

## Annex 2

### Working document on possible ecodesign requirements for external power supplies

#### Subject matter

This implementing measure pursuant to Directive 2005/32/EC establishes eco-design requirements related to external power supplies.

#### Definitions

For the purposes of this implementing measure the following definitions shall apply:

1. "External power supply" means a device which
  - is designed to convert alternating current (AC) power input from the mains power source input into lower voltage direct current (DC) or AC output;
  - and is able to convert to only one DC or AC output voltage at a time;
  - and is intended to be used with a separate device that constitutes the primary load;
  - and is contained in a physical enclosure separate from the device that constitutes the primary load;
  - and 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 has nameplate output power not exceeding 250 Watts.
2. "Nameplate output power", in the following denoted by  $P_O$ , means the output power as specified by the manufacturer (also called rated output power).
3. "Halogen lighting convertor" means an external power supply used with extra low voltage tungsten halogen lamps covered in IEC 60357.
4. "No load" means the condition in which the input of an external power supply is connected to the mains power source, but the output is not connected to any primary load.
5. "Active mode" means a condition in which the input of an external power supply is connected to the mains power source, and the output is connected to a load.
6. "Active mode efficiency" means the ratio of the power produced by an external power supply in active mode, to the input power required to produce it.
7. "Average active efficiency" means the average of the active mode efficiencies at 25%, 50%, 75% and 100% of the nameplate output power.

Other expressions used in this implementing measure shall have the same meaning as in Directive 2005/32/EC.

## **Eco-design requirements**

External power supplies shall meet the ecodesign requirements set out in Annex I.

## **Conformity Assessment**

A conformity assessment shall be carried out according to Article 8(2), and Annex IV (Internal design control) or Annex V (Management system for assessing conformity) of Directive 2005/32/EC.

## **Benchmarks**

### ***1. External power supplies***

#### **a) No load**

The best available active average efficiency of external power supplies excluding halogen lighting transformers according to most recent available data (EU Code of Conduct for External Power Supplies, US Environmental Protection Agency, 2006/2007) can be expressed as approximately

- 0.1 Watt or less, for  $P_O \leq 90$  Watts;
- 0.2 Watt or less, for  $90 < P_O \leq 150$  Watts;
- 0.4 Watt or less, for  $150 < P_O \leq 180$  Watts;
- 0.5 Watt or less, for  $P_O > 180$  Watts.

#### **b) Active average efficiency**

The best available active average efficiency of external power supplies identified in the preparatory study (published January 2007) can be approximated by

- $0.09 \cdot \ln(P_O) + 0.60$ , for  $1.0 \text{ Watt} \leq P_O \leq 25.0 \text{ Watts}$ ;
- 0.89, for  $P_O > 25.0 \text{ Watts}$ .

The best available active average efficiency of external power supplies according to most recent available data (status January 2008) can be approximated by

- $0.09 \cdot \ln(P_O) + 0.68$ , for  $1.0 \text{ Watt} \leq P_O \leq 10.0 \text{ Watts}$ ;
- 0.89, for  $P_O > 10.0 \text{ Watts}$ .

### ***2. Halogen lighting convertors***

#### **a) No load**

Electronic halogen lighting convertors can have, according to the EuP preparatory study, no load losses of 0.2 Watt. No further data is currently reported on lower no load power consumption.

b) Active efficiency

According to the EuP preparatory study the best performing halogen lighting convertor has an active efficiency of 0.96.

**Review**

A review of this IM shall be presented to the Consultation Forum depending on technological progress and not later than 5 years after its entry into force.

## **Annex I: Ecodesign requirements**

### **1. External power supplies**

a) **Six months** after this implementing measure has come into force:

#### ***No load***

The no load power consumption shall not exceed 0.50 Watt.

#### ***Average active efficiency***

The average active efficiency shall be not less than

$0.50 \cdot P_O$ , for  $P_O < 1.0$  Watt;  
 $0.09 \cdot \ln(P_O) + 0.50$ , for  $1.0 \text{ Watt} \leq P_O \leq 51.0$  Watts;  
 $0.85$ , for  $P_O > 51.0$  Watts.

The no load power consumption and the active efficiencies shall be measured according to the Test method in Annex II.

b) **Two years** after this implementing measure has come into force:

#### ***No load***

0.30 Watt, for  $P_O < 50.0$  Watts;  
0.50 Watt, for  $P_O \geq 50.0$  Watts.

#### ***Average active efficiency***

The average active efficiency shall be not less than

$0.50 \cdot P_O$ , for  $P_O < 1.0$  Watt;  
 $0.08 \cdot \ln(P_O) + 0.585$ , for  $1.0 \text{ Watt} \leq P_O \leq 36.0$  Watts;  
 $0.87$ , for  $P_O \geq 36.0$  Watts.

The no load power consumption and the active average efficiency referred to in paragraphs a) and b) shall be measured according to the Test method in Annex II.

### **2. Halogen lighting convertors**

**One year** after this implementing measure has come into force:

#### ***No load***

The no load power consumption shall not exceed 0.50 Watt.

### *Active efficiency*

The active efficiency shall not be less than 0.925.

The no load power consumption shall be measured according to IEC/EN 62301 (revised version).

The active efficiency shall be measured according to Annex III.

### **Annex II: Measurement procedure for external power supplies excluding halogen lighting convertors**

(procedure following the "Test Method for Calculating the Energy Efficiency of Single-Voltage External Ac-Dc and Ac-Ac Power Supplies", Chris Calwell et al, August 11, 2004)

### **Annex III: Measurement procedure for halogen lighting convertors**

(procedure following the "Australian/New Zealand Standard on the Performance of transformers and electronic step-down convertors for ELV lamps")

## Explanatory Notes

### Scope

The purpose of the implementing measure ("IM") is to set ecodesign requirements for external power supplies (EPS) both sold together with the "primary load" (e.g. a notebook, a monitor, a modem ...) and sold separately. The definition is closely related to US legislation, the Energy Star EPS programme and Chinese legislation (based on Energy Star).

*Halogen lighting convertors* (operating low voltage halogen lamps) are covered by the "external power supply" definition, and the preparatory study has shown that significant improvement potentials for the use phase energy consumption exist. In order to ensure a consistent approach as far as measurement methods and ecodesign requirements are concerned, halogen lighting convertors are treated separately in this IM.

The Lot 7 preparatory study has come to the conclusion that the potential for improving the use phase energy performance of *battery chargers* (standard battery charger, charger for cordless tools) is not cost effective, and that their contribution to the total use phase energy of external power supplies and battery chargers is less than 5%. As a consequence at this stage it is suggested that *battery chargers are not in the scope of this IM*. A revision of this IM should reconsider these conclusions.

### Definitions

The "no load" condition is identical to the "off mode" condition as defined in the standby and off mode working document, but "no load" is used here for the sake of international harmonization. This can be noted in a recital of the legislative text.

### Energy efficiency levels

The Lot 7 preparatory study has shown that the energy efficiency levels corresponding to least life cycle cost (LLCC) are slightly more demanding than the levels contained in the new US Energy Bill (requirement on external power supplies applicable as of 1 July 2008). Nevertheless it is suggested to harmonize the first stage of ecodesign requirements with the US legislation. The second stage of the ecodesign requirements is suggested to be harmonized with the energy efficiency levels of the Energy Star programme for external power supplies and the European Code of Conduct for external power supplies (both coming into force in 2008), because

- the market penetration of products applying technologies yielding better energy efficiency levels, but not fully corresponding yet to least life cycle cost in 2005/2006 (when the preparatory study was developed), is expected to grow and, by economy of scale, are expected to be cost effective by 2011 (or earlier);
- the approach provides a clear roadmap with sufficiently long transition periods for product design, both for manufacturers of external power supplies, and for manufacturers of the "primary load" products;

- harmonization with the Energy Star and EU Code of Conduct benchmarks provides coherence with further international initiatives;
- the approach is dynamic.

### ***Halogen lighting convertors***

For halogen lighting convertors separate energy efficiency levels are foreseen because lighting convertors are operated usually at full load, and therefore using an average of efficiencies at several load points, as done for the other external power supplies, is not appropriate. The suggested levels correspond to the least life cycle cost energy performance levels developed in the Lot 7 preparatory study.

### **Measurement methods**

The measurement method suggested in Annex II is widely accepted and used in legislation in the US and in China, and in further initiatives such as Energy Star and the EU Code of Conduct for EPS. On the other hand, *electronic* convertors operate at high frequency which leads to inaccuracies when the test method used for external power supplies is applied. Therefore electronic convertors should be measured with a dedicated method, that, for consistency, should be applied for all convertors regardless the technology. A corresponding standard has been developed by "Standards Australia".

### **Product information, international marking protocol**

The use of an efficiency mark on the external power supply according to the international marking protocol is required e.g. by the new federal US legislation. However, the criteria for categories beyond category "IV" are not defined yet. Furthermore affixing the mark would have little additional benefit. Therefore it is not foreseen to request product information under ecodesign.

### **Standardization of interfaces**

The Lot 7 preparatory study has shown that the environmental impact of external power supplies can be reduced by standardization of interfaces connecting the external power supply to the primary load. Initiatives are currently under way (regulatory action in China, voluntary initiatives by manufacturers) aiming at standardization of interfaces. Depending on their results and impacts, an ecodesign requirement and/or a mandate to the standardization bodies related to standardization of interfaces can be envisaged. Stakeholder input on this issue is welcome.