of point 5 of Annex 1 to this Technical Regulation)	The determined value shall not exceed the declared value by more than 7 %

An additional allowance in accordance with the provisions of subpoint 4 of point 5 of Annex 1 can be added to the test results for verifying conformity with the requirements of subpoint 2 of point 5 of Annex 1, if the model configuration is offered 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 offered without Ethernet capability shall be tested with WOL functionality disabled.

2) Where the power demand requirements are smaller than or equal to 1,00 W, the model configuration shall be considered to comply with the requirements laid down in subpoint 1 of point 6 and 7 of Annex 1 if the test results do not exceed the verification tolerances listed below.

Verification tolerances for power demand requirements smaller than or
equal to 1,00 W

Requirements	Verification tolerances
Subpoint 1 of point 6 of Annex 1 (with and without additional values referred to in subpoint 3 of point 6 of Annex 1 to this Technical Regulation)	The determined value shall not exceed the declared value by more than 0,10 W
Subpoint 1 of point 7 of Annex 1 (with and without additional values referred to in subpoint 3 of point 7 of Annex 1)	The determined value shall not exceed the declared value by more than 0,10 W

An additional allowance referred to in subpoint 3 of point 6 of Annex 1 can be added to the test results for verifying conformity with the requirements of subpoint 1 of point 6 of Annex 1, if the model configuration is offered with an ‘information or status display’.

An additional allowance in accordance with subpoint 3 of point 7 of Annex 1 can be added to the test results for verifying conformity with the requirements of subpoint 1 of point 7 of Annex 1, if the model configuration is offered 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 offered without Ethernet capability shall be tested with WOL functionality disabled.

4. Internal power supply efficiency

The model shall be considered to comply with the requirements laid down in points 8 to 9 of Annex 1 if the test results do not exceed the verification tolerances listed below.

Verification tolerances for internal power supply efficiency

Requirements	Verification tolerances
The arithmetic average of efficiency at load conditions in accordance with the provisions of Annex 1 does not fall below the applicable limit value for average active efficiency.	The determined value shall not be lower than the declared value by more than 2 %
The arithmetic average of the power factor in accordance with the provisions of Annex 1 does not fall below the applicable limit value for the power factor.	The determined value shall not be lower than the declared value by more than 10 %

5. Power management enabling

When the state market surveillance authorities verify the compliance with the requirements set out in point 10 of Annex 1, they shall measure the power demand after the power management function, or a similar function, has switched the equipment into the applicable power mode.

When the state market surveillance authorities verify the compliance with the requirements set out in points 1 to 6 of point 11 of Annex 1, the model configuration shall be considered to comply with the requirements of:

subpoint 1 of point 11 of Annex 1, if the speed of any active Ethernet network link (1 Gigabit per second (Gb/s)) is reduced when a desktop computer, integrated desktop computer or notebook computer transitions to sleep or off-with-WOL mode;

subpoint 2 of point 11 of Annex 1, 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;

subpoint 3 of point 11 of Annex 1, if a display connected to a desktop computer, integrated desktop computer or notebook computer enters sleep mode within 10 minutes of user inactivity;

subpoint 4 of point 11 of Annex 1, if a WOL function for sleep and off mode can be enabled and disabled;

subpoint 5 of point 11 of Annex 1, if a desktop computer, integrated desktop computer or notebook computer enters sleep mode within 30 minutes of user inactivity;

subpoint 6 of point 11 of Annex 1, if users are able to easily activate and deactivate any wireless network connection and users are given a clear indication

with a symbol, light or equivalent, when wireless network connection has been activated or deactivated.

Annex 3
to the Technical Regulation
on Ecodesign Requirements
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Servers

INDICATIVE BENCHMARKS

The indicative benchmarks for computers, available on the market at the time of entry into force by this Technical Regulation, are the following:

E_{TEC} varies by category — see Table below;

sleep mode: 0,4 W;

off mode: 0 W.

Table

Indicative benchmarks for E_{TEC}

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

⁽¹⁾ Latest data as of 20 March 2012

Annex 4
to the Technical Regulation
on Ecodesign Requirements
for Computers and Computer
Servers

CORRELATION TABLE

of the provisions of 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
and of the provisions of the Technical Regulation on Ecodesign Requirements for
Computers and Computer Servers

Provisions of the Commission Regulation (EU)	Provisions of the Technical Regulation
Article 1(1)	point 1
Article 1(2)	point 2
Article 1(3)	point 3
First indent of Article 2	first indent of point 4
Article 2(1)	thirty-third indent of point 4
Article 2(2)	thirty-fourth indent of point 4
Article 2(3)	twenty-sixth indent of point 4
Article 2(4)	seventh indent of point 4
Article 2(5)	hundred-and-fifteenth indent of point 4
Article 2(6)	fifty-third indent of point 4
Article 2(7)	sixty-ninth indent of point 4
Article 2(8)	hundred-and-thirty-first indent of point 4
Article 2(9)	hundred-and-third indent of point 4
Article 2(10)	forty-seventh indent of point 4
Article 2(11)	forty-first indent of point 4
Article 2(12)	fifth indent of point 4
Article 2(13)	hundred-and-twelfth indent of point 4
Article 2(14)	fourth indent of point 4
Article 2(15)	fourteenth indent of point 4
Article 2(16)	fortieth indent of point 4
Article 2(17)	thirteenth indent of point 4
Article 2(18)	twenty-fourth indent of point 4
Article 2(19)	hundred-and-thirty-fourth indent of point 4
Article 2(20)	fifteenth indent and ninetieth indent of point 4
Article 2(21)	twelfth indent of point 4

Provisions of the Commission Regulation (EU)	Provisions of the Technical Regulation
Article 2(22)	hundred-and-thirty-third indent of point 4
Article 2(23)	hundred-and-second indent of point 4
Article 3	point 5,6
Article 4	-
Article 5	-
Article 6	point 7
Article 7	point 8
Article 8	point 9
Article 9	-
Article 10	-
Annex I	point 4
Annex II	Annex 1
Annex III	Annex 2
Annex IV	Annex 3
