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COMMISSION REGULATION (EU) No …/..

of XXX

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)

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THE EUROPEAN COMMISSION,

Having regard to the Treaty on the Functioning of the European Union,

Having regard to Directive 2009/125/EC of the European Parliament and of the Council of 21 October 2009 establishing a framework for the setting of ecodesign requirements for energy-related products[1], and in particular Article 15(1) thereof,

After consulting the Consultation Forum referred to in Article 18 of Directive 2009/125/EC,

Whereas:

(1)   Under Directive 2009/125/EC, ecodesign requirements are to be laid down by the Commission for energy-related products that represent significant volumes of sales and trade, have a significant environmental impact and present significant potential for improvement in terms of their environmental impact without entailing excessive costs.

(2)   Article 16(2)(a) of Directive 2009/125/EC provides that the Commission, in accordance with the procedure referred to in Article 19(3) and the criteria set out in Article 15, and after consulting the Consultation Forum, has to introduce, as appropriate, an implementing measure for office equipment.

(3)   The Commission has carried out a preparatory study which analysed the technical, environmental and economic aspects of computers. The study involved stakeholders and interested parties from the Union and third countries, and the results have been made publicly available.

(4)   The preparatory study showed that the cost-efficient improvement potential in the electricity consumption of computers between 2011 and 2020 was estimated at about 93TWh, which corresponds to 43 Mt of CO_2 emissions, and in 2020 at between 12.5 TWh and 16.3 TWh, which corresponds to 5.0–6.5 Mt of CO_2 emissions. Consequently, computers constitute a product group for which ecodesign requirements should be established.

(5)   Since a lot of the energy-savings potential of desktop thin clients, workstations, small-scale servers and computer servers is linked to the efficiency of their internal power supplies and since the technical specifications of internal power supply for these products are similar to those for desktop computers and integrated desktop computers, the provisions on internal power supply efficiency of this Regulation should also apply to the former. However, other environmental performance aspects of desktop thin clients, workstations, mobile workstations, small-scale servers and computer servers could be addressed in a more specific measure implementing Directive 2009/125/EC.

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[1]   OJ L 285, 31.10.2009, p. 10.

(6)   Displays have distinct characteristics and should therefore be excluded from the scope of this Regulation. However, considering their significant environmental impact and their significant potential for improvement, they could be addressed in another measure implementing Directive 2009/125/EC and/or Directive 2010/30/EU of the European Parliament and of the Council of 19 May 2010 on the indication by labelling and standard product information of the consumption of energy and other resources by energy-related products[2].

(7)   The ecodesign requirements should not have any significant negative impact on the functionality of the product or on consumers, and in particular as regards the affordability of the product, the life cycle costs and the industry's competitiveness. Furthermore, the requirements should not impose on manufacturers proprietary technology or excessive administrative burden, nor should they negatively affect health, safety and the environment.

(8)   Improvements in the energy efficiency of computers and computer servers should be achieved by applying existing non-proprietary and cost-effective technologies that can reduce the total combined costs of purchasing and operating them.

(9)   The ecodesign requirements should be introduced gradually in order to provide a sufficient time frame for manufacturers to redesign products that are subject to this Regulation. The timing should be such that negative impacts on the supply of computers and computer servers are avoided, and costs for manufacturers, in particular small and medium-sized enterprises, are taken into account, while ensuring timely achievement of the objectives of this Regulation.

(10)   A review of this Regulation is envisaged no later than three and a half years after its entry into force.

(11)   The energy efficiency of computers and computer servers should be determined through reliable, accurate and reproducible measurement methods, which take into account the recognised state of the art, including, where available, harmonised standards established in conformity with the applicable European standardisation legislation[3].

(12)   As ecodesign requirements for standby and off mode electric power demand of electrical and electronic household and office equipment are not fully appropriate for the characteristics of computers, the requirements of Commission Regulation (EC) No 1275/2008 of 17 December 2008 implementing Directive 2005/32/EC of the European Parliament and of the Council with regard to ecodesign requirements for standby and off mode electric power demand of electrical and electronic household and office equipment[4] should not apply to computers and computer servers. Consequently, specific requirements for power management, as well as for sleep mode, off mode and mechanical off power demand in computers should be set in this Regulation, and Regulation (EC) No 1275/2008 should be amended accordingly.

(13)   Despite the exclusion of computers and computer servers from the scope of Regulation (EC) No 1275/2008, provisions of Commission Regulation (EC) No 278/2009 of 6 April 2009 implementing Directive 2005/32/EC of the European Parliament and of the

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[2]   OJ L 151, 18.6.2010, p. 1.
[3]   Directive 98/34/EC of the European Parliament and of the Council of 22 June 1998 laying down a procedure for the provision of information in the field of technical standards and regulations and of rules on Information Society services; OJ L 204, 21.7.1998, p. 37.
[4]   OJ L 339, 18.12.2008, p. 45.

Council with regard to ecodesign requirements for no-load condition electric power demand and average active efficiency of external power supplies[5] shall apply to external power supplies that are placed on the market with computers and computer servers.

(14) In accordance with Article 8 of Directive 2009/125/EC, this Regulation should specify the applicable conformity assessment procedures.

(15) In order to facilitate compliance checks, manufacturers should be requested to provide information contained in the technical documentation referred to in Annexes IV and V to Directive 2009/125/EC in so far as that information relates to the requirements laid down in this Regulation.

(16) Benchmarks for currently available products with high energy efficiency should be identified. This will help to ensure the wide availability and easy accessibility of information, in particular for small and medium-sized enterprises, which will further facilitate the integration of best design technologies and the development of more efficient products for reducing energy consumption.

(17) The measures provided for in this Regulation are in accordance with the opinion of the Committee established by Article 19(1) of Directive 2009/125/EC,

HAS ADOPTED THIS REGULATION:

Article 1
Subject matter and scope

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

(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;

   (h) computer servers.

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

   (a) blade system and components;

   (b) server appliances;

   (c) multi-node servers;

   (d) computer servers with more than four processor sockets;

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[5] OJ L 93, 7.4.2009, p. 3.

(e)   game consoles;

(f)   docking stations.

(4)   A product can only meet one of the product type definitions as set out in Article 2 of this Regulation.

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;

(2)   '*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:

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

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

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

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

(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;

(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 or computer server and has the following characteristics:

   (a)   is contained within the computer or computer server casing but is separate from the main computer or computer server 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 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;

(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:

      (a)   two physical cores within the CPU, and

      (b)   a minimum of two gigabytes (GB) of system memory.

   (c)   '*Category C*' desktop computer means a desktop computer with:

      (a)   three or more physical cores within the CPU, and

      (b)   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:

      (a)   a minimum four physical cores in the CPU, and

      (b)   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:

   (a) two physical cores in the CPU, and

   (b) a minimum of two gigabytes (GB) of system memory.

(c) '*Category C*' integrated desktop computer means an integrated desktop computer with:

   (a) three or more physical cores in the CPU, and

   (b) 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:

   (a) a minimum of four physical cores in the CPU, and

   (b) 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 22.86cm (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:

   (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 an idle state power demand of less than 6W 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 12V supplemental power feed);

      (2) its system is wired such that all PCI-E slots on the motherboard, which are provided in addition to the graphics slot(s) and/or PCI-X support, must comply with the 4x PCI-E specification or greater;

      (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.

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 32GB 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;

(12) '*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;

(13) '*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;

(14) '*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;

(15) *'Dual-node server'* means a common multi-node server configuration consisting of two server nodes;

(16)   '*Computer server with more than four processor sockets*' means a computer server containing more than four interfaces designed for the installation of a processor;

(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;

(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 ≤ 16);

(b)   G2 (16< FB_BW ≤ 32);

(c)   G3 (32 <FB_BW ≤ 64);

(d)   G4 (64 <FB_BW ≤ 96);

(e)   G5 (96 <FB_BW ≤ 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:

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

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;

(e)   dividing by 1000 converts Megabytes into Gigabytes;

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

(22)   '*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.

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

Article 3
Ecodesign requirements

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

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

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, notebook computers, desktop thin clients, workstations, mobile workstations, small-scale servers and computer servers as defined in Commission Regulation (EU) […] [*Numbering of the Regulation to be added before publication in the OJ*].'

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 and computer servers as defined in Commission Regulation (EU) [...] [*Numbering of the Regulation to be added before publication in the OJ*].'

Article 6
Conformity assessment

The conformity assessment procedure referred to in Article 8 of Directive 2009/125/EC[6] 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.

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[6]   OJ L 285, 31.10.2009, p. 10.

Article 7
Market surveillance and verification procedure

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

Checking of computers and computer servers 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.

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

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.

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 2., 3. and 6. of Annex II shall apply as from the entry into force of the Regulation.

Points 1.1., 1.3., 4., 5.1., 5.2., 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.

Done at Brussels,

For the Commission
The President
José Manuel BARROSO

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 lowest 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. For systems where Advanced Configuration and Power Interface (ACPI) standards are applicable, an off mode usually correlates to ACPI system level G2/S5 ('soft off') state;

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

(3) '*Mechanical Off*' means a computer state that is entered or left by a mechanical means, including by turning off the computer's power through the movement of a mechanical switch. For systems where Advanced Configuration and Power Interface (ACPI) standards are applicable, 'mechanical off' usually correlates to ACPI system level G3 ('mechanical off');

(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. For systems where Advanced Configuration and Power Interface (ACPI) standards are applicable, a sleep mode usually correlates to ACPI system level G1/S3 (suspend to RAM) state;

'P_{sleep}' represents the 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 a sleep mode, and activity is limited to those basic applications that the system starts by default;

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

(6) '*Additional Internal Storage*' means any and all internal hard disk drives (HDD) or solid state drives (SSD) 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 a sleep mode or an 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;

(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 a sleep mode or an 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.

Ecodesign requirements and timetable

1. TEC	
Desktop computer and integrated desktop computer	**1.1.** **From 1 July 2014**

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

(a) Category A computer: 148.00;

(b) Category B computer: 175.00;

(c) Category C computer: 209.00;

(d) Category D computer: 234.00.

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

$E_{TEC} = (8760/1000) * (0.55*Poff + 0.05*Psleep + 0.40*Pidle)$.

For computers that lack a discrete sleep mode, but have an idle state power demand less than or equal to 10.00 W, power in idle state (Pidle) may be used in place of sleep (Psleep) in the above equation, such that the formula is replaced by

$E_{TEC} = (8760/1000) * (0.55*Poff + 0.45*Pidle)$

All Px 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.

1.1.2. The following capability adjustments apply:

(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);

(b) additional internal storage over base, where base is 1 internal storage device: 25 kWh/year;

(c) discrete television tuner: 15 kWh/year;

(d) discrete audio card: 15 kWh/year;

(e) 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	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

1.1.3.   The capability adjustments for discrete graphics cards (dGfx) mentioned in point 1.1.2. (e) and point 1.2.2. only apply to discrete graphics cards (dGfx) that are enabled during testing of desktop computers or integrated computers.

1.1.4.   Category D desktop computers and integrated desktop computers meeting all of the following technical parameters are exempt from the requirements specified in points 1.1.1. and 1.1.2. and their revisions specified in point 1.2.:

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

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

(c)   a minimum 16GB of system memory; and

(d)   a PSU with a rated output power of at least 1000 W.

1.2.   From 1 January 2016

1.2.1.   The following revisions to the annual total energy consumption specified in point 1.1.1. apply:

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

(a)   Category A computer: 118.00;

(b)   Category B computer: 140.00;

(c)   Category C computer: 167.00;

(d)   Category D computer: 187.00.

1.2.2.   The following revisions to the capability adjustments for discrete graphics cards (dGfx) specified in point 1.1.2. (e) apply:

	dGfx category	TEC allowance (kWh/year)
First discrete graphics card (dGfx)	G1	20
	G2	33
	G3	42
	G4	60
	G5	80
	G6	100
	G7	136
Each additional discrete graphics card (dGfx)	G1	12
	G2	19
	G3	25
	G4	36
	G5	47
	G6	59
	G7	80

Notebook computer

1.3. From 1 July 2014

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

(a) Category A computer: 40.00;

(b) Category B computer: 53.00;

(c) Category C computer: 88.50;

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

$E_{TEC} = (8760/1000) * (0.60*P_{off} + 0.10*P_{sleep} + 0.30*P_{idle})$ 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 over base, where base is 1 internal storage device: 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) mentioned in point 1.3.2. (d) and point 1.4.2. only apply to discrete graphics cards (dGfx) 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 requirements 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 16GB 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: 32.00;

(b) Category B computer: 42.00;

(c) Category C computer: 70.50;

	dGfx category	TEC allowance (kWh/year)
1.4.2. The following revisions to the capability adjustments for discrete graphics cards (dGfx) specified in point 1.3.2(d) apply:		
First discrete graphics card (dGfx)	G1	8
	G2	12
	G3	15
	G4	22
	G5	30
	G6	37
	G7	68
Each additional discrete graphics card (dGfx)	G1	4
	G2	7
	G3	9
	G4	13
	G5	18
	G6	22
	G7	40

2. SLEEP MODE

Desktop computer, integrated desktop computer and notebook computer	**2.** **As of the entry into force of the Regulation**
	2.1. A product shall provide a sleep mode and/or another condition that provides the functionality of the sleep mode and which does not exceed the applicable power demand requirements for a sleep mode.
	2.2. Power demand in a 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 the 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 a 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. MECHANICAL OFF
Desktop computer, integrated desktop computer and notebook computer	**3**. **As of the entry into force of the Regulation** 3.1. Power demand in a mechanical off state shall not exceed 0.50 W. 3.2. A product shall provide a mechanical off state and/or another condition which does not exceed the applicable power demand requirements for a mechanical off 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.
	4. OFF MODE
Desktop computer, integrated desktop computer and notebook computer	**4. From 1 July 2014** 4.1. Power demand in an off mode shall not exceed 1.00 W. 4.2. A product shall provide an off mode and/or another condition which does not exceed the applicable power demand requirements for an off mode when it is connected to the mains power source. 4.3. Where a product is placed on the market with a WOL functionality enabled in an off 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. 4.4. Where a product is placed on the market without Ethernet capability, it shall be tested without WOL enabled.

	5. INTERNAL POWER SUPPLY EFFICIENCY

Desktop computer, integrated desktop computer, desktop thin client, workstation, and small-scale server	**5.1. From 1 July 2014**
	
	5.1.1. All computer internal power supplies shall not perform at less than:
	
	    (a) 85 % efficiency at 50 % of rated output power;
	
	    (b) 82 % efficiency at 20 % and 100 % of rated output power;
	
	    (c) power factor = 0.9 at 100 % of rated output power.
	
	Internal power supplies with a maximum rated output power of less than 75W are exempt from the power factor requirement.

Computer servers	**5.2. From 1 July 2014**
	
	5.2.1. All multi-output (AC-DC) power supplies shall not perform at less than:
	
	    (a) 85 % efficiency at 50 % of rated output;
	
	    (b) 82 % efficiency at 20 % and 100 % of rated output.
	
	5.2.2. All multi-output (AC-DC) power supplies shall not perform at less than:
	
	    (a) power factor 0.8 at 20 % of rated output;
	
	    (b) power factor 0.9 at 50 % of rated output;
	
	    (c) power factor 0.95 at 100 % of rated output.
	
	5.2.3. All single output (AC-DC) power supplies with rated output of not more than 500W shall not perform at less than:
	
	    (a) 70 % efficiency at 10 % of rated output;
	
	    (b) 82 % efficiency at 20 % of rated output;
	
	    (c) 89 % efficiency at 50 % of rated output;
	
	    (d) 85 % efficiency at 100 % of rated output.
	
	5.2.4. All single output (AC-DC) power supplies with rated output of not more than 500W shall not perform at less than:
	
	    (a) power factor 0.8 at 20 % of rated output;
	
	    (b) power factor 0.9 at 50 % of rated output;
	
	    (c) power factor 0.95 at 100 % of rated output.
	
	5.2.5. All single output (AC-DC) power supplies with rated output greater than 500W but not more than 1000W shall not perform at less than:
	
	    (a) 75 % efficiency at 10 % of rated output;
	
	    (b) 85 % efficiency at 20 % and 100 % of rated output;
	
	    (c) 89 % efficiency at 50 % of rated output.

	5.2.6.	All single output (AC-DC) power supplies with rated output greater than 500W but not more than 1000W shall not perform at less than:
		(a) power factor 0.65 at 10 % of rated output;
		(b) power factor 0.8 at 20 % of rated output;
		(c) power factor 0.9 at 50 % of rated output;
		(d) power factor 0.95 at 100 % of rated output.
	5.2.7.	All single output (AC-DC) power supplies with rated output of more than 1000W shall not perform at less than:
		(a) 80 % efficiency at 10 % of rated output;
		(b) 88 % efficiency at 20 % and 100 % of rated output;
		(c) 92 % efficiency at 50 % of rated output.
	5.2.8.	All single output (AC-DC) power supplies with rated output of more than 1000W shall not perform at less than:
		(a) power factor 0.8 at 10 % of rated output;
		(b) power factor 0.9 at 20 % of rated output;
		(c) power factor 0.9 at 50 % of rated output;
		(d) power factor 0.95 at 100 % of rated output.
	6. POWER MANAGEMENT ENABLING	
Desktop computer, integrated desktop computer and notebook computer	**6.**	**As of the entry into force of the Regulation**
	6.1.	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 requirement than the applicable power demand requirement for a sleep mode.
	6.2.	The computer shall reduce the speed of any active 1 Gigabit per second (Gb/s) Ethernet network links when transitioning to a sleep or an off-with-WOL mode.
	6.3.	When in a 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.
	6.4.	The computer shall be placed on the market with the display sleep mode set to activate within 10 minutes of user inactivity.
	6.5.	The computer with Ethernet capability shall have the ability to enable and disable a WOL function for a sleep and an off mode.
	6.6.	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.
	6.7. 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.

7. INFORMATION TO BE PROVIDED BY MANUFACTURERS

Desktop computer, integrated desktop computer, and notebook computer	**7.1.** **From 1 July 2014**
	7.1.1. Manufacturers shall provide in the technical documentation and make publicly available on free-access websites the following information:
	(a) product type and category as defined in Article 2;
	(b) manufacturer's name or trade mark, commercial registration number and place of manufacture;
	(c) product model number;
	(d) year of manufacture;
	(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) 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;
	(o) the minimum number of loading cycles that the batteries can withstand (applies only to notebook computers);
	(p) the measurement methodology used to determine information mentioned in points (e) to (o);
	(q) sequence of steps for achieving a stable condition with

respect to power demand;

(r) description of how the sleep and/or off mode was selected or programmed;

(s) sequence of events required to reach the mode where the equipment automatically changes to a sleep and/or an off mode;

(t) the duration of the idle state condition before the computer automatically reaches a sleep mode, or another condition which does not exceed the applicable power demand requirements for a sleep mode;

(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 a sleep mode;

(v) the length of time before the display sleep mode is set to activate after user inactivity;

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

(x) user information on how to enable the power management functionality;

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

(z) 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.

7.1.2. If a product model is placed on the market in multiple configurations this information may be reported once by product category as defined in Article 2, at the model level representing the highest power-demanding configuration available within each product category.

Notebook computer	**7.2.** **From 1 July 2014** 7.2.1. 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'*. 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.

Workstation, mobile workstation, desktop thin client, small-scale server and computer server	**7.3.** **From 1 July 2014**
	
	7.3.1. Manufacturers shall provide in the technical documentation and make publicly available on free-access websites the following information:
	
	(a) product type as defined in Article 2;
	
	(b) manufacturer's name or trade mark, commercial registration number and place of manufacture;
	
	(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 this information may be reported once at the model level representing the highest power-demanding configuration available.

ANNEX III

Measurements and verification procedure for market surveillance

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.

For the compliance and verification of compliance of desktop computers, integrated desktop computers and notebook computers with the applicable requirements on E_{TEC} from measurements of an off mode, a sleep mode and an idle state, measurements and calculations shall be made using the method provided in Commission Decision 2009/489/EC of 16 June 2009 determining the Community position for a decision of the Management entities under the Agreement between the Government of the United States of America and the European Community on the coordination of energy-efficiency labelling programmes for office equipment on the revision of the computer specifications in Annex C, part VIII, to the Agreement[7].

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.   Verification procedure

When performing the market surveillance checks referred to in Article 3(2) of Directive 2009/125/EC, the authorities of the Member States shall apply the following verification procedure for the ecodesign requirements set out in Annex II to this Regulation:

TEC, sleep mode, off mode and mechanical off:

2.1.   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, Member State authorities shall test one single unit as follows:

The model configuration shall be considered to comply with the applicable requirements set out in points 1.1., 1.2., 1.3., 1.4., and 2.3. of Annex II if the test results for the applicable limit values do not exceed them by more than 7 %.

The model configuration shall be considered to comply with the applicable requirements set out in point 2.2. of Annex II if the test results for the applicable limit values do not exceed them by more than 7 %. An additional allowance as set out in point 2.4. of Annex II can be added to the test results if the model configuration is placed on the market with a WOL functionality enabled in a 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.

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[7]

If the test results referred to above are not achieved, three additional units of the same model configuration shall be tested.

After three additional units of the same model and configuration have been tested, 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 average of the test results of the latter three units for the applicable limit values does not exceed them by more than 7 %.

If the test results referred to above are not achieved, the model configuration and all models that are listed under the same product information (see Annex II, points 7.1.2. and 7.3.2.) shall be considered not 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.

2.2. For power demand requirements smaller than or equal to 1.00 W, Member State authorities shall test one single unit as follows:

The model configuration shall be considered to comply with the applicable requirements set out in point 3.1. of Annex II if the test results for the applicable limit values do not exceed them by more than 0.10 W. An additional allowance as set out in point 3.3. of Annex II can be added to the test results if the model configuration is placed on the market with an 'information or status display'.

The model configuration shall be considered to comply with the applicable requirements set out in point 4.1. of Annex II if the test results for the applicable limit values do not exceed them by more than 0.10 W. An additional allowance as set out in point 4.3. of Annex II can be added to the test results if the model configuration is placed on the market with a WOL functionality enabled in an 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.

If the test results referred to above are not achieved, three additional units of the same model configuration shall be tested.

After three additional units of the same model and configuration have been tested, the model configuration shall be considered to comply with the applicable requirements set out in points 3.1. and 4.1. of Annex II if the average of the test results of the latter three tests for the applicable limit values does not exceed them by more than 0.10 W.

If the test results referred to above are not achieved, the model configuration and all models that are listed under the same product information (see Annex I, points 7.1.2. and 7.3.2.) shall be considered not to comply with the applicable requirements set out in points 3.1. and 4.1. of Annex II.

Internal power supply efficiency

2.3. Authorities of the Member States shall test one single unit.

The model shall be considered to comply with the provisions set out in point 5. of Annex II if:

(a) the arithmetic average of efficiency at load conditions as defined in Annex II does not fall below the applicable limit value for average active efficiency by more than 2 %; and

(b) the arithmetic average of the power factor as defined in Annex II does not fall below the applicable limit value for the power factor by more than 10 %.

If the results referred to above are not achieved, three additional units of the same model shall be tested.

After three additional units of the same model have been tested, the model shall be considered to comply with the provisions set out in point 5. of Annex II if:

(a) the average of the arithmetic averages of efficiency at load conditions as defined in Annex II does not fall below the applicable limit value for average active efficiency by more than 2 %; and

(b) the arithmetic average of the power factor as defined in Annex II does not fall below the applicable limit value for the power factor by more than 10 %.

If the results referred to above are not achieved, the model shall be considered not to comply with the requirements set out in point 5. of Annex II.

Power management enabling

2.4. For 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.

2.5. For the requirements set out in points 6.2. to 6.7. of Annex II, Member State authorities shall test one single unit as follows:

The model configuration shall be considered to comply with the applicable requirements set out in point 6.2. if the speed of any active 1 Gigabit per second (Gb/s) Ethernet network links is reduced when a desktop computer, integrated desktop computer or notebook computer transitions to a sleep or an off-with-WOL mode.

The model configuration shall be considered to comply with the applicable requirements set out in point 6.3. 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.

The model configuration shall be considered to comply with the applicable requirements set out in point 6.4. if a display connected to a desktop computer, integrated desktop computer or notebook computer enters sleep mode within 10 minutes of user inactivity.

The model configuration shall be considered to comply with the applicable requirements set out in point 6.5. if a WOL function for a sleep and an off mode can be enabled and disabled.

The model configuration shall be considered to comply with the applicable requirements set out in point 6.6. if a desktop computer, integrated desktop computer or notebook computer enters sleep mode within 30 minutes of user inactivity.

The model configuration shall be considered to comply with the applicable requirements set out in point 6.7. if users are able to easily activate and deactivate any wireless network connection(s) and users are given a clear indication with a symbol, light or equivalent, when wireless network connection(s) have been activated or deactivated.

If the test results referred to above are not achieved, three additional units of the same model configuration should be tested.

After three additional units of the same model and configuration have been tested, the model configuration shall be considered to comply with the applicable requirements set out in points 6.2. to 6.7. of Annex II if all three of the additional units meet the requirements.

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 0.4W;
- Off mode 0.0W.

Table – E_{TEC} best current performance:

		TEC (kWh/year)[8]
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

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[8]   Latest data as at 20 March 2012.