



**Ecolabelling of**  
**Rechargeable batteries and**  
**battery chargers**

**Version 3.0 • 17 December 2002 – 14 September 2007**

This is a translation of the criteria document in Swedish. In any case of dispute, the original document should be taken as authoritative



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# Joint Nordic ecolabelling

In November 1989, the Nordic Council of Ministers adopted a measure to implement a voluntary, positive ecolabelling scheme in the Nordic countries. The scheme is administered by the Nordic Ecolabelling Board. The board, among other things, chooses product groups and lay down the final criteria. Secretariats in the participating countries are responsible for implementing the scheme on national level.

The objective of ecolabelling is to provide information to consumers to enable them to select products that are the least harmful to the environment. Ecolabelling is intended to stimulate environmental concern in product development and a sustainable society.

In its work on ecolabelling Nordic Ecolabelling follows the ISO 14024 standard: "Environmental labels and declarations - Type 1 ecolabelling - Principles and Procedures". The product groups and environmental and performance requirements selected by Nordic Ecolabelling reflect the objectives, principles, practices and requirements of the standard. ISO 14024 includes the requirements that criteria should be objective, reasonable and verifiable, that interested parties should be given the opportunity to participate and that their comments are evaluated.

The criteria are based on evaluation of the environmental impacts during the actual products' life cycle. The criteria set requirements towards a number of these factors. Upon approved application all products found to meet the criteria are awarded the environmental label. Due to new knowledge and production methods the criteria must be updated regularly.

New revised criteria are presented at least 1 year prior to the expiry date. During the period of validity minor corrections may be adopted. These will normally not affect already approved licences. A handling fee is paid upon submission of a complete application. The turnover value of the product determines the additional annual fee.

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# 1 Introduction

The environmental impact of rechargeable batteries can mainly be linked to the spread of metals.

The requirements for arsenic, lead, cadmium and mercury content have been determined on the basis of the amounts of impurity present in the raw material. Batteries that require these metals for their operation cannot be ecolabelled.

Requirements regarding the capacity of the battery have been introduced. This is a quality requirement and can be seen indirectly as an environmental requirement. In other words, if the capacity is high, the more times the battery can be recharged to satisfactory capacity and the fewer batteries will have to be purchased which results in saved production materials.

The product group has been expanded to cover chargers for nickel metal hydride batteries. The requirements focus on the energy consumption of the charger.

In addition to the criteria, there is a background document which is available from the ecolabelling organisation.

# 2 Definition of the product group

The rechargeable battery product area is large and has a vast field of application in the business and consumer sectors. In this document, the rechargeable battery product group comprises closed secondary cells and removable battery cassettes containing such batteries.

The product group also includes chargers for nickel metal hydride batteries.

# 3 Application instructions

Applicants should study the “Regulations for the Nordic Ecolabelling of Products” 2001-12-12 as well as the ecolabelling requirements in the criteria for rechargeable batteries.

The applicant must submit the documentation stated under each individual requirement in Sections 4, 5 and 6 in this document. The application must include a contents list showing which documentation is enclosed for each individual requirement.

In order for a product to be awarded an ecolabel, all requirements in the criteria must be fulfilled.

### 3.1 Documentation which must be accessible on site at the applicant/licence holder

The following documentation must be held by the licence holder for the period of validity for the licence and must be available to be shown to the ecolabelling organisation:

- Copy of the entire application.
- Facts/basis of calculation for the documentation sent when the application was processed, for example results of testing of the batteries.
- Records of planned production changes and unexpected deviations in production in relation to this criteria document.
- All complaints about the ecolabelled products which are sent to the applicant.

## 4 Environmental requirements

### 4.1 Metal content of batteries

- Mercury content in a battery must not exceed 0.1 ppm.
- The total content of arsenic, lead and cadmium must not exceed 20 ppm.

Test method, see Section 7.2.1.

*Documents required:*

- *Reporting of metal content, including report from testing institute.*
- *The laboratory shall also certify that it satisfies the requirements in accordance with chapter 7.1.*

### 4.2 Requirements regarding plastic in chargers

- Plastic in case and cables must not be based on chlorine.
- Case in plastic must be marked in accordance with ISO 11469.
- Cadmium and lead must not be actively added to the plastic in case and cables.
- Halogenated flame retardants or flame retardants to which any of the following risk phrases can be applied at the time of application must not be present as additives in the plastic in case and cables: R45 (may cause cancer), R46 (may cause heritable genetic damage), R60 (may impair fertility) or R61 (may cause harm to the unborn child) in accordance with EU chemicals legislation.

*Documents required:*

- *The manufacturer of chargers must declare that requirements regarding plastics are met (See, appendix 1)*
- *Flame retardants used in plastic in case and cables must be stated with CAS-No.*
- *The manufacturer of flame retardant must prove that there are basis for stating that the flame retardant used does not cause any of the above stated effects on health. Types of acceptable documentation is test result and test method including a statement about by whom the test was performed or other accessible kind of documentation.*

### 4.3 Packaging

PVC or other chlorinated plastics must not be used.

*Documents required:*

- *Certificate stating that PVC or other chlorinated plastics not are used in the packaging (See, appendix 2)*

### 4.4 Recovery systems for products and packaging

Relevant national regulations and legislation/industry-specific agreements regarding recovery systems for products and packaging must be fulfilled in the Nordic countries where the ecolabelled products are sold.

*Documents required:*

- *Copy of agreement and/or invoice for recovery system according to the product.*
- *Copy of agreement and/or invoice for recovery system according to the packaging*

## 5 Effectiveness/performance requirements

### 5.1 Requirement regarding capacity of nickel metal hydride batteries, Li-ion/Li-polymer batteries and RAM batteries (rechargeable alkaline batteries)

- The capacity measured at the final inspection, after 400 cycles, must be at least 80% of the nominal capacity stated on the battery. All the tested batteries must meet the requirement.
- The batteries must not leak during the test.

Test method, see 7.2.2, 7.2.3 and 7.2.4.

*Documents required:*

- *Report of measured values of capacity from testing institute.*

*Table with the following information:*

- *Nominal capacity, C (in Ah).*
- *Measured C/5 capacity from initial cycling*
- *Measured C/5 capacity from final inspection.*
- *Percentage capacity remaining after the test.*
- *The laboratory shall also certify that it satisfies the requirements in accordance with chapter 7.1.*

## 5.2 Energy consumption requirements – chargers for nickel metal hydride batteries

- The charger must have a built-in interruption criterion which interrupt the charging when the battery is fully charged. Independent of how the interruption technology works, the charger must interrupt in accordance to a reference charger which has an interruption criterion  $-\Delta V$  of 10 mV.
- $E_{\text{charger}}/E_{\text{ref}} = 1.0 \pm 0.1$  (i.e. a difference of maximum 10%) where  $E_{\text{ref}}$  corresponds to the energy which will be needed for a reference charging.
- Maximum float charge current: 10% of C/5 current i.e. C/50.
- Maximum no-load current, where no-load is defined as the current drawn by the charger when it is connected to the supply but with no batteries inserted: 10% of C/5-ström, ie C/50.

Test conditions, see 7.2.5

### *Documents required:*

- *Report from testing institute that contains estimated amount of charged energy (in Wh) at reference charging,  $E_{\text{ref}}$ . Estimated amount of energy (in Wh) at charging in battery charger for application,  $E_{\text{charger}}$ . Values of measured float charge current and no-load current.*
- *Estimated value of  $E_{\text{charger}}/E_{\text{ref}}$ .*
- *The laboratory shall also certify that it satisfies the requirements in accordance with chapter 7.1.*

## 6 Other requirements

### 6.1 Information for the consumer

#### 6.1.1 Batteries

The capacity, expressed in mAh, and the chemical system of the battery, must be clearly stated on the battery.

### *Documents required:*

- *A sample/picture of the product must be provided.*

#### 6.1.2 Charger

Markings on the charger must clearly state which type of battery, which chemical system and which capacity the charger is suitable for. If a charger is suitable for more than one chemical system, the switch must be clearly marked as above.

### *Documents required:*

- *A sample/picture of the product must be provided which shows that the charger is marked with recommended battery capacity for the charger.*

## 6.2 Requirements of the authorities on safety, working environment and outdoor environment

The holder of an ecolabelling licence is responsible for ensuring that the regulations on safety, working environment, environmental legislation and plant-specific conditions/concessions in each producing country are followed in the production of ecolabelled products. If deviation is discovered the licence can be withdrawn.

## 6.3 Environmental and quality control

Manufacturers of ecolabelled products must themselves, or through an agent/importer, have documented routines and instructions for ensuring:

- that the requirements in the ecolabelling criteria are met,
- that the requirements can be checked during the validity period of the licence,
- the quality level as regards function and performance for the products covered by the licence,
- that there is an organisational structure which can guarantee that the requirements in the ecolabelling criteria are met,
- that there is a contact person for the ecolabelling organisation,
- the traceability of the batteries,
- that consumers can see which batteries are ecolabelled.

### *Documents required:*

- *Detail on how the ecolabelling requirements are followed up, documented and reported on in day-to-day production.*

## 6.4 Marketing

Ecolabelled products shall be marketed in accordance with “Rules for Nordic Ecolabelling of Products”, 2001-12-12 or later version

### *Documents required:*

- *Details of how the marketing of ecolabelled products is organised and who is responsible for what.*
- *A certificate that the head of marketing has knowledge of "Regulations for Nordic Ecolabelling of Products" (See, appendix 3).*

# 7 Analyses and inspection

## 7.1 Requirements on test institute/analysis laboratory

The testing institute/analysis laboratory must be impartial and competent. The testing institute/analysis laboratory must fulfil the general requirements in accordance with standard EN 45001/DS/EN/ISO/IEC 17025, or be an official GLP-approved analysis laboratory.

## 7.2 Analysis methods/Test methods

### 7.2.1 Metal content in batteries

The metal content is analysed in accordance with “Battery Industry Standard Analytical Method. For the determination of Mercury, Cadmium and Lead in Alkaline Manganese Cells Using AAS, ICP-AES and Cold Vapour, European Portable Battery association (EPBA), Battery Association of Japan (BAJ), National Electrical Manufactures Association (NEMA; USA). April 1998”.

At least four examples of the product in question must be analysed. Analysis results stated with < ie “less than” are interpreted in the application as = ie “equal to”.

### 7.2.2 Capacity test, nickel metal hydride batteries

The test is done on at least four batteries.

C is the stated nominal capacity of the battery in Ah.

Charging is defined as constant current with  $1C^1$  up the cut-off criterion  $-\Delta V=10$  mV/cell.

Discharging to the cut-off criterion 1 V/cell.

Rest between charging/discharging: 30 minutes.

Rest between discharging/charging: 30 minutes.

#### *Initial cycling (five cycles)*

The batteries are discharged at a constant current based on nominal capacity as follows:

1. Residual discharging C/5
2. Conditioning: three cycles with 1C
3. Capacity-determining cycle with C/5

The capacity from step 3 must not differ from the stated nominal capacity by more than 10%. If the difference is greater than 10%, testing is aborted. All the tested batteries must meet the requirements.

#### *Lifetime cycling (400 cycles):*

400 cycles are done with constant current discharging 1C.

*Final inspection (one cycle):* One cycle with C/5 discharging is done.

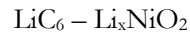
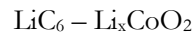
The capacity from this cycle is compared with the capacity from the initial cycling, step 3.

Measuring conditions:	Room temperature: $21 \pm 2$ °C
Measuring accuracy:	Voltage measurement: $\pm 0.5$ %
	Current: $\pm 0.5$ %

<sup>1</sup> The current for charging/discharging of rechargeable batteries is expressed as a multiple of the capacity. For example a current of 20A for charging a battery with a nominal capacity of 100 Ah is expressed as C/5 or 0,2C A.

### 7.2.3 Capacity test, Li-ion/Li-polymer batteries

The requirements below relate to Li-ion and Li-polymer batteries defined as follows:



and analogous systems.

The technologies differ in their electrolyte systems: Li-ion comprises systems with free fluid electrolyte and Li-polymer cells have fluid electrolyte bound in a polymer phase. Systems in addition to these must be tested individually in order to determine requirements that agree with this standard.

The test is done on at least four batteries.

C is the stated nominal capacity of the battery in Ah.

Charging for initial cycling and final inspection must be done in accordance with the manufacturer's specification for determining the nominal capacity.

Charging for lifetime cycling is defined as constant-voltage charging with a current of  $1C^1$  until a voltage of 4.1 or 4.2 V (as per battery specification, to be stated by the applicant) is reached, after which the current falls and is cut off at 20 mA or after 3 h total charging time.

Discharging to the cut-off criterion 3 V/cell.

Rest between charging/discharging: 30 minutes.

Rest between discharging/charging: 30 minutes.

#### ***Initial cycling (five cycles)***

The batteries are discharged at a constant current based on nominal capacity as follows:

1. Residual discharging C/5
2. Conditioning: three cycles with 1C
3. Capacity-determining cycle with C/5

The capacity from step 3 must not differ from the stated nominal capacity by more than 10%. If the difference is greater than 10%, testing is aborted. All the tested batteries must meet the requirements.

#### ***Lifetime cycling (400 cycles):***

400 cycles are done with constant current discharging 1C.

***Final inspection (one cycle):*** One cycle with C/5 discharging is done.

The capacity from this cycle is compared with the capacity from the initial cycling, step 3.

Measuring conditions: Room temperature:  $21 \pm 2$  °C  
Measuring accuracy: Voltage measurement:  $\pm 0,5$  %  
Current:  $\pm 0,5$  %

<sup>1</sup> The current for charging/discharging of rechargeable batteries is expressed as a multiple of the capacity. For example a current of 20A for charging a battery with a nominal capacity of 100 Ah is expressed as C/5 or 0,2C A

#### 7.2.4 Capacity test of RAM batteries (rechargeable alkaline manganese batteries)

The test is done on at least four batteries.

C is the stated nominal capacity of the battery in Ah.

The batteries must be charged in accordance with the profile used by chargers for the battery type, which must be stated by the applicant. Experience shows that this is usually a type of constant-voltage charging.

Discharging to the cut-off criterion 1 V/cell.

Rest between charging/discharging: 20 minutes.

Rest between discharging/charging: 20 minutes.

##### *Initial cycling (five cycles)*

The batteries are discharged at a constant current based on nominal capacity as follows:

1. Residual discharging C/5
2. Conditioning: three cycles with 1C
3. Capacity-determining cycle with C/5

The capacity from step 3 must not differ from the stated nominal capacity by more than 10%. If the difference is greater than 10%, testing is aborted. All the tested batteries must meet the requirements.

##### *Lifetime cycling (400 cycles):*

400 cycles are done with constant current discharging 1C.

*Final inspection (one cycle):* One cycle with C/5 discharging is done.

The capacity from this cycle is compared with the capacity from the initial cycling, step 3.

Measuring conditions: Room temperature:  $21 \pm 2$  °C  
Measuring accuracy: Voltage measurement:  $\pm 0.5$  %  
Current:  $\pm 0.5$  %

#### 7.2.5 Testing conditions, chargers for nickel metal hydride batteries

Charged amount of energy (charger) is compared with the amount of energy which have been added to the batteries in a reference charger with the interrupt criterion  $-\Delta V=10$  mV /cell.

Testing is done on one charger with batteries (nickel metal hydride) supplied by the licence applicant. The investigated charger must be marked with recommended battery capacity for optimal charging. The investigated charger must have clearly stated instructions for operation. The batteries must have a clearly marked nominal capacity. The same batteries shall be used during the entire test. The capacity of the batteries that are used in the test shall correspond to the recommended battery capacity stated for the charger. In the cases where the charger is recommended for a capacity interval the test must include charging of batteries with minimum and maximum capacity.

Reference charging must be performed with interrupt criterion  $-\Delta V=10$  mV /cell, according to the definition of reference charging in step 1 of below mentioned test method.

Test method:

1. Conditioning of batteries:  
The batteries are discharged at a constant current based on nominal capacity as follows:
  - Residual discharging C/5
  - Conditioning 5 cycles with 1C
  - Reference charging is defined as constant current with 1 C until interrupt criterion -  $\Delta V=10$  mV /cell is reached
  - Rest between charging/discharging: 20 minutes.
  - Rest between discharging/charging: 20 minutes.
2. Reference charging with 1C, according to definition in step 1, to estimate  $E_{ref}$
3. Discharging with 1C until interruption criterion 1V/cell.
4. Charge the batteries in accordance with the operation instructions, to estimate  $E_{charger}$ .
5. Measurement of the float charging and no-load current.

Measuring conditions: Room temperature  $21 \pm 2$  °C  
Measuring accuracy: Voltage measurement:  $\pm 0.5$  %  
Current:  $\pm 0.5$  %

### 7.3 Follow-up inspection

At a follow-up inspection, a product with an ecolabelling licence may be inspected on the initiative of the ecolabelling organisation. Such an inspection can be done in many ways. Among other things, samples for analysis can be taken randomly in retail outlets and then analysed by an impartial testing institute. In this case the licence holder bears the cost of such an inspection if the product does not meet the requirements on which the ecolabelling licence is based.

## 8 Registration

On registration of the licence, the following must be documented by the applicant and sent to the ecolabelling organisation:

- application form for registration,
- copy of licence,
- certificate confirming that the product and packaging are identical to the product in the licence concerned,
- samples of product or packaging
- information about marketing in accordance with appendix 3,
- details about participation in systems for recovering products and packaging, under own management or in conjunction with an official recovery system

## 9 Design of the ecolabel

The ecolabel and the allocated licence number (shown below as 000 000) shall be of the following design:



000                      000

“Rechargeable batteries/Battery charger”  
explanatory text if necessary

The ecolabel must be placed on the packaging and/or the product.

See “Rules for Nordic Ecolabelling of Products” 2001-12-12, Appendix 3, for more detailed information about the design of the ecolabel.

## 10 Validity of the criteria document

This criteria document was confirmed by the Nordic Ecolabelling Board on 17 December 2002, and it is valid until 14 September 2007 as version 3.0.

During the validity period, the Nordic Ecolabelling Board may decide on adjustments, clarifications and/or extensions of the criteria, and a new version will then be issued. This does not normally involve any re-appraisal of licences that have been granted.

The Nordic Ecolabelling Board states which criteria will apply in the future at least 12 months before the current criteria version expires, i.e. on 14 September 2006.

## 11 Future criteria

In future criteria, the following requirements will be evaluated:

- Requirements regarding the use of recovered metal.
- Requirements regarding the use of the metals chrome and cobalt.
- Requirements regarding the material on the label of the cell.
- Extending the product group to include fuel cells.
- Requirements that the charger does not draw current when the battery is fully charged and when the charger is empty.
- To extend the product group to include chargers for Li-ion/Li-polymer batteries.
- Requirements on plastic in printed circuit boards and components in the chargers.

## Requirements regarding plastics in cabinet and cables in chargers

1. Does the case or the cables contain chlorine-based polymers? Yes  No
2. Is the plastic casing marked in accordance with ISO 11469? Yes  No
3. Has cadmium or lead been added to plastic in case or cables? Yes  No
4. Does the case or cables contain halogenated flame retardants? Yes  No
5. Does any of the flame retardants used in case or cables been applied to any of following risk phrases at the time of application:  
R45 (may cause cancer),  
R46 (may cause heritable genetic damage),  
R60 (may impair fertility) or  
R61 (may cause harm to the unborn child)  
in accordance with EU chemicals legislation. Yes  No
6. Is there a list of used flame retardants in case and cables enclosed, including CAS-numbers,? Yes  No

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Place and date

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Company name

---

Signature of the manufacturer of the chargers

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Clarification of signature



## Appendix 2

# Packaging Certificate

We hereby certify that the packaging does not contain PVC or other chlorine-based plastics.

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Date

---

Company name (licence applicant)

---

Person responsible

---

Phone



## Appendix 3

# Marketing of ecolabelled products for which a licence application is made

We hereby confirm that we are familiar with the rules for using the Nordic ecolabel in accordance with "Rules for Nordic Ecolabelling of Products".

We hereby give assurance that marketing will be pursued in accordance with these rules.

We also confirm that we are familiar with the contents of the criteria document for the ecolabelling of rechargeable batteries and chargers for nickel metal hydride batteries.

We give assurance that those within our company who market the ecolabelled products will be informed of the criteria for ecolabelling of rechargeable batteries, chargers for nickel metal hydride batteries and "Rules for Nordic Ecolabelling of Products".

..... Place/date	..... Company
..... Contact person	..... Phone
..... Marketing manager	..... Phone

In the event of a change of personnel, a new confirmation must be sent to the ecolabelling organisation