About Nordic Swan Ecolabelled

Primary Batteries

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Nordic Ecolabelling

Content

Addresses

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
Fonden Dansk Standard
Göteborg Plads 1, DK-2150 Nordhavn
Fischersgade 56, DK-9670 Løgstør
Tel: +45 72 300 450
info@ecolabel.dk
www.ecolabel.dk

Iceland
Ecolabelling Iceland
Norræn Umhverfismerking á Íslandi
Suðurlandsbraut 24
IS-108 Reykjavik
Tel: +354 591 20 00
ust@ust.is
www.svanurinn.is

Finland
Ecolabelling Finland
Uhro Kekkosen katu 4-6 E
FI-00100 Helsingfors
Tel: +358 9 61 22 50 00
joutsen@ecolabel.fi
www.ecolabel.fi

Norway
Ecolabelling Norway
Henrik Ibsens gate 20
NO-0255 Oslo
Tel: +47 24 14 46 00
info@svanemerket.no
www.svanemerket.no

Sweden
Ecolabelling Sweden
Box 38114
SE-100 64 Stockholm
Tel: +46 8 55 55 24 00
info@svanen.se
www.svanen.se

What is a Nordic Ecolabelled primary battery?

The quality (operating time) of Nordic Ecolabelled primary batteries places them amongst the best on the market, which is essential to the environmental profile of the batteries. The longer the operating time, the fewer batteries will need to be used and, accordingly, produced. Strict requirements apply to the information provided to the consumer. Both of these points are intended to ensure that the battery will need to be replaced less frequently, thereby ”sparing” the environment the burden of more batteries. The battery or packaging does not contain PVC, and the permitted content of lead, cadmium and mercury is lower than the levels stipulated by the authorities in their requirements.

Producers of batteries must demonstrate good corporate social responsibility regarding the sourcing of conflict minerals, as well as critical raw materials and working conditions.

A different Nordic Ecolabelling criteria document allows rechargeable batteries to be ecolabelled. Rechargeable batteries will in most cases represent a better choice in environmental terms than primary batteries[1][2]. However, not all types of consumer household batteries have developed a market for rechargeable battery alternatives, e.g. button cells. There are differences between primary batteries with some representing a better choice in environmental terms than others. Nordic Ecolabelling has therefore opted to draft criteria for Nordic Ecolabelled primary batteries in order to be able to offer guidance to consumers who wish to purchase primary batteries and in doing so to take account of environmental considerations.

Nordic Swan Ecolabelled primary batteries:

- Meet stringent requirements for both battery operation time and shelf life – to ensure a long lifetime for the battery.
- Have a low content of mercury, cadmium and lead – to reduce the spreading and use of metals.
- Does not contain PVC* – to reduce the environmental impact in particular waste handling.
- Meet a CSR policy – to ensure responsible use and sourcing of limited raw materials and “conflict-free” minerals.

**applies to 9V batteries from 30/6-2021.*

Why choose the Nordic Swan Ecolabel?

- Licence holders may use the Nordic Swan Ecolabel trademark for marketing. The Nordic Swan Ecolabel is a very well known and well-reputed trademark in the Nordic region.

[1] 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).
[2] 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).

- The Nordic Swan Ecolabel is a simple way of communicating environmental work and commitment to customers.
- The Nordic Swan Ecolabel clarifies the most important environmental impacts and thus shows how a company can cut emissions, resource consumption and waste management.
- Environmentally suitable operations prepare primary batteries for future environmental legislation.
- Nordic Ecolabelling can be seen as providing a business with guidance on the work of environmental improvements.
- The Nordic Swan Ecolabel not only covers environmental issues, but also quality requirements, since the environment and quality often go hand in hand. This means that a Nordic Swan Ecolabel licence can also be seen as a mark of quality.

What can carry the Nordic Swan Ecolabel?

The product group comprises the following products:

Portable primary batteries in accordance with the definition given in the European Union's Battery Directive, 2006/66/EC.

The following batteries and electrical appliances cannot be Nordic Swan Ecolabelled according to these criteria:

- Rechargeable batteries, for which separate criteria exist.
- Batteries that are built into or form a permanent part of electronic products and where replacement of the batteries is not possible.
- Car batteries and industrial batteries.

Summary

Nordic Ecolabelling has developed criteria for primary batteries generation 5. The market for primary batteries is extensive and there are differences between primary batteries in terms of their environmental and quality properties[3][4], which enables Nordic Ecolabelling to differentiate the primary batteries that are best in terms of their environmental and quality properties from the rest.

Product group message
The quality (operating time) of Nordic Ecolabelled primary batteries places them amongst the best on the market, which is essential to the environmental profile of the batteries. The longer the operating time, the fewer batteries will need to be used and, accordingly, produced. Strict requirements apply to the information provided to the consumer. Both of these points are intended to ensure that the battery will need to be replaced less frequently, thereby "sparing" the environment the burden of more batteries. The battery or packaging does not contain PVC, and the permitted content of lead, cadmium and mercury is lower than the levels stipulated by the authorities in their requirements.

[3] https://www.altomdata.dk/aa-batterier-test-kaempe-forskel/2 (visited April 2017)
[4] https://www.radron.se/tester/boende-tradgard--husdjur/batterier-aaa/ (visited May 2017)

Producers of batteries must demonstrate good corporate social responsibility regarding the sourcing of conflict minerals, as well as critical raw materials and working conditions.

Nordic Swan Ecolabelled primary batteries:

- Meet stringent requirements for both battery operation time and shelf life – to ensure a long lifetime for the battery.
- Have a low content of mercury, cadmium and lead – to reduce the spreading and use of metals.
- Does not contain PVC* – to reduce the environmental impact in particular waste handling.
- Meet a CSR policy – to ensure responsible use and sourcing of limited raw materials and "conflict-free" minerals.

MECO and RPS analysis

To obtain an overview of the key environmental impacts in the products' life cycles, an environmental assessment of the product group was performed, as a qualitative MECO analysis for each of the four product areas. MECO stands for the assessment of Materials, Energy, Chemicals and Other characteristics and describes the principal environmental impacts during the product group's life cycle phases. This was followed by an overall RPS analysis for the product group as a whole. RPS stands for Relevance, Potential and Steerability and the analysis identifies the most relevant environmental impacts that the Nordic Swan Ecolabel has the greatest possibility of steering towards a lower environmental impact. RPS was found for the following:

- The spreading and use of metals, especially heavy metals, from the batteries.
- The quality and safety of the primary batteries.
- Overuse of batteries: due to lack of knowledge about optimized battery use, use of incorrect battery type for electrical appliances, and use of poor quality batteries.
- Incorrect handling of used batteries in the waste flow.

Changes in the revised version

The focus in the revision has been on the areas that comes up/were identified in the evaluation of the criteria. Based on the assessment, the MECO and RPS analyses and the market description, the main changes in the revision focus on:

- Adjustment of the requirements of minimum average duration (operation time) both regarding the test requirement for applications and regarding the minimum permitted operation time. There is also a new requirement concerning leakage during testing.
- New requirement for test of battery shelf live.
- Adjustment of the requirements for plastic in batteries and packaging regarding use of PVC.
- New requirements for corporate social responsibility regarding the sourcing of conflict minerals and critical raw materials.

All changes and amendments to the requirements are listed in Chapter 6. Further details of the requirements can be found in Chapter 5.

1 Basic facts about the criteria

The Nordic Ecolabelling Board adopted generation 2 of the Nordic Ecolabel criteria document for primary batteries on 15 March 1996. Generation 2 of the criteria was valid until 14 September 2003.

Generation 3 was adopted by the Nordic Ecolabelling Board on 17 December 2002. Generation 3 of the criteria was extended several times and was therefore valid until 30 June 2012.

Generation 4 of the criteria document was adopted on 22 June 2011. The criteria document has subsequently been extended several times. Version 4.7 is valid until 31 December 2019.

Nordic Swan Ecolabel licences in the Nordic Market

Table 1: Overview of licenses in the Nordic market

Country	Number of licenses	Battery technology
Sweden	10	Alkaline
Denmark	3	Alkaline
Finland	1	Alkaline
Norway	1	Alkaline

2 Market analysis

Type of batteries

The technology used in commercial batteries has not changed drastically: they consist of an electrolyte and two electrodes (the anode and the cathode). The chemical reaction that takes place at the electrodes and the nature of the electrolyte influence the efficiency of a battery. The inactive components – steel casings, seals and separators – ensure the normal functioning of a battery cell. The active components comprise different chemical compounds which define the main attributes of a battery. Some of these may have a significant environmental impact if they are disposed of inappropriately (cadmium (Cd), lead (Pb) and mercury (Hg) and, to a lesser degree, – copper (Cu), nickel (Ni), lithium (Li), silver (Ag), and zinc (Zn)).

Currently, manganese dioxide primary batteries and cells account for 64,2% of the global demand. The remaining market share is divided between lithium primary batteries and cells 22,3%, air-zinc primary batteries and (cells 1,8%), silver oxide primary batteries and cells (1,6%), mercuric oxide primary batteries and cells (0,1%, other primary batteries and cells (6,1%) and parts of primary batteries and cells (4,0%)[5].

[5] https://www.grdsreports.com/electronics/primary-batteries-and-cells/ (visited February 2018)

The EU Battery Directive distinguishes between three types of batteries: portable, industrial and automotive batteries. See table 2 below. Portable batteries are sealed, can be hand-carried and are neither industrial nor automotive batteries. Only portable primary batteries are covered by these Nordic Swan Ecolabel criteria. According to European Commission[6], approximately 75% of all portable batteries in the EU are non-rechargeable – for the "general purpose" use, leaving the rest of the market – 25%– to rechargeable batteries, see figure 1 below. Industrial batteries comprise batteries designed for professional application, often at the manufacturing level. Here, lead-acid batteries prevail in the market, at 96%, while the remaining 4% is divided equally between NiCd and other batteries. Finally, automotive batteries are used for vehicle starting, lighting and ignition systems (so-called "SLI" batteries).

Table 2: Battery types, based on their application and the chemistries used

Portable		**Industrial**	**Automotive (SLI)**
Non-rechargeable	Rechargeable		
Zink-Carbon Alkaline-manganese Lithium-Oxide	Nickel-Cadmium Nickel metal hydride Lithium-ion Lead-acid	Lead-acid Nickel-Cadmium other	Lead-acid

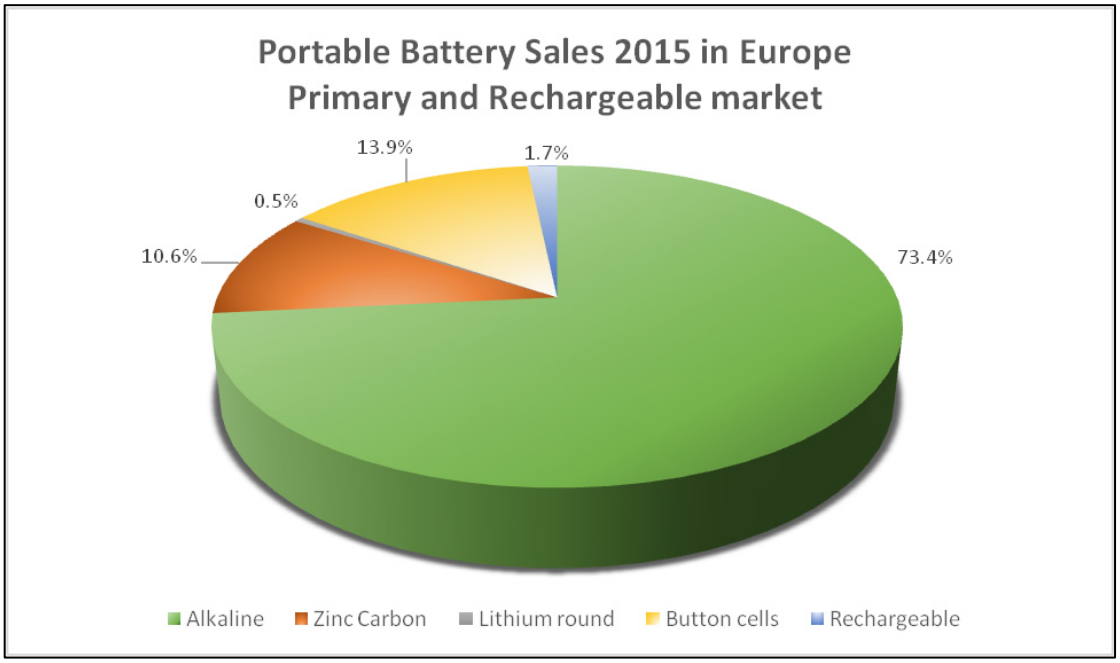

Figure 1: Total primary and rechargeable by volume: According to EPBA, statistics a total of 5 billion units of portable batteries were placed on the European market by the EPBA members in 2015. This included primary round and prismatic batteries, button cells and rechargeable batteries and packs.

[6] European Commission (2014). Frequently Asked Questions on Directive 2006/66/EU on Batteries and Accumulators and Waste Batteries and Accumulators. Commission Services document – not legally binding. http://ec.europa.eu/environment/waste/batteries/legislation.htm (visited 8/11-2017).

2.1 The market development

The trend in the marked for primary batteries is moving towards a steady replacement of carbon-zinc with alkaline batteries as the later occupy a significant share[7]. Alkaline batteries find applications in a wide array of consumer products ranging from clocks, electronic door locks, and smoke and carbon monoxide detectors to freezer alarms.

The global primary batteries market is expected to grow at a Compound Annual Growth Rate (CAGR) of 4 - 7% during the period 2016-2020[8].

The market for primary batteries is extensive and there are differences between primary batteries in terms of their environmental and quality properties[9][10], which enables Nordic Ecolabelling to differentiate the primary batteries that are best in terms of their environmental and quality properties from the rest.

According to the primary batteries market report, the demand for portable medical devices is increasing day by day. High-energy pulse along with the battery makes a portable device 60% smaller than the usual portable devices. Pulse power along with batteries deliver long-term power solutions to high-end portable sophisticated devices such as portable EKG and defibrillators. Pulse power technology accumulates energy and releases it when needed.

Micro-battery is a latest addition to the primary battery market that are as small as a rice grain[11]. These batteries are used mostly used in transmitters. Companies manufacturing these micro-batteries that are small enough to be injected into an organism and last longer than similar-sized batteries.

Table 3: Market development indicators for primary batteries.

Market driver	Increased demand for portable medical equipment
Market challenges	Threat of rechargeable battery solutions
Market trend	Replacement of carbon-zinc with alkaline batteries Legislative support for battery recycling

2.2 Environment as a means of competition

Several battery manufacturers use “long lasting/ ultra power” in one way or another in their marketing. Duracell, for example, uses”#1 longest lasting batteries”[12] while Energizer names its premium batteries as “# 1 longest-lasting MAX™”[13]. Panasonic uses “Eco ideas: higher energy efficiency = less batteries needed = less impact for the environment”.

Other dominating marketing parameters is “hold power for up to 10 years while in storage” and “no leakage”[14]

[7] http://www.reportsnreports.com/reports/738711-global-primary-battery-market-2016-2020.html (visited November 2017)
[8] https://www.freedoniagroup.com/World-Batteries.html (visited February 2018)
[9] https://www.altomdata.dk/aa-batterier-test-kaempe-forskel/2 (visited April 2017)
[10] https://www.radron.se/tester/boende-tradgard--husdjur/batterier-aaa/ (visited May 2017)
[11] https://www.giiresearch.com/report/tbrc603861-primary-batteries-global-market-report.html (visited February 2018)
[12] https://www.duracell.co.uk/ (visited November 2017)
[13] http://www.energizer.com/batteries/energizer-max-alkaline-batteries (visited November 2017)
[14] http://www.varta-consumer.dk/en-gb/products/batteries (Visited November 2017).

The content of heavy metals in batteries is also very used in marketing. Philips, for example, uses "Philips alkaline batteries contain 0% Cadmium, Mercury and Lead"[15].

Finally, the majority battery manufacturers/brand owners is using and focusing on their recycling programs in the marketing[16][17].

2.3 Stakeholders

The European Portable Battery Association (EPBA) represents the interests of primary and rechargeable portable battery manufacturers, industries using portable batteries in their products, and distributors of portable batteries active within the European Union, and beyond. www.epbaeurope.net

The European Battery Recycling Association (EBRA) represents the companies whose main activities are battery sorting and recycling. EBRA's members are involved in the collection, sorting, treatment and recycling of used or waste batteries, whatever the technology or category – automotive, or Starting-Lighting-Igniting (SLI) batteries, industrial batteries, and consumer portable batteries (rechargeable and non-rechargeable). http://www.ebra-recycling.org/home

3 Other labels

This chapter summarises the main regulatory requirements, controls and labelling schemes for primary batteries.

3.1 Battery Directive (2006/66/EC)

The Battery Directive 2006/66/EC[18] (2006) applies to all batteries and accumulators in the European Union market, unless, according to Article 2.2 of the Directive, they are used in equipment intended to protect essential national security interests and equipment designed to be sent into space. The Directive has two different purposes. One is to reduce the environmental impact of batteries and the other is to coordinate the rules throughout the EU.

The Directive reduces environmental impacts by limiting the use of batteries containing the heavy metals cadmium, mercury and lead, and by requiring the collection of batteries. The Directive also reduces the environmental impact of batteries by requiring the recovery of end-of-life batteries and prohibiting landfill deposits and incineration of untreated batteries. All of the Nordic countries have established collection arrangements for batteries, as provided by the Directive.

[15] https://www.philips.co.uk/c-p/LR03-P4_00B/powerlife-battery (Visited November 2017).
[16] http://de-shop.varta-consumer.com/en-gb/company/environment%20sustainibility/environmentally%20friendly%20substances%20recycling (visited November 2017)
[17] http://www.gpbatteries.se/om-oss/miljoansvar.html (visited November 2017)
[18] http://ec.europa.eu/environment/waste/batteries/legislation.htm (visited 6/11-2017).

The EU Battery Directive is subject to revision[19]. The task is to minimise waste and maintain material flows within the economy for as long as possible, to achieve economic, social and environmental benefits. An area of special interest is to find economic and strategic incentives for material recovery. It is also planned to consider such issues as 1) business models for collection and recycling of negative-value waste streams; 2) recycling capacity; 3) recycling technologies for new chemistries; and 4) the legal framework for reuse (the second life). For more information concerning EU legislation, see appendix 1 in this document.

3.2 Type 1 ecolabels

Type 1 ecolabels, like the Nordic Swan Ecolabel, are voluntary, multiple-criteria based, third-party programmes, which award a licence that authorises the use of environmental labels on products, to indicate the overall environmental preferability of a product within a specific product category, based on life-cycle considerations.

The Nordic Swan Ecolabel is the only type 1 ecolabelling organisation that ecolabel primary batteries.

3.3 Environmental Product Declarations (EPD)

In life cycle assessment, an Environmental Product Declaration (EPD) is a standardized way of quantifying the environmental impact of a product or system. While EPD do educate consumers about the product and its environmental impact, consumers should know that it is for disclosure purpose only, and does not mean that the product meets any environmental performance standards.

EPDs are referred to as type 3 environmental declarations according to ISO 14024. No EPDs for batteries are found on the international EPD page, but it has been found that the Taiwan Battery Association has developed product category roles (PCR) for ”Lithium-ion Secondary Battery Pack for Consumer Electronics” as from 2014.

3.4 Purpose of the revision of the criteria

Evaluation of the current generation 4 of the criteria for the Nordic Swan Ecolabelling of primary batteries (2014 and 2016) resulted in a proposal to revise the criteria. In addition, to adjust the requirements of capacity, capacity testing methods, the overall quality of primary batteries and the possibility of new requirements for metals.

Based on the recommendations in the evaluation report, the objectives of the revision have been to:

- Clarifying the product group definition.
- Adjust and tighten the requirement for minimum average duration (MAD) for all battery types and update the testing methods for primary batteries.
- Introducing a new requirement for battery shelf life.

[19] http://www.prba.org/wp-content/uploads/9.1-EU-Batteries-Directive-Review.pdf (visited 2/5-2017).

- Map the types of metals and constituents found in today's battery types in order to adjust the requirements for the use of metals.
- Examine the possibility of developing a new requirement for metal extraction.
- Examine the possibility of developing new requirements for leakage and consumer information about which applications the battery is suitable for.
- Generally update current requirements to ensure they are clear and relevant.
- Update background documents in line with the revision of requirements and conclusions from MECO and RPS made in this evaluation.

About this criteria revision

The revision was conducted by; Thomas Christensen (DK, product group manager) and Ove Jansson (S, project adviser). Jakob Waidtløw (DK), Randi Rødseth (N), Ove Jansson (S) and Anna Sahlman (Fin) are the national product specialists (PS).

The revision was conducted as an internal Nordic Ecolabelling project, with an ongoing dialogue with international and national stakeholders.

4 Environmental impact of the product group

The product group primary batteries comprises of 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. This means that the overall life cycles are the same as for the primary batteries included in today's criteria: production of raw materials, production of batteries, and the user-facing and end-of-life battery treatment. The differences in the types of products lie in the type of battery technology.

Safety and quality requirements of primary batteries ensure safe, energy-effective (long duration) and consumer-friendly batteries. The requirements of consumer information and the design of the packaging ensure a high degree of recycling of the products.

A MECO analysis was performed in conjunction with Nordic Ecolabelling's revision of the criteria in 2017[20]. MECO stands for the assessment of Materials, Energy, Chemicals and Other characteristics and describes the principal environmental impacts during the product's life-cycle phases. The MECO analyses are based on LCA studies[21,22,23] and scientific reports[24].

[20] The separate MECO analysis for primary batteries is written in Danish and is available on request from Nordic Ecolabelling: tc@ecolabel.dk.
[21] 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).
[22] 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).
[23] Mia Romare, Lisbeth Dahllöf (2017). The life cycle energy consumption and greenhouse gas emissions from Lithium-ion batteries, IVL Swedish Environmental Research Institute.
[24] Wang, X. (2014). Managing End-of-Life Lithium-ion Batteries: an Environmental and Economic Assessment. Thesis. Rochester Institute of Technology.

Based on the MECO analysis, an RPS analysis was conducted to identify the relevance, steerability and potential of the various environmental aspects of primary batteries.

Nordic Ecolabelling uses the RPS analysis to pinpoint the environmental issues that are most relevant (R) in the life cycle of the products and to assess the potential (P) which exists for reducing adverse effects on the environment in these areas. At the same time, it is important to examine how manufacturers in particular can make changes to the products (steerability = S) that will trigger the potential for environmental improvements. This section describes the key findings of the RPS analysis. The complete analysis is in Danish, but can be requested from Nordic Ecolabelling.

The RPS analysis for primary batteries shows that RPS has been found in a life cycle for the following areas:

- The spreading and use of metals, especially heavy metals, from the batteries.
- The quality and safety of the primary batteries.
- Overuse of batteries: due to lack of knowledge about optimized battery use, use of incorrect battery type for electrical appliances, and use of poor quality batteries.
- Incorrect handling of used batteries in the waste flow.

The spreading and use of metals, especially heavy metals, from the batteries

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 is thus relevance (R) and potential (P) to distinguish between more or less environmentally hazardous types of batteries. The Battery Directive, 2006/66/ EC, already regulates the content of mercury (Hg), cadmium (Cd) and lead (Pb) in batteries.

The potential (P) for a stricter requirement concerning the use of mercury, cadmium and lead is therefore limited, but would, however, 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 of materials used in batteries is by far the biggest environmental impact across the life cycle of alkaline batteries. According to LCA studies,[25] 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 very low at the moment, but new legislation and new initiatives to verify and trace minerals from mines through the supply chain, is coming forward.

[25] https://www.epbaeurope.net/wp-content/uploads/2016/09/EPBASustainabilityreport2010_final.pdf (visited September 2017)

New requirements of the use of conflict and critical raw minerals in battery production ensure that battery manufacturers have an active policy for the purchase and use of metals. The requirement is supporting the new EU regulations that will be enforced in 2021[26]. Conflict minerals such as tin, tantalum, tungsten, gold and cobalt are often mined in conflict- or high-risk areas such as the Democratic Republic of Congo region. According to EU and NGOs critical raw materials are considered critical to our society and our well-being.

By requiring information concerning the content of the battery, Nordic Ecolabelling can collect evidence in order to 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.

The quality/safety of primary batteries

Materials composition and production methods vary between the individual product types of primary batteries. This has a major impact on the quality of the products. It is therefore highly relevant (R) to ensure that the quality of primary 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.

Imposing stringent requirements of the quality of primary batteries not only ensures good energy efficiency and durability, but also increases the lifetime of the battery. A long battery lifetime also leads to a smaller amount of batteries in the commercial and waste stream.

Swedish and Danish consumer test[27,28] from 2017 shows that there is potential for tighten the requirement for the batteries minimum permitted operation time compared with today's limits in criteria generation 4.

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

Nordic Ecolabelling is of the view that the most important parameter for the environmental impact of batteries is the overuse of batteries. The fewer batteries that are used, the lower the overall environmental impact of 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. Nordic Ecolabelling sets a number of information requirements to the customers on the packaging of batteries, but it is presumably limited who is reading this.

[26] http://ec.europa.eu/trade/policy/in-focus/conflict-minerals-regulation/regulation-explained/ (visited May 2018)
[27] https://www.altomdata.dk/aa-batterier-test-kaempe-forskel/2 (visited April 2017)
[28] https://www.radron.se/tester/boende-tradgard--husdjur/batterier-aaa/ (visited May 2017)

Therefore, the environmental impact is to ensure that only high quality and durable batteries, both for low and high-energy devices, can be Nordic Swan ecolabeled.

5 Justification of the requirements

This chapter presents proposals for new and revised requirements and explains the background to the requirements, the chosen requirement levels and any changes compared with feedback received in the pre-consultation and generation 4.

5.1 Definition of the product group

The product group comprises the following products:

Portable primary batteries in accordance with the definition given in the European Union's Battery Directive, 2006/66/EC.

The following batteries and electrical appliances cannot be Nordic Swan Ecolabelled according to these criteria:

- Rechargeable batteries, for which separate criteria exist.
- Batteries that are built into or form a permanent part of electronic products and where replacement of the batteries is not possible.
- Car batteries and industrial batteries.

Background

As in the criteria for generation 4, the product group includes portable primary batteries in accordance with the definition provided in the European Union's Battery Directive, 2006/66/EC[29].

According to Directive 2006/66/EC a primary battery is:

Any source of electrical energy generated by direct conversion of chemical energy and consisting of one or more primary battery cells (non-rechargeable). Portable batteries are confined to: any battery or button cell, or any battery pack or accumulator, that is sealed, can be hand-carried and is neither an industrial battery nor an accumulator, nor an automotive battery or accumulator.

The term "sealed" applies to most - if not all - types of batteries: lead-acid, Nickel-Cadmium (Ni-Cd), Lithium-Primary, Lithium-Ion (Li-ion), Zinc Alkaline, etc. The battery is sealed during normal use in order to avoid spillage of the electrolyte out of the battery, but also to protect the battery from the introduction of air inside the battery. Both the spillage and the air inlet would reduce the service life of the battery.

In amending the product group definition to the above definition, Nordic Ecolabelling is in line with the product group definition in the European Union's Batteries Directive.

[29] http://eur-lex.europa.eu/legal-content/En/ALL/?uri=CELEX:32006L0066 (visited Marts 2018

This enables us to compare our applicant's batteries with the grouping of batteries under the Directive, thereby facilitating the process of determining whether the batteries form part of the product group.

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. Many tools, for example, such as cheaper screwdrivers and drills, beauty products or toys, have primary- or rechargeable batteries that cannot be replaced when they get old and cannot be recharged at all. 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.

5.2 Production and product description

O1 Description of the product

The applicant must submit the following information about the product(s):

- Brand and trading name(s).
- Name and contact details of production location(s) for the manufacture and brand owner(s) of batteries.
- Description of the product(s), detailing all constituent substances present in the battery in the application (weight %); cathode-and anode ingredients, electrolyte solutions, conductor-, separator- and container ingredients and other materials.
- Description of materials used in the primary packaging. Primary packaging: refers to the purchase packaging for the consumer, e.g. the packaging that holds the batteries, and which the consumer encounters in sales.
- Description of the manufacturing process for the product, including a general description of the batteries manufacturing process e.g. in a form of flow chart and which technology that is being used to produce the batteries.

✉ Description of the above points. Appendix 1 may be used. A flow chart is recommended to explain the production process.

Background to requirement O1

The requirement of the description of the product has been slightly adjusted in generation 5 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.

5.3 Resources

O2 Metal content of batteries

The metal content of the battery may not exceed the following limits:

Metal	Content
Mercury	< 0.1 ppm
Cadmium	< 1.0 ppm
Lead	< 10 ppm

It should be noted that the EU's Battery Directive 2006/66/EC permits a maximum cadmium content of 20 ppm and a maximum mercury content of 5 ppm. The test laboratory may need special equipment in order to test batteries for a mercury content of <0.1 ppm.

At least four examples of the product in question must be analysed and all four must meet the requirement.

The metal content of the batteries must be 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), and National Electrical Manufacturers Association (NEMA; USA). April 1998".

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

✉ Report from the analysis body showing the metal content of the batteries.
✉ Declaration confirming that the institution performing the analysis is impartial and fulfils the general requirements applicable to test laboratories, as described in the requirements applicable to the analysis laboratory/test institutions in appendix 6.

Background to requirement O2

The requirement to metal content of batteries remains unchanged in generation 5 of the criteria.

As noted above, Nordic Ecolabelling is aware that substances that are harmful to the environment are used in primary 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 very hazardous to health and the environment, accumulates in the body and is known to be highly volatile.
- 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[30].

[30] http://mst.dk/kemi/kemikalier/fokus-paa-saerlige-stoffer/

The EU's Battery Directive 2006/66/EC (2006) 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 Directive 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[31], 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 Directive.

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 primary batteries, and Nordic Ecolabelling is aware that the specified test method is old. Similar test methods may therefore be approved if assessed and adjudged to be equivalent to the recommended method by an independent third party.

O3 Plastic

Chlorine-based plastic must not be used in primary batteries.

PVC used in separators between the individual 1,5 V cells/casing around each individual 1,5 V cell in 9V batteries are exempted from the requirement until 30/6-2021.

✉ Declaration from the manufacturer of the battery that the requirement is fulfilled. Appendix 2 may be used.

Background to requirement O3

This is a new requirement in generation 5 of the criteria. Some types of 9-volt batteries (rectangular cell alkaline) are using PVC-separators between the individual 1,5V cells inside the battery instead of other types of plastic such as PE and nylon. In addition, for some 9-volt alkaline batteries the specific construction of the casing consist of PVC. The use of PVC in the 9-volt batteries has to first of all be seen as a structural component to support the prismatic shape of the battery.

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

A large proportion of 9-volt batteries is however using alternative materials to PVC such as PE, nylon and steel. Nordic Ecolabelling has no information on use of PVC in traditional alkaline primary batteries e.g. AAA, AA, C and D.

In 2015[32], 222.000 tonnes or an estimated 10.5 billion portable batteries (approx. 70% primary and 30% rechargeable batteries) were reported to have been placed on the market of the EEA[33] plus Switzerland in 2015, while around 91,000 tonnes of waste portable batteries were reported as collected. This corresponds to a collection rate on a current year basis of 41%, up from 25% in 2010. This means that potentially half of all batteries ends up in wrong waste streams or the nature where they form an environmental risk regarding soil-, water and air pollution.

The use of chlorine-based plastic in primary batteries is primarily limited to be used in 9V batteries and battery labels. PVC constitutes approx. 1-2%Wt of the total battery[34]. This roughly corresponds to 2300[35] tons of PVC used in primary batteries placed on the European marked in 2015, of which PVC in battery labels constitutes the main share. PVC in battery labels, see O4.

PVC is excluded from Nordic Swan Ecolabelled primary batteries since PVC leads to adverse environmental impacts in particular the waste handling and contain substances with adverse health effects. The most important problem areas for PVC are described in Nordic Ecolabelling's background report for floors[36]. PVC contains chemicals that may have adverse health effects:

- Exposure to PVC often includes exposure to phthalates and chlorine.
- Manufacturing, burning, or landfilling PVC releases dioxins.
- Phthalates, dioxins, and BPA are suspected to be endocrine disruptors. Endocrine disruptors are chemicals that may interfere with the production or activity of human hormones

According to the report "Hazardous substances in plastic materials" published by the Norwegian Environment Agency in 2013, PVC can be added to more than 50% of plasticisers, of which phthalates are still the most popular[37]. PVC requires stabilisation in order to tolerate the temperature required for the production of a PVC product (extrusion, injection moulding, etc.). Stabilisers can be based on lead, metal compounds (such as barium-zinc and calcium-zinc) ortin. In modern production plant, the environmental impact is reduced, e.g. dioxin emissions from production. Dioxins can also be formed when waste is incinerated. The neutralising process of dioxin also generates a number of problematic residues in the plant, and these residues must be deposited under special conditions such as landfill.

[32] https://www.epbaeurope.net/wp-content/uploads/2018/03/Report-on-the-portable-battery-collection-rates-Update-Dec-17.pdf (visited May 2018)
[33] EU, Norwey, Iceland and Croatia
[34] https://calpsc.org/mobius/cpsc-content/uploads/2015/01/life_cycle_impacts_of_alkaline_batteries_2011_02.pdf
[35] 70% of 222.000 tons protable batteries = 116620 tonnes primary batteries of which 2% are PVC = 2300 tonnes.
[36] https://www.nordic-ecolabel.org/product-groups/group/?productGroupCode=029 (visited May 2018)
[37] Norwegian Environment Agency, Hazardous substances in plastic materials, Cowi, January 2013

The typical recycling process of collected batteries[38] is based on incineration in order to separate metals by volatilization process. The environmental problems regarding incineration of PVC is described above.

Within the EU, the Waste Directive (91/689/EC) sets limits for emissions of dioxins from incineration plants. In overall terms, the environmental impacts related to the production, use and disposal of PVC are steadily diminishing, among other things due to new knowledge and the technological development. Yet there is every indication that there are still problems related to PVC, nor is there sufficiently adequate control of the PVC which is imported to the EU and the Nordic countries from other parts of the world that are not subject to the same European limitations. The use of PVC in primary batteries and packaging is therefore prohibited.

Nordic Ecolabelling is aware that it takes time for the 9V battery industry to replace specific PVC parts with new materials in the battery. PVC used in separators between the individual 1,5 V cells/casing around each individual 1,5 V cell in 9V batteries are there for exempted from the requirement until 30/6-2021.

For Nordic Swan Ecolabelled primary batteries, there is also a ban on the use of PVC in the battery labels and their packaging, see requirement O4.

5.4 Packaging and information

Primary packaging: refers to the purchase packaging for the consumer, e.g. the packaging that holds four batteries, and which the consumer encounters in sales.

Secondary packaging: refers to the transport packaging and protects the packs of batteries during transport to stores and consumers.

O4 Battery labels and packaging

Battery labels:

The battery label* must not contain PVC or other halogenated organic compounds in general (including flame retardants).

* *The label itself, not any pigment or inks used for printing on the label.*

Packaging:

The total proportion of pre- and post-consumer* recycled material in the primary packaging for the batteries must be at least 80% by weight.

Chlorine-based plastic must not be used in primary and secondary 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.

Small antitheft RFID components are excluded from the dismantling requirement.

**Pre- and post-consumer material is defined in accordance with ISO 14021:*

"Pre-consumer": Material diverted from the waste stream during a manufacturing process. Excluded is reutilization of materials such as rework,

[38] https://www.iva.se/globalassets/presentationer-fran-seminarier/ekberg--iva-20180112---framtidens-batterier-id-114812.pdf

regrind or scrap generated in a process and capable of being reclaimed within the same process that generated it.

"Post-consumer/commercial" is defined as material created by households or commercial, industrial or institutional facilities in the role of end users of a product which can no longer be used for the intended purpose. This includes return of material from the distribution chain.

☒ Declaration from the manufacturer of the battery label that the requirement is fulfilled. Appendix 3 may be used.

☒ Description of the primary and secondary packaging. Declaration from the manufacturer of the battery or brand owner(s) showing that the requirement is fulfilled. Appendix 4 may be used.

☒ Documentation from packaging suppliers showing the proportion of pre- and post-consumer recycled material in their products.

☒ Declaration from the manufacturer of the battery or brand owner(s) showing that the total proportion of pre- and post-consumer recycled material in the primary packaging exceeds 80% weight. Appendix 4 may be used.

Background to requirement O4

The requirement to packaging has been adjusted in generation 5 of the criteria. New requirement to battery labels has been added to the requirement.

Primary battery labels are made of thermal plastic, mostly PVC but also Polyethylene terephthalate (PET). The recycling processes (pyrometallurgy[39] and hydrometallurgy[40]) 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.

It is possible to ad 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.

[39] https://www.iva.se/globalassets/presentationer-fran-seminarier/ekberg--iva-20180112---framtidens-batterier-id-114812.pdf (visited October 2018)
[40] http://www.revatech.be/en/reva/reva_piles.html (visited October 2018)

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 varies 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 primary batteries consist 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 handeling, industry of cardboard, small antitheft component (labels) does not cause a problem for recycling.

O5 Consumer information on the battery and primary packaging

The battery must be marked in accordance with IEC 60086.

The primary packaging must clearly state:

a) The types of energy-intensive appliances for which the battery is recommended in order to secure optimum use from the battery. This information must contain:
   - Information on whether the batteries are suitable for appliances with high, medium, low energy drain or if the batteries are suitable for all types of electrical appliances. The information must be shown with either pictograms or clear visible text.

b) Date of manufacture or best before of the batteries (year and month).

c) Use of the Nordic Swan Ecolabel according to "Guidelines for using the Nordic Swan Ecolabel"[41]

✉ Declaration from the manufacturer of the battery or brand owner(s) showing that the battery is marked in accordance with IEC 60086. Appendix 5 may be used.

✉ Sample of packaging showing compliance with the requirement.

Background to requirement O5

The requirement to consumer information/marking on batteries has been adjusted in generation 5 of the criteria.

[41] http://www.nordic-ecolabel.org/certification/graphical-guidelines/ (visited March 2018)

New requirements saying that batteries must be marked in accordance with IEC 60086, and that the primary packaging must be clearly stated with “date of manufacture” of the batteries or “best before date”.

The IEC 60086-1:2015 and IEC 60086-4:2015 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 advices and safety pictograms for lithium batteries. With this new requirement, Nordic Ecolabelling ensures that the batteries are marked with relevant and accepted information for consumers.

The EU’s Battery Directive 2006/66/EC requires that end users shall be informed about the necessity to collect all types of waste batteries and accumulators separately for recycling. The EU Battery Directive also requires that rechargeable batteries is to be labelled with their capacity in mAh. However, the EU Commission has not yet proposed any requirement for the capacity marking of portable primary batteries, and Nordic Ecolabelling does therefore not set any requirement for this kind of labelling for primary batteries.

Studies conducted by the industry[42][43] reveal that there are a major environmental impacts associated with the incorrect use of batteries. If, for example, 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 are 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 posible to use a clear text (instead of pictograms) saying that the batteries are suitable for all appliances. In requirement O9, batteries are to be testet agains several electrical applications representing both high-, medium- and low energy drain (3 to 6 different application). Requirment 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.

[42] ”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
[43] http://ec.europa.eu/environment/waste/batteries/pdf/CENELEC%20feasibility%20study.pdf (November 2012)

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.

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 60086:2015 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.

5.5 Corporate Social Responsibility

O6 Sourcing of "conflict-free" minerals

The licensee must:

- Have a supply chain policy for responsible mineral sourcing that can be considered to cover tin, tantalum, tungsten, gold and cobalt. The policy must be both public and communicated to the supply chain.
- Have a process to identify smelters and refiners of at least tin, tantalum, tungsten, gold and cobalt.
- Be a part of an established multi-stakeholder program that works at supporting responsible sourcing programs for at least tin, tantalum, tungsten, gold and cobalt.

The background document contains recommendations (verification guidelines) to what can be included in the documentation of the three points.

✉ The most recent version of the public policy and a description of how it is communicated to the supply chain.
✉ A description of the licensees structured work on identifying risk areas in their supply chain.
✉ Proof of participation in an approved multi-stakeholder program.

Background to requirement O6

This is a new requirement in generation 5 of the criteria.

The European Commission has agreed on a framework to stop the financing of armed groups through trade in conflict minerals[44][45], after negotiations between the Commission, Council and Parliament. It aims for EU companies to source tin, tantalum, tungsten and gold responsibly. These minerals are typically used in everyday products such as mobile phones, electronic products, cars and jewellery. The regulation will be enforced in 2021. Conflict minerals are often mined in conflict or high-risk areas such as the Democratic Republic of Congo (DRC) region, Afghanistan, Colombia, the Central African Republic and Myanmar[46]. In many cases, armed groups control mineral extraction activities in order to finance their operations[47]. This illicit trade contributes to violent conflicts and severe human rights violations.

Cobalt is primarily used in Lithium-ion and NiMH- batteries in the cathode chemistries and in battery cans (Nickel Cobalt Plated Steel).

Cobalt is not on the list in the EU Regulation on conflict minerals. More than half of the cobalt on the world market is extracted in DRC under hazardous working conditions, where child labour is used, among other things[48][49]. This is why Nordic Ecolabelling has decided to include cobalt in this generation of the criteria.

There already exist several recognized due diligence programmes covering tin, tantalum, tungsten, gold and cobalt e.q. European Partnership of Responsible Minerals (EPRM[50]), Responsible Mineral Initiative (RMI[51]) and Responsible Cobalt Initiative (RCI)[52]. Several other initiatives to verify and trace minerals from mines through the supply chain is is described below.

The licensee's policy is an essential statement. It reflects the licensee´s commitment toward responsibly sourcing minerals and the expectations of their raw material suppliers regarding the use of these minerals.

Involvement in multi-company coordinated action 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.

As documentation for the requirement, the licensee shall describe their due diligence activities along the supply chain for the five minerals identified.

[44] The EU Regulation on Conflict Minerals solely comprises tin, tantalum, tungsten and gold.
[45] http://www.consilium.europa.eu/en/press/press-releases/2016/06/16/conflict-minerals/# (visited 10-10-2017).
[46] Jaekel, T. "Far From Reality: How the EU Falls Short in Preventing the Illicit Trade of Conflict Minerals", Swedwatch, 2016.
[47] http://www.swedwatch.org/wp-content/uploads/2017/07/swedwatch_annual_progress_report_2016.pdf (visited 10-10-2017).
[48] Amnesty International, "This Is What We Die For, Human Rights Abuses in the Democratic Republic of the Congo Power the Global Trade in Cobalt", 2016.
[49] Nordic Ecolabelling (2017): Report on mining and traceability.
[50] https://europeanpartnership-responsibleminerals.eu/ (visited august 2018)
[51] http://www.responsibleminerals initiative.org/ (visited august 2018)
[52] http://www.responsibleminerals initiative.org/emerging-risks/cobalt/ (visited august 2018)

Nordic Ecolabeling recommend that the supply chain policy for responsible minerals sourcing contains the following points:

- That suppliers neither directly nor indirectly finance armed groups in conflict-affected regions.
- That suppliers neither tolerate nor contribute to human rights abuses that include forced labor, child labor and environmental degradation. This point is also included in the requirement O8 (working conditions).
- A commitment to supporting responsible sourcing from those regions in which specific mining operations may present risk

Nordic Ecolabeling recommend that the describtion of the licensees structured work on identifying risk areas contains the following points:

- Identifying risk areas is a process that helps map the chain of custody of risk minerals down to the smelters and refiners within the supply chain. This is commonly done by a reporting template such as the "Conflict Mineral Reporting Template[53]" being systematically sent through the supply chain. This transfer of information facilitates the identification of high risk smelters and refiners.
- An list of smelters and refiners

There are a number of initiatives to verify and trace minerals from mines through the supply chain:

- The OECD Due Diligence Guidance for Responsible Supply Chains of Minerals from Conflict-Affected and High-Risk Areas[54] ("the Guidance"). Licence holders/brand owners require suppliers to disclose their sourcing origins for conflict minerals by using a questionnaire template such as the EICC "Conflict Minerals Reporting Template", or similar, in order to prevent the potential use of conflict minerals.
- iTSCi - ITRI[55] represent tin producers and smelters. This programme is a supply chain initiative to verify and trace minerals from the mine to the smelter (traceability tagging). Although full membership is focused on upstream companies (Mining, Smelters, etc), an associate membership for downstream companies exists (manufacturers, etc,). Associate members contribute to the financing of the iTSCi programme and thereby stay informed on initiative activities and specific mining sites, while also supporting the development in Africa.
- The Conflict-Free Tin Initiative (CFTI): sources conflict-free tin from the South Kivu province of DRC that implements the ITRI Tin Supply Chain Initiative (iTSCi), and the due diligence and traceability system.
- The Public-Private Alliance for Responsible Minerals Trade[56] (PPA) is a multi-sector and multi-stakeholder initiative that provides funding and support for systems that trace and certify mineral supply chains in the DRC and Great Lakes Region.

[53] OECD Due Diligence Guidance for Responsible Supply Chains of Minerals from Conflict-Affected and High-Risk Areas[53]
[54] http://www.oecd.org/corporate/mne/mining.htm (visited 04-04-2018)
[55] https://www.itri.co.uk/index.php?option=com_zoo&view=item&Itemid=191
[56] http://www.resolv.org/site-ppa/

- Other relevant in-region initiatives: initiatives not stated on the list, but which prove active commitment to an initiative aimed at increasing legitimately sourced minerals. Examples of other relevant initiatives:
    - Solutions for Hope (SfH); sources conflict-free tantalum from the Katanga province of DRC (incorporates the iTSCi process and CFS programme).
    - The Certified Trading Chains initiative (CTC) is a programme supported by the German government, which certifies mines to defined performance standards.
- Member of the EICC & GeSi Conflict-Free Sourcing Initiative (CFSI). Members contribute to a number of tools and resources, including the Conflict Minerals Reporting Template; supporting in-region sourcing schemes and the Conflict Free Smelter Programme (identification of Smelters and Refiners that source conflict-free minerals).

O7 Sourcing of critical raw materials

The licensee must have a policy for the use of raw materials included in the EU's newest list of critical raw materials[57] in batteries at the time of application. The EU 2017-list of critical raw materials can be found in appendix 7.

The policy must describe how the licensee works actively;

- To minimize and to phase out (in the long term) the use of critical raw materials in future.
- to recycle critical raw materials in the batteries.
- support recycling programs for collecting used batteries.

✉ The licensee must submit a written policy that describes how the licensee work actively to phase out/recycle any critical raw materials in batteries, support recycling programs for collecting used batteries and minimizes the use of critical raw materials in the future.

Background to requirement O7

This is a new requirement in generation 5 of the criteria. The European Commission has listed 27 critical raw materials (CRMs) that are considered to be critical to our society and for well-being[58] (see appendix 2 in this document). The critical raw materials are chosen according to two important criteria: economic importance and access. The 27 critical raw materials are listed in table 4 below.

Table 4: The European Commission´s list of critical raw materials (CRMs)

2017 CRMs			
Antimony	Fluorspar	LREEs*	Phosphorus
Baryte	Gallium	Magnesium	Scandium
Beryllium	Germanium	Natural graphite	Silicon metal
Bismuth	Hafnium	Natural rubber	Tantalum
Borate	Helium	Niobium	Tungsten
Cobalt	HREEs*	PGMs*	Vanadium
Coking coal	Indium	Phosphate rock	

[57] http://ec.europa.eu/growth/sectors/raw-materials/specific-interest/critical_en
[58] http://ec.europa.eu/growth/sectors/raw-materials/specific-interest/critical_en (visited 5/11-2017).

*HREEs=heavy rare earth elements, LREEs=light rare earth elements, PGMs=platinum group metals

The assessment made by the EU shows that China is the most influential country in terms of global access to the 17 critical materials. The map below shows where in the world the 27 critical materials on the EU CRM list are available.

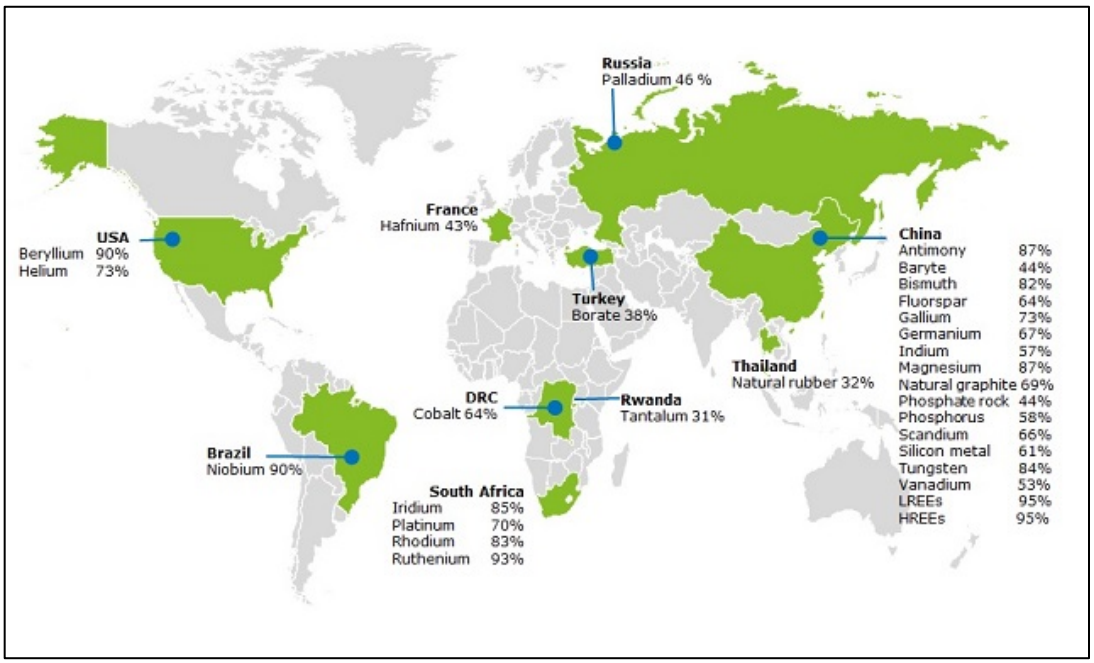

Figure 1: The major producers of the twenty EU-critical raw materials.

The economic aspects force battery producers to look for new chemical compounds, developing alternative battery technologies. The main reasons for this are: 1) to meet customers' expectations in terms of higher energy capacity and faster charging; and 2) to make the battery cheaper. Several of the 27 critical materials included on the EU list have e.g. very good conductive properties, supporting the customer's expectations in terms of a higher energy capacity. Cobalt, for example, is mainly used in Lithium-ion batteries for portable consumer electronics. Indium and platinum group metals (rare earths metals) is another example of critical raw materials being used in primary batteries.

The market shows signs of gradually eliminating cobalt from cathode chemistries (to substitute cobalt in the battery content with nickel, manganese, and other materials[59]). Cobalt is the main contributor to the Li-ion battery price. Lithium is not among the 27 critical materials on the EU's list, but even this raw material is sourced from a narrow circle of areas: around 75% of lithium comes from the "Lithium Triangle": Argentina, Chile and Bolivia[60].

[59] Dmytro Kapotia: Ecolabelling Criteria development for rechargeable batteries in ICT products – Justifying a new generation of requirements to batteries based on state of the art in the sector, IIIEE Theses 2017:21.
[60] Nordic Ecolabelling (2017): Report on mining and traceability.

The list of raw materials produced by EU is based on the entire European market, not just the market for batteries. Therefore, some of the materials is not relevant for today's battery production, but it might change in the future. Nordic Ecolabel is aware that is not easy, simple or realistic to phase out some of the listed critical material in the nearest future. Therefore, the requirement is focusing on the license holder to address the concerns regarding the use of critical raw materials now and in the future. In order to do so, the licensee must submit a written policy that describes how the licensee works actively:

- To minimize and to phase out (in the long term) the use of critical raw materials in future.
- to recycle any critical raw materials in the batteries.
- support recycling programs for collecting used batteries.

The list of critical raw materials is continuously updated by EU. The newest list given by the EU commission is published 2017 and shown in appendix 7 in the criteria. The licensee must relate to EU's newest list of critical raw materials, at the time of application.

O8 Working conditions

The licensee must have a written Code of Conduct that explains how the licensee ensures compliance with the following UN conventions and the UN Global Compact at component and battery suppliers:

- The UN Convention on the Rights of the Child, Article 32.
- The UN Declaration (61/295) on the Rights of Indigenous Peoples.

The UN's: Global Compact[61], which comprises the following ten principles:

- Principle 1: Businesses should support and respect the protection of internationally proclaimed human rights.
- Principle 2: Make sure that they are not complicit in human rights abuses.
- Principle 3: Businesses should uphold the freedom of association and the effective recognition of the right to collective bargaining (ILO Conventions 87 and 98).
- Principle 4: The elimination of all forms of forced and compulsory labour; (ILO Conventions 29 and 105).
- Principle 5: The effective abolition of child labour (ILO Conventions 138 and 182).
- Principle 6: the elimination of discrimination in respect of employment and occupation (ILO Conventions 100 and 111).
- Principle 7: Businesses should support a precautionary approach to environmental challenges.
- Principle 8: Undertake initiatives to promote greater environmental responsibility.
- Principle 9: Encourage the development and diffusion of environmentally friendly technologies.
- Principle 10: Businesses should work against corruption in all its forms, including extortion and bribery.

The licensee must ensure that all suppliers are familiar with and comply with the Code of Conduct.

[61] http://www.unglobalcompact.org

If components and/or batteries are produced in countries in which these conventions are incorporated as part of the requirements of the authorities, no further documentation will be required beyond the signed application form for a licence for Nordic Ecolabelling.

✉ Licensees must submit a written Code of Conduct that explains how the licensee ensures that its suppliers comply with the requirements of the UN conventions and the UN Global Compact.

✉ A description of how the licensee's Code of Conduct is communicated to all of its suppliers.

Background to requirement O8

The requirement concerning working conditions has been amended slightly, compared with generation 4. Generation 4 of the criteria required licensees to have a plan in place for compliance with the UN Global Compact[62], of which the aim is to lay down international principles for human rights, labour, the environment and anti-corruption. Nordic Ecolabelling has adopted a common 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.

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.

5.6 Electrical testing

O9 Electrical testing

Minimum average duration (MAD)

The test conditions under which the batteries are tested must be in accordance with IEC 60086-1:2015.

This requirement encompasses the testing of the operating time in various applications depending on the type of battery; see Table 5-9 below. The tables uses the designations in IEC 60086-2:2015.

Each test includes at least eight batteries per size and model, and all eight must meet the requirements.

The battery must meet the minimum permitted operation time specified in Table 5-9 for the specific battery dimension.

[62] http://www.unglobalcompact.org

The battery must meet the test requirement for all applications specified in Table 5-9 for the specific battery dimension. E.g., battery dimension LR20 must meet the test requirements for all three test specified in Table 5 in order to be approved.

Button cells and all other types of batteries with dimensions that do not match those specified in Table 5–9, including specially designed batteries, are subject to the following requirement:

If the battery in question is found in the standard IEC 60086-2:2015, the battery must be tested in accordance with the standard, and the test result must show that the battery is minimum 50% better than the operation time specified in the standard (MAD).

In the case of batteries of type and sizes not found in IEC 60086-2:2015: contact Nordic Ecolabelling. Nordic Ecolabelling will conduct an internal assessment of the operation time requirements that should be applicable with respect to such battery.

In the case of batteries with a different chemical composition than alkaline, but of the same size as the batteries specified in Table 5-9, the requirement in Table 5–9 applicable to the relevant battery dimension must be met.

Table 5: Household batteries, dimension LR20

Battery dimension	Application	Load	Daily period	EV (V)	Minimum permitted operating time
LR20	Portable lighting	2,2 Ω	4 min on, 11 min off for 8 h per day	0,9	19,5 h
LR20	Toy	2,2 Ω	1 h	0,8	24 h
LR20	Portable stereo	Current drain 600 mA	2 h	0,9	17 h

Table 6: Household batteries, dimension LR14

Battery dimension	Application	Load	Daily period	EV (V)	Minimum permitted operating time
LR14	Toy	3,9 Ω	1 h	0,8	21 h
LR14	Portable lighting	3,9 Ω	4 min on, 11 min off for 8 h per day	0,9	19 h
LR14	Portable stereo	Current drain 400 mA	2 h	0,9	13 h

Table 7: Household batteries, dimension LR6

Battery dimension	Application	Load	Daily period	EV (V)	Minimum permitted operating time
LR6	Digital still camera	1500 mW 650 mW	*	1,05	70 pulses
LR6	Portable lighting	3,9 Ω	4 min on, 56 min off for 8 h per day	0,9	370 min
LR6	Motor/toy	3,9 Ω	1 h	0,8	7,5 h
LR6	Toy, non-motorized	250 mA	1 h	0,9	8 h

LR6	CD, digital audio, wireless gaming and accessories	100 mA	1 h	0,9	24 h
LR6	Radio/clock/remote control	50 mA	1 h on, 7 h off for 24 h per day	1,0	47,5 h
*According to part 6.1.4 in IEC 60086-2:2015					

Table 8: Household batteries, dimension LR03

Battery dimension	Application	Load	Daily period	EV (V)	Minimum permitted operating time
LR03	Portable lighting	5,1 Ω	4 min on, 56 min off for 8 h per day	0,9	3,5 h
LR03	Toy	5,1 Ω	1 h	0,8	190 min
LR03	Digital audio	50 mA	1 h on, 11 hr off for 24 h	0,9	19 h
LR03	Remote control	24 Ω	15 s per min 8 h per day	1,0	21 h

Table 9: Household batteries, dimension 6LR61/LF22

Battery dimension	Application	Load	Daily period	EV (V)	Minimum permitted operating time
6LR61	Toy	270 Ω	1 h	5,4	21 h
6LR61	Clock radio	620 Ω	2 h	5,4	47 h
6LR61	Smoke detector*	Background: 10 kΩ Pulse: 0,62 kΩ	1 s on, 3599 s off for 24 h day*	7,5	20 days
*According to part 6.6.8 in IEC 60086-2:2015					

Leakage

During testing, no leakage may occur.

The requirements concerning test laboratories and test instructions for operation time (MAD) and leakage are stated in Appendix 6.

✉ Complete test report, including information that the batteries have been tested in accordance with IEC 60086-1:2015 and that no leakage has occurred during testing.

✉ Documentation showing that the test laboratory fulfil the requirements stated in Appendix 6. Independent competent third party must confirm that the testing has been carried out in line with the requirement.

Background to O9

The requirement of electrical testing has been adjusted in generation 5 of the criteria, and a new requirement of leakage during testing has been added to the requirement.

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 primary batteries results in potential resource savings and decreasing waste[63].

The requirement for test of minimum average duration (MAD) has been adjusted according to IEC 60086-1:2015 and IEC 60086-2:2015 compared to generation 4. The test conditions under which the batteries are tested must be in accordance with IEC 60086-1:2015.

The requirement to test of minimum average duration has been adjusted both regarding the test requirement for applications and regarding the minimum permitted operation time. The battery must meet the test requirement for all applications specified in Table 5-9 for the specific battery dimension. E.g., battery dimension LR20 must meet the test requirements for all three test specified in Table 5 in order to be approved. The selected applications correspond to the application specified in IEC 60086-2:2015. The specific requirement to photo batteries has been removed in generation 5 due to the removal of the test-application for photoflash regarding LR6 and LR03 batteries in the standard.

The requirement to the minimum permitted operation time has been adjusted according to test-data from existing licensees, external battery test[64] and feedback received during the public consultation for generation 5. Both test-data from existing licensees and the external battery tests shows that there is a potential to tighten the requirement to minimum permitted operation time compared to the requirement levels in IEC 60086-2:2015 for all battery types. The requirement to MAD for the types of batteries has been adjusted the following requirement levels compared to IEC 60086-2:2015 listed in the table below.

Table 10: Requirement to MAD compared to the specific MAD-requirement in IEC 60086-2:2015 for different battery dimension

Battery dimension	Application	The requirements, compared to the specific MAD-requirement in IEC 60086-2:2015
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%

[63] 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).
[64] https://www.altomdata.dk/aa-batterier-test-kaempe-forskel/2 and https://www.radron.se/tester/boende-tradgard--husdjur/batterier-aaa/ (visited November 2017)

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 60086-2:2015, 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 Table 5-9, the requirement in Table 5–9 applicable to the relevant battery dimension must be met.

In the case of batteries of type and sizes not found in IEC 60086-2:2015: contact Nordic Ecolabelling. Nordic Ecolabelling will conduct an internal assessment of the operation time requirements that should be applicable with respect to such battery.

A new requirement has been added that no leakage may occur during testing. This requirement is the same as in the Korean Eco-label standard (EL764:2012) for rechargeable batteries[65] 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-2:2015. 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.

O10 Delayed discharge performance (shelf life)

The battery must achieve a delayed discharge performance after 12 month, or 13 weeks when using the high temperature test, of minimum 90% of the specific MAD limit listed in requirement O9 for each battery dimension and applications.

The test conditions under which the batteries are tested must be in accordance with IEC 60086-1:2015.

Each test includes at least eight batteries per size and model, and all eight must meet the requirements.

In case the manufacturer of the battery or licensee has not had time to performe 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.

The requirements concerning test laboratories are stated in Appendix 6.

✉ Complete test report.
✉ Documentation showing that the test laboratory fulfil the requirements stated in Appendix 6. Independent competent third party must confirm that the testing has been carried out in line with the requirement.
✉ In case of no test at the time of application: The licensee must present a specific plan for performing delayed discharge performance tests for the relevant battery/ies. When the test is completed it must be sent to Nordic Swan Ecobelling.

[65] http://el.keiti.re.kr/enservice/enindex.do (visited 6/11-2017).

Background to O10

The new requirement for delayed discharge performance ensures that the battery holds a high operation time even after 12 month 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 13 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 60086-1:2015. 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 test specified in Table 5 in requirement 09.

The requirement for delayed discharge performance must be documented with a complete test report according to IEC 60086-1:2015. 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 performe 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.

5.7 Safety

O11 Lithium batteries, safety

Lithium batteries must fulfil the testing requirements in IEC 60086-4.

The requirements concerning test laboratories are stated in Appendix 6.

✉ Complete test report.
✉ Documentation showing that the test laboratory fulfil the requirements stated in Appendix 6.

Background to O11

This requirement has been adjusted slightly in generation 5 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”.

5.8 Waste plan

O12 Waste sorting in the production process

A waste plan for sorting waste generated in the production process must be submitted. The waste plan must as a minimum contain the following:

- Overview of all waste fractions occurring in production. (The waste plan must specify discarded batteries and discarded semi-manufactured batteries.)
- Description of how waste is handled during the production process and after delivery (landfill, incineration, treatment, material recycling…)
- Name and address of the business/organisation(s)/authority (authorities) that collect/receive the waste.

Discarded batteries and discarded semi-manufactured batteries* must be collected and sent for recycling. Documentation must be submitted in the form of a declaration from the collector/recipient confirming that these batteries/semi-manufactured batteries have been sent for material recycling.

**In case of specific national regulatory requirements that prohibit companies to recycle discharged batteries/discharged semi-manufactured partial batteries (i.e. unsealed cans), the licensee must:*

- describe and document the national regulatory requirements for recycling of discharged semi-manufactured partial batteries

- describe how they handle discarded semi-manufactured partial batteries

☒ Waste plan as described in the requirement.
☒ Declaration from collector/recipient of discarded batteries and discarded semi-manufactured batteries confirming that they are sent for material recycling.

✉ In case of specific national regulatory requirments for recycling of discarded batteries, the licesess must: a) describe and document the national regulatory requirements for recycling of discharged semi-manufactured partial batteries and b) describe how they handle discarded semi-manufactured partial batteries.

Background to O12

The requirement to waste sorting in the production process remains unchanged in generation 5 of the criteria. However, some clarifications concerning country regulatory requirments regardin recycling of partial batteries have been made.

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.

5.9 Requirements of the authorities and quality requirements

To ensure that Nordic Ecolabelling requirements are fulfilled, the following procedures must be implemented.

O13 Responsible person and organisation

The company shall appoint individuals who are responsible for ensuring the fulfilment of the Nordic Ecolabelling requirements, for marketing and for finance, as well as a contact person for communication with Nordic Ecolabelling.

✉ Organisational chart showing who is responsible for the above.

O14 Documentation

The licensee must archive the documentation that is sent in with the application, or in a similar way maintain information in the Nordic Ecolabelling data system.

🔑 To be checked on site as necessary.

O15 Quality of primary batteries

The licensee must guarantee that the quality of the Nordic Swan Ecolabelled product does not deteriorate during the term of validity of the licence.

✉ Procedures for archiving claims and, where necessary, dealing with claims and complaints regarding the quality of the Nordic Swan Ecolabelled primary batteries.

🔑 The claims archive is checked on site.

O16 Planned changes

Written notice must be given to Nordic Ecolabelling of planned changes in products and markets that have a bearing on Nordic Ecolabelling requirements.

✉ Procedures detailing how planned changes in products and markets are handled.

O17 Unplanned nonconformities

Unplanned nonconformities that have a bearing on Nordic Ecolabelling requirements must be reported to Nordic Ecolabelling in writing and journalised.

✉ Procedures detailing how unplanned nonconformities are handled.

O18 Traceability

The licensee must be able to trace the Nordic Swan Ecolabelled primary batteries in production.

✉ Description of/procedures for the fulfilment of the requirement.

O19 Legislation and regulations

The licensee shall ensure compliance with all applicable local laws and provisions at all production facilities for the Nordic Swan Ecolabelled product, e.g. with regard to safety, the working environment, environmental legislation and site-specific terms/permits.

✉ Duly signed application form.

Background to the requirements

Requirements O13 to O19 are general quality assurance requirements to ensure that the Nordic Swan Ecolabelled products fulfil the requirements and comply with legislation and regulations, so that the products maintain the environmental quality which is the purpose of the requirements. Most of these requirements are general and apply to all production of ecolabelled products. Individual requirements are not justified in greater detail here.

6 Changes compared to the previous version

The following are the key amendments compared with the previous generation 4 (table 11).

Table 11: Key amendments compared with the previous generation 4.

Proposed requirement generation 5	Requirement generation 4	Same requirement	Change	New requirement	Comment
Products that may be Nordic Swan Ecolabelled	Products that may be Nordic Swan Ecolabelled	*			The product definition is the same.
O1	O1		*		Description of the product has been slightly adjusted.
O2	O2	*			The requirement to metal content of batteries is the same.
O3				*	New requirement: PVC must not be used in primary batteries.
O4	O3 and O4		*	*	The requirements for packaging has been adjusted.

					Both pre- and post-consumer recycled material applies to the minimum 80% by weight of the primary packaging. New requirement: The battery label must not contain PVC or other halogenated organic compounds.
O5	O7		*	*	The requirement for consumer information has been adjusted. New: Batteries must also be marked in accordance with EN 60086 and “date of manufacture of the batteries” or “best before” must be clearly stated on the primary packaging.
O6				*	New requirement: sourcing of conflict-free minerals.
O7				*	New requirement: sourcing of critical raw materials.
O8	O8		*		The requirement concerning working conditions has been amended slightly to also include the UN convention (art 32) and declaration (61/295).
O9	09		*	*	The batteries has to be tested to several applications according to IEC 60086-2. The requirement to MAD has been tightened. During testing, no leakage may occur.
O10				*	New requirement: delayed discharge performance (shelf life)
O11	O6		*		Lithium batteries must fulfil the testing requirements in IEC 60086-4.
O12	05	*	*		Waste sorting in the production process. Some clarifications concerning country regulatory requirments regardin recycling of partial batteries have been made.

Terms and definitions

Term	Explanation or definition
Button cell	Button cell means any small round portable battery or accumulator whose diameter is greater than its height and which is used for special purposes such as hearing aids, watches, small portable equipment and back-up power.
Conflict-affected and high-risk areas	Areas in a state of armed conflict, fragile post-conflict areas, as well as areas witnessing weak or non-existing governance and security, such as failed states. In these areas, there are often widespread and systematic violations of international law, including human rights abuses.
DoD	Depth of Discharge.
High, medium or low energy drain level	High energy drain is >500 milliamperes. Medium energy drain is >100<500 milliamperes. Low energy drain is <100 milliamperes.
Li-ion	Lithium-ion.
mAh or Ah	Milliamp hours or amp hours: the amount of power expected over time. The higher the number, the greater the capacity. This is the electrical charge (current) that passes through a specific circuit in one hour.
MAD	Minimum Average Duration.
OECD Due Diligence Guidance for Responsible Supply Chains of Minerals from Conflict-Affected and High-Risk Areas	For more information: http://www.oecd.org/corporate/mne/mining.htm
PVC	PolyVinyl Chloride
Pre- and post-consumer material	Pre- and post-consumer defined in accordance with ISO 14021: Pre-consumer: Material diverted from the waste stream during a manufacturing process. Excluded is reutilization of materials such as rework, regrind or scrap generated in a process and capable of being reclaimed within the same process that generated it. Post-consumer/commercial: Material created by households or commercial, industrial or institutional facilities in the role of end users of a product which can no longer be used for the intended purpose. This includes return of material from the distribution chain.
Primary packaging	Refers to the purchase packaging for the consumer, e.g. the packaging that holds 4 batteries or one portable charger, and what the consumer encounters in sales.
Secondary packaging	Refers to the transport packaging and protects the packs of batteries and portable chargers during transport to stores and consumers.
WEEE	Waste Electrical and Electronic Equipment

Appendix 1 European legislation

Directive 2002/96/EC on Waste Electrical and Electronic Equipment (WEEE) was recast on 24 July 2012 as Directive 2012/19/EU[66]

The Directive implements the principle of "extended producer responsibility" whereby electrical and electronic product manufacturers are responsible for the costs of collection, treatment, recovery and disposal of their own products, and hence for preventing such object products from entering municipal waste collection systems.

Furthermore, the Directive states that member states should encourage the design and production of electrical and electronic equipment that facilitates reuse, recycling and other forms of recovery of such waste in order to reduce it. Producers should not, through specific design features or manufacturing processes, prevent WEEE from being reused, unless such specific design features or manufacturing processes present overriding advantages, for example with regard to the protection of the environment and/or safety requirements.

The WEEE Directive applies to all electrical and electronic equipment, as listed in the categories below, which is dependent on electrical current or electromagnetic fields in order to work properly, and equipment for the generation, transfer and measurement of such currents and fields, designed for use with a voltage rating not exceeding 1000V for AC and 1500V for DC, provided that the equipment concerned is not part of another type of equipment that does not fall within the scope of the Directive (Annex I (covering the period from 14 August 2012 to 14 August 2018, of the WEEE Directive)):

- Large household appliances
- Small household appliances
- IT and telecommunications equipment
- Consumer equipment
- Lighting equipment
- Electrical and electronic tools (with the exception of large-scale stationary industrial tools)
- Toys, leisure and sports equipment
- Medical devices (with the exception of all implanted and infected products)
- Monitoring and control instruments
- Automatic dispensers

From 15 August 2018, the WEEE Directive will apply to products covered by the categories outlined in Annex III of the Directive:

- Temperature exchange equipment
- Screens, monitors, and equipment containing screens having a surface greater than 100 cm^2
- Lamps

[66] http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2012:197:0038:0071:en:PDF

- Large equipment (any external dimension greater than 50 cm), including, but not limited to:

  Household appliances; IT and telecommunication equipment; consumer equipment; luminaires; equipment reproducing sound or images, musical equipment; electrical and electronic tools; toys, leisure and sports equipment; medical devices; monitoring and control instruments; automatic dispensers; equipment for the generation of electrical currents. This category does not include equipment included in categories 1 to 3.

- Small equipment (no external dimension greater than 50 cm), including, but not limited to:

  Household appliances; consumer equipment; luminaires; equipment reproducing sound or images, musical equipment; electrical and electronic tools; toys, leisure and sports equipment; medical devices; monitoring and control instruments; automatic dispensers; equipment for the generation of electric currents. This category does not include the equipment included in categories 1 to 3 and 6.

- Small IT and telecommunication equipment (no external dimension greater than 50 cm).

Directive 2002/95/EC on Restrictions of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment[67] (RoHS)

This Directive restricts the use of hazardous substances in electrical and electronic equipment, for the protection of human health. As from 1 July 2006, new products should not contain lead, mercury, cadmium, hexavalent chromium, polybrominated biphenyls (PBBs) and polybrominated diphenyl ethers (PBDEs)[68]. This Directive covers electrical and electronic equipment as defined in the WEEE Directive. There are exemptions for some of these materials when used in certain products.

Batteries used within portable chargers are classed as hazardous waste[69].

1.4.1.3 Directive 2006/66/EC on batteries and accumulators and waste batteries and accumulators[70]

The Directive aims to reduce the impact on the environment of the manufacture, distribution, use, disposal and recovery of batteries (primary-single use, and secondary battery cells which are rechargeable, accumulators). The Directive introduces measures to prohibit the marketing of some batteries containing hazardous substances. It contains measures for establishing schemes aiming at a high level of collection and recycling of batteries with quantified collection and recycling targets.

67 http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2009:201:0054:0057:EN:PDF
68 http://ec.europa.eu/environment/waste/rohs_eee/events_rohs1_en.htm
69 http://www.greenit.net/downloads/GreenIT-EnvIssues-Batteries.pdf
70 http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2006:266:0001:0014:en:PDF

The Directive sets out minimum rules for producer responsibility and provisions with regard to the labelling of batteries and their removability from equipment.

The EU Battery Directive is under revision[71]. Continuously. The task is to minimise waste and to maintain material flows within the economy for as long as possible, in order to achieve economic, social and environmental benefits. Of special interest is finding economic and strategic incentives for material recovery. Preliminary Recommendations from the working group so far:

- Definitions of Portable/Automotive/Industrial: no change.
- Definitions of Re-use and Second use: to be added, explaining the impact on Extended Producer Responsibility (EPR) and definition of "producer".
- Placing on the Market (POM) definition/ harmonisation in transposition
- If needed, replace calculation for collection rate by "available for collection".
- Recycling efficiency: no change.
- Reporting (general): keep it simple, harmonise, improve data quality.
- Quality treatment of waste batteries in the event of export: "equivalent conditions" allowing the export of waste batteries as described in a certification scheme.
- Labelling and marking: coordination with the IEC standard is ongoing.

Registration, Evaluation, Authorisation and Restriction of Chemical substances (REACH) Regulation (EC) 1907/2006[72]

The REACH Regulation came into force on 1 June 2007 and deals with the Registration, Evaluation, Authorisation and restriction of Chemical substances. The aim of REACH is to improve the protection of human health and the environment through better and earlier identification of the intrinsic properties of chemical substances. At the same time, REACH aims to enhance the innovation and competitiveness of the EU chemicals industry.

REACH was introduced because many thousands of chemicals are used in the EU, some in very large quantities, but the risks to human health and to the environment from many of these are not widely understood. REACH addresses this by making manufacturers and importers of chemicals responsible for producing data to define the hazards and risks from around 30,000 substances that are manufactured or imported in quantities of one tonne or more per year within the EU[73].

Manufacturers are required to register the details of the properties of their chemical substances on a central database, which is run by the European Chemicals Agency in Helsinki. The Regulation also requires the most dangerous chemicals to be progressively replaced as suitable alternatives are developed.

[71] http://www.prba.org/wp-content/uploads/9.1-EU-Batteries-Directive-Review.pdf (visited 2/5-2017)
72 http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=oj:l:2006:396:0001:0849:en:pdf
[73] http://www.element14.com/community/community/legislation/reach?CMP=KNC-EULEGREACH&s_kwcid=TC|21070|reach%20regulation||S||8299726988

Appendix 2 List of critical raw materials[74]

Raw materials	Main global producers (average 2010-2014)	Main importers to the EU (average 2010-2014)	Import reliance rate*	Substitution indexes EI/SR**	End-of-life recycling input rate***
Antimony	China 87% Vietnam 11%	China 90% Vietnam 4%	100%	0.91/0,93	28%
Baryte	China 44% India 18% Morocco 10%	China 53% Morocco 37% Turkey 7%	80%	0,93/0,94	1%
Beryllium	USA 90% China 8%	n/a	n/a[75]	0.99/0,99	0%
Bismuth	China 82% Mexico 11% Japan 7%	China 84%	100%	0,96/0,94	1%
Borate	Turkey 38% USA 23% Argentina 12%	Turkey 98%	100%	1,0/1,0	0%
Cobalt	DRC 64% China 5% Canada 5%	Russia 91% DRC 7%	32%	1,0/1,0	0%
Coking coal	China 54% Australia 15% USA 7% Russia 7%	USA 39% Australia 36% Russia 9% Canada 8%	63%	0,92/0,92	0%
Fluorspar (Fluorite)	China 64% Mexico 16% Mongolia 5%	Mexico 38% China 17% South Africa 15% Namibia 12% Kenya 9%	70%	0.98/0,97	1%
Gallium[76]	China 85% Germany 7% Kazakhstan 5%	China 83% USA 11% Ukraine 9% South Korea 8%	34%	0,95/0,96	0%
Germanium	China 67% Finland 11% Canada 9% USA 9%	Chine 60% Russia 17% USA 16%	64%	1,0/1,0	2%
Hafnium	France 43% USA 41% Ukraine 8% Russia 8%	Canada 67% China 33%	9%	0,93/0,97	1%
Helium	USA 73% Qatar 12% Algeria 10%	USA 53% Algeria 29% Qatar 8% Russia 8%	96%	0,94/0,96	1%

[74] EU list of 27 CRMs was published in the communication on the list of critical raw materials 2017: http://ec.europa.eu/growth/sectors/raw-materials/specific-interest/critical_en
[75] The EU import reliance cannot be calculated for the beryllium, as there is no production and trade for beryllium ores and concentrates in the EU.
[76] Gallium is a by-product; the best available data refer to production capacity, not to production as such.

Indium	China 57% South Korea 15% Japan 10%	China 41% Kazakhstan 19% South Korea11% Hong Kong 8%	0%	0,94/0,97	0%
Magnesium	China 87% USA 5%	China 94%	100%	0,91/0,91	9%
Natural graphite	China 69% India 12% Brazil 8%	China 63% Brazil 13% Norway 7%	99%	0,95/0,97	3%
Natural rubber	Thailand 32% Indonesia 26% Vietnam 8% India 8%	Indonesia 32% Malaysia 20% Thailand 17% Ivory Coast 12%	100%	0,92/0,92	1%
Niobium	Brazil 90% Canada 10%	Brazil 71% Canada 13%	100%	0,91/0,94	0,3%
Phosphate rock	China 44% Morocco 13% USA 13%	Morocco 31% Russia 18% Syria 12% Algeria 12%	88%	1,0/1,0	17%
Phosphorus	China 58% Vietnam 19% Kazakhstan 13% USA 11%	Kazakhstan 77% China 14% Vietnam 8%	100%	0,91/0,91	0%
Scandium	China 66% Russia 26% Ukraine 7%	Russia 67% Kazakhstan 33%	100%	0,91/0,95	0%
Silicon metal	China 61% Brazil 9% Norway 7% USA 6% France 5%	Norway 35% Brazil 18% China 18%	64%	0,99/0,99	0%
Tantalum[77]	Rwanda 31% DRC 19% Brazil 14%	Nigeria 81% Rwanda 14% China 5%	100%	0,94/0,95	1%
Tungsten[78]	China 84% Russia 4%	Russia 84% Bolivia 5% Vietnam 5%	44%	0,94/0,97	42%
Vanadium	China 53% South Africa 25% Russia 20%	Russia 71% China 13% South Africa	84%	0,91/0,94	44%

[77] Tantalum is covered by the Conflict Minerals Regulation (Regulation (EU) 2017/821) establishing a Union system for supply chain due diligence to curtail opportunities for armed groups and security forces to trade in tin, tantalum and tungsten, and their ores, and gold.
[78] Tungsten is covered by the Conflict Minerals Regulation (Regulation (EU) 2017/821) establishing a Union system for supply chain due diligence to curtail opportunities for armed groups and security forces to trade in tin, tantalum and tungsten, and their ores, and gold.

Platinum Group Metals	South Africa 83% -Iridium, platinum, rhodium, ruthenium	Switzerland 34%	99,6%	0,93/0,98	14%
		South Africa 31%			
	Russia 46% -palladium	USA 21%			
		Russia 8%			
Heavy Rare Earth Elements	China 95%	China 40% USA 34% Russia 25%	100%	0,96/0,89	8%
Light Rare Earth Elements	China 95%	China 40% USA 34% Russia 25%	100%	0,90/0,93	3%