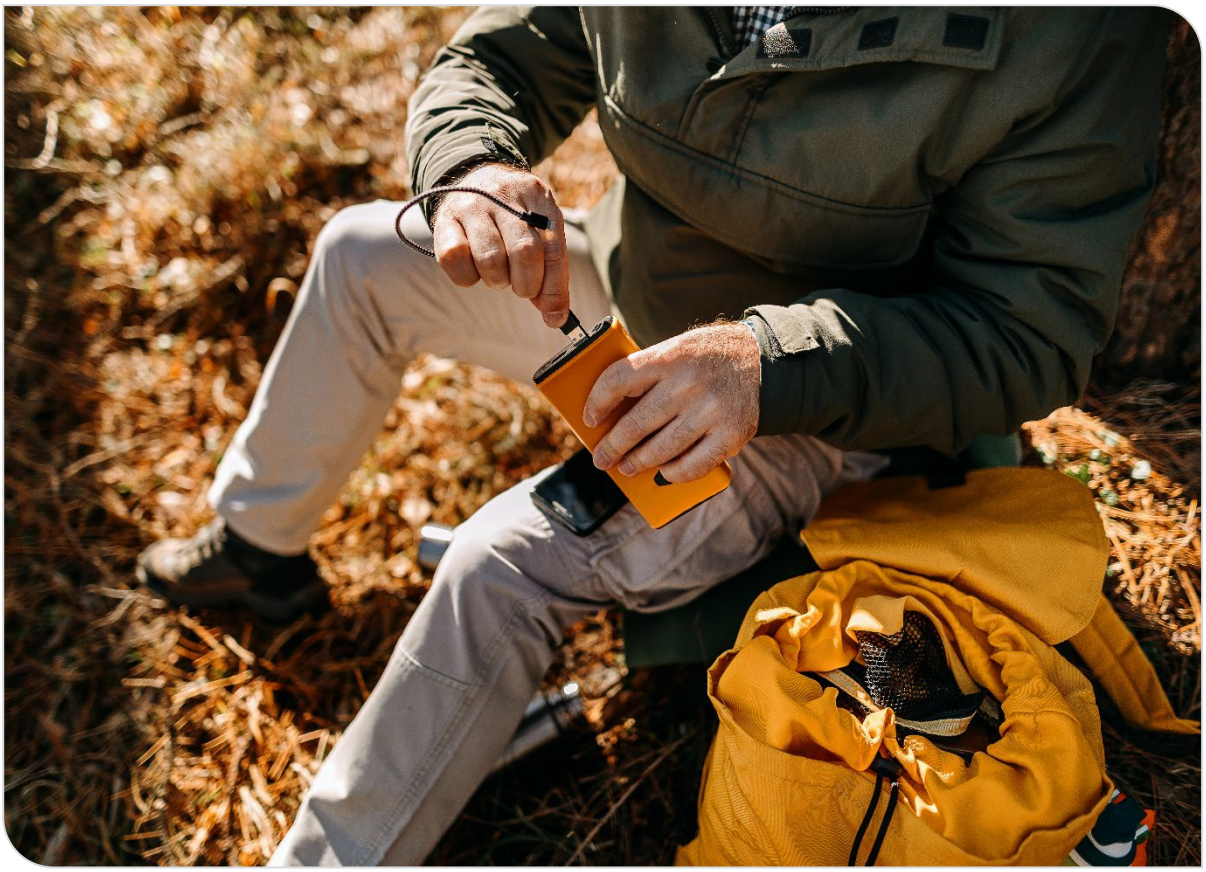
Nordic Ecolabelling for

Rechargeable batteries and power banks



Version 6.0 • date – date

CONSULTATION

Nordic Ecolabelling

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Contact information

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

Denmark

Ecolabelling Denmark

www.svanemaerket.dk

Iceland

Ecolabelling Iceland

www.svanurinn.is

Finland

Ecolabelling Finland

www.joutsenmerkki.fi

Norway

Ecolabelling Norway

www.svanemerket.no

Sweden

Ecolabelling Sweden

www.svanen.se

1 Environmental communication guideline for Nordic Swan Ecolabel rechargeable batteries and power banks

Nordic Swan Ecolabel rechargeable batteries and power banks have a reduced environmental impact. They meet strict requirements for responsible sourcing, raw materials, quality and recycled content.

Nordic Swan Ecolabel rechargeable batteries and power banks:

- Contain responsibly sourced mineral raw materials.
- Are produced by manufacturers that actively address social and environmental risks associated with the sourcing, processing, and trading of these materials throughout the entire supply chain.
- Meet much stricter requirements than standard regulations for both battery capacity and durability, ensuring a longer battery lifetime.
- Contain lower levels of mercury, cadmium and lead than permitted by legislation, thereby reducing the spread and use of harmful metals.
- Consist of a minimum of 22% recycled content to promote a circular economy.
- Meet strict requirements regarding chemicals harmful to the environment and human health, including a ban on added PFAS.
- Have plastics and metal casings that meet strict requirements regarding PVC, flame retardants, and metal types.
- Promote a circular economy by ensuring that power banks are designed for easy disassembly and material recovery.

Why choose the Nordic Swan Ecolabel?

- The manufacturer of rechargeable batteries and power banks 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.
- The Nordic Swan Ecolabel is a cost-effective and simple way of communicating environmental work and commitment to customers and suppliers.
- Reducing environmental impact often creates scope for lowering costs, such as reducing the energy use.
- Environmentally suitable operations prepare the manufacturer for potential future environmental legislation.
- Environmental issues are complex. It can take a long time and extensive resources to gain an understanding of a specific area. Nordic Ecolabelling can be seen as aid in this work.
- 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.

2 What can carry the Nordic Swan Ecolabel?

The product group comprises the following products:

Portable rechargeable batteries

Portable batteries that are rechargeable in accordance with the definition provided in the European Union's Battery Regulation (EU) 2023/1542[1]. This can include for example single cell nickel-metal hydride (AA/AAA/C/D/F/9V), lithium-ion batteries, and light means of transport (LMT) batteries.

LMT batteries are rechargeable batteries designed to provide power for the traction of light vehicles like e-bike and e-scooters. The batteries weigh 25 kg or less and are a specific category under the Regulation (EU) 23/1542.

Rechargeable batteries sold together with, or as accessories/parts for, electrical appliances, e.g. cordless power tools, cameras and e-bikes, can also be Nordic Swan Ecolabel. However, the battery must be designed to be replaced and charged in a separate charger. It is only the battery that can uphold the Nordic Swan Ecolabel, not the full product such as the whole power tool, camera or e-bike. The Nordic Swan Ecolabel cannot be used on the packaging of the combination products (e.g. power tool + batteries).

Rechargeable batteries sold in combination packs with external battery chargers are also eligible for a Nordic Swan Ecolabel. It must be made clear to the purchaser of combination packs of this type that the Nordic Swan Ecolabel applies solely to the batteries and not to the charger, or to other elements of the package.

Power banks

A power bank is defined as any portable energy-storage device/unit containing secondary batteries (typically lithium-ion) with charging circuitry, and which is used to charge portable consumer electronic devices via DC output. Power banks with built-in solar panels can also be Nordic Swan Ecolabel.

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

- Car batteries and industrial batteries.
- Non-rechargeable portable 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. Power banks (portable power banks) are exempt from this.
- Batteries that are built into or form a permanent part of electronic products and where the entire product is placed in a charger e.g. an electric toothbrush.
- Chargers sold for rechargeable batteries alone, products with AC input, products with jump starter functions, higher-capacity power packs intended for charging high-power industrial devices, and Uninterruptible Power Supply (UPS) systems.
- Rechargeable buttoncell lithuim-ion batteries.

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

2.1 Justification of the product group definition

For a description of the product group definition, see “What can carry the Nordic Swan Ecolabel”.

In generation 6, the product group definition for rechargeable portable batteries has been updated accordance to the definition provided in the European Union’s Battery Regulation (EU) 2023/1542:

> *‘portable battery’ means a battery that is sealed, weighs 5 kg or less, is not designed specifically for industrial use and is neither an electric vehicle battery, an LMT battery, nor an SLI battery.*
> *‘portable battery of general use’ means a portable battery, whether or not rechargeable, that is specifically designed to be interoperable and that has one of the following common formats 4,5 Volts (3R12), button cell, D, C, AA, AAA, AAAA, A23, 9 Volts (PP3);*

In generation 5, the product group was expanded with batteries for light means of transport, for example batteries used in e-scooters or e-bikes. In generation 6, the definition has been updated in accordance with the definition provided in the European Union’s Battery Regulation (EU) 2023/1542:

> *‘light means of transport battery’ or ‘LMT battery’ means a battery that is sealed, weighs 25 kg or less and is specifically designed to provide electric power for the traction of wheeled vehicles that can be powered by an electric motor alone or by a combination of motor and human power, including type-approved vehicles of category L within the meaning of Regulation (EU) No 168/2013 of the European Parliament and of the Council[2], and that is not an electric vehicle battery;*

In generation 5, the product group was expanded with power banks. A power bank is defined as any portable energy-storage device containing secondary batteries with charging circuitry (a PCB with voltage conversion and power management system and USP ports), which is used to charge portable consumer electronic devices via DC output. Power banks with built-in solar panels can also be Nordic Swan Ecolabel.

The marked for power- and garden tools is going towards electrical appliance systems, all powered by one battery system[3]. When rechargeable batteries are sold in combination packs together with an electrical application, there is a risk that consumer perceives that the entire product (electrical application + rechargeable battery) is Nordic Swan Ecolabel. Therefore, the Nordic Swan Ecolabel must be used in a way so there is no doubt that that the Nordic Swan Ecolabel applies solely to the batteries and not to the electrical appliances or to other elements of the package.

[2] Regulation (EU) No 168/2013 of the European Parliament and of the Council of 15 January 2013 on the approval and market surveillance of two- or three-wheel vehicles and quadricycles (OJ L 60, 2.3.2013, p. 52).
[3] Power tools are tools that consumers and professionals use for turning, milling, sanding, grinding, sawing, cutting, shearing, drilling, making holes, punching, hammering, riveting, screwing, polishing or the similar processing of wood, metal and other materials, as well as for mowing, cutting and other gardening activities.

If a Swan-labelled battery is sold as an individual item (accessories/parts for, electrical appliances), the Nordic Swan Ecolabel logo can be used on the product and outer packaging

Nordic Swan 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 rechargeable batteries that cannot be replaced when they get old and cannot be recharged at all. Nordic Swan 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.

Nordic Swan Ecolabelling has also chosen to exclude electronic products which contain a rechargeable battery, but where the entire product is placed in a charger, e.g. mobile telephones, portable computers, toys and household appliances such as electric toothbrushes, razors and hand-held vacuum cleaners. This is because Nordic Swan Ecolabelling does not impose further requirements on the electrical appliances into which the battery is built, and it would therefore not be possible to ensure that the overall product is environmentally-friendly.

The charger plays a major role in the useful life and performance of a rechargeable battery. For this reason, Nordic Swan Ecolabelling has chosen to impose special quality requirements on chargers sold in combination with Nordic Swan Ecolabel rechargeable batteries. Rechargeable batteries sold in combination packs with external battery chargers are also eligible for a Nordic Swan Ecolabel. It must be made clear to the purchaser of combination packs of this type that the Nordic Swan Ecolabel applies solely to the batteries and not to the charger, or to other elements of the package.

A different Nordic Swan Ecolabelling criteria document allows non-rechargeable portable batteries to be ecolabelled. Nordic Swan Ecolabelling has not combined rechargeable batteries and disposable batteries in the same criteria document, since there is an essential difference which, in most cases, will mean that rechargeable batteries represent a better choice from an environmental perspective. Furthermore, non-rechargeable batteries and rechargeable batteries have differing chemical compositions.

It is not possible to label power banks with an AC input (direct integrated plug to power outlet), since these are designed for “stationary” charging and are therefore not portable. Portable chargers with a jump-start function are not designed for continuous charging of electronic products and are therefore not part of these criteria. Higher-capacity portable chargers intended for charging high-power industrial devices are not included in the product group, since these products are not intended for consumer electronic devices. Uninterruptible power supply (UPS) systems are designed for “stationary” power supply/charging and are therefore not portable.

Most button cell batteries are not rechargeable, mainly because their relatively high self-discharge rate compared to their capacity makes recharging impractical. Rechargeable button cells therefore remain rare, although they are used in certain applications such as hearing aids. Rechargeable NiMH button cells can, in theory, be Nordic Swan Ecolabelled since they fall under the IEC 61951-2 standard. In contrast, Li-ion button cells are not tested according to the IEC 61960-3:2017 standard and therefore cannot fulfil our requirements.

Relevant rechargeable products in addition to those mentioned above, which can be assessed as rechargeable battery products, can be included in the product group upon request. The decision on which new products can be included in the product group is made by Nordic Ecolabelling.

3 How to read this criteria document

Each requirement is marked with the letter O (obligatory requirement) and a number. All requirements must be fulfilled to be awarded a licence.

The text describes how the applicant shall demonstrate fulfilment of each requirement. There are also icons in the text to make this clearer. These icons are:

- Upload
- Requirement checked on site

Before a license is issued, the Nordic Ecolabelling organization will normally pay an inspection visit to the applicant and/or the manufacturer. If necessary, multiple inspection visits can be made.

All information submitted to Nordic Ecolabelling is treated confidentially. Suppliers can send documentation directly to Nordic Ecolabelling, and this will also be treated confidentially.

4 Summary

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

The focus of the revised criteria has been to strengthen the performance requirements, including capacity and cycle endurance. A new requirement for a minimum share of recycled materials in the battery/cell as well as a ban on PFAS has also been introduced in the criteria. In addition, the due diligence requirements have been strengthened and clarified to align and be more stringent compared to the updated EU Batteries Regulation (EU) 2023/1542.

Finally, the name has changed from "rechargeable batteries and portable chargers" to "rechargeable batteries and power banks" to enhance clarity of what can be labelled within the criteria.

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

4.1 Changes compared to previous generation

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

Table 1 Overview of changes to criteria for Nordic Swan Ecolabel rechargeable batteries and power banks generation 6 compared with previous generation 5.

Proposal gen. 6	Gen. 5	Same req.	Change	New req.	Comments
Product group definition	Product group definition		X		No practical changes for a potential licensee. - Updated according to EU battery regulation (EU) 2023/1542. - Clarification regarding which type of batteries that can be Nordic Swan Ecolabelled. - Changed name from "rechargeable batteries and portable chargers" to "rechargeable batteries and power banks".
Production and product description					
O1 Description of the product	O1		X		Adjusted requirement to adapt to legislation. - CE-label is added according to EU battery regulation (2023/1542).
Resources					
O2 Metal content	O2	X			Editorial change. - Now referring to the EU battery regulation (2023/1542). - Updated name. Previous "Metal content of batteries".
O3 Excluded substances	-			X	New requirement. - Per- and polyfluoroalkyl (PFAS) substances are added as an excluded substance.
O4 Plastic and metal in casing	O3		X		Requirement made stricter. - Per- and polyfluoroalkyl (PFAS) substances are added as an excluded substance. - Requirements on other ingoing materials remains the same. - Changed name from "Requirements applicable to plastic and metal in the casing of the battery charger and in the outer casing/container that encircles the batteries/cells in the portable charger" to "Plastic and metal in casing"
O5 Battery charger, battery sizes	O4	X			Same requirement.
Corporate social responsibility					
O6 Responsible sourcing of mineral raw materials	O5 Sourcing of "conflict-free" minerals O6 Sourcing of critical raw materials		X		Requirement made stricter. - All licensees, regardless of turnover, must have a Due diligence management system according to the new EU Batteries Regulation (EU) 2023/1542. Further, all smelters and refiners now must be verified by a relevant third party, such as the Responsible Mineral initiative (RMI). - Mineral raw materials include minerals listed in Annex X (EU 2023/1542) and minerals listed in EU Conflict Minerals Regulation (2017/821). - Replaces previous requirements O5 and O6.
O7 Working conditions	O7	X			Editorial change to enhance clarity.
Electrical testing					
O8 Electrical testing	O9		X		Requirement made stricter.

					- Endurance in cycles are made stricter for both NiMH and Li-ion. - Leakage and capacity remain the same. - Editorial change to enhance clarity.
O9 Charged battery	O10	X			Same requirement.
Safety					
O10 Battery, power bank and charger safety	O11 Battery safety and O12 Portable charger safety O13 Quality of the battery charger		X		No practical changes for a potential licensee. The safety requirements have been updated in generation 6. The previous requirements O11, O12 and O13 have been merged into a single requirement. The safety testing for battery chargers is also made clearer compared to previous generation.
Consumer information					
O11 Consumer information	O14	X			Editorial change. - Updated according to EU battery regulation (EU) 2023/1542.
Circular economy and recyclability					
O12 Recycled content	-			X	New requirement. - A minimum limit of recycled content in the battery/cell is introduced.
O13 Recyclable design of the power bank	O15	X			Same requirement. - Editorial change to enhance clarity.
O14 Packaging	O8	X			Same requirement. - Moved to chapter "Circular economy and recyclability", previous under "Packaging and information" which no longer exist. - Updated according to EU battery regulation (EU) 2023/1542.
Licence maintenance					
O15 Customer complaints				X	Replaces the former requirements O16 to O22.
O16 Traceability				X	Replaces the former requirements O16 to O22.
Removed requirements in gen. 6 compared to gen. 5					
	O5				Removed. Replaced by O6 in gen 6.
	O6				Removed. Replaced by O6 in gen 6.
	O11				Removed. Replaced by O10 in gen 6.
	O12				Removed. Replaced by O10 in gen 6.
	O13				Removed. Replaced by O10 in gen 6.
	O16				Removed. Replaced by O15 and O16 in gen 6.
	O17				Removed. Replaced by O15 and O16 in gen 6.
	O18				Removed. Replaced by O15 and O16 in gen 6.
	O19				Removed. Replaced by O15 and O16 in gen 6.
	O20				Removed. Replaced by O15 and O16 in gen 6.
	O21				Removed. Replaced by O15 and O16 in gen 6.
	O22				Removed. Replaced by O15 and O16 in gen 6.

5 Requirements and justification of these

This section presents all the requirements, including the associated documentation requirements. The appendices referred to in the requirements can be found in the end of the criteria document. Background to the requirements, the levels of the requirement, and any changes since generation 5 are described in the background document.

Definitions

Terms	Definition/Explanation
AC input	Direct integrated plug to the power outlet. Designed for “stationary” charging and therefore not portable.
Battery capacity	The total amount of electric charge a battery can store and deliver, usually measured in ampere-hours (Ah) or watt-hours (Wh). It indicates how long a battery can power a device before needing to be recharged.
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.
DC output	Direct current (DC) is the unidirectional flow of an electrical charge. A battery is a good example of a DC power supply.
DoD	Depth of Discharge.
EEE	Electrical and Electronic Equipment.
Endurance in cycles	The number of charge and discharge cycles a battery can perform under specific conditions, such as temperature and relative humidity, before the capacity drops below a specified fraction of the rated capacity. It indicates the battery’s lifespan in regular use.
Li-ion	Lithium-ion.
LMT battery	Light means of transport (LMT) batteries intended for use in e.g. e-motorcycles, e-bikes, e-scooters
mAh or Ah	Milliampere hours or ampere hours: the amount of electric current 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.
NiMH	Nickel-metal hydride battery.
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
PCB	Printed circuit board.
Primary packaging	Refers to the purchase packaging for the consumer, e.g. the packaging that holds 4 batteries or one power bank, and what the consumer encounters in sales.
Recycled materials	Recycled materials are defined according to ISO 14021 in the following two categories: ”Pre-consumer/commercial” is defined as material diverted from the waste stream during a manufacturing process. ”Post-consumer/commercial” is defined as material generated by households or by commercial, industrial and institutional facilities in their role as end-users of the product, which can no longer be used for its intended purpose. This includes returns of material from the distribution chain.

Secondary packaging	Refers to the transport packaging and protects the packs of batteries and power banks during transport to stores and consumers.
SLI batteries	Batteries used for vehicle starting, lighting and ignition systems.
SOC	State Of Charge. Short for electrical stored capacity in a rechargeable cell or battery. 100 % SOC = fully charged, 0 % SOC = fully discharged.
SWCNT	Single-walled carbon nanotube.
UPS	Uninterruptible power supply (UPS) systems.
USB ports	A USB port is a standard cable connection interface for e.g. personal computers and consumer electronics devices. They can also supply electric power across the cable to devices that require it.
WEEE	Waste Electrical and Electronic Equipment.
Wh-Watt hours	A measure of electrical energy equivalent to power consumption of one watt for one hour. A simple way to determine the current delivered by the power bank is to divide the watts by the voltage rating of the device. Electrical power is measured in watts and power equals the voltage multiplied by the current (ampere).

5.1 Production and product description

O1 Description of the product

The applicant must provide 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 owners(s) of batteries and/or power banks .
- Description of the product(s) (detailing all constituent substances present in the battery/portable charger; metals, other solid substances and liquid chemical substances) in the application (weight %).
- CE-label according to EU battery regulation (2023/1542).
- Description of raw materials used in the casing of the battery charger or the power bank..
- 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 or one power bank, and which the consumer encounters in sales.
- Description of the manufacturing process for the product. Nordic Ecolabelling wants a general description of the battery/power bank manufacturing process and which technology that is being used to produce the batteries/power banks. A flow chart is recommended to explain the production process.

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

Background to O1 Description of the product

This requirement has been adjusted referring to EU battery legislation and CE-labelling.

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 and power bank must be given in weight-%. The new EU battery regulation (2023/1542) has introduced a new mandatory requirement for CE assessment and CE marking of both portable- and LMT batteries.

The requirement will thus give an insight into the product(s) in the application, in order to ensure that the application is processed correctly.

5.2 Resources

O2 Metal content

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

Metal	Content
Mercury	< 0.1 ppm
Cadmium	< 5.0 ppm
Lead	< 5.0 ppm

Note: The EU's Battery Regulation (EU) 2023/1542 permits a maximum cadmium content of 20 ppm and a maximum mercury content of 5 ppm. Testing for mercury < 0.1 ppm may require specialised laboratory equipment.

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 an independent third party has assessed and confirmed them to be equivalent to the recommended method.

- 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 (see appendix 4).

Background to O2 Metal content

This requirement remains unchanged in generation 6 of the criteria.

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

- Mercury, which is a highly toxic substance harmful to both human health and the environment, has been shown to negatively affect the kidneys, reproductive system and nervous system.

- Cadmium, which accumulates in the body, particularly the kidneys, and is known to be hazardous to health and the environment and in certain connections is carcinogenic, mutagenic or toxic for reproduction.
- Lead, which is known to be toxic for reproduction, environmentally harmful and has negative effects on the nervous system[4].
- Arsenic, which can occur in large quantities in rechargeable batteries. Arsenic is classified as toxic (H330 or H331/H301) and hazardous to the environment (H410).

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

A German test study from 2013[5], which examined around 300 batteries, taken from stores, discovered that in some batteries, represented in the market, these metals may exceed the permitted EU limit, yet this is an exception: strict control in this sector will make it possible to completely erase commercial batteries with a prohibited level of such metals. Nevertheless, according to the same study, Li-ion batteries possess a significantly better chemical profile: the level of heavy metals is much lower than is allowed under the Regulation.

As far back as in generation 3 of the criteria, Nordic Swan Ecolabelling opted to introduce stricter requirements than those of the authorities in this respect, to ensure that only the best constituent substances with very low concentrations of pollutants of the above metals may be used in Nordic Swan Ecolabel 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 Swan Ecolabelling is aware that applications may be submitted for ecolabels for other types of rechargeable batteries, and Nordic Swan 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 Excluded substances

Per- and polyfluoroalkyl substances (PFAS)* must not be actively added in the battery/cell.

**PFAS: any substance that contains at least one fully fluorinated methyl (-CF3) or methylene (-CF2-) carbon atom, with no H/Cl/Br/I attached.*

- Manufacturer's declaration confirming that the battery contains no PFAS. Appendix 1 may be used.

[4] Fokus på særlige stoffer - Miljøstyrelsen
[5] Batteries put to the test: too many heavy metals, faulty labelling | Umweltbundesamt

Background to O3 excluded substances

This is a new requirement in generation 6 of the criteria.

Per- and polyfluoroalkyl substances (PFAS) are used in many types of products due to their water and dirt repellent properties. These compounds constitute a group of substances that have highly problematic intrinsic hazardous properties. They are extremely persistent and accumulate in the body. They are spread all over the globe, from the large oceans to the Arctic, and are found in e.g. wild birds and fish and their eggs. Also, shorter chain compounds (2–6 carbon atoms) have been discovered in nature. The substances in this group are suspected to be endocrine disruptors, carcinogenic and to have a negative impact on the human immune system. PFAS are primarily found in rechargeable batteries, especially in advanced types such as lithium-ion batteries[6],[7] used in electrical vehicles (VE). Applying the precautionary principle, the Nordic Swan Ecolabelling has chosen to exclude PFAS from rechargeable portable batteries.

O4 Plastic and metal in casing

The requirement applies to plastic and metal in the casing of the battery charger and the outer casing that encircles the batteries/cells in the power bank. The requirement does not apply to the battery, the casing encircling the battery/cell itself, circuit/PCBs, wires or USB/charge ports.

The plastic or metal in the casing of the battery charger and the outer casing that encircles the batteries/cells in the power bank must fulfil the following requirements:

Plastic:

- Plastic parts covering a surface > 200 mm^2 in the casing must be labelled in accordance with ISO 11469.
- The plastic may not be chlorinated plastic.
- PFAS* must not be actively added to the plastic in the casing.
- Cadmium and lead must not be actively added to the plastic in the casing.
- Chloro-paraffins must not be actively added to the plastic in the casing.
- The following flame retardants must not be actively added to the plastic in the casing:

  a) Hexabromocyclodecane (HBCDD), tetrabromobisphenol A (TBBP-A) and tris (2-chloroethyl) phosphate (TCEP).

  b) Other halogenated organic flame retardants and flame retardants that have been given one or several of the following risk phrases; H350, H350i, H340, H360D, H360F, H360Df, H360Fd.

**PFAS: any substance that contains at least one fully fluorinated methyl (-CF3) or methylene (-CF2-) carbon atom, with no H/Cl/Br/I attached.*

Metal:

The following metals may not be actively added to the casing in the battery charger and the outer casing that encircles the batteries/cells in the power bank:

[6] PFAS in batteries: The toxic Trojan of the electric vehicles revolution, visited September 2025
[7] 'Forever chemicals' used in lithium ion batteries threaten environment, research finds | Lithium-ion batteries | The Guardian, visited September 2025

Lead (Pb), mercury (Hg), chromium VI (CrVI), cadmium (Cd), cobalt (Co), antimony (Sb), zinc (Zn,), copper (Cu) or nickel (Ni).

Exception: Steel is allowed to be used in the base panel that holds the USB/charge ports in power banks, but only if the steel is coated/laminated or covered with e.g. plastic.

- Documentation showing that the casing is labelled in accordance with ISO 11469.
- Declaration from the manufacturer of the battery charger or power bank that the requirement is fulfilled. Appendix 2 may be used.

Background to O4 Plastic and metal in casing

This requirement has been adjusted in generation 6. PFAS must not be actively added to the plastic in casing.

The requirement solely applies to the plastic and metal in the casing of the battery charger and the outer casing that encircles the batteries/cells of the power bank. This is because the consumer only has direct contact with the outer casing. It is also difficult for the manufacturer to have full traceability of materials that are part of small plastic pieces and electronics. The requirement does not apply to the battery, the casing encircling the cell itself, the circuit/PCB, wires or USB/charge ports, since some of these metals are essential in the circuit/PCB, wires, USB/charge ports, etc.

Plastic parts covering a surface > 200 mm^2 in the casing must be labelled in accordance with ISO 11469. Smaller parts are exempt, as marking is impractical. The same limit exists in other Nordic Swan Ecolabelling criteria, e.g. imaging products. PVC offers useful technical properties but poses environmental challenges, especially in the end-of-life phase. It often contains harmful additives and, when incinerated, increases chlorine in the waste stream, leading to more acidic gases and higher demands on flue gas cleaning[8,9]. Combustion of 1 kg PVC can generate up to 1.7 kg of flue gas cleaning residues, often requiring special landfilling. Older PVC may contain hazardous additives such as lead or cadmium, creating further disposal problems. PC/ABS is common in electronics due to its strength, impact and heat resistance, and processability. If flame retardants are used, they must comply with requirements.

All electrical and electronic products involve a risk of fire, which is why flame retardants are used. They are designed to last through a product's lifetime and are therefore persistent in the environment and can cause several environmental and health issues. Brominated flame retardants (BFRs) have received the most attention, as several (PBDEs, HBCDD, TBBP-A) are persistent, bioaccumulative, and toxic, with proven health and environmental risks.[10] Many have been banned under the EU RoHS Directive, while others are classified as SVHC under REACH. TBBP-A, though widely used in printed circuit boards, is currently exempt due to lack of alternatives. Chloroparaffins, also used as flame retardants, are poorly degradable and toxic to aquatic life. Some short-chain types are listed as SVHC under REACH. Based on these risks, Nordic Swan Ecolabelling prohibits hazardous flame

[8] Hjelmar, 2002: Forbrænding af PVC: Påvirkning af massestrømmene gennem et forbrændingsanlæg. DHI – Institut for Vand og Miljø.
[9] http://www.esa.chalmers.se/education/l1/text_files/pvc.pdf (report from Chalmers University of Technology, Sweden).
[10] Information from the Swedish Chemicals Agency website, www.kemi.se

retardants in chargers for rechargeable batteries, aligning requirements with other ecolabelled electronic products. The global certification scheme for IT- related products, TCO Certifiedas similar restrictions.

The manufacture of the heavy metals zinc and nickel is associated with high energy consumption and emissions of environmentally harmful substances, which is why their use is not permitted in the casing of battery chargers and the outer casing that encircles the batteries/cells in the power bank. Any metal used must be free from hazardous heavy metals such as lead, mercury, hexavalent chromium, cadmium, cobalt, antimony, zinc, copper and nickel. Steel/stainless steel may be used in the base panel for USB/charge ports, but only if coated or covered to avoid direct skin contact, as some alloys contain allergenic metals like nickel and chromium.

O5 Battery charger, battery sizes

This requirement applies solely to chargers for rechargeable batteries of the following sizes: AAA: HR03, AA: HR6, C:HR14, D: HR20, 9V:HR 22.

If the rechargeable batteries are sold together with a charger, the charger must be suitable for use with a minimum of two battery sizes.

- Declaration from the licensee that the charger can be used for charging a minimum of two battery sizes. Appendix 2 may be used.
- A description/documentation of the charger confirming this must be attached.

Background to O5 Battery charger, battery sizes

The requirement of the battery charger (battery sizes) remains unchanged in generation 6 of the criteria.

To reduce the need for consumers to purchase multiple chargers for different battery sizes, thereby minimizing the environmental impact of increased charger production, Nordic Ecolabelling recommends that chargers sold with ecolabelled rechargeable batteries support charging of multiple battery sizes.

This requirement solely applies to chargers for rechargeable batteries for ordinary household batteries, size: AAA: HR03, AA: HR6, C:HR14, D: HR20, 9V:HR 22. Batteries for power tools (typically NiCd, NiMH and Li-ion) are normally not divided into the same battery sizes as ordinary household batteries and are therefore not subject to the requirement. A battery for a power tool often comes with a charger of the relevant power tool. The charger can only handle one specific shape/size of battery, but the manufacturer of the power tool has ensured that the same shape/size of the battery/charger fits several of its power-tool products

5.3 Corporate social responsibility

O6 Responsible sourcing of mineral raw materials

The licensee must:

- Have a due diligence management system* for responsible sourcing of mineral raw materials used in Nordic Swan Ecolabelled batteries/cells. This includes the following minerals:
  - cobalt, natural graphite, lithium, nickel and chemical compounds base on these minerals listed in Annex X (EU 2023/1542), and
  - tin, tantalum, tungsten and gold listed in EU Conflict Minerals Regulation (2017/821)[11].
- Have a system for identifying and assessing all smelters/refiner's due diligence measures. All smelters/refiners must have been verified/in a process of being verified by relevant 3rd party such as the Responsible Mineral Initiative (RMI).
- Be member of an established multi-stakeholder program that works at supporting responsible sourcing of minerals.

From the 1st of January 2028*

- The due diligence management system must be reviewed and approved by an independent third party and
- information/summary on due diligence approaches, measures and results must be published annually.

** According to the EU Battery Regulation 2023/1542.*

- Documentation showing that all smelters/refiners have been verified/is in a process of being verified by relevant 3rd party such as the Responsible Mineral Initiative (RMI).
- Documentation of membership in a multi-stakeholder program supporting responsible mineral sourcing.

From the 1. January 2028:

- Description of due diligence management system for responsible sourcing of mineral raw materials.
- Link to or copy of the most recent publishes report on due diligence approaches, measures, and results.

Background to O6 Responsible sourcing of mineral raw materials

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

The new EU Batteries Regulation (EU) 2023/1542 aims to ensure that batteries/cells placed on the EU market are sustainable, efficient and safe throughout their lifecycle. One of the new features of the Regulation is that it imposes an obligation on all economic operators (in first place operators with a net turnover of 150 million euro or more) placing batteries on the

[11] https://policy.trade.ec.europa.eu/development-and-sustainability/conflict-minerals-regulation_en

market or putting them into service, to have a due diligence management system to address the social and environmental risks linked to sourcing, processing and trading raw materials along the whole supply chain. The requirement applies to all NSE applicants regardless of turnover.

The requirement has been adjusted to include mineral raw materials listed in Annex X (EU 2023/1542) i.e. cobalt, natural graphite, lithium, nickel and chemical compounds base on these minerals and conflict minerals tin, tantalum, tungsten and gold (regulated by EU Conflict Minerals Regulation (2017/821). To strengthen the risk assessment all smelters and refiners must have been verified/in a process of being verified by a relevant third party such as the Responsible Mineral Initiative (RMI). It's recommended to align due diligence management system with OECD due diligence guidance for responsible supply chain of minerals.[12]

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

To ensure transparency the due diligence management systems must be reviewed and approved by an independent third party. The applicant must also annually publish a report (information must be accessible to the public) on due diligence approaches, measures, and results. Due to the 2 years delay in due diligence obligations according to EU 2023/1542 (apply from 18/8-2027) these two requirements apply from 1. January 2028. Transparency is central to ensuring accountability in supply chains, allowing stakeholders, including consumers and investors, to assess the sustainability of a company's operations.

O7 Working conditions

The licensee must have a written Code of Conduct that explains how compliance with the following UN conventions and the UN Global Compact is ensured at suppliers of component, battery, battery charger and power bank:

- 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[13], which comprises the following ten principles:

1. Businesses should support and respect the protection of internationally proclaimed human rights.
2. Make sure that they are not complicit in human rights abuses.
3. Businesses should uphold the freedom of association and the effective recognition of the right to collective bargaining (ILO Conventions 87 and 98).
4. The elimination of all forms of forced and compulsory labour; (ILO Conventions 29 and 105).
5. The effective abolition of child labour (ILO Conventions 138 and 182).

[12] https://mneguidelines.oecd.org/mining.htm (visited April 2025)
[13] http://www.unglobalcompact.org

6. the elimination of discrimination in respect of employment and occupation (ILO Conventions 100 and 111).
7. Businesses should support a precautionary approach to environmental challenges.
8. Undertake initiatives to promote greater environmental responsibility.
9. Encourage the development and diffusion of environmentally friendly technologies.
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.

If components, batteries, battery chargers and power bankss 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 explaining how suppliers comply with the above UN conventions and the UN Global Compact.
- A description of how the licensee's Code of Conduct is communicated to all suppliers.

Background to O7 Working conditions

The requirement of working conditions remains unchanged in generation 6 of the criteria.

Generation 5 of the criteria required licensees to have a plan in place for compliance with the UN Global Compact[14] , of which the aim is to lay down international principles for human rights, labour, the environment and anti-corruption. Nordic Swan 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 Swan Ecolabelling is aware that it may be difficult to ensure that the working environment of all suppliers in the Nordic Swan Ecolabel 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.

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

5.4 Electrical testing

O8 Electrical testing

The batteries and cells must comply with A, and either B or C depending on the type of cell/battery. The requirements concerning test laboratories and test instructions are stated in Appendix 4.

A. Leakage

No leakage* shall occur during testing.

** Any unplanned escape of electrolyte, gas or other material.*

B. Nickel-metal hydride (NiMH) batteries and cells

1. Battery capacity

The battery or cell capacity must be tested*. The rated capacity (C) must be at least as high as the nominal capacity (N) indicated on the battery and in the product documents.

**The test must be in accordance with paragraph 7.3.2 "Discharge performance at 20°C (rated capacity)" of IEC 61951-2:2017. The test must be carried out on a minimum of three batteries, in accordance with the sample size specified in IEC 61951-2:2017, and all three batteries/cells must meet the requirements.*

2. Endurance in cycles

The endurance in cycles for the battery or cell must be tested*. The total number of cycles obtained when the test is completed shall be ≥ 150% above the specific limit** for cell types listed in paragraph 7.5.1 of IEC 61951-2.

**The test must be in accordance with paragraph 7.5.1 "Endurance in cycles" of IEC 61951-2:2017. The test must be carried out on a minimum of three batteries, in accordance with the sample size specified in IEC 61951-2:2017, and all three batteries/cells must meet the requirements.*

***Table below presents examples of limits for minimum number of cycles for cylindrical cells, in relation to IEC 61951-2:2017.*

Table 1: Example of limits for endurance in cycles for cylindrical cells dimensionally interchangeable with NiMH non-rechargeable portable batteries.

Type of cell	Capacity	Limit in IEC 61951-2:2017 Total numbers in cycles	Limit in NSE (150% above the limit in IEC 61951-2:2017) Total number of cycles
HR 03 / AAA	< 800 mAh	≥ 200	≥ 500
HR 03 / AAA	≥ 800 mAh	≥ 100	≥ 250
HR 06 / AA	< 2100 mAh	≥ 200	≥ 500
HR 06 / AA	≥ 2100 mAh	≥ 100	≥ 250
HR 14 / C	-	≥ 200	≥ 500
HR 20 / D	-	≥ 200	≥ 500
For other cell types, see the IEC 61951-2:2017.			

C. Lithium ion (Li-ion) batteries and cells

1. Battery capacity

The battery capacity must be tested*. The rated capacity (C) must be at least as high as the nominal capacity (N) indicated on the battery and in the product documents.

** The test must be in accordance with paragraph 7.3 "Discharge performance at 20°C (rated capacity)" of IEC 61960-3:2017. The test must be carried out on a minimum of three batteries, in accordance with the sample size specified in IEC 61960-3:2017, and all three tested batteries/cells must meet the requirements.*

2. Endurance in cycles

The battery or cell must be tested*. The total number of cycles obtained when the test is completed shall be 85% C_5 Ah.**

**The test must be performed a rate of 0,5 I_t A (accelerated test) in accordance with paragraph 7.6 "Endurance in cycles" of IEC 61960-3:2017. The test must be carried out on a minimum of three batteries, in accordance with the sample size specified in IEC 61960-3:2017, and all three tested batteries/cells must meet the requirements.*

*** 85% C_5 Ah is 41,7% above the specific limit for components listed in paragraph 7.6 of IEC 61960-3:2017. Table below presents examples of limits for minimum number of cycles for li-ion cells and batteries, in relation to IEC 61960-3:2017.*

Table 2: Endurance in cycles at a rate of 0,5 I_tA (accelerated test). Reference paragraph 7.6.3 in IEC 61960-3:2017.

Number of cycles	Limit in IEC 61960-3:2017 Endurance in cycles at a rate of 0,5 I_tA (accelerated)	Limit in NSE (41,7 % above the limit in IEC 61951-2:2017) Endurance in cycles at a rate of 0,5 I_tA (accelerated)
Cells	60% C_5 Ah	85% C_5 Ah
Batteries	60% C_5 Ah	85% C_5 Ah

- Complete test report, including information that no leakage has occurred during testing, and that at least 3 batteries/cells meet the requirements regarding battery capacity and endurance in cycles.
- Documentation showing that the test laboratory fulfils the requirement stated in Appendix 4.

Background to O8 Electrical testing

The requirement of electrical testing has been adjusted in generation 6 of the criteria.

The RPS analysis shows that the use phase is very important in an LCA perspective. A short-lived use stage for batteries results in a higher environmental impact. The lifespan of rechargeable batteries is significantly prolonged, since they can be used repeatedly due to numerous charging and discharging cycles. This results in potential resource savings and decreasing waste, especially when compared with non-rechargeable portable batteries[15]. The battery capacity is equivalent to the quantity of electricity (in ampere hours, Ah) declared

[15] Yu, Y., Chen, B., Huang, K., Wang, X., & Wang, D. (2014). Environmental Impact Assessment and End-of-Life Treatment Policy Analysis for Li-Ion Batteries and Ni-MH Batteries. International Journal of Environmental Research and Public Health.

by the manufacturer of the battery. Ah is the discharge current a battery can deliver over time.

The requirement for leakage was introduced in generation 5 of the criteria and remains unchanged in this revision. No leakage may occur doing testing and this aligns with the Koran Eco-label standard (EL764:2012) for batteries. The requirement ensures that the batteries meet high safety and quality requirements.

The requirement of battery capacity for both NiMH batteries and Li-ion batteries is unchanged compared to the generation 5 criteria since the requirements are considered to still be relevant on the market. Capacity testing is performed in order to ensure that the capacity of the batteries/cells corresponds to the actual discharge ability of fresh batteries/cells. The battery capacity for NiMH batteries shall be measured in accordance with paragraph 7.3.2 “Discharge performance at 20°C (rated capacity)” of IEC 61951-2:2017. The battery capacity for Li-ion batteries shall be measured in accordance with paragraph 7.3 “Discharge performance at 20°C (rated capacity) of IEC 61960-3:2017. For all batteries/cells the rated capacity (C) must be at least as high as the nominal capacity (N) indicated on the battery and in the product documents.

When it comes to endurance in cycles, life cycle testing is performed to ensure that the batteries/cells have an appropriate number of charge/discharge cycles, offering an acceptable level of performance. There is a strong connection between the number of charge-discharge cycles and energy consumption, since shorter cycles lead to uncertainty concerning energy consumption during the use phase, thereby generating a greater impact on the battery. An improved cycle performance is important to reduce the environmental impact[16]. The requirement for testing endurance in cycles for NiMH cell/batteries has been adjusted in generation 6. All types of NiMH cells must achieve a minimum of 150% number of circles above the specific limit for cell types listed in paragraph 7.5.1 of IEC 61951-2. E.g. an AAA battery (< 800mAh) must obtain at least 200 cycles according to IEC 61951-2:2017, while the requirement in Nordic Ecolabelling is at least 500 cycles. The new level has been decided after discussions and input from stakeholders, for example the test institute Intertek, and are considered to be an ambitious but realistic level. The requirement for testing endurance in cycles for Li-ion cell/batteries has also been adjusted in generation 6. Nordic Ecolabelling demands that both batteries and cells must achieve a minimum of 85% C_5 Ah according to paragraph 7.6 “Endurance in cycles” of IEC 61960-3:2017. The threshold limit in the standard is 60% C_5 Ah which make the Nordic Swan Ecolabel requirement 41,7% above the limit in IEC 61951-2:2017. Nordic Ecolabelling has further decided to remove the possibility to test the endurance of cycles at a rate of 0,2 I_tA since it is an easier test to comply with compared to an accelerated test at a rate of 0,5 I_tA.

O9 Charged battery

The requirement solely applies to Nickel-metal hydride (NiMH batteries) and cells.

The battery must be fully charged when it leaves the production site.

[16] Yu, Y., Chen, B., Huang, K., Wang, X., & Wang, D. (2014). Environmental Impact Assessment and End-of-Life Treatment Policy Analysis for Li-Ion Batteries and Ni-MH Batteries. International Journal of Environmental Research and Public Health.

Fully charged is defined as minimum 70% electrical stored capacity (SOC)

- A declaration confirming that the battery is fully charged when leaving the production site for delivery to customers/brand owners. Appendix 1 may be used.

Background to 09 Charged battery

The requirement of charged battery remains unchanged in generation 6 of the criteria.

The new requirement for fully charged nickel-metal hydride (NiMH batteries) supports the trend in the market towards fully charged batteries (when purchased in the store), which are thereby ready to be used when taken out of the packaging. One of the reasons for the consumer's purchase of non-rechargeable portable batteries is that these are ready for use right away. This requirement ensures that consumers have the same experience when purchasing rechargeable batteries. Fully charged is here defined as minimum 70% electrical stored capacity (SOC). This term refers to the percentage of the electrical stored capacity in a rechargeable cell or battery that is available for use. The limit of minimum 70% SOC is based on stakeholder input.

The international regulations applicable to air shipments of lithium batteries have changed[17]. Effective from 1 April 2016, all lithium-ion batteries shipped by air without equipment must not exceed 30% SOC because of safety reasons. Although it does not apply if the batteries are transported by sea or road transport Nordic Ecolabelling has exempted lithium batteries entirely from the requirement.

5.5 Safety

O10 Battery, power bank and charger safety

The requirement applies to both batteries and batteries/cells used in power banks.

The battery/cell must be tested and comply with the following standards:

- NiMH batteries/cells: IEC 62133-1.
- Lithium-ion batteries/cells: IEC 62133-2.

The power bank must be tested and comply with:

- IEC 62368-1.

The battery charger must be tested and comply with:

- IEC 60950-1

The requirements concerning test laboratories are stated in Appendix 4.

- Complete test report.
- Documentation showing that the test laboratory fulfils the requirement stated in Appendix 4.

[17] http://www.iata.org/whatwedo/cargo/dgr/Pages/lithium-batteries.aspx

Background to O10 Battery, power bank and charger safety

The safety requirements have been adjusted in generation 6. The previous requirements O11, O12 and O13 in generation 5 have been merged into a single requirement in generation 6.

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-ion (Li-ion) or the more conventional nickel metal hydride cell (NiMH).

The use of lithium-ion batteries/cells (Li-ion) has grown exponentially in recent years. While Li-ion and NiMH 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.

When a Li-ion battery is being charged or is charging another device, it can overheat and cause a fire hazard.

This is referred to as thermal runaway. Even when not in use or being charged, the battery’s internal temperature may rise, yielding destructive and dangerous results. The fires that result from these batteries are difficult to extinguish. Even when the number of batteries in use is compared to a relatively low failure rate, the degree of danger presented by a failure is the reason for strict standards and regulations. Well-publicised incidents have resulted in numerous product safety recalls[18]. The main hazards for both NiMH batteries and Li-ion batteries are explosion, fire, overheating and fire danger. Primary causes can be things like improper charging, improper use, overheating, electrical abuse (over-current, over-voltage, over-temperature) or other abuses such as internal short-circuiting and transportation.

The batteries/cells must fulfil the testing requirements in IEC 62133: “Secondary cells and batteries containing alkaline or other non-acid electrolytes – Safety requirements for portable sealed secondary cells, and for batteries made from them, for use in portable applications – Part 1 regarding Nickel systems and Part 2: Lithium systems”, as amended.

Power banks must be tested and comply with IEC 62368-1 and battery chargers must be tested and comply with IEC 60950-1. Both standards ensures that the power bank and battery charger is tested in order to reduce the risk of injury or damage due to the following: electric shock, energy-related hazards, fire, heat-related hazards, mechanical hazards, radiation and chemical hazards.

[18] http://www.rechargebatteries.org/knowledge-base/batteries/lithium-ion-cell-lilon/

5.6 Consumer information

O11 Consumer information

Battery:

The battery must be marked in accordance with IEC 61951-2 (NiMH) or IEC 61960-3 (Lithium).

The battery must me marked and labelled in accordance with the EU Battery Directive 2006/66/EC and the Battery regulation (EU) 2023/1542.

The “guidelines for using the Nordic Swan Ecolabel” must be used.[19]

Use of the Nordic Swan Ecolabel on rechargeable batteries sold/marked together with electrical appliances, e.g. cordless power tools: The Nordic Swan Ecolabel must be used in a way so there is no doubt that the Nordic Swan Ecolabel applies solely to the batteries and not to the electrical appliances or to other elements of the package.

Power bank:

Power banks must be supplied with the following safety information:

- Minimum instructions for use as specified below:
  - The power bank will generate heat when charging. Always charge in a well-ventilated area. Do not charge under pillows, blankets or on flammable surfaces.
  - Keep the power bank away from heat sources, direct sunlight, combustible gas, humidity, water or other liquids.
  - Do not dismantle, open, microwave, incinerate, paint or insert foreign objects into the power bank.
  - Do not subject the power bank to mechanical shock such as crushing, bending, puncturing or shredding. Avoid dropping or placing heavy objects on the power bank.
  - Do not short-circuit the power bank or store it in a receptacle where it may be short-circuited by other metallic or conductive objects.
  - Do not operate the power bank if it has been wet or otherwise damaged, so as to avoid electric shock, explosion and/or injury. Contact the dealer or authorised agent.
  - Power bank usage by children should be supervised.
  - Please read the operating instructions (including charging instructions and information on the minimum and maximum operating temperatures) supplied with this power bank.
- Instructions on how to charge the power bank.
- Information on the minimum and maximum operating temperatures for the power bank.

T̄ A sample of the information provided on the battery.

T̄ Rechargeable batteries sold/marked together with electrical appliances: A sample of the battery in combination with the electrical appliances, showing that the use and

[19] https://www.nordic-swan-ecolabel.org/how-to-apply/regulations-guidelines-logos/logos-and-guidelines/

placement of the logo assure that there is no doubt that the Nordic Swan Ecolabel applies solely to the battery.

- A sample of the safety information supplied with the power bank.

Background to O11 Consumer information

The requirement to consumer information/marking on batteries has been adjusted in generation 6 of the criteria referring to the new EU Battery regulation (EU) 2023/1542.

The Battery regulation (EU) 2023/1542 requires that the following information (specified in annex VI) needs to be printed on the battery label: Information on the manufacturer, battery category, type and chemistry, manufacturing date, weight, information on hazardous substances (Cd, Pb and Hg) and critical raw materials, capacity marking for rechargeable batteries, crossed-out dustbin to indicate the mandatory separate collection of waste batteries and CE marking. As already required under the 2006 Batteries Directive, batteries must be marked with the crossed-out dust bin symbol. The battery label on LMT batteries must also include a QR code through which the user will get access to additional information such as those required un the due diligence reporting.

The marked for power- and garden tools is going towards electrical appliance systems, all powered by one battery system. When rechargeable batteries are sold in combination packs together with an electrical application, there is a risk that consumer perceives that the entire product (electrical application + rechargeable battery) is Nordic Swan Ecolabel.

Therefore, the Nordic Swan Ecolabel must be used in a way so there is no doubt that that the Nordic Swan Ecolabel applies solely to the batteries and not to the electrical appliances or to other elements of the package.

If a Swan-labelled battery is sold as an individual item (accessories/parts for, electrical appliances), the Nordic Swan Ecolabel logo can be used on the product and outer packaging.

As written under requirements O10 (battery, power bank and charger safety) power banks are considered to be hazardous, due to the risk of overheating, fire and short-circuiting. Nordic Swan Ecolabel has therefore listed some minimum consumer safety instructions/information requirements that must be provided together with the power bank. There is a strong connection between the Depth of Discharge (DoD) and the battery capacity retention of a Li-ion battery: deep DoD results in a shorter lifespan. Moreover, if the battery is constantly influenced by high voltage and temperature changes, this will enhance the degradation processes and aging. By following the basic recommendations for battery charging and the conditions for its use, it is possible to preserve the initial battery capacity, thereby extending the battery lifespan and product integrity.

5.7 Circular economy and recyclability

O12 Recycled content

The battery/cells must consist of a minimum of 22% by weight* of recycled** content***.

**The percentage must be calculated as the total annual weight of recycled content in the batteries/cells in relation to the total annual weight of produced Nordic Swan Ecolabelled rechargeable batteries.*

*** Recycled content is defined according to ISO 14021 in the category's pre-consumer and post-consumer. See Definitions.*

****The percentage include materials contained in the battery/cells, such as metals, plastic etc. Packaging and ancillary materials shall not be included in the percentage.*

- Completed reporting sheet (available on Nordic Ecolabelling's websites).
- Documentation confirming the recycled content in the battery/cells (e.g. material report or similar documents).

Background to O12 Recycled content

This is a new requirement in generation 6 of the criteria.

Including recycled content into rechargeable batteries provides environmental benefits, including reduced greenhouse gas emissions and lower water consumption. [20] [21] [22] Compared with mining and processing virgin raw materials, battery recycling requires less energy and generates less air pollution. In addition, recycling helps mitigate long-term supply risks, both physical and geopolitical, associated with critical battery minerals. By decreasing reliance on mining, it also reduces the high energy and water demands, environmental disruption, and social challenges often linked to extraction. Improved recyclability and higher recycled content contribute to a more circular economy by minimizing waste and strengthening resource security.

Today, recycled content in rechargeable portable batteries is limited. Globally, less than 5% of lithium-ion batteries are recycled, and lithium's recycling input rate is around 3% of supply.[23] [24] The EU Battery Regulation sets ambitious targets for recovered content from 2027 onward, but today recycled inputs cover only a minor fraction of demand.[25] While cobalt, nickel and copper can be recovered at higher rates, lithium remains more difficult and less profitable to recycle.[26]

Nordic Swan Ecolabelling wants to encourage the share of recycled content in batteries, however, acknowledge the challenges involved. In this generation, all types of recycled

[20] Recycling lithium-ion batteries delivers significant environmental benefits | Stanford Report
[21] Life cycle comparison of industrial-scale lithium-ion battery recycling and mining supply chains - PubMed
[22] Life Cycle Assessment of Lithium-Ion Battery Recycling: Evaluating the Impact of Recycling Methods and Location - PMC
[23] Recycling lithium-ion batteries: A review of current status and future directions - ScienceDirect
[24] | Material Insights
[25] Scaling up reuse and recycling of electric vehicle batteries: Assessing challenges and policy approaches
[26] Church, Wuennenberg, IISD (2019) *Sustainability and second life - The case for cobalt and lithium recycling* iisd.org/system/files/publications/sustainability-second-life-cobalt-lithium-recycling.pdf

content within the battery (metals, plastics, etc.) will be accepted, as this reflects current market practice. Through stakeholder dialogue, it is confirmed that recycled content are already used in batteries. The proposed requirement is considered to be both realistic and ambitious, provided that the calculation can include more than just metals. Packaging is excluded from this requirement, as it is regulated separately and has a lower environmental impact. This criterion therefore applies solely to recycled materials within batteries or cells. The ambition is to introduce specific requirements for recycled metals in future generations.

O13 Recyclable design of the power bank

The power bank must be designed in such a way that dismantling is possible. The requirement consists of the following individual requirements:

- A qualified professional, working alone, must be able to dismantle the product.
- It must be possible to separate the substances, preparations and components listed in ANNEX VII of the WEEE Directive (2012/19/EU).
- It must be possible to remove the secondary batteries/cells for recycling purposes.
- The battery/cell chemicals must be prevented from leaking during the removal.

t̄ Declaration from the manufacturer of the power bank showing that the requirements are met. Appendix 2 may be used.

Background to O13 Recyclable design of the power bank

The requirement remains unchanged in generation 6 of the criteria.

Besides safety and consumer information requirements for the power bank itself listed in requirements O10 and O11, the power bank must be designed to make recycling easier.

Power banks are considered hazardous, due to the risk of overheating, fire and short-circuiting. Therefore, power banks are not recommended to be dismantled or opened by the consumer. In a life cycle perspective, however, it is essential to recycle the batteries and other materials in the product.

According to the EU battery regulation (2023/1542) it should be possible, when needed, to remove batteries from appliances without delay or difficulty, and at a reasonable cost, using the instructions provided.

Article 11 solely applies to electrical or electronic equipment (EEE), as defined by Article 3(11) of the Battery Directive (2006/66/EC), i.e. any EEE as defined by Directive 2012/19/EU (WEEE Directive). Power banks are part of the WEEE Directive.

Article 11 of the Directive contains a number of requirements in this respect. Its main objective is to ensure the removal of waste batteries and accumulators, thereby facilitating their recycling, and, by replacing them, extending the lifetime of the appliances in which they are used. This means that it should be possible to remove them without delay or difficulty and at a reasonable cost, when needed, using the instructions provided. If batteries or accumulators cannot be readily removed by end-users, it should always be possible to have them removed by “qualified professionals” (e.g. electronic repair shops or services) “independent of the manufacturer”.

The qualified professionals should be able to remove the batteries/cells from the power bank without the risk of exposure to chemicals in the batteries/cells. Therefore, the battery and power bank must be designed to ensure that there is no leakage from the battery/cell when removed.

The manufacturer of the power bank must declare that the requirements are met.

O14 Packaging

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

The primary packaging must be designed in such a way that dismantling is possible for all individually parts for waste sorting (e.g. cardboard, paper, plastic, metal) without using any tools.

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

**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, 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.*

- Description of the primary and secondary product packaging. Declaration from the manufacturer of the battery/power bank or brand owner(s) showing that the requirement is fulfilled. Appendix 3 may be used.
- Documentation from packaging suppliers showing the proportion of post-consumer recycled material in their products.
- Statement from the manufacturer of the battery/power bank showing that the total proportion of pre- and post-consumer recycled material in the primary packaging exceeds 80% weight. Appendix 3 may be used.

Background to O14 Packaging

This requirement remains unchanged in generation 6 of the criteria.

The environmental impact of PVC is associated primarily with waste management, the use of additives, and dioxin emissions, for example in the production of PVC, plus the use of mercury in the production of chlorine. According to the report on "Hazardous substances in plastic materials"[27] published by the Norwegian Environment Agency in 2013, PVC may have over 50% plasticiser added, of which phthalates remain the most popular, since they are cheap and have solubility parameters that are very similar to the PVC polymer. PVC requires stabilisers to tolerate the temperatures needed to manufacture a PVC product (extrusion, injection moulding, etc). These stabilisers may be based on lead, metal mixtures (such as barium-zinc and calcium-zinc), tin or cadmium.

Overall, the environmental impact associated with the production, use and disposal of PVC is steadily declining, in part due to new knowledge and technical advances. However, there

[27] Norwegian Climate and Pollution Agency, Hazardous substances in plastic materials, Cowi, January 2013.

is every suggestion that problems associated with PVC remain. There is also inadequate control of PVC imported into the EU and the Nordic region from other parts of the world, which are not subject to the same restrictions.

For Nordic Swan Ecolabel rechargeable batteries and power banks, there is therefore a ban on the use of PVC in the products and their packaging.

Nordic Ecolabelling has reviewed the proportion of recycled materials in the packaging of producers of Nordic Swan Ecolabel primary/rechargeable batteries and concluded that a figure of 80% for pre- and post-consumer recycled material in packaging is an ambitious, but attainable, level. The typical material in packaging is cardboard and PE plastic. An evaluation of primary packaging material used in portable banks shows that primarily the same materials as for batteries are used.

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 primary packaging must be designed in such a way that dismantling is possible for all individually parts for waste sorting (e.g. cardboard, paper, plastic, metal) without using any tools. The typical primary packaging for rechargeable batteries, battery chargers and power banks consist of cardboard/paper and plastic. The primary packaging must be designed so that it is easy to separate the individual material fractions for recycling.

5.8 Licence maintenance

The purpose of the licence maintenance is to ensure that fundamental quality assurance is dealt with appropriately.

O15 Customer complaints

The licensee must guarantee that the quality of the Nordic Swan Ecolabel product or service does not deteriorate during the validity period of the licence. Therefore, the licensee must keep an archive over customer complaints.

Note that the original routine must be in one Nordic language or in English.

- Upload your company's routine for handling and archiving customer complaints.

Background to O15 Customer complaints

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

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

O16 Traceability

The licensee must be able to trace the Nordic Swan Ecolabel products in the production. A manufactured / sold product should be able to trace back to the occasion (time and date) and the location (specific factory) and, in relevant cases, also which machine / production line where it was produced. In addition, it should be possible to connect the product with the actual raw material used.

You can upload your company's routine or a description of the actions to ensure traceability in your company.

- Please upload your routine or a description.

Background to O16 Traceability

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

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

6 Environmental impact of rechargeable batteries and power banks

The relevant environmental impacts found in the life cycle of rechargeable batteries and power banks are set out in the MECO scheme below. A MECO describes the key areas that have impact on the environment and health throughout the life cycle of the product – including consumption of materials/resources (M), energy (E), chemicals (C) and other impact areas (O). This MECO analysis was performed in conjunction with Nordic Ecolabelling's evaluation of the criteria in 2024. The MECO analyses are based on LCA studies[28,29,30] and scientific reports[31,32].

Nordic Ecolabelling sets requirements concerning the topics and processes in the life cycle that have a high environmental impact – also called hotspots. Based on the MECO analysis, an RPS tool is used to identify where ecolabelling can have the greatest effect. R represents the environmental relevance; P is the potential to reduce the environmental impact, and S is

[28] 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).
[29] 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).
[30] Mia Romare, Lisbeth Dahllöf (2017). The life cycle energy consumption and greenhouse gas emissions from Lithium-ion batteries, IVL Swedish Environmental Research Institute.
[31] Wang, X. (2014). Managing End-of-Life Lithium-ion Batteries: an Environmental and Economic Assessment. Thesis. Rochester Institute of Technology.
[32] 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.

the steerability on how compliance with a requirement can be documented and followed up. The criteria contain requirements in those areas in the life cycle that have been found to have high RPS, since there is potential to achieve positive environmental gains.

The product group non-rechargeable portable batteries include different materials and types of production, but with a uniform function: namely to store energy and provide a portable source of power to charge drained electronic devices. Despite differences in battery technology, the overall life cycle remains consistent with those covered in the current criteria: production of raw materials, production of batteries, usage and end-of-life battery treatment. The differences in the types of products lie primarily in the specific battery chemistry and technology used which also influence where the Nordic Ecolabelling focus on setting requirements. Power banks also consist of a special electrical circuit that controls the power flow and a closed casing (plastic or metal) surrounding the battery and circuit.

For rechargeable batteries, the materials and chemistries used provide clear potential for environmental improvements. This made it possible to tighten performance requirements and introduce requirements for recycled content. In contrast, investigations during the revision of non-rechargeable batteries showed no realistic potential for recycled content since alkaline batteries rarely contain recycled materials, and there is no active research or market development in this area. In contrast, rechargeable batteries contain more valuable materials, research is ongoing, and recycling already exists on the market, which made it possible to set requirements here. While energy use in production offered the highest RPS for non-rechargeable batteries, this was not the case for rechargeable batteries and was therefore not prioritised in these criteria.

RPS scheme

Area and assessment	RPS level (high-medium-low)	Comments
The spreading and use of metals, especially heavy metals, from the batteries	R: High P: Medium S: Medium	When it comes to the spreading and use of metals, there are differences in which substances the batteries in the market today contain, and at which concentrations. There are thus relevance (R) and potential (P) to distinguish between more or less environmentally hazardous types of batteries. The Battery Regulation (EU) 2023/1542, already regulates the content of mercury (Hg), cadmium (Cd) and lead (Pb) in batteries. However, Nordic Ecolabelling have seen that there is a potential (P) for a stricter requirement concerning the use of mercury, cadmium and lead. This ensure that the raw materials used in a Nordic Swan Ecolabelled battery have a high purity, which has an impact on the quality (R) of the battery. The steerability (S) of the Hg, Cd and Pb content in the batteries is increased by requiring relevant test analyses.
Mining and refining materials used in batteries	R: High P: High S: Low	Mining and refining of materials used in batteries is by far the biggest environmental impact across the life cycle of batteries. According to LCA studies almost 80% of environmental impacts across the life cycle of batteries were found to occur during the mining and refining of materials. There is thus high relevance (R) for reducing the environmental impacts from mining and refining. The steerability (S) is however low at the moment, but new legislation and new initiatives to verify and trace minerals from mines through the supply chain, is coming forward. When it comes to emissions to air and water, chemical used during extraction and biodiversity loss there are also low steerability. Requirements for the responsible sourcing of mineral raw materials in battery production ensure that batteries placed on the EU market are sustainable, efficient and safe throughout their lifecycle. All licenced batteries within Nordic Swan Ecolabelled rechargeable batteries and power banks must have a due diligence management system to address the social and environmental risks linked to sourcing, processing and trading raw materials along the whole supply chain, regardless of turnover. The requirement is supporting the new EU regulations.
Quality/safety of rechargeable batteries and power banks	R: High P: Medium S: High	Materials composition and production methods vary between the individual product types of rechargeable batteries and power banks. This has a major impact on the quality of the products. It is therefore highly relevant (R) to ensure that the quality of rechargeable batteries and power banks are good. This can be ensured by having requirements that mandates compliance with quality standards. The threshold limit has been discussed together with stakeholders, for example the test institute Intertek to ensure an ambitious but realistic limit on the market (P). The steerability (S) of the quality of the battery/charger is increased by requiring relevant quality parameters to be tested by independent, qualified third parties. Imposing stringent requirements of the quality of rechargeable batteries and power banks not only ensure good energy efficiency and durability but also increases the lifetime of the battery and ensures that no leakage occurs during the use phase. A long battery lifetime also leads to a reduced number of batteries in the commercial and waste stream. It is important that only high quality and durable batteries/chargers, both for low and high-energy devices, can be Nordic Swan Ecolabelled. Safety and quality requirements of rechargeable batteries/chargers ensure safe, energy-effective (long duration) and consumer-friendly batteries.
Overuse of batteries: due to lack of knowledge about	R: High P: Medium/High S: Low	One important parameter for the environmental impact is the incorrect handling of batteries and overuse of batteries. The fewer batteries that are used, the lower the overall environmental impact of the

optimized use, use of incorrect battery type for electrical appliances, and use of poor-quality batteries, incorrect handling of used batteries in the waste flow		batteries/chargers. Accordingly, it is important to ensure that Nordic Ecolabel licences are awarded only to batteries that offer the longest operating time. For the consumer, there are economic and environmental benefits from choosing the right battery with the best capacity for the electronic application, thereby ensuring a long and optimised battery life. There is generally a low level of steerability for the consumers' use of batteries, however an improper use or poor matching of battery type and device lead to unnecessary disposal of batteries. Nordic Ecolabelling sets information requirements to the customers on the packaging of batteries, but it is presumably limited who is reading the information. However, the requirements of consumer information and the design of the packaging ensure a high degree of recycling of the products.
End-of-life for rechargeable batteries and power banks: downcycling, energy in recycling processes, emissions	R: High P: Low/Medium S: Low	Important and valuable material is lost if the recycling processes of rechargeable batteries and portable are not functioning. The recycling in the Nordic countries is a developed and functioning system governed by a combination of EU regulations and national policies. Each country has implemented systems to manage the collection and recycling of batteries/chargers. Collection points are widely available in all countries which makes the potential low to medium. The steerability of setting requirements is low since the producer do not have any controllability after the battery/charger is sold and no controllability over the recycling processes. In a life cycle perspective, however, it is essential to recycle the batteries and other materials in the product. Nordic Ecolabelling has chosen to require that qualified professionals should be able to remove the batteries/cells from the power bank without the risk of exposure to chemicals in the batteries/cells. Therefore, the battery and power bank must be designed so as to ensure that there is no leakage from the battery/cell when removed.
Corporate Social Responsibility	R: High P: High S: Low	Social aspects such as child labour, unsafe working conditions, etc are common within mining and production in countries around the world. The relevance and potential remain high, however the steerability in making a difference remains low due to low controllability in the supply chain. Nordic Ecolabelling has a requirement for working conditions which, in addition to compliance with the UN Global Compact, also includes compliance with the UN Convention on the Rights of the Child (Article 32) and the UN Declaration (61/295) on the Rights of Indigenous Peoples.
PVC in plastic and labelling	R: Medium/High P: High S: High	PVC is still used in some rechargeable battery/charger components. Although PVC accounts for a smaller part of a battery's weight, its environmental impact is significant. PVC contains substances with known adverse health effects such as phthalates and chlorine-based compounds, and its incineration releases harmful dioxins. Alternatives to PVC, such as PET, PE, nylon, and steel, are widely used in many battery/chargers types, indicating strong market potential for substitution. Nordic Swan Ecolabel therefore has a high degree of steerability to prohibit PVC.
Recycled content	R: High P: High S: Medium	Including recycled materials into rechargeable batteries provides environmental benefits, including reduced greenhouse gas emissions and lower water consumption.[33] [34] [35] Compared with mining and processing virgin raw materials, battery recycling requires less energy and generates less air pollution. In addition, recycling helps mitigate long-term supply risks, both physical and geopolitical, associated with critical battery minerals. By decreasing reliance on mining, it also reduces the high energy and water demands, environmental disruption, and social challenges often linked to extraction. Improved recyclability

[33] Recycling lithium-ion batteries delivers significant environmental benefits | Stanford Report
[34] Life cycle comparison of industrial-scale lithium-ion battery recycling and mining supply chains - PubMed
[35] Life Cycle Assessment of Lithium-Ion Battery Recycling: Evaluating the Impact of Recycling Methods and Location - PMC

		and higher recycled content contribute to a more circular economy by minimizing waste and strengthening resource security. Today, recycled material in rechargeable portable batteries is limited. Globally, less than 5 % of lithium-ion batteries are recycled, and lithium's recycling input rate is around 3 % of supply. [36] [37] The EU Battery Regulation sets ambitious targets for recovered content from 2027 onward, but today recycled inputs cover only a minor fraction of demand. While cobalt, nickel and copper can be recovered at higher rates, lithium remains more difficult and less profitable to recycle. Nordic Swan Ecolabelling wants to encourage the share of recycled materials in batteries, however, acknowledge the challenges involved. Through stakeholder dialogue, it is confirmed that recycled materials are already used in batteries. The ambition is to introduce specific requirements for recycled metals in future generations.
PFAS in batteries	R: Medium P: High S: High	Per- and polyfluoroalkyl substances (PFAS) are used in many types of products due to their water and dirt repellent properties. These compounds constitute a group of substances that have highly problematic intrinsic hazardous properties. They are extremely persistent and accumulate in the body. They are spread all over the globe, from the large oceans to the Arctic, and are found in e.g. wild birds and fish and their eggs. Also, shorter chain compounds (2–6 carbon atoms) have been discovered in nature. The substances in this group are suspected to be endocrine disruptors, carcinogenic and to have a negative impact on the human immune system. PFAS are primarily found in rechargeable batteries/chargers, especially in advanced types such as lithium-ion batteries. Applying the precautionary principle, the Nordic Swan Ecolabelling has chosen to exclude PFAS from all rechargeable batteries and power banks.

[36] Recycling lithium-ion batteries: A review of current status and future directions - ScienceDirect
[37] | Material Insights

MECO scheme rechargeable batteries and power banks

[38] [39] [40] [41] [42] [43]	**Raw material**	**Production**	**Use**	**End of life**
Material	Metals (Li, Co, Ni, Mn, Cu and more) Plastic casings, circuit boards in chargers	Mostly assembly (Battery cells, electronics for protection, control and chargers) PVC in components and labelling	Performance degrades over time	Loss of useful materials (Zn, Mn, Li) due to lacking recycling processes (downcycling)
Energy	Energy use – mining and refining of metals	Electricity/energy of the production of the main product (drying, forming and assembly processes), BMS integration Energy source (renewable/fossil) highly affects footprint	Energy losses during charging Energy efficiency varies between models	Energy for dismantling and recycling of metals / materials
Chemicals	Emissions to air and water related to mining Chemicals used during extraction	Emissions to air and chemical exposure (NMP, electrolytes, VOC)	Potential risk of leak of electrolytes/chemicals Risk of fire from damaged or aging cells	Emissions to air and water from the recycle process Emissions to air and water in incorrect recycling (landfill) Emission from incineration
Other	Biodiversity/habitat destruction due to mining Social aspects (Conflict and critical raw minerals) (child labor, unsafe working conditions, etc.)	Unsafe working conditions Waste treatment Waste water with heavy metals or chemical residues	Battery quality and performance Improper use / poor matching of battery type and device which lead to unnecessary disposal (deep discharge, overcharging)	Limited consumer awareness of proper disposal

[38] (PDF) Life cycle assessment of consumption choices: a comparison between disposable and rechargeable household batteries (researchgate.net) 2016
[39] PEFCR Batteries, 2020, version 1.1
[40] 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).
[41] 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).
[42] Mia Romare, Lisbeth Dahllöf (2017). The life cycle energy consumption and greenhouse gas emissions from Lithium-ion batteries, IVL Swedish Environmental Research Institute.
[43] Wang, X. (2014). Managing End-of-Life Lithium-ion Batteries: an Environmental and Economic Assessment. Thesis. Rochester Institute of Technology

7 Criteria version history

Nordic Ecolabelling adopted version 6 of the criteria for 030 Rechargeable batteries and power banks on xxxx. The criteria are valid until xxxx.

8 Future criteria generation

As part of any future evaluation of the criteria, it will be relevant to consider the following:

- Performance requirements.
- Recycled content, specifically focusing on metals.
- Responsible sourcing of raw materials.
- Energy sources in the production.

9 How to apply and regulations for the Nordic Ecolabelling

Application and costs

For information about the application process and fees for this product group, please refer to the respective national website. For contact information see the beginning of this document.

The application consists of an application form/web form and documentation showing that the requirements are fulfilled.

Licence validity

The Nordic Swan Ecolabel licence is valid providing the criteria are fulfilled and until the criteria expire. The validity period of the criteria may be prolonged or adjusted, in which case the licence is automatically prolonged, and the licensee informed.

Revised criteria shall be published at least one year prior to the expiry of the present criteria. The licensee is then offered the opportunity to renew their licence.

Responsibility for Compliance with Applicable Legislation

When applying for the Nordic Swan Ecolabel, the applicant/licensee confirms compliance with all current regulatory requirements related to both the exterior and interior environment in connection with the production and handling of the product(s) covered by the application. Furthermore, the applicant declares that all applicable regulatory requirements within the Nordic region are met for the product(s). Compliance with these regulations is a prerequisite for obtaining a license.

On-site inspection

In connection with handling of the application, Nordic Ecolabelling normally conduct on-site inspection visit/-s to ensure adherence to the requirements. Scope and timing of on-site inspection is evaluated per product group and adapted to the specific application situation.

Queries

Please contact Nordic Ecolabelling if you have any queries or require further information. See contact info in the beginning of this document. Further information and assistance (such as calculation sheets or electronic application help) is available. Visit the relevant national website for further information.

Follow-up inspections

Nordic Ecolabelling may decide to check whether the rechargeable batteries and/or power banks fulfils Nordic Ecolabelling requirements during the licence period. This may involve a site visit, random sampling, or similar test.

The licence may be revoked if it is evident that the products does not meet the requirements.

Random samples may also be taken in-store and analysed by an independent laboratory. If the requirements are not met, Nordic Ecolabelling may charge the analysis costs to the licensee.

Regulations for the Nordic Ecolabelling of products

When the Nordic Swan Ecolabel is used on products the licence number shall be included.

More information on graphical guidelines, regulations and fees can be found at www.nordic-swan-ecolabel.org/regulations

Appendix 1 Description of the rechargeable battery/power bank, material composition and production (O1, O3, O9 and O14)

Product **Brand/trading name(s) of rechargeable battery(s) / power bank(s):**	
Production site(s) (location and address:	

For each battery/cell type and power bank, list the chemical composition, the weight-% and function of each ingoing substance (detailing all constituent substances present in the battery; metals, other solid substances, and liquid chemical substances) in the application: cathode-and anode ingredients, electrolyte solutions, conductor-, separator- and container ingredients and other materials.

Product name		
Cathode ingredients Substance and CAS nr.	**Concentration of total weight-%**	**Function**
Anode ingredients Substance and CAS nr.		
Electrolyte solutions Substance and CAS nr.		
Conductor Substance and CAS nr.		
Separator Substance and CAS nr.		
Other ingredients Substance and CAS nr.		
Container Substance and CAS nr.		

Description of manufacturing process of the product:

_____
_____
_____
_____

Excluded substances (O3)

The battery/cell shall not contain per- and polyfluoroalkyl substances (PFAS)*

**PFAS: any substance that contains at least one fully fluorinated methyl (-CF3) or methylene (-CF2-) carbon atom, with no H/Cl/Br/I attached.*

I hereby declare that the battery/cell does not contain (has not been added intentionally) per- and polyfluoroalkyl substances (PFAS).

Charged battery (Requirement O9)

The requirement solely applies to Nickel-metal hydride (NiMH batteries) and cells. Fully charged is defined as minimum 70% electrical stored capacity (SOC).

I hereby declare that the battery/cell is fully charged when it leaves the production site.

Applicant or manufactures signature

Date:	Company Name:
Responsible person:	Responsible persons signature:

Appendix 2 Battery charger and power bank (O4, O5, O13)

Applications for battery chargers: fill in part A and part B.

Applications for power bank: fill in part A and part C.

Name/type of battery charger or power bank:	
Manufacturer of the battery charger or power bank:	

Battery charger:

A. Plastic and metal in casing (O4)

The requirement solely applies to plastic and metal in the casing of the battery charger and the outer casing that encircles the batteries/cells in the power bank. The requirement does not apply to the battery, the casing encircling the battery/cell itself, circuit/PCBs, wires or USB/charge ports.

Plastic Mark your answers with an X in the relevant column.		**Yes**	**No**
1.	Does the casing of the battery charger or power bank consist of plastic parts covering a surface > 200 m2?		
1.a	If yes, is the plastic part labelled in accordance with ISO 11469?		
2.	Does the plastic contain chlorinated plastic?		
3.	Has PFAS actively been added to the casing?		
4.	Have cadmium and lead actively been added to the plastic in the casing?		
5.	Have chloro-paraffins actively been added to the plastic in the casing?		
6.	Have the following flame retardants been added to the plastic in the casing? a. Hexabromocyclodecane (HBCDD), tetrabromobisphenol A (TBBP-A) and tris(2-chloroethyl)phosphate (TCEP)? b. Other halogenated organic flame retardants and flame retardants that have been given one or several of the following risk phrases; H350, H350i, H340, H360D, H360F, H360Df, H360Fd?		

Metal Mark your answers with an X in the relevant column.		**Yes**	**No**
1.	Have the following metals actively been added to the plastic in the casing: Lead (Pb), mercury (Hg), chromium VI (CrVI), cadmium (Cd), cobalt (Co), antimony (Sb), zinc (Zn), copper (Cu) or nickel (Ni)?		
Exception: Steel is allowed to be used in the base panel that holds the USB/charge ports in power banks, but only if the steel is coated/laminated or covered with e.g. plastic.			

Manufacture of the battery charger or power bank signature

Date:	Company Name:
Responsible person:	Responsible persons signature:

B. Battery charger, battery sizes (O5)

The requirement applies solely to chargers for rechargeable batteries of the following sizes: AAA: HR03, AA: HR6, C: HR14, D: HR20, 9V: HR 22.

I hereby declare that the charger is suitable for use with a minimum of two battery sizes.

Manufacture of the battery charger signature

Date:	Company Name:
Responsible person:	Responsible persons signature:

Power bank:

C. Recyclable design of the power bank (O13)

The power bank must be designed in such a way that dismantling is possible.

I hereby declare that:

- A qualified professional, working alone, is able to dismantle the power bank.
- It is possible to separate the substances, preparations, and components according to ANNEX VII of the WEEE Directive (2012/19/EU).
- It is possible to remove the secondary batteries/cells for recycling purposes.
- The battery/cell chemicals are prevented from leaking during the removal of the battery/cell(s).

Manufacturer of the power bank signature

Date:	Company Name:
Responsible person:	Responsible persons signature:

Appendix 3 Packaging (O14)

Name of the manufacturer of the battery/portable charger or brand owner	

Description of materials used in the primary[44] and secondary[45] product packaging:

_____
_____
_____
_____
_____

I hereby declare that

- the total proportion of pre- and post-consumer recycled material in the primary packaging for the batteries is at least 80% by weight.
- chlorine-based plastic is not used in the primary and secondary product packaging.
- the primary packaging is designed in such a way that dismantling is possible for all individually parts for waste sorting (e.g. cardboard, paper, plastic, metal) without using any tools.

Manufacturer or brand owner signature

Date:	Company Name:
Responsible person:	Responsible persons signature:

[44] Primary packaging: refers to the purchase packaging for the consumer, e.g. the packaging that holds four batteries or one portable charger, and which the consumer encounters in sales.
[45] Secondary packaging: refers to the transport packaging and protects the packs of batteries and portable chargers during transport to stores and consumers.

Appendix 4 Analysis and test laboratories

Testing of quality specifications must be performed by laboratories, which are accredited to the current standard and fulfil the general requirements in the standard EN ISO/IEC 17025 or have official GLP status. A non-accredited laboratory may perform tests if the laboratory has applied for accreditation according to the current testing method, but has not yet been granted approval, or if accreditation is not available for the technical specification or proposed standard. In such case, the laboratory must prove that it is an independent, competent laboratory.

The manufacturer's analysis laboratory/test procedure may be approved for analysis and testing if:

- Sampling and analysis are monitored by the authorities; or
- The manufacturer's quality assurance system covers analyses and sampling and is certified to ISO 9001; or
- The manufacturer can demonstrate agreement between a first-time test conducted at the manufacturer's own laboratory, and testing carried out in parallel at an independent test institute, and the manufacturer takes samples in accordance with a fixed sampling schedule.

Electrical testing (O8):

Determination of battery endurance in cycles for NiMH batteries and cells

Preparation of the test

1. Determination of the rated capacity (C) in accordance with IEC 61951-2, paragraph 7.3.2 “Discharge performance at 20°C (rated capacity)” at an ambient temperature of 20 °C.
2. Determination or specification of the nominal capacity (N).
3. Prior to endurance in cycle test, the cell shall be discharged at a constant current of 0,2 I_tA, to a final voltage of 1,0 V.

Performance of the tests

1. Charge and discharge currents, ambient temperature and the respective periods of rest must be carried out in accordance with IEC 61951-2, paragraph 7.5.1 “Endurance in cycles”.
2. The tests must carry out on a minimum of three batteries, in accordance with the sample size specified in IEC 61951-2. Each test must include at least three batteries of each size and brand model. The highest capacity value specified on the cell must be used for the purposes of testing.
3. All three batteries must meet the requirements listed therein.

Determination of endurance in cycles for Li-ion batteries and cells

Preparation of the test

1. Determination of the rated capacity (C) in accordance with IEC 61960-3, paragraph 7.3.1 “Discharge performance at 20°C (rated capacity)” at an ambient temperature of 20°C.
2. Determination or specification of the nominal capacity (N).
3. Prior to charging, the cell or battery shall be discharged at 20 °C ± 5° C at a constant current of 0,2 I_tA, down to a specified final voltage.

Performance of the tests

1. Endurance in cycles at a rate of 0,5 I_tA (accelerated test procedure). In order to accelerate the test, the procedure in Table 4 must be followed.
2. The remaining capacity measured according to step 1 to step 3 of paragraph 7.3.1 “Discharge performance at 20°C” when the test is completed shall be no less than stated in the requirement.
3. The tests must be performed on a minimum of three batteries in accordance with the sample size specified in IEC 61960-3. Each test must include at least 3 batteries of each size and brand model. The highest capacity value specified on the cell must be used for the purposes of testing
4. All three batteries must meet the requirements listed therein.

Table 3

Cycle number a	Charge	Stand in charged condition h	Discharge
A: 700 or B: 525	Method declared by the manufacturer	0 to 1	0,5 ItA to final voltage
[a] A: for cell, B: for batteries.			