

## Guide to ecodesign requirements for computers and computer servers

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### Are you a manufacturer or importer of computers and/or computer servers?

#### Please be aware. There are requirements for power management and energy efficiency

Computers and computer servers must meet ecodesign requirements. This means that the products must be designed to provide power management and meet requirements for energy efficiency and maximum allowed energy consumption.

#### Which products?

The requirements apply to computers (including desktops, notebooks, tablets etc.), thin clients, workstations, small-scale servers and computer servers.

#### When?

The ecodesign requirements are introduced in three steps from respectively 17<sup>th</sup> July 2013, 1<sup>st</sup> July 2014 and 1<sup>st</sup> January 2016.

For desktop computers and notebooks the requirements include:

- Maximum allowed power consumption in lowest power states (from 17<sup>th</sup> July 2013)
- Provision of low power state (from 17<sup>th</sup> July 2013)
- Power management (from 17<sup>th</sup> July 2013, and tightened from 1<sup>st</sup> July 2014)
- Maximum allowed annual total energy consumption (from the 1<sup>st</sup> July 2014, and tightened from 1<sup>st</sup> January 2016)
- Maximum allowed sleep and off mode energy consumption (from 1<sup>st</sup> July 2014)
- Provision of sleep mode or similar condition (from 1<sup>st</sup> July 2014)
- Efficiency of internal power supply (from 1<sup>st</sup> July 2014)
- Product information requirements (from 1<sup>st</sup> July 2014)

For computer servers, desktop thin clients, workstations, and small-scale servers the requirements include:

- Efficiency of internal power supply (from 1<sup>st</sup> July 2014)
- Product information requirements (from 1<sup>st</sup> July 2014)

## Who?

You have the responsibility of ensuring and documenting compliance with the requirements, if you are:

- a manufacturer in the EEA that produces electrical and electronic household and office equipment etc. to be placed on the market in the EEA
- an importer of electrical and electronic household and office equipment etc. from a country outside of EEA to be placed on the market in the EEA
- an authorised representative in the EEA for a manufacturer that is situated in a country outside of EEA

The above mentioned responsible parties are hereafter referred to as suppliers.

The EEA (European Economic Area) includes the EU member states and the EFTA countries.

## Why?

Computers and computer servers account for a large share of the energy consumption in European households and offices. In 2020 the saving potential is estimated to be approximately 12.5 to 16.3 TWh. Consequently, EU has decided to establish ecodesign requirements for these products.

### **Where can I find more information?**

Find relevant regulations on the last page of this guide, or read more about ecodesign and energy labelling on [www.ens.dk/energikrav](http://www.ens.dk/energikrav)

### **Disclaimer**

This guide presents the contents of the Regulation and is addressed to manufacturers, importers and others interested. The guide is not a substitution for the Regulation, in any case of doubt, the Regulation is applicable. This guide is not legally binding as a binding interpretation can only be made by the EU court.

### **Acknowledgement**

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## Which products must comply with the requirements?

The requirements apply to computers and servers, which can be powered directly from the mains alternating current including via an external or internal power supply. Table 1 shows products which are covered by the requirements and to avoid doubt, products that are exempted.

**Table 1 Products covered and exempted from the requirements**

The requirements apply to:	The requirements do <b>NOT</b> apply to:
<ul style="list-style-type: none"> <li>✓ Desktop computers</li> <li>✓ Integrated desktop computers</li> <li>✓ Notebook computers, including tablet computers, slate computers and mobile thin clients</li> <li>✓ Desktop thin clients</li> <li>✓ Workstations</li> <li>✓ Mobile workstation</li> <li>✓ Small-scale servers</li> <li>✓ Computer servers</li> </ul>	<ul style="list-style-type: none"> <li>✗ Blade system and components</li> <li>✗ Server appliances</li> <li>✗ Multi-node servers</li> <li>✗ Computer servers with more than four processor sockets</li> <li>✗ Game consoles</li> <li>✗ Docking stations</li> <li>✗ Notebook computers with idle state power demand less than 6 W</li> </ul>

Desktop computers and integrated desktop computers are hereafter referred to as desktop computers.

### Definitions of covered products:

*Please see more detailed definitions in Article 1 of Regulation 617/2013/EU*

#### **Desktop computer:**

Computer designed for use with an external display, keyboard and mouse, and not designed for portability.

#### **Integrated desktop computer:**

Computer where the display and computer itself function as one single unit either physically or via a power cord, and not designed for portability.

#### **Notebook computer:**

Computer designed for portability and operating in extended periods without direct connection to AC power source.

#### **Desktop thin clients:**

Computer that relies on a connection to remote computing resources to obtain primary functionality and has no integrated rotational storage.

#### **Workstation:**

High-performance, single-user computer primarily used for graphics, CAD, financial and scientific applications among other compute intensive tasks.

#### **Mobile workstation:**

Workstation 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 have integrated display and are capable of operation on an integrated battery.

#### **Small-scale server:**

Computer that typically uses desktop computer components (stored within one box) 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.

#### **Computer server:**

Computer designed to support computer server operating systems (OS) and/or hypervisors, and targeted to run user-installed enterprise applications. It is placed on the market with one or more AC-DC power supplies.

## What are the requirements?

From 17<sup>th</sup> July 2013 desktop computers and notebooks are covered by ecodesign requirements. Additional requirements apply from 1<sup>st</sup> July 2014, and 1<sup>st</sup> July 2016.

For other products than desktop computers and notebooks mentioned in table 1 ecodesign requirements apply from 1<sup>st</sup> July 2014, and additional requirement from 1<sup>st</sup> July 2016.

The requirements include maximum allowed annual total energy consumption, maximum allowed sleep mode power consumption, lowest power state and off mode power consumption, internal power supply efficiency, provision of power management as well as product information requirements.

### From 17<sup>th</sup> July 2013

#### **Low power states and power management**

The requirements for desktop computers and notebooks include:

- Power consumption in the lowest power state  $\leq 0.50$  W (1.0 W in case of information or status display)
- Provision of a power state or mode, which power consumption does not exceed the above mentioned limit
- Provision of power management that automatically, when the computer is not providing a main function, switches the computer into a power mode that has a lower power than the applicable power demand for sleep mode

Please be aware of requirements for power management enabling mentioned below.

### From 1<sup>st</sup> July 2014

#### **Annual total energy consumption ( $E_{TEC}$ )**

From 1<sup>st</sup> July 2014 desktop computers and notebooks must comply with requirements regarding maximum allowed annual total energy consumption ( $E_{TEC}$ ). The requirements are tightened from 1<sup>st</sup> July 2016.

Annual total energy consumption ( $E_{TEC}$  in kWh/year) is calculated using power consumption in off, sleep and idle mode, and hours in a year the computer spend in that mode. The usage profile varies between the types of computers.

$E_{TEC}$  is determined using the following formula:

$$E_{TEC} = \left(\frac{8760}{1000}\right) \times (0,55 \times P_{off} + 0,05 \times P_{sleep} + 0,40 \times P_{idle})$$

For computers that lack a sleep mode, but have idle state power demand less or equal to 10 W, the formula is replaced by:

$$E_{TEC} = \left(\frac{8760}{1000}\right) \times (0,55 \times P_{off} + 0,45 \times P_{idle})$$

The allowed  $E_{TEC}$  is higher for the desktop computers than for notebooks. It also depends highly on the category of the computer (A to D) and additional functionalities. Please see definitions of computer categories in table 2, requirements for desktop computers in table 3 and requirements for notebooks in table 4.

Table 2 Definitions of computer categories

Type	Desktop computers	Integrated desktop computers	Notebook computers
Category A	A desktop computer that does not meet the definition of category B, C or D desktop computers.	An integrated desktop computer that does not meet the definition of category B, C or D integrated desktop computers.	A notebook computer that does not meet the definition of category B, or C notebook computers.
Category B	A desktop computer with 2 physical cores within the CPU and a minimum of 2 GB of system memory.	An integrated desktop computer with 2 physical cores within CPU and a minimum of 2 GB of system memory.	A note book computer with at least one discrete graphics card.
Category C	A desktop computer with 3 or more physical cores within the CPU and either a minimum of 2 GB of system memory or a discrete graphics card, or both.	An integrated desktop computer with 3 or more physical cores within the CPU and either a minimum of 2 GB of system memory or a discrete graphics card, or both.	A notebook computer with at least the following: A minimum of 2 physical cores in the CPU, a minimum of 2 GB of system memory, and a discrete graphics card in the category G3 (with frame buffer data width > 128 bit), G4, G5, G6 or G7.
Category D	A desktop computer with 4 or more physical cores within the CPU, and either a minimum of 4 GB system memory or a discrete graphics card in the category G3 (with frame buffer data width > 128 bit), G4, G5, G6, or G7, or both.	An integrated desktop computer with a minimum of 4 physical cores in the CPU, and either a minimum of 4 GB system memory or a discrete graphics card in the category G3 (with frame buffer data width > 128 bit), G4, G5, G6, or G7, or both.	

**Discrete graphic cards categories:**

G1: Frame buffer bandwidth  $\leq 16$

G2:  $16 < \text{Frame buffer bandwidth} \leq 32$

G3:  $32 < \text{Frame buffer bandwidth} \leq 64$

G4:  $64 < \text{Frame buffer bandwidth} \leq 96$

G5:  $96 < \text{Frame buffer bandwidth} \leq 128$

G6: Frame buffer bandwidth > 128 (with frame buffer data width < 192)

G7: Frame buffer bandwidth > 128 (with frame buffer data width  $\geq 192$ )

**Table 3 Maximum annual total energy consumption for desktop computers**

Category	E <sub>TEC</sub> kWh/year		Additional allowances
	From 1 <sup>st</sup> July 2014	From 1 <sup>st</sup> July 2016	
Category A	133	94	Additional allowances for extra memory, internal storage, discrete tuner and audio cards, and discrete graphics cards. The allowance for graphic cards depends on its category*.
Category B	158	112	
Category C	188	134	
Category D	211	150	

\*Note: See the full list of additional allowances in Annex II of Regulation 617/2013/EU

**Table 4 Maximum annual total energy consumption for notebooks**

Category	E <sub>TEC</sub> kWh/year		Additional allowances
	From 1 <sup>st</sup> July 2014	From 1 <sup>st</sup> July 2016	
Category A	36	27	Additional allowances for extra memory, internal storage, discrete tuner and audio cards, and discrete graphics cards. The allowance for graphic cards depends on its category*.
Category B	48	36	
Category C	80.5	60.5	

\*Note: See the full list of additional allowances in Annex II of Regulation 617/2013/EU

### Sleep and off modes requirements

From 1<sup>st</sup> July 2014 requirements regarding maximum allowed power consumption in sleep and off mode apply to desktop computers and notebooks. Furthermore desktop computers and notebooks must provide sleep mode or a similar condition, which power consumption does not exceed the maximum allowed value for sleep mode.

Desktop computers are allowed a higher consumption in sleep mode than notebooks.

For computers with enabled WOL (Wake On Lan) functionality in sleep mode or off mode an additional allowance of 0.7 W can be applied. Please see the requirements in table 5.

**Table 5 Maximum allowed power consumption for sleep and off mode from 1<sup>st</sup> July 2014**

Computer type	Sleep mode*	Off mode*
Desktop computer	≤ 5.00 W	≤ 1.00 W
Notebook	≤ 3.00 W	
Extra allowance for enabled WOL functionality	+ 0.7 W	+ 0.7 W

## Internal power supply efficiency

From 1<sup>st</sup> July 2014 desktop computers, desktop thin clients, workstations, small-scale servers, and computer servers must comply with requirements concerning internal power supply efficiency and power factor (PF). The requirements depend on the type of power supply and for single output AC-DC power supplies for computer servers of the rated input. Please see the requirements in table 6.

**Table 6 Requirements for efficiency of internal power supply and power factor (PF) from 1<sup>st</sup> July 2014**

Product groups	At 10 % of rated output	At 20 % of rated output	At 50 % of rated output	At 100 % of rated output
<b>Desktop computers, desktop thin client, workstation and small-scale server*</b>				
All internal power supplies	-	Efficiency ≥ 82 %	Efficiency ≥ 85 %	Efficiency ≥ 82 % PF = 0.9*
<b>Computer server</b>				
All multi output AC-DC power supplies	-	Efficiency ≥ 82 % PF ≥ 0.8	Efficiency ≥ 85 % PF ≥ 0.9	Efficiency ≥ 82 % PF ≥ 0.95
Single output AC-DC rated input ≤ 500 W	Efficiency ≥ 70 %	Efficiency ≥ 82 % PF ≥ 0.8	Efficiency ≥ 89 % PF ≥ 0.9	Efficiency ≥ 85 % PF ≥ 0.95
Single output AC-DC 500 < rated input ≤ 1000 W	Efficiency ≥ 75 % PF ≥ 0.65	Efficiency ≥ 85 % PF ≥ 0.8	Efficiency ≥ 89 % PF ≥ 0.9	Efficiency ≥ 85 % PF ≥ 0.95
Single output AC-DC rated input > 1000 W	Efficiency ≥ 80 % PF ≥ 0.8	Efficiency ≥ 88 % PF ≥ 0.9	Efficiency ≥ 92 % PF ≥ 0.9	Efficiency ≥ 88 % PF ≥ 0.95

\*Internal power supplies for desktop computer, integrated desktop computer, desktop thin client, workstation and small-scale server with a maximum rated output power of less than 75 W are exempt from the power factor requirement.

## Power management enabling

From the 1<sup>st</sup> July 2014 a set of more specific requirement for power management apply to desktop computer, integrated desktop computer and notebooks. The requirements include:

- Reduction of the speed of any active 1 Gigabit per second (Gb/s) Ethernet network links when transitioning to sleep or off-with-WOL mode
- Wake up time from sleep mode to the system becoming fully usable should happen with a latency of maximum 5 seconds
- Display sleep mode set to activate within 10 minutes of user inactivity (as default)
- Ability to enable and disable WOL functions for sleep mode and off-mode (if WOL function is available and supported)
- Sleep mode or another condition that provides sleep mode functionality should activate within 30 minutes of user inactivity (as default).
- Possibility for the users to easily activate and deactivate any wireless network connections and provision of a clear indication with a symbol, light or equivalent, when wireless network connections have been activated or deactivated

Please see more details in Regulation 617/2013/EU Annex II point 6.

## Product information

From 1<sup>st</sup> July 2014 product information must be shown on a freely accessible website of the manufacturer.

The website must among others include information about:

- Power consumption in various modes
- $E_{TEC}$  value and capability adjustment applied when all discrete graphic card are enabled and disabled\*
- Internal power supply efficiency
- Noise levels
- Minimum number of loading cycles for battery\*\*
- Description of various sequence and steps with regard to power management\*
- Length of time before display sleep mode is set to activate\*
- Duration of idle state before the computer automatically reaches sleep mode\*
- Length of time before the computer automatically reaches a power mode with lower consumption than sleep mode\*
- User information about energy saving potential of power management and on how to enable power management\*
- For products with display containing mercury the content of mercury as x,x mg\*
- Information about test parameters and measurement methodology

\*The requirement does not apply to workstations, desktop thin clients, small-scale servers and computer servers.

\*\*The requirement does only apply to notebooks.

If a product model is placed on the market in multiple configurations the product information required should be reported once per product category, for the highest power-demanding configuration available within the category. Furthermore a list of all model configurations should be provided.

More details appear from Regulation 617/2013/EU Annex II point 7.

### ***Additionally for notebooks***

If a notebook computer is operated by batteries that cannot be accessed and replaced by a non-professional user, the manufacturer's website and the packaging of the notebook must include the following information:

- 'The battery(ies) in this product cannot be easily replaced by users themselves'.

The information provided on the packaging must be clearly visible and legible and be provided in all the official languages of the country where the product is marketed.

## What are the requirements for documentation?

### **CE marking and EC declaration of conformity**

Products covered by ecodesign requirements must be CE marked when they are placed on the EEA market.

Furthermore an EC declaration of conformity must be available by the suppliers. In the EC declaration of conformity, the manufacturer or its authorised representative in the EEA must document and guarantee that their products fulfil all relevant EU regulations, i.e. the following reference numbers of Ecodesign Regulations should be mentioned:

- (EU) No 617/2013 for computers and computer servers
- (EC) No 278/2009 for external power supplies

Find requirement for the contents of EC declaration of conformity in the Ecodesign Directive 2009/125/EC Annex VI.

### **Technical documentation**

The supplier is responsible for making sure the product has a technical documentation when placing it on the EEA market. The technical documentation should show that the product is constructed in conformity with the requirements in all relevant ecodesign regulations. The technical documentation must be compiled by the manufacturer.

For computers and computer servers, you can see the requirement for technical documentation in Regulation (EU) No 617/2013 Annex II point 7. The information in the technical documentation is similar to the information that must be provided on the website of the manufacturer.

The market surveillance authorities of EEA countries may request the technical documentation, and you must provide it within a maximum of ten days after receiving the request. The documentation must be stored for ten years after the last examples of the model are produced.

### **Measurement and calculation methods**

The power consumption of computers and computer servers must be measured by a reliable, accurate and reproducible measurement procedure, which takes into account the generally recognised state of the art. A reproducible measurement procedure means that the measurement can be repeated and produce the same results.

Measurements must always be carried out in accordance with guidelines of the Regulation.

## Where can I find information?

Danish Energy Agency's homepage [www.ens.dk/energikrav](http://www.ens.dk/energikrav) contains more information about policies, new requirements in regulations, guidance, contact information and links to relevant legislation.

### Legislations

Commission Regulation (EU) No 617/2013 with regard to ecodesign requirements for computers and computer servers:

<http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2013:175:0013:0033:EN:PDF>

Directive 2009/125/EC of the European parliament and of the council establishing a framework for the setting of ecodesign requirements for energy-related products:

<http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2009:285:0010:0035:en:PDF>

### Danish legislations with regard to ecodesign

The ecodesign directive is implemented by the following Danish legislations:

- Lovbekendtgørelse om miljøvenligt design af energirelaterede produkter, nr. 1068 af 15. september 2010
- Bekendtgørelse om miljøvenligt design af energirelaterede produkter, nr. 1274 af 19. november 2010 (only available in Danish)

## Where can I find help and guidance?

You can have your questions answered and help to comply with the requirements by contacting the Secretariat for Ecodesign and Energy Labelling of Products

Telephone: +45 43 30 50 20

Monday to Thursday 9:00 - 16:00

Friday 9:00 - 15:30

E-mail: [sekretariat@eco-energimaerke.dk](mailto:sekretariat@eco-energimaerke.dk)

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More about ecodesign and energy labelling:

[www.ens.dk/energikrav](http://www.ens.dk/energikrav)

E-mail: [ecodesign@ens.dk](mailto:ecodesign@ens.dk)

