



**EUROPEAN COMMISSION**  
DIRECTORATE-GENERAL JRC  
JOINT RESEARCH CENTRE  
Institute for Energy  
**Renewable Energy Unit**

Ispra, 19 September 2012

**Code of Conduct  
on Energy Efficiency of External Power Supplies  
Version 5**

## 1. INTRODUCTION

This Code of Conduct has been prepared by the European Commission, following the discussions of the working group composed by independent experts, Member States representatives and representatives of industry.

Power supplies contribute substantially to the electricity consumption of households in Europe. The Study on Miscellaneous Standby Power Consumption of Household Equipment (Molinder, 1997) calculated an increase in standby losses, including no-load losses for wall packs and chargers from about 8 TWh in 1996 to about 14 TWh in 2006 (Business as Usual scenario). With actions resulting from this Code of Conduct this increase can be counterbalanced, resulting in savings of a maximum of 5 TWh per year from 2010, this is equivalent to a total saving of 500 Million EURO per year. In addition, energy losses occur also under load operation because the power conversion efficiency is smaller than one. These losses can be reduced by increasing the power conversion efficiency, resulting in energy savings of the same order of magnitude (1 to 5 TWh). <<this section will be revised according to the latest studies>>

When addressing efficiency of power supplies, also power quality should be taken into account. Although applying electronics in power supplies can increase efficiency and lower no load losses, it should not adversely affect the power quality.

## 2. SCOPE

Scope of this Code of Conduct are single voltage external ac-dc and ac-ac power supplies for electronic and electrical appliances, including among others AC adapters, battery chargers for mobile phones, domestic appliances, power tools and IT equipment, in the output power range 0.3W to 250W. As the name implies, external power supplies are contained in a separate housing from the end-use devices they are powering; internal power supplies (those contained inside the product) are not covered by this Code of Conduct. In most cases power supplies are specified by the appliance manufacturer; production can be at the appliance manufacturer or at a dedicated manufacturer.

As a separate subcategory a Low Voltage external power supply is defined as an external power supply that satisfies both of the following criteria:

- a nameplate output voltage of less than 6 volts and
- a nameplate output current greater than or equal to 550 milliamps.

This Code of Conduct does not cover the following types of external power supplies:

- dc-dc power supplies,
- ac adapters with more than one output terminal using switching power circuit,
- contact-less chargers using switching power circuit.

### 3. AIM

To minimise energy consumption of external power supplies both under no-load and load conditions in the output power range 0.3W to 250W.

### 4. COMMITMENT

Signatories of this Code of Conduct commit themselves to:

- 4.1 Design power supplies or component so as to minimise energy consumption of external power supplies. Those companies who are not responsible for the production of power supplies shall include the concept of minimisation of energy consumption in their purchasing procedures of power supplies.
- 4.2 Achieve both the no-load power consumption and on-mode efficiency targets shown in Table 1.1, Table 2.1 and 2.2 for at least 90% of products<sup>1</sup>, for the new models of external power supplies that are introduced on the market or specified in a tender/procurement after the effective date (for new participants after the date they have signed the Code of conduct).

**Table 1.1: No-load Power Consumption**

Rated Output Power ( $P_{no}$ )	No-load power consumption	
	Tier 1	Tier 2
$\geq 0.3$ W and $< 49$ W	0.150 W	0.075 W
$\geq 49$ W and $< 250$ W	0.250 W	0.150 W
Mobile handheld battery driven and $< 8$ W	0.075 W	0.075 W

**Table 2.1: Energy-Efficiency Criteria for Active Mode (excluding Low Voltage external power supplies)**

Rated Output Power ( $P_{no}$ )	Minimum Four Point Average Efficiency in Active Mode		Minimum Efficiency in Active Mode at 10 % load of full rated output current	
	Tier 1	Tier 2 (to be further discussed)	Tier 1	Tier 2 (to be further discussed)
$0 < W \leq 1$	$\geq 0.50 * P_{no} + 0.145$	$\geq 0.50 * P_{no} + 0.160$	$\geq 0.50 * P_{no} + 0.045$	$\geq 0.50 * P_{no} + 0.060$
$1 < W \leq 49$	$\geq 0.0626 * \ln(P_{no}) + 0.645$	$\geq 0.071 * \ln(P_{no}) - 0.0014 * P_{no} + 0.670$	$\geq 0.0626 * \ln(P_{no}) + 0.545$	$\geq 0.071 * \ln(P_{no}) - 0.0014 * P_{no} + 0.570$
$49 < W \leq 250$	$\geq 0.890$	$\geq 0.890$	$\geq 0.790$	$\geq 0.790$

“ln” refers to the natural logarithm. Efficiencies to be expressed in decimal form: an efficiency of 0.88 in decimal form corresponds to the more familiar value of 88% when expressed as a percentage.

<sup>1</sup> The external power supplies not meeting the Code of Conduct specifications, shall not in any case exceed 10 % of the total sales volume for all models (falling in the scope of the Code of Conduct) produced or purchased by a participating company.

**Table 2.2: Energy-Efficiency Criteria for Active Mode for Low Voltage external power supplies**

Rated Output Power ( $P_{no}$ )	Minimum Four Point Average Efficiency in Active Mode		Minimum Average Efficiency in Active Mode at 10 % load of full rated output current	
	Tier 1	Tier 2 (to be further discussed)	Tier 1	Tier 2 (to be further discussed)
$0 < W \leq 1$	$\geq 0.50 * P_{no} + 0.085$	$\geq 0.517 * P_{no} + 0.087$	$\geq 0.50 * P_{no}$	$\geq 0.517 * P_{no}$
$1 < W \leq 49$	$\geq 0.0755 * \ln(P_{no}) + 0.585$	$\geq 0.0834 * \ln(P_{no}) - 0.0014 * P_{no} + 0.609$	$\geq 0.0755 * \ln(P_{no}) + 0.485$	$\geq 0.0834 * \ln(P_{no}) - 0.0014 * P_{no} + 0.509$
$49 < W \leq 250$	$\geq 0.880$	$\geq 0.880$	$\geq 0.780$	$\geq 0.780$

“ln” refers to the natural logarithm. Efficiencies to be expressed in decimal form: an efficiency of 0.88 in decimal form corresponds to the more familiar value of 88% when expressed as a percentage.

The no-load power consumption and the energy efficiency shall be measured and declared according to the method in the Annex.

**Effective dates:**

Tier 1: 1 January 2014

Tier 2: 1 January 2016

4.3 Co-operate with the European Commission and Member States in monitoring the effectiveness of the Code of Conduct for external power supplies.

**5. MONITORING**

Signatories will report on a yearly basis in a confidential manner to the European Commission how many models of external power supplies out of the total number of models a manufacturer produces reach the target in that year. For each model using an external power supply or each external power supply the associated no-load power consumption and the efficiency values as specified in the Annex shall be reported by means of an electronic spreadsheet that will be provided by the European Commission. The reporting shall be completed by the end of February of the following year. The monitoring results will be discussed in an anonymous manner with parties involved and can be published by the European Commission.

## **Annex**

### **MEASUREMENT METHOD**

Measurements should be carried out according to the method specified in the “Test Method for Calculating the Energy Efficiency of Single Voltage External Ac-Dc and Ac-Ac Power Supplies (August 13, 2004)”, issued by US EPA.

The following measurement results should be reported:

- no-load power consumption
- efficiency at 10 %, 25 %, 50 %, 75 % and 100 % of full rated output current

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# Code of Conduct on Efficiency of External Power Supplies

## *SIGNING FORM*

The organisation/company/  
.....

signs the Code of Conduct on Efficiency of External Power Supplies and commits itself to abide to the principles described in point 4 “The Commitment” for the following product categories:  
.....

The organisation, through regular upgrade reports, will keep the European Commission informed on the implementation of the Code of Conduct on Efficiency of External Power Supplies.

for the organisation

Director or person authorised to sign:

Name: .....

Managerial Function: .....

Address .....

Tel. / Fax. .... / .....

Signature .....

*Please send the signed form to :*

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