About Nordic Ecolabelling for

# Non-rechargeable portable batteries

Version 6 · 14 January 2026 – 31 October 2030

Nordic Ecolabelling

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# Contact information

In 1989, the Nordic Council of Ministers decided to introduce a voluntary official ecolabel, the Nordic Swan Ecolabel. These organisations/companies operate the Nordic Ecolabelling system on behalf of their own country's government. For more information, see the websites:


## Denmark

Ecolabelling Denmark

www.svanemaerket.dk

## Iceland

Ecolabelling Iceland

www.svanurinn.is

## Finland

Ecolabelling Finland

www.joutsenmerkki.fi

## Norway

Ecolabelling Norway

www.svanemerket.no

## Sweden

Ecolabelling Sweden

www.svanen.se

# 1 Summary

Nordic Ecolabelling criteria for non-rechargeable portable batteries has been revised to generation 6. Despite differences in battery technology, the overall life cycle remains consistent with those covered in the previous criteria: production of raw materials, production of batteries, usage, and end-of-life battery treatment. Non-rechargeable portable batteries impact the environment throughout the entire life cycle, but life cycle assessments indicate that a long service life significantly reduces the overall environmental impact.

The focus of the revised criteria has been to introduce new mandatory requirements targeting energy consumption in battery production, with a strong emphasis on the use of non-fossil energy sources. These requirements and their thresholds have been developed through close dialogue with the battery industry and supported by collected data. During the evaluation process of generation 5, it was determined that the existing performance requirements for non-rechargeable portable batteries could not be further strengthened. The current thresholds remain appropriate and relevant for the market, reinforcing the decision to focus this revision on energy-related aspects.

In addition, the due diligence requirements have been strengthened and clarified to align and be more stringent compared to the updated EU Batteries Regulation (EU) 2023/1542. Further, the name has changed from "primary batteries" to "non-rechargeable portable batteries" due to updated vocabulary in the new EU battery regulation (EU) 2023/1542.

The most important changes within this revision are presented in Table 1.

# 2 Changes compared to previous generation

All changes and updates to the requirements in generation 6 compared to previous generation 5 are summarized in Table 1 below. Further details on the requirements are provided in Chapter 5.

**Table 1 Overview of changes to criteria for Nordic Swan Ecolabel non-rechargeable portable batteries generation 6 compared with previous generation 5.**

| Proposal Generation 6 | Generation 5 | Same req. | Change | New req. | Comments |
|---|---|---|---|---|---|
| Product group definition | Product group definition | | X | | Updated according to EU battery regulation (EU) 2023/1542, however no "practical" changes for a potential licensee.<br>- Now referring to new EU battery regulation (EU) 2023/1542.<br>- Changed name from "primary batteries" to "non-rechargeable portable batteries". |
| **Production and product description** | | | | | |
| O1 Description of the product | O1 | X | | | Editorial change to enhance clarity. |

| Proposal Generation 6 | Generation 5 | Same req. | Change | New req. | Comments |
|---|---|---|---|---|---|
| **Resources** | | | | | |
| O2 Metal content | O2 | X | | | Editorial change.<br>- Updated name. Previous "Metal content of batteries". |
| O3 Excluded substances | O3 | | X | | Requirement made stricter.<br>- Per- and polyfluoroalkyl (PFAS) substances are added as an excluded substance.<br>- The ban of chlorine-based plastic remains the same.<br>- Changed name from "Plastic" to "Excluded substances". |
| **Packaging and information** | | | | | |
| O4 Labels and packaging | O4 | X | | | Editorial change.<br>- Updated name. Previous "Battery labels and packaging". |
| O5 Consumer information | O5 | X | | | Editorial change.<br>- Updated name. Previous "Consumer information on the battery and primary packaging" |
| **Corporate social responsibility** | | | | | |
| O6 Responsible sourcing of mineral raw materials | O6 Sourcing of conflict-free minerals and O7 Critical raw materials | | X | | Requirement made stricter.<br>- All licensees, regardless of turnover, must have a Due diligence management system according to the new EU Batteries Regulation (EU) 2023/1542. Further, all smelters and refiners now must be verified by a relevant third party, such as the Responsible Mineral initiative (RMI).<br>- Mineral raw materials include minerals listed in Annex X (EU 2023/1542) and minerals listed in EU Conflict Minerals Regulation (2017/821).<br>- Replaces previous requirements O6 and O7. |
| O7 Working conditions | O8 | X | | | Editorial change to enhance clarity. |
| **Electrical testing** | | | | | |
| O8 Electrical testing | O9 | X | | | Editorial change to enhance clarity. |
| O9 Delayed discharge performance (shelf life) | O10 | X | | | Editorial change to enhance clarity. |
| O10 Lithium batteries, safety | O11 | X | | | Editorial change to enhance clarity. |
| **Waste plan** | | | | | |
| O11 Waste sorting in the production process | O12 | X | | | Editorial change to enhance clarity. |
| **Energy in production** | | | | | |
| O12 Energy consumption | - | | | X | New requirement.<br>Energy consumption data must be reported. |

| Proposal Generation 6 | Generation 5 | Same req. | Change | New req. | Comments |
|---|---|---|---|---|---|
| O13 Energy source - fossil fuels | - | | | X | New requirement.<br>Fossil oil and coal are prohibited in the production of batteries.<br>Maximum limit of natural gas in the production of batteries.<br>If natural gas is used in production, the licensee must also actively implement and maintain an energy management system. |
| O14 Renewable electricity | - | | | X | New requirement.<br>Minimum limit of renewable electricity generation in the production of batteries. |
| **Licence maintenance** | | | | | |
| O15 Customers complaints | | | X | | Replace the former requirements O13 to O19 |
| O16 Traceability | | | X | | Replace the former requirements O13 to O19 |
| **Removed requirements in gen. 6 compared to gen. 5** | | | | | |
| | O13 | | | | Removed. Replaced by O15 and O16. |
| | O14 | | | | Removed. Replaced by O15 and O16. |
| | O15 | | | | Removed. Replaced by O15 and O16. |
| | O16 | | | | Removed. Replaced by O15 and O16. |
| | O17 | | | | Removed. Replaced by O15 and O16. |
| | O18 | | | | Removed. Replaced by O15 and O16. |
| | O19 | | | | Removed. Replaced by O15 and O16. |

# 3 Justification of the product group definition

The product group includes non-rechargeable portable batteries in accordance with the definition given in the new European Union´s Battery Regulation (EU) 2023/1542[1]. The new battery regulation entered into force 17 August 2023 and replace the former Directive 2006/66/EC.

The definition of portable batteries is overall the same in the new regulation (EU) 2023/1542 compared to the former directive. The former use of the term "primary batteries" has been changed to "non-rechargeable portable batteries":

> *Battery' means any device delivering electrical energy generated by direct conversion of chemical energy, having internal storage, and consisting of one or more non-rechargeable portable battery cells, modules or of packs of them, and includes a battery that has been subject to preparation for repurposing, repurposing or remanufacturing.*
>
> *The term "portable battery" means a battery that is sealed, weighs 5 kg or less, is not designed specifically for industrial use and is neither an electric vehicle battery, a*

[1] https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32023R1542 (visited April 2025).

*Light Means of Transport (LMT battery), nor a Starting, Lighting, Ignition (SLI battery).*

*The term "portable battery of general use"' means a portable battery, whether or not rechargeable, that is specifically designed to be interoperable and that has one of the following common formats 4,5 Volts (3R12), button cell, D, C, AA, AAA, AAAA, A23, 9 Volts (PP3).*

The definition of the product group is aligned to the new Regulation (EU) 2023/1542. This means that the name of the product group is changed from "primary batteries" to "non-rechargeable portable batteries" in generation 6 of the criteria.

As in generation 5 of the criteria, Nordic Ecolabelling has chosen to exclude batteries that are built into or form a fixed part of electrical products and that accordingly cannot be replaced. Tools, for example, such as cheaper screwdrivers and drills, beauty products or toys, can have non-rechargeable portable - or rechargeable batteries that cannot be replaced when they get old and cannot be recharged. Nordic Ecolabelling believes that it is an unnecessary waste of resources to have to discard an electrical appliance simply because the battery no longer functions optimally.

A different Nordic Ecolabelling criteria document allows rechargeable batteries and portable chargers to be Nordic Swan Ecolabelled.

# 4 Requirements and justification of these

Background to the requirements, the levels of the requirement, and any changes since generation 5 are described in the background document.

## 4.1 Production and product description

**Background to O1 Description of the product**

This requirement remains unchanged in generation 6 of the criteria.

The intention of the requirement is to provide an adequate picture of the manufacturing process and the life cycle of the product and any packaging: which raw materials and production processes are used, which metals, other solid substances and liquid chemical substances are used in the battery, and so on. Details of all constituent substances present in the battery must be given in weight-%. The requirement will thus give an insight into the product(s) in the application, in order to ensure that the application is processed correctly.

## 4.2 Resources

**Background to O2 Metal content**

This requirement remains unchanged in generation 6 of the criteria.

Nordic Ecolabelling is aware that substances that are harmful to the environment are used in non-rechargeable portable batteries and that some of these substances are known to offer direct technical benefits. Unfortunately, at the present time we do not have sufficient knowledge of how these harmful metals might be limited without reducing the performance of the battery. On the other hand, we have known for many years that certain harmful metals can be limited without detrimental effect for battery performance:

- Mercury, which is a highly toxic substance harmful to both human health and the environment, has been shown to negatively affect the kidneys, reproductive system and nervous system.
- Cadmium, which accumulates in the body, particularly the kidneys, and is known to be hazardous to health and the environment and in certain connections is carcinogenic, mutagenic or toxic for reproduction.
- Lead, which is known to be toxic for reproduction, environmentally harmful and has negative effects on the nervous system[2].

The EU's Battery Regulation (EU) 2023/1542 requires batteries to be labelled if they contain concentrations of one or more of the three metals: mercury (more than 5 ppm), cadmium (more than 20 ppm) and lead (more than 40 ppm). In addition, the Regulation prohibits the marketing of ordinary consumer batteries with a mercury content in excess of 5 ppm and a cadmium content in excess of 20 ppm. At these levels, legislation has ensured that these three heavy metals may not be added to portable batteries deliberately. Even so, pollutants may nevertheless occur.

A German test study from 2013[3], which examined around 300 batteries, taken from stores, discovered that in some batteries, represented in the market, these metals may exceed the permitted EU limit, yet this is an exception: strict control in this sector will make it possible to completely erase commercial batteries with a prohibited level of such metals. Nevertheless, according to the same study, Li-ion batteries possess a significantly better chemical profile: the level of heavy metals is much lower than is allowed under the Regulation.

As far back as in generation 3 of the criteria, Nordic Ecolabelling opted to introduce stricter requirements than those of the authorities in this respect, in order to ensure that only the best constituent substances with very low concentrations of pollutants of the above metals may be used in Nordic Swan Ecolabelled batteries.

The requirement refers to a test method for determining the content of the above metals, which was developed for use on Alkaline Manganese (AlMg) batteries. Nordic Ecolabelling is aware that applications may be submitted for ecolabels for other types of non-rechargeable portable batteries, and Nordic Ecolabelling is aware that the specified test method is old.

[2] https://mst.dk/erhverv
[3] https://www.umweltbundesamt.de/en/press/pressinformation/batteries-put-to-the-test-too-many-heavy-metals (visited May 2015).

Similar test methods may therefore be approved if assessed and adjudged to be equivalent to the recommended method by an independent third party.

### Background to O3 Excluded substances

This is partly a new requirement in generation 6 of the criteria. Per- and polyfluoroalkyl substances are added as an excluded substance in generation 6 of the criteria. Chlorine-based plastic was already banned in the previous generation 5 of the criteria. The requirement has changed name from "Plastic" to "Excluded substances".

Certain problematic substances and substance groups are difficult to exclude through general chemical requirements. To address this, Nordic Ecolabelling has compiled a list of substances that must not be present as ingoing substances in the ecolabelled product.

The ban on use of PVC plastic in non-rechargeable portable batteries was introduced in generation 5 of the criteria as this was typically used as separators between the individual 1,5 V cells inside the battery instead of other types of plastic such as PE and nylon. Nordic Ecolabelling position on PVC can be found one Nordic Ecolabelling´s webpage[4].

Per- and polyfluoroalkyl substances (PFAS) are used in many types of products due to their water and dirt repellent properties. These compounds constitute a group of substances that have highly problematic intrinsic hazardous properties. They are extremely persistent and accumulate in the body. They are spread all over the globe, from the large oceans to the Arctic, and are found in e.g. wild birds and fish and their eggs. Also, shorter chain compounds (2–6 carbon atoms) have been discovered in nature. The substances in this group are suspected to be endocrine disruptors, carcinogenic and to have a negative impact on the human immune system. PFAS are primarily found in rechargeable batteries, especially in advanced types such as lithium-ion batteries. In non-rechargeable portable batteries, the occurrence is generally low or uncommon but not completely excluded. Applying the precautionary principle, the Nordic Swan Ecolabelling has chosen to exclude PFAS from non-rechargeable portable batteries.

## 4.3 Packaging and information

### Background to O4 Labels and packaging

This requirement remains unchanged in generation 6 of the criteria.

Non-rechargeable portable battery labels are made of thermal plastic, mostly PVC but also Polyethylene terephthalate (PET). The recycling processes (pyrometallurgy[5] and hydrometallurgy[6]) for alkaline batteries reuses the plastic for energy purpose e.g. the PVC/PET is burned off. The environmental impact of PVC is described under requirement O3.

[4] https://www.nordic-swan-ecolabel.org/nordic-ecolabelling/environmental-aspects/circular-economy-and-resource-efficiency/pvc/

[5] RESURSEFFEKTIVISERING VID NYPRODUKTION AV ELBILSBATTERIER

[6] http://www.revatech.be/en/reva/reva_piles.html (visited October 2018)

It is possible to add flame retardants to the PET used in the battery label. Flame-retardants function is mainly to protect the plastic in the use phase. Therefore, they are deliberately constructed so that they do not break easily, making the flame-retardants persistent if spread in the nature. The greatest attention is directed toward the brominated flame-retardants, partly because they are detected in breast milk and in blood. Because of this, battery labels must not contain halogenated organic compounds in general (including flame retardants).

Nordic Ecolabelling has reviewed the proportion of recycled materials in the packaging of producers of Nordic Swan Ecolabelled primary/rechargeable batteries and concluded that a figure of 80% for post-consumer recycled material in packaging is too ambitious. The requirement of at least 80% by weight for pre- and post-consumer recycled material applies to the total % by weight of the primary packaging.

The typical material in packaging is cardboard and PET plastic (blister cups). Data from cardboard packaging suppliers for batteries shows that the share of post-consumer recycled material varies between 50 to 90%. In cases, where plastic foils are used to create blister-cups for blister-packs; the plastic foil typically does not contain recycled material. Blisters are often produced in PET, and we see that the PET/blister market has an increased focus on using recycled pre- and post-consumer PET plastic.

Use of pre-consumer recycled material in cardboard or plastic also benefits in the efforts to efficiently manage resources and minimize the burden on the environment. By allowing both the use of pre- and post-consumer recycled material in the primary packaging, the requirements immediately encourage the use of cardboard in the primary packaging. However, the proportion by weight of primary packaging that consists of both cardboard and a blister-cup typically vary between 70-75% cardboard and 30-25% plastic. This means that the requirement (minimum 80% recycled material) promotes the use of pre- and post-consumer material in plastic in the primary packaging.

The primary packaging must be designed in such a way that dismantling is possible for all individual parts for waste sorting (e.g. cardboard, paper, plastic, metal) without using any tools. The typical primary packaging for non-rechargeable portable batteries consists of cardboard/paper and plastic. The reason for this requirement is to ensure that the packaging can easily be separated in material-types to ensure optimal recycling.

Small antitheft RFID components added to the primary packaging are excluded from the dismantling requirement. The antitheft components are often added to the primary packaging after the battery has left the production site, which means that the licensee /brand owner has very limited steerability to control this. Consumer batteries are a product type that is most often stolen in conjunction with shop thefts. The products are therefore sometimes equipped with small antitheft components, in order to minimize the number of thefts. According to the waste handling, industry of cardboard, small antitheft component (labels) does not cause a problem for recycling.

### Background to O5 Consumer information

This requirement remains unchanged in generation 6 of the criteria.

The IEC 60086-1:2021and IEC 60086-4:2019 standards specify minimum information requirements on the battery, such as expiration of a recommended usage period, nominal voltage, name or trademark of the manufacturer or supplier, cautionary advice and safety

pictograms for lithium batteries. With this requirement, Nordic Ecolabelling ensures that the batteries are marked with relevant and accepted information for consumers.

The EU battery regulation (EU) 2023/1542 sets requirements for labelling and marking of batteries in relation to e.g. battery category, capacity and recycling.

Studies conducted by the industry[7,8] reveal that there are major environmental impacts associated with the incorrect use of batteries. If, for example, a low capacity batteries are used in energy-intensive applications the battery will run down quickly. This will reduce the life of the battery or reduce its performance, which in turn will mean more frequent replacement of the battery and accordingly a greater consumption of batteries.

In order to extend the useful life of batteries it is important to ensure that end users are provided with clear information on the types of uses for which the battery in question is optimally suited. There are major differences between the level of information provided for consumers on battery packs, and accordingly potential exists for ensuring that customers receive the best possible information.

Nordic Ecolabelling requires that the information on the batteries is as readily understandable to the consumer as possible by requiring the information to be in a form that is accessible to the consumer (pictograms or clear visible text). The pictograms will encourage the consumer to consider what he/she intends to use the battery for before purchasing. Alternative, if the batteries are suitable for all different types of energy-consuming appliances (high-, medium- and low energy drain) it is possible to use a clear text (instead of pictograms) saying that the batteries are suitable for all appliances. In requirement O9, batteries are to be tested against several electrical applications representing both high-, medium- and low energy drain (3 to 6 different application). Requirement O9 therefore supports the possibility to market the battery as an “all round” battery”.

Unfortunately, Nordic Ecolabelling has not been able to find any statutory or industrywide commonly agreed definitions of high, medium and low energy drain.

For this reason, there are no common agreements on pictograms for these three energy drain levels, which may be because the same type of electrical appliance may show light variations in energy drain levels.

Nordic Ecolabelling has concluded that the following levels could be used as guidelines for when an appliance has:

- High energy drain is >500 milliamperes
- Medium energy drain is >100<500 milliamperes
- Low energy drain is <100 milliamperes

These ampere levels have not been incorporated in the requirement since they are intended only to function as a guideline. Instead, there are proposals for pictograms for use for the various levels. The requirement permits the use of other pictograms if Nordic Ecolabelling is provided with an explanation of the reason for the choice of a different pictogram.

[7] ”European Commission ENV.G.4/FRA/2007/0067 Study on Elements for an impact assessment on proposed capacity labelling on portable primary batteries in the context of the batteries directive 2006/66/EC” June 2010
[8] http://ec.europa.eu/environment/waste/batteries/pdf/CENELEC%20feasibility%20study.pdf (November 2012)

Nordic Ecolabelling has added a new information requirement saying that the primary packaging must be clearly stated with “date of manufacture” of the batteries (the year and month of manufacture) or “best before”. According to EN 60086 batteries shall be marked with expiration of a recommended usage period or year and month or week of manufacture.

A new requirement is the reference to the logo guidelines as Nordic Ecolabelling has experienced many examples of wrong use of the Nordic Swan Ecolabel.

## 4.4 Corporate Social Responsibility

**Background to O6 Responsible sourcing of mineral raw materials**

This is partly a new requirement in generation 6 of the criteria and replaces the previous requirements "O6 Sourcing conflict-free minerals" and "O7 Critical raw materials" in generation 5.

The new EU Batteries Regulation (EU) 2023/1542 aims to ensure that batteries placed on the EU market are sustainable, efficient and safe throughout their lifecycle. One of the new features of the Regulation is that it imposes an obligation on all economic operators (in first place operators with a net turnover of 150 million euro or more[9]) placing batteries on the market or putting them into service, to have a due diligence management system to address the social and environmental risks linked to sourcing, processing and trading raw materials along the whole supply chain.

The requirement has been adjusted to include mineral raw materials listed in Annex X (EU 2023/1542) i.e. cobalt, natural graphite, lithium, nickel and chemical compounds base on these minerals and conflict minerals tin, tantalum, tungsten and gold (regulated by EU Conflict Minerals Regulation (2017/821)). To strengthen the risk assessment all smelters and refiners must have been verified/in a process of being verified by a relevant third party such as the Responsible Mineral Initiative (RMI). It’s recommended to align due diligence management system with OECD due diligence guidance for responsible supply chain of minerals.[10]

Involvement in multi-company coordinated programs that supports the development of responsible sourcing initiatives within the conflict-affected and high-risk areas is essential, since they help suppliers meet due diligence requirements, maintain trade and benefit local mining communities, whose livelihoods depend on a legitimate mining trade.

To ensure transparency the due diligence management systems must be reviewed and approved by an independent third party. The applicant must also annually publish a report (information must be accessible to the public) on due diligence approaches, measures, and results. Transparency is central to ensuring accountability in supply chains, allowing stakeholders, including consumers and investors, to assess the sustainability of a company’s operations.

[9] https://www.consilium.europa.eu/en/press/press-releases/2025/07/18/simplification-council-adopts-law-to-stop-the-clock-on-due-diligence-rules-for-batteries/ (visited https://www.consilium.europa.eu/en/press/press-releases/2025/07/18/simplification-council-adopts-law-to-stop-the-clock-on-due-diligence-rules-for-batteries/ (visited September 2025)

[10] https://mneguidelines.oecd.org/mining.htm (visited April 2025)

### Background to O7 Working conditions

This requirement remains unchanged in generation 6 of the criteria.

Nordic Ecolabelling has adopted a common requirement for working conditions which, in addition to compliance with the UN Global Compact[11], also includes compliance with the UN Convention on the Rights of the Child (Article 32) and the UN Declaration (61/295) on the Rights of Indigenous Peoples.

Nordic Ecolabelling is aware that it may be difficult to ensure that the working environment of all suppliers in the Nordic Swan Ecolabelled battery production chain is satisfactory. Nevertheless, Nordic Ecolabelling is convinced that as more component suppliers and battery producers are confronted with the requirement/signal from their customers that compliance with a Code of Conduct is required, the more likely it is to be achieved. Licensees must inform their suppliers about their Code of Conduct. However, the licensee is not required to guarantee that it will be complied with by its suppliers.

If component suppliers and battery producers operate in countries in which these conventions are incorporated as part of the authorities' requirements, no further documentation will be required beyond the signed application form for a licence for Nordic Swan Ecolabelling.

## 4.5 Electrical testing

### Background to O8 Electrical testing

This requirement remains unchanged in generation 6 of the criteria.

The RPS analysis shows that the use phase is very important in an LCA perspective. A short-lived use stage for batteries results in a higher environmental impact. A long lifespan of non-rechargeable portable batteries results in potential resource savings and decreasing waste[12].

The test conditions under which the batteries are tested must be in accordance with IEC 60086-1. The battery must meet the test requirement for all applications specified in Tables 2-6 for the specific battery dimension. E.g., battery dimension LR20 must meet the test requirements for all three tests specified in Table 5 in order to be approved. The selected applications correspond to the application specified in IEC 60086-2. The requirement always refers to the latest valid version of the standard, and the publication year are therefore not included in the requirement.

The requirement to the minimum permitted operation time was adjusted in generation 5 according to test-data from existing licensees, external battery test[13] and feedback received during the public consultation for generation 5. Both test-data from existing licensees and the external battery tests at that time showed that there was a potential to tighten the

[11] http://www.unglobalcompact.org
[12] Helgstand A.: AA batteries, disposable or rechargeable – A comparative Life Cycle Assessment of potential climate impact of rechargeable NiHM and alkaline disposable AA batteries. Linköping Universitet (2011).
[13] https://www.altomdata.dk/aa-batterier-test-kaempe-forskel/2 and https://www.radron.se/tester/boende-tradgard--husdjur/batterier-aaa/ (visited November 2017)

requirement to minimum permitted operation time compared to the requirement levels in IEC 60086-2 for all battery types. The requirement to MAD for the types of batteries was adjusted in generation 5 to the following requirement levels compared to IEC 60086-2 listed in the table below.

**Table 2 Requirement to MAD compared to the specific MAD-requirement in IEC 60086-2 for different battery dimension**

| Battery dimension | Application | The requirements, compared to the specific MAD-requirement in IEC 60086-2 |
|---|---|---|
| LR20 | Toy, Portable lighting and Portable stereo | 50-55% |
| LR14 | Toy and Portable stereo | 50-55% |
| LR14 | Portable lighting | 45% |
| LR6 | Digital still camera | 75% |
| LR6 | Portable lighting, Toy, non-motorized, CD, digital audio, wireless gaming and accessories and Radio/clock/remote control | 60% |
| LR6 | Motor/toy | 50% |
| LR03 | Portable lighting, Toy and Digital audio | 60% |
| LR03 | Remote control | 45% |
| 6LR61 | Toy | 75% |
| 6LR61 | Clock radio | 45% |
| 6LR61 | Smoke detector | 25% |

Button cells and all other types of batteries with dimensions that do not match those specified in Table 5–9 but is found in the standard IEC 60086-2, must perform minimum 50% better than the operation time specified in the standard (MAD) for all applications/battery type.

In the case of batteries with a different chemical composition than alkaline (e.g. lithium battery) but of the same size as the batteries specifies in Tables 2-6, the requirement in Table 2-6 applicable to the relevant battery dimension must be met.

In the case of batteries of type and sizes not found in IEC 60086-2, Nordic Ecolabelling should be contacted. Nordic Ecolabelling will conduct an internal assessment of the operation time requirements that should be applicable with respect to such battery.

In generation 5 the no leakage requirement was added. This requirement is the same as in the Korean Eco-label standard (EL764:2012) for rechargeable batteries[14] and IEC 60086-1. The requirement ensures that the batteries meet high safety and quality requirements.

The requirement for minimum average duration (MAD) and leakage must be documented with a complete test report according to IEC 60086-1 and-2. The report shall be conducted by an independent testing laboratory. The independent testing laboratory must confirm that the testing has been carried out in line with the requirement. This will ensure that it is the relevant batteries (eight selected batteries) being tested.

[14] Microsoft Word - EL764_2012_126__eng

**Background to O9 Delayed discharge performance (shelf life)**

This requirement remains unchanged in generation 6 of the criteria.

The requirement for delayed discharge performance ensures that the battery holds a high operation time even after 12 months of storage. The new requirement supports the overall requirement to ensure a long battery operation time. The fewer batteries that are used, the lower the overall environmental impact of batteries. It is also possible to use the high temperature test (accelerated test method) with a duration of only 4 weeks, which is also described in the standard. This is to make the application process to the Nordic Swan Ecolabel license more flexible.

The test conditions under which the batteries are tested must be in accordance with IEC 60086-1. The limit of minimum 90 % of the specific MAD limit listed in requirement O9 for each battery dimension/applications is identical to the MAD-limit in IEC 60086-2. Each test includes at least eight batteries per size and brand model, and all eight batteries must meet the requirement. E.g., eight batteries dimension LR20 must meet the test requirements for all three tests specified in Table 5 in requirement 09. The requirement always refers to the latest valid version of the standard, and the publication year are therefore not included in the requirement.

The requirement for delayed discharge performance must be documented with a complete test report according to IEC 60086-1. The report shall be conducted by an independent testing laboratory. The independent testing laboratory must confirm that the testing has been carried out in line with the requirement. This will ensure that it is the relevant batteries (eight selected batteries) being tested.

In case the manufacturer of the battery or licensee has not had time to perform a delayed discharge test (new battery design/-chemistries) at the time of application, the licensee must present a specific plan for when the test is started and expected to be completed. Complete test report must be sent to Nordic Ecolabelling.

## 4.6 Safety

**Background to O10 Lithium batteries, safety**

This requirement remains unchanged in generation 6 of the criteria.

Batteries are an essential part of many of today's high-technology products. Together with the continuous development of battery technology and the increasing perfecting of manufacturing techniques, batteries are used more widely as a “green power” enabler for all kinds of applications, whether they are high-performance Lithium batteries or the more conventional zinc-alkaline manganese batteries.

The use of Lithium batteries/cells has grown exponentially in recent years.

While Li-ion batteries are widely used in consumer electronics, many users are not aware that these batteries are considered to be hazardous, especially due to the risk of overheating, fire and short circuiting.

The main hazards for lithium batteries are:

- Explosion
- Fire
- Overheating and fire danger

Primary causes:

- Improper charging
- Improper use
- Overheating
- Electrical abuse
  - Over-current
  - Over-voltage
  - Over-temperature
- Other abuses
  - Internal short-circuiting
  - Transportation
  - Miscellaneous

The batteries must fulfil the testing requirements in IEC 60086-4: “Safety of lithium batteries”, paragraph six, “testing and requirements”.

## 4.7 Waste plan

**Background to O11 Waste sorting in the production process**

This requirement remains unchanged in generation 6 of the criteria.

As in all other types of production, waste is produced in the production of batteries. Some of the waste fractions created during battery production contains substances that are harmful to health and the environment and need to be processed correctly. Some waste fractions consist of raw materials or material residues containing raw materials that constitute a limited resource and should therefore be collected and reused. For example, potential exists for environmental improvement in the production process if during production semi-manufactured and/or discarded batteries are collected and recycled with a view to material recovery in the same way as post-consumer used batteries. For this reason, Nordic Ecolabelling has chosen to impose the requirement that producers must have a waste processing plan and that this plan must comply with certain requirements. Checks will be conducted during audits to ensure that the waste processing plan is correctly implemented in the production process.

## 4.8 Energy in production

### Background to O12 Energy consumption

New requirement in generation 6.

Limited data on energy consumption and energy sources hinders progress within the industry. Without accurate data, it becomes difficult to identify major energy use hotspots, compare performance between producers, or evaluate the effectiveness of energy efficiency measures. To support continuous improvement and enable more targeted and impactful criteria development, Nordic Ecolabelling has introduced a requirement to collect detailed energy data. Reported data will be utilized and will serve as a foundation for future criteria generations, enabling Nordic Ecolabelling to better address climate impact and further promote the transition toward more sustainable production practices.

### Background to O13 Energy source - fossil fuels

New requirement in generation 6.

Burning fossil fuels like coal, oil and natural gas results in greenhouse gas emissions, which contributes to climate change as well as air and water pollution[15]. Excluding or limiting the use of fossil fuels supports EUs climate policy to achieve climate neutrality by 2050[16]. Dialogue and data received from manufactures of non-rechargeable portable batteries shows that fossil fuels sometimes are used in emergency back up systems and fire protection systems. Due to safety reasons, these kinds of systems are excluded from the requirement. Regarding transport, Nordic Ecolabelling has too little data to prohibit fossil fuels in transport in this generation of the criteria. Fossil fuels utilized within grid electricity or district heating systems are exempt from this requirement, as licensees have limited capacity to influence the energy mix or fuel sources in these externally managed systems.

Dialogue and data received from manufactures of non-rechargeable portable batteries shows that natural gas is still a widely used energy source. A ban on the use of natural gas will therefore have consequences for the ability to produce Nordic Swan Ecolabelled non-rechargeable portable batteries. However, dialogue and data from manufactures show that a maximum limit on 15% will encourage manufactures to reduce their consumption of natural gas. Manufactures who use natural gas must further work actively with energy savings by either being certified according to ISO 50001, ISO 50002, ISO 14001 (including extended energy review corresponding to part 6.3 of ISO 50001 upon recertification) or audit according to EN 16247 performed within the last 3 years. Nordic Ecolabelling aim to ban the use of all fossil fuels, including natural gas, in the next generation.

[15] https://www.greenpeace.org/usa/8-reasons-why-we-need-to-phase-out-the-fossil-fuel-industry/ (visited April 2024)
[16] https://www.consilium.europa.eu/en/press/press-releases/2023/10/16/cop28-council-sets-out-eu-position-for-un-climate-summit-in-dubai/

### Background to O14 Renewable electricity

New requirement in generation 6.

Renewable electricity, generated from sources such as solar and wind, offers environmental advantages.[17] Unlike fossil fuels, renewable energy produces little to no greenhouse gas emissions, helping to mitigate climate change. In addition, renewable energy helps reduce air and water pollution and lowers the overall ecological footprint of electricity generation. The main objective of this requirement is to promote and support the development of new renewable energy capacity. Therefore, it is essential that the chosen renewable electricity solutions contribute to additional renewable energy generation on the market.

Dialogue and data received from manufacturers of non-rechargeable portable batteries shows that electricity is an important energy source in the production of batteries. Since battery factories often are located in countries with electricity grids heavily reliant on fossil fuels, it becomes important to transition to renewable energy sources, such as solar PV, at the production sites or in the same electricity market.

At the moment, the amount of own produced electricity varies in the market, where some battery producers have started their transition, whilst other have not. A limit on 10% of the total electricity consumption coming from on-site or off-site renewable electricity production is an ambitious but realistic limit according to dialogue and data received from producers of non-rechargeable portable batteries. To accommodate varying site conditions, NSE both accept self-generated electricity, for example self-owned solar PV on the facilities, and certain types of Power Purchase Agreements (PPAs) which has a clear additionality. Both physical greenfield on-site and greenfield off-site PPAs are accepted since they clearly contribute to additionality and support the expansion of renewable energy capacity in the market. However, virtual and physical brownfield PPA offer limited additionality and do not contribute to increasing the total renewable capacity in the electricity grid. Consequently, virtual or off-site brownfield PPAs are not considered sufficient to fulfil the intent of the requirement. Similarly, the purchase of Guarantees of Origin (GOs) or Renewable Energy Certificates (RECs) is not considered a sufficient alternative. While these instruments serve as proof that electricity has been produced from renewable sources, they generally represent existing generation rather than stimulating new investments or an increased capacity. The trading of such certificates occurs independently of the actual electricity market and rarely provides a direct financial signal that leads to additional renewable energy capacity on the market.

The requirement calculates on the total share of renewable electricity in relation to the overall electricity consumption across all factories involved in producing the Nordic Swan Ecolabelled non-rechargeable portable batteries. The requirement regards the total energy consumption of the factories, regardless of the proportion that is dedicated to manufacturing Nordic Swan Ecolabel non-rechargeable portable batteries. This approach acknowledges that factories have different possibilities and conditions for installing renewable electricity solutions such as solar PV and wind power. By allowing flexibility in where renewable electricity investments are made, the Nordic Swan Ecolabel ensures that the collective share of renewable electricity remains meaningful and aligned with environmental goals.

[17] Förnybar energi | Faktablad om Europeiska unionen | Europaparlamentet

To ensure steerability and actual environmental improvements, licensees that have renewable electricity installations more than one year old are asked to report the actual electricity generation from the installations. If the installations are less than one year old, estimated electricity generation data are allowed to be reported.

## 4.9 Licence maintenance

**Background to O15 Customer complaints**

Nordic Ecolabelling requires that your company has implemented a customer complaint handling system. To document your company's customer complaint handling, you must upload your company's routine describing these activities. The routine should be dated and signed and will normally be part of your company's quality management system.

If your company does not have a routine for customer complaint handling, it is possible to upload a description of how your company performs these activities. During the on-site visit, Nordic Ecolabelling will check that the customer complaint handling is implemented in your company as described. The customer complaints archive will also be checked during the visit.

**Background to O16 Traceability**

Nordic Ecolabelling requires that your company has implemented a traceability system. To document your company's product traceability, you must upload your company's routine describing these activities. The routine should be dated and signed and will normally be part of your company's quality management system.

If your company does not have a routine for product traceability, it is possible to upload a description of how your company performs these activities. During the on-site visit, Nordic Ecolabelling will check that the product traceability is implemented in your company as described.

# 5 Environmental impact of non-rechargeable portable batteries

The relevant environmental impacts found in the life cycle of non-rechargeable portable batteries are set out in the MECO scheme below. A MECO describes the key areas that have impact on the environment and health throughout the life cycle of the product – including consumption of materials/resources (M), energy (E), chemicals (C) and other impact areas (O). This MECO analysis was performed in conjunction with Nordic

Ecolabelling's evaluation of the criteria in 2024. The MECO analyses are based on LCA studies[18],[19],[20] and scientific reports[21].

Nordic Ecolabelling sets requirements concerning the topics and processes in the life cycle that have a high environmental impact – also called hotspots. Based on the MECO analysis, an RPS tool is used to identify where ecolabelling can have the greatest effect. R represents the environmental relevance; P is the potential to reduce the environmental impact, and S is the steerability on how compliance with a requirement can be documented and followed up. The criteria contain requirements in those areas in the life cycle that have been found to have high RPS, since there is potential to achieve positive environmental gains.

The product group non-rechargeable portable batteries include different materials and types of production, but with a uniform function: namely to store energy and provide a portable source of power to charge drained electronic devices. Despite differences in battery technology, the overall life cycle remains consistent with those covered in the current criteria: production of raw materials, production of batteries, usage and end-of-life battery treatment. The differences between products lie primarily in the specific battery chemistry and technology used.

## 5.1 RPS scheme

| Area and assessment | RPS level (high-medium-low) | Comments |
|---|---|---|
| The spreading and use of metals, especially heavy metals, from the batteries | R: High<br>P: Medium<br>S: Medium | When it comes to the spreading and use of metals, there are differences in which substances the batteries in the market today contain, and at which concentrations. There are thus relevance (R) and potential (P) to distinguish between more or less environmentally hazardous types of batteries. The Battery Regulation (EU) 2023/1542, already regulates the content of mercury (Hg), cadmium (Cd) and lead (Pb) in batteries. However, Nordic Ecolabelling have seen that there is a potential (P) for a stricter requirement concerning the use of mercury, cadmium and lead. This ensure that the raw materials used in a Nordic Swan Ecolabelled battery have a high purity, which has an impact on the quality (R) of the battery. The steerability (S) of the Hg, Cd and Pb content in the batteries is increased by requiring relevant test analyses. |
| Mining and refining materials used in batteries | R: High<br>P: High<br>S: Low | Mining and refining of materials used in batteries is by far the biggest environmental impact across the life cycle of alkaline batteries. According to LCA studies almost 80% of environmental impacts across the life cycle of these batteries were found to occur during the mining and refining of materials. There is thus high relevance (R) for reducing the environmental impacts from mining and refining. The steerability (S) is however low at the moment, but new legislation and new initiatives to verify and trace minerals from mines through the supply chain, is coming forward. When it comes to emissions to air and water, chemical |

[18] Giovanni Dolci et al.: Life cycle assessment of consumption choices: a comparison between disposable and rechargeable household batteries. The International Journal of Life Cycle Assessment (2016).
[19] Helgstand A.: AA batteries, disposable or rechargeable – A comparative Life Cycle Assessment of potential climate impact of rechargeable NiHM and alkaline disposable AA batteries. Linköping Universitet (2011).
[20] Mia Romare, Lisbeth Dahllöf (2017). The life cycle energy consumption and greenhouse gas emissions from Lithium-ion batteries, IVL Swedish Environmental Research Institute.
[21] Wang, X. (2014). Managing End-of-Life Lithium-ion Batteries: an Environmental and Economic Assessment. Thesis. Rochester Institute of Technology.

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| | | used during extraction and biodiversity loss there are also low steerability.<br>Requirements for the responsible sourcing of mineral raw materials in battery production ensure that batteries placed on the EU market are sustainable, efficient and safe throughout their lifecycle. All licenced batteries within Nordic Swan Ecolabelled non-rechargeable portable batteries must have a due diligence management system to address the social and environmental risks linked to sourcing, processing and trading raw materials along the whole supply chain, regardless of turnover. The requirement is supporting the new EU regulations. |
| Quality/safety of non-rechargeable portable batteries | R: High<br>P: Low/Medium<br>S: High | Materials composition and production methods vary between the individual product types of non-rechargeable portable batteries. This has a major impact on the quality of the products. It is therefore highly relevant (R) to ensure that the quality of non-rechargeable portable batteries is good. This can be ensured by requirements to apply quality standards (P). The steerability (S) of the quality of the battery is increased by requiring relevant quality parameters to be tested by independent, qualified third parties.<br>Imposing stringent requirements of the quality of non-rechargeable portable batteries not only ensure good energy efficiency and durability but also increases the lifetime of the battery and ensures that no leakage occurs during the use phase. A long battery lifetime also leads to a smaller amount of batteries in the commercial and waste stream. It is important that only high quality and durable batteries, both for low and high-energy devices, can be Nordic Swan Ecolabelled. Safety and quality requirements of non-rechargeable portable batteries ensure safe, energy-effective (long duration) and consumer-friendly batteries. Swedish consumer tests and license data shows that there is a lower potential for tighten the requirement for the batteries minimum permitted operation time compared with today's limits in criteria generation 5. |
| Overuse of batteries: due to lack of knowledge about optimized use, use of incorrect battery type for electrical appliances, and use of poor-quality batteries, incorrect handling of used batteries in the waste flow | R: High<br>P: Medium/High<br>S: Low | One important parameter for the environmental impact of non-rechargeable portable batteries is the overuse of batteries. The fewer batteries that are used, the lower the overall environmental impact of the non-rechargeable portable batteries. Accordingly, it is important to ensure that Nordic Ecolabel licences are awarded only to batteries that offer the longest operating time. For the consumer, there are economic and environmental benefits from choosing the right battery with the best capacity for the electronic application, thereby ensuring a long and optimised battery life. There is generally a low level of steerability for the consumers' use of batteries, however an improper use or poor matching of battery type and device lead to unnecessary disposal of batteries. Nordic Ecolabelling sets information requirements to the customers on the packaging of batteries, but it is presumably limited who is reading the information. However, the requirements of consumer information and the design of the packaging ensure a high degree of recycling of the products. |
| End-of-life for non-rechargeable portable batteries: downcycling, energy in recycling processes, emissions | R: High<br>P: Low/Medium<br>S: Low | Important and valuable material is lost if the recycling processes of non-rechargeable portable batteries are not functioning. Since non-rechargeable portable batteries are a disposable product the end-of-life is extra important for non-rechargeable portable batteries. The recycling in the Nordic countries is a developed and functioning system governed by a combination of EU regulations and national policies. Each country has implemented systems to manage the collection and recycling of non-rechargeable portable batteries. Collection points are widely available in all countries which makes the potential low to medium. The steerability of setting requirements is low since the producer do not have any controllability after the battery is sold and no controllability over the recycling processes. However, due to the fact that waste is also produced in the production of batteries, Nordic Ecolabelling has chosen to impose a requirement that producers must have a waste processing plan and that this plan must comply with certain requirements. Further, by requiring information concerning the content of the battery, Nordic Ecolabelling can collect evidence in order to |

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|---|---|---|
| | | assess how we will set requirements of the battery content in the future. Requirements of consumer information and material used in packaging will ensure a high degree of recycling of the products. |
| Corporate Social Responsibility | R: High<br>P: High<br>S: Low | Social aspects such as child labour, unsafe working conditions, etc are common within mining and production in countries around the world. The relevance and potential remain high, however the steerability in making a difference remains low due to low controllability in the supply chain. Nordic Ecolabelling has a requirement for working conditions which, in addition to compliance with the UN Global Compact, also includes compliance with the UN Convention on the Rights of the Child (Article 32) and the UN Declaration (61/295) on the Rights of Indigenous Peoples. |
| PVC in plastic and labelling | R: Medium/High<br>P: High<br>S: High | PVC is still used in some non-rechargeable portable battery components, especially labels and 9-volt battery casings. Although PVC accounts for a smaller part of a battery's weight, its environmental impact is significant. PVC contains substances with known adverse health effects such as phthalates and chlorine-based compounds, and its incineration releases harmful dioxins. Alternatives to PVC, such as PET, PE, nylon, and steel, are widely used in many battery types, indicating strong market potential for substitution. Nordic Swan Ecolabel therefore has a high degree of steerability to prohibit PVC. |
| PFAS in batteries | R: Medium<br>P: High<br>S: High | Per- and polyfluoroalkyl substances (PFAS) are used in many types of products due to their water and dirt repellent properties. These compounds constitute a group of substances that have highly problematic intrinsic hazardous properties. They are extremely persistent and accumulate in the body. They are spread all over the globe, from the large oceans to the Arctic, and are found in e.g. wild birds and fish and their eggs. Also, shorter chain compounds (2–6 carbon atoms) have been discovered in nature. The substances in this group are suspected to be endocrine disruptors, carcinogenic and to have a negative impact on the human immune system. PFAS are primarily found in rechargeable batteries, especially in advanced types such as lithium-ion batteries. In non-rechargeable portable batteries, the occurrence is generally low or uncommon but not completely excluded. Applying the precautionary principle, the Nordic Swan Ecolabelling has chosen to exclude PFAS from non-rechargeable portable batteries. |
| Energy in the production of batteries | R: High<br>P: High<br>S: Medium | The production of non-rechargeable portable batteries requires energy, particularly in areas such as electrode material preparation, filling and sealing, line production and drying process. Further, the energy source (renewables vs. fossil) heavily affects the footprint of the production. The relevance of setting requirements for energy in production is therefore high and offers an opportunity to reduce greenhouse gas emissions. The potential for improvements in the battery sector is growing, with an increasing number of manufacturers investing in more energy efficient processes and shifting to renewable energy sources, such as solar PV. The steerability of setting realistic and ambitious requirements are medium since external suppliers are common where the steerability are lower. However, energy data for the production help determine the level and type of requirements that can be effectively implemented. |

## 5.2 MECO scheme non-rechargeable portable batteries

| 22 23 24 25 26 27 | Raw material | Production | Use | End of life |
|---|---|---|---|---|
| **Material** | Metals (Zn, Mn/MnO2, Li, Fe and more) | (Mostly assembly)<br>PVC in components and labelling | (minimal risk of leakage) | Loss of useful materials (Zn, Mn, Li) due to lacking recycling processes (downcycling) |
| **Energy** | Energy use – mining of metal used in batteries<br>Processing of raw material | Electricity/energy of the production of the main product (drying and assembly processes)<br>Energy source (renewable/fossil) highly affects footprint | (no energy use) | Energy for recycling of metals / materials |
| **Chemicals** | Emissions to air and water related to mining<br>Chemicals used during extraction | Emissions to air and chemical exposure (NMP, electrolytes, VOC) | Potential risk of leak of electrolytes/chemicals | Emissions to air and water from the recycle process<br>Emissions to air and water in incorrect recycling (landfill)<br>Emission from incineration |
| **Other** | Biodiversity/habitat destruction due to mining<br>Social aspects (Conflict and critical raw minerals) (child labor, unsafe working conditions, etc.) | Unsafe working conditions<br>Waste treatment<br>Waste water with heavy metals or chemical residues | Battery quality and performance<br>Improper use / poor matching of battery type and device which lead to unnecessary disposal | |

[22] (PDF) Life cycle assessment of consumption choices: a comparison between disposable and rechargeable household batteries (researchgate.net) 2016
[23] PEFCR Batteries, 2020, version 1.1
[24] Giovanni Dolci et al.: Life cycle assessment of consumption choices: a comparison between disposable and rechargeable household batteries. The International Journal of Life Cycle Assessment (2016).
[25] Helgstand A.: AA batteries, disposable or rechargeable – A comparative Life Cycle Assessment of potential climate impact of rechargeable NiHM and alkaline disposable AA batteries. Linköping Universitet (2011).

**Table 1** **[26] Mia Romare, Lisbeth Dahllöf (2017). The life cycle energy consumption and greenhouse gas emissions from Lithium-ion batteries, IVL Swedish Environmental Research Institute.**

[27] Wang, X. (2014). Managing End-of-Life Lithium-ion Batteries: an Environmental and Economic Assessment. Thesis. Rochester Institute of Technology