About Nordic Swan Ecolabelled

# Cleaning of liquid damaged electronics



Version 1.0 • date – date

**Consultation proposal**

Nordic Ecolabelling

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This document is a translation of an original in Danish. In case of dispute, the original document should be taken as authoritative.

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# Addresses

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


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**Summary**

Cleaning liquid damaged electronics has a positive impact on the environment, since instead of ending up as e-waste, the damaged electronic device is returned to the user. This avoids the production of a new device to replace the liquid damaged electronics, which in turn saves on both energy and raw materials that would have been used to manufacture the new device.

Although saving the electronics and bringing them back into use provides by far the greatest environmental gain, the Nordic Swan Ecolabelled service must also be as gentle on the environment and people as possible. Therefore we apply a number of additional energy and environmental requirements to the process – including requiring that all the chemical products used must be ecolabelled. Nordic Swan Ecolabelling further ensures that the electronic parts that are replaced, or the electronic devices that cannot be saved, are handled responsibly in the waste phase.

For the cleaning of electronic devices to work, and to ensure that new products are not purchased instead, the service should be fast and provide a high success rate. Customers will then be very pleased and see this as a qualitatively good alternative to discarding their device and buying a new one.

Typically, devices are sent for cleaning and repair via insurance companies and private customers. The insurance company contacts the workshop on behalf of its customer, who has a damaged product.

Cleaning of liquid damaged electronics is still a relatively new area, but provision of the service is growing. Its clear environmental credentials justify its backing by Nordic Ecolabelling, and the Nordic Swan Ecolabel is a mark of quality and assurance that the cleaning technique is effective and does not have any undesirable environmental side-effects.

# 1 Basic facts about the criteria

### Products that may be Nordic Swan Ecolabelled

These criteria provide for the Nordic Swan Ecolabelling of a service that cleans and saves liquid damaged electronics such as laptops, tablets, mobile phones and smart phones and -watches. The cleaning process may be manual, semi-manual or fully automated. The service is counted from the time the business receives the liquid damaged electronic device, until the device is cleaned and dried, any corrosion has been stopped and the product is ready to be returned to the customer.

This generation of the criteria does not include requirements regarding any transport included in the service.

### Who can apply for a licence

Businesses that have control over the process and can document full compliance with Nordic Ecolabelling's requirements may apply for a licence.

It may be a single workshop that offers the service or the supplier of a fully automated process that supplies the technology to multiple workshops, which then offer the service. If the licensee is a supplier of a fully automated service, it must be made clear in the licence which workshops and drop-off points are covered by the Nordic Swan Ecolabel licence. Only those workshops and drop-off points that are covered by the Nordic Swan Ecolabel licence may market themselves using the Nordic Swan Ecolabel.

### Motivation for Nordic Swan Ecolabelling

Cleaning liquid damaged electronics so that they work again has a positive impact on the environment since, instead of ending up as e-waste, they are directly returned to the eco cycle. This avoids the production of a new device to replace the liquid damaged electronics, which in turn saves on both energy and raw materials that would have been used to manufacture the new device. It also avoids using resources to process the electronic device as electronic waste. With modern electronics, energy consumption in the use phase is not what most affects the environment. The consumption of energy and scarce resources during manufacture, and the processing of the devices after use, on the other hand, are incredibly significant[1, 2, 3], which is why the environmental gain from bringing electronics back into use is so great.

For the cleaning of electronic devices to work, and to ensure that customers do not buy a new product instead, the service should be fast and provide a high success rate. The customers will then be very pleased and see this as a qualitatively good alternative to discarding their device and buying a new one. A high proportion of the cleaning must thus result in the electronic device working satisfactorily again. Similarly, the time between handing in and collecting/getting back the device must not be too long. Last but not least, it is important to ensure that any corrosion is stopped, so that the liquid damage does not have any later consequences.

Although saving the electronics and bringing them back into use provides by far the greatest environmental gain, the Nordic Swan Ecolabelled service must also be as gentle on the environment and people as possible. This is why a number of additional energy and environmental requirements are also applied to the process – including requiring that all the chemical products used must be ecolabelled. No chemicals such as pure organic solvents may therefore be used in a Nordic Swan Ecolabelled process. There must also be no use of chemicals that might create a poor working environment or have an unnecessarily high environmental impact.

[1] Zink, T., Maker, F., Geyer, R. & Amirtharajah, R. (2014): Comparative life cycle assessment of smartphone reuse: Repurposing vs. refurbishment. https://www.researchgate.net/publication/260338005_Comparative_life_cycle_assessment_of_smartphone_reuse_Repurposing_vs_refurbishment
[2] Ciroth, A. & Franze, J. (2011): LCA of an Ecolabeled Notebook, Considerations of Social and Environmental Impacts Along the Entire Life Cycle. https://www.greendelta.com/wp-content/uploads/2017/03/LCA_laptop_final.pdf
[3] Hoang, A., Tseng, W., Viswanathan, S. & Evans, H. (2009): Life Cycle Assessment of a Laptop Computer and its Contribution to Greenhouse Gas Emissions. https://www.researchgate.net/publication/268414508_Life_Cycle_Assessment_of_a_Laptop_Computer_and_its_Contribution_to_Greenhouse_Gas_Emissions

As a supplier of the service “cleaning of liquid damaged electronics”, you have influence over how effective and environmentally harmful the cleaning is through your choice of process/technology and chemicals.

Nordic Swan Ecolabelled cleaning of liquid damaged electronics:

- Has a high success rate and ensures a fast service
- Involves limited use of energy and water
- Only uses ecolabelled removal and cleaning agents
- Ensures the correct handling of electronic waste

### The version and validity of the criteria

Nordic Ecolabelling adopted version 1.0 of the criteria for cleaning of liquid damaged electronics on xx. mmm 2019. This version will apply until xx. mmmm.20xx.

# 2 The Nordic market

Manufacturers/suppliers of cleaning machines used to clean electronics make their machines available to workshops that repair damaged electronics. The workshops pay for the successful cleaning processes, where the cleaning results in the electronics once again being fully functional and ready for return to the end user.

Typically, devices will come in for repair from insurance companies and private customers. The insurance company contacts the workshop on behalf of a customer who has a damaged product. In this case, the success rate will be determined by how many units can be repaired within the set budget. Private customers are customers who do not have insurance cover for their electronic device. Such customers will contact the workshop directly.

Cleaning of liquid damaged electronics is still a relatively new area. At this time, only a few cleaning machines are available at workshops in the Nordic region, and the number of cleaned electronic devices only runs to a few thousand per month in this territory. This is, however, a growth market, not only in the Nordic region but across Europe, and in other parts of the world.

The global trend currently is for declining sales of personal electronic devices such as laptops and tablets[4], which suggests that the market is fairly saturated. It is reasonable to assume that this trend is greater in the more developed parts of the world (such as the Nordics), since the less developed countries are expected to continue growing. The decline in sales of electronic devices is explained in part by the fact that the products do not require updating as regularly as they used to.

[4] Statista, 2018: Shipment forecast of laptops, desktop PCs and tablets worldwide from 2010 to 2022 (in million units). https://www.statista.com/statistics/272595/global-shipments-forecast-for-tablets-laptops-and-desktop-pcs/

This trend means that more people will be interested in getting their devices repaired, since this is usually cheaper than replacing them – and also the data on the devices is not lost.

### The environment as a competitive factor

Cleaning of electronics is obviously a eco-friendlier solution than buying a new replacement, but suppliers of this service believe that it will still be beneficial for their technology to carry the Nordic Swan Ecolabel.

The ecolabel is a clear marker of the environmental gains that are achieved when a laptop can be cleaned instead of a new one having to be purchased. It is, however, important that the Nordic Swan Ecolabel also serves as a quality assurance that the cleaning technology is effective and does not have any undesirable side-effects.

# 3 Other labels

As far as Nordic Ecolabelling is aware, there are no official ecolabels or ecolabelling schemes for the cleaning of liquid damaged electronics.

# 4 About the development of the criteria

### Aim of developing the criteria

The main purpose of developing these criteria is for Nordic Ecolabelling to help promote the eco-friendly service of saving electronic devices and thus giving them a longer lifetime and avoiding production of new electronics. This is a prime example of how the Nordic Swan Ecolabel can support a circular economy by ensuring good promotion of one such circular service. The Nordic Swan Ecolabel also aims to establish the credibility of this service, so that cleaning is used more widely instead of buying new electronic devices. This is achieved by setting requirements for the performance of the cleaning service (speed and quality) that ensure a good customer experience, plus relevant environmental requirements for a cleaning process that does not cause any unnecessary impact on the environment.

### About this criteria development

The preliminary study of this service, which led to a recommendation that Nordic Ecolabelling should develop criteria, was adopted on 7 November 2018.

Proposed criteria were sent out for consultation over the period xxxx-yyyyy. A total of xx responded to the consultation. Of these, xx approved the proposal, xx opposed it and xx expressed no position, but xx of them submitted comments. The areas that attracted the most comments were:

- xxx
- yyy

This current criteria document is the result of amendments to the consultation proposal on the basis of the responses to the consultation.

# 5 Environmental impact of cleaning of liquid damaged electronics

### General environmental gains from cleaning of liquid damaged electronics

Cleaning liquid damaged electronics so that they work again has a positive impact on the environment.

Avoiding the production of new electronics helps to reduce e-waste, as well as saving on the energy and raw materials used to produce a new electronic device.

The background document for the Nordic Swan Ecolabelling of computers states that energy consumption in the production phase plays a major role in the computer's overall environmental impact. This is supported by Hoang, Tseng, Viswanathan & Evans (2010), who conclude that the production and manufacture of a computer accounts for almost 90% of its energy consumption and emissions of greenhouse gases over the course of its life cycle.

According to the background document for the EU Ecolabel criteria for computers, many current studies on the environmental impact of computers and other electronics continue to focus strongly on the use phase of the devices. The environmental impact that occurs during the production phase is often overlooked, not least because data about production processes is hard to access. An LCA of smartphones (Ercan et al., 2016[5]) shows that 85-90% of a smartphone's climate impact over its lifetime derives from the extraction of raw materials and the manufacture of the phone. It is therefore a highly significant move, environmentally, to avoid discarding electronics and instead extend their lifetime – as is the case with cleaning of liquid damaged electronics.

Electronic devices such as mobile phones, tablets and laptops contain a number of scarce resources and metals such as gold, silver, platinum, indium, tantalum, gallium and so on. Although the quantity in grams may seem relatively small, from a resource perspective it is incredibly significant. In addition, extraction and production are associated with significant environmental impacts and, in the case of certain metals, may also be linked with breaches of human rights[6] and problems for endangered animal species[7].

Furthermore, large quantities of water are used in the manufacture of computers and other electronics, particularly when producing computer chips. Environmental organisation Friends of the Earth has attempted to estimate a water footprint that takes account of water consumption over the life cycle of a smartphone. They put consumption at no less than 12,760 litres of water per phone, the vast majority of which occurs during the raw material extraction and production phases[8].

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[5] Ercan, M., Bergmark, P., Kimfalk, E. & Nilsson, E. (2016): Life Cycle Assessment of a Smartphone. https://download.atlantis-press.com/article/25860375.pdf
[6] The Guardian (2018): Is your phone tainted by the misery of the 35,000 children in Congo's mines? https://www.theguardian.com/global-development/2018/oct/12/phone-misery-children-congo-cobalt-mines-drc
[7] Wildlife Conservation Society (2017): Conflict minerals: Deadly for great apes. https://www.wcs.org/get-involved/updates/conflict-minerals-deadly-for-great-apes
[8] Friends of the Earth (2015): The land and water footprints of everyday products. Mind your step. https://friendsoftheearth.uk/sites/default/files/downloads/mind-your-step-report-76803.pdf

The above-mentioned resource consumption involved in the production of new electronics will not occur if electronics are repaired/cleaned instead of being replaced, thus extending the lifetime of the product.

E-waste is a major environmental problem for a number of reasons. One of the ways that e-waste is disposed of is by exporting it abroad, with a major risk that it will then end up in landfill. This is a considerable problem for the environment, since emissions of toxic chemicals in an area, not least into the groundwater, can destroy the local environment. Another method of e-waste disposal is incineration. Incineration releases toxic substances into the atmosphere, which is also a serious problem for the environment.

#### Environmental impacts from the cleaning of liquid damaged electronics

The cleaning of liquid damaged electronics requires energy to run the cleaning process and to fully dry out the devices. Water and cleaning agents are also used in the cleaning process, which will thus generate wastewater containing chemical residues and possibly also substances that were flushed out from the electronic device.

Suppliers of the service cleaning of liquid damaged electronics have influence over how effective and environmentally harmful the cleaning is through their choice of process, technology, chemicals and so on. The type of chemicals to be used in the machine often depends on the cleaning method – and if it is a fully automated process, the chemicals will often already be part of the supplied technology. In this case, the manufacturer/supplier of the machine has the capacity to influence their supplier of cleaning chemicals for the machine. The manufacturer/supplier of the machine may be the licensee.

For the cleaning of electronic devices to work, and to ensure that people do not just buy new products instead, the service should be fast and provide a high success rate, so the customer experiences a high level of satisfaction.

The electronic devices that cannot be brought back to life must be processed correctly, so that not all the important resources end up in landfill, with the scrap instead sent for recycling in order to bring as many of the resources as possible back into the eco-cycle. The supplier of the service can contribute to this by having good and trustworthy agreements with collectors of electronic scrap.

# 6 Justification of the requirements

## 6.1 Definition of the product group

These criteria provide for the Nordic Swan Ecolabelling of a service that cleans and saves liquid damaged electronics such as laptops, tablets, phones and smartphones and -watches. The cleaning process may be manual, semi-manual or fully automated. The service is counted from the time that the business receives the liquid damaged electronic device, until the device is cleaned and dried, any corrosion has been stopped and the product is ready to be returned to the customer.

This generation of the criteria does not set requirements concerning any transport that may be involved in the service.

The product group is limited specifically to personal electronics such as personal computers, tablets, mobile phones, smartphones and smart watches. This therefore excludes electronic products for industrial use such as robots and machinery containing electrical devices. This restriction has been set in part to ensure the relevance of the requirements and requirement levels in relation to the types of liquid damage that may occur and the functional unit.

The criteria have been developed in collaboration with a manufacturer of a mechanical solution for the cleaning of liquid damaged electronics, which Nordic Ecolabelling also predicts will be the most widespread solution used. However, this does not exclude more manual solutions from obtaining a licence, as they may also be a good environmental solution.

The service is limited to the actual cleaning of the electronic devices. There may be suppliers who offer transport (collection/delivery) as part of the service. There is, however, considerable variation in how such a collection/delivery service is offered, and whether it falls into the service provider's area of responsibility.

Some workshops package the electronic device in a cardboard box and send it by courier to the nearest cleaning machine. Other workshops have their own cleaning machine. Nordic Ecolabelling's knowledge in this area remains limited, but we judge the impact from this transport to be small, compared to the overall positive environmental effect of getting the electronic device back to the user. Therefore no transport requirement has been included in this generation of the criteria.

Nordic Ecolabelling has included a requirement that the licensee must offer processing of the electronic devices that cannot be repaired through cleaning. It is highly likely that a customer whose electronic device cannot be saved will require help in disposing of the device in a responsible way.

The functional unit is "per cleaned electronic device". The unit has been chosen to ensure that the requirements are balanced in relation to each other and in terms of their relevance/importance to the product group's environmental performance.

### The licence structure is thus subdivided as follows:

Businesses that have control over the process and can document full compliance with Nordic Ecolabelling's requirements may apply for a licence.

It may be a single workshop that offers the service or the supplier of a fully automated process that supplies the technology to multiple workshops, which then offer the service. If the licensee is a supplier of a fully automated service, it must be made clear in the licence which workshops and drop-off points are covered by the Nordic Ecolabel licence. Only those workshops and drop-off points that are covered by the Nordic Ecolabel licence may market themselves using the Nordic Swan Ecolabel.

## 6.2 Description of the service

### O1 Description of the service

The applicant must submit the following information about the service:

- Trade name(s)
- The types of electronic devices that are cleaned.
- Workshops and drop-off points included in the application, with their full name and address plus GPS coordinates.
- Description of the process from the customer dropping off their liquid damaged electronic device until its return to the customer.
- A description of the technology and the materials, chemicals and similar used.
- Any subcontractors who provide part of the service must be described with company name, production location, contact person and the production processes used.

✉ Detailed description of the points above. Any product data sheet may be sent as part of the documentation. A flow chart is recommended to explain the production process.

**Background to requirement O1**

In order for Nordic Ecolabelling to be able to establish that the service for which a licence is being sought falls within the product group definition, and in order to correctly process the case, it is important to have basic information about the performance in place at the start of the application.

## 6.3 Effectiveness and quality of the service

### O2 Rescue rate

At least 70% of the smartphones, tablets and smart watches deposited submitted and screened* and at least 80% of the laptops deposited and screened* are to be returned to the customer in a usable condition**. The rescue rate is to be achieved and documented per cleaning location/facility.

For all electronics devices that are rescued and which according to product warranty rules are within the warranty period, the licensee is responsible for the warranty for the remaining period of the product warranty period.

** "Deposited and screened" means that the electronic devices have been deposited with a technician, who has conducted an initial assessment of whether the device can realistically be saved by cleaning.*

*** "Usable state" means that the technician conducts a final check of the electronic device's functionality. It must be established at this point that the device is in the same state and has the same level of functionality as before the damage, and this is to be confirmed using a standard procedure from the manufacturer of the electronic device.*

✉ The licence applicant must submit statistics from every single cleaning location/facility: 1. Deposited and screened electronics. 2. The percentage of the devices that are returned to the customer in a usable condition.

✉ Calculation showing fulfilment of the requirement.

☒ Declaration from the licensee and workshops (if workshops are linked to the licence) that after cleaning the electronic device is tested for functionality under standard testing procedures from the manufacturer of the electronic device.

☒ Declaration from the licensee that they take over the warranty for the remaining period of the product warranty period, for all electronics devices that are rescued and which were still within the product warranty period. In addition, a description of how such a guarantee system is maintained and secured to customers.

### Background to requirement O2

The most important function of these criteria is to save as many liquid damaged electronics as possible. If the electronic device is not going to work satisfactorily for the customer, they are likely to get rid of it and so the work of trying to save the product is simply an unnecessary use of resources. In addition, a high proportion of electronic devices need to be saved to ensure high customer satisfaction and thus increase confidence in the service.

In order to ensure that every customer receives the same service level for the cleaning of their electronic device, we have decided that the requirement concerning rescue rate must be achieved for every location and in every facility that provides the cleaning service. This means that if, as a licensee, you have multiple cleaning machines located at different workshops, each individual workshop with a cleaning machine must fulfil the requirement.

As part of rescuing the electronic device, the workshop may need to replace certain seriously damaged electronic parts in order to make the device work properly again. Nordic Ecolabelling has chosen not to relate the requirement concerning proportion of rescued electronic devices to the proportion of the product's parts that are replaced.

Components for electronic devices are relatively expensive compared with the price of a new electronic device. There is therefore a financial limit on how many parts can be replaced before it makes better financial sense to buy a new device. There will, however, always be an environmental gain in cleaning and saving electrical devices, compared with buying new products – even with extensive replacement of components.

In the EU there are product guarantee rules to ensure the consumer if one's products break down prematurely. For most products, including electronics devices, the product guarantee scheme in the EU is set at 2 years. However, as soon as a device has been exposed to damage, such as liquid damage, the manufacturer's warranty lapses. The consumer will therefore not be able to rectify complaints during the original warranty period. To ensure security about the service cleaning of liquid damaged electronics, Nordic Ecolabelling requires that the licensee must "take over" the original product guarantee, so that the consumer's original warranty is intact.

## O3 Cleaning speed

For each cleaning location/facility in the licence application, the total time for the cleaning process and drying must not exceed one working day.

*Additional repairs and replacement of components are not included in this working day.*

✉ The licence applicant must provide documentary evidence that the cleaning process and drying are completed within one working day. If the licence covers multiple cleaning locations/facilities, documentation must be provided for each one.

### Background to requirement O3

People are extremely dependent on their electronic devices these days and being without them for any length of time is very bad news for most users. It is therefore vital for the credibility of this service that it is able to compete against buying a new device, which is why the customer must get the electronic device back in a usable condition as quickly as possible – a short turnaround time (TAT).

In order to ensure that every customer receives the same service level, we have decided that the requirement concerning speed of cleaning must be achieved for every location and in every facility that provides the cleaning service. This means that if, as a licensee, you have multiple cleaning machines located at different workshops, each individual workshop with a cleaning machine must fulfil the requirement.

There are, however, certain limits to the parts of the repair process over which this service has steerability. If, for example, a user in northern Sweden requires a repair, time for transport to a location where the repair and cleaning can be carried out needs to be factored in. There may also be delays in delivery of components from the manufacturer, something over which the repairer or licensee has no control, which is why Nordic Ecolabelling's requirement focuses on the part of the repair that the licensee has control over, which is cleaning and drying. It is important to make sure that the cleaning and drying do not delay the overall repair to any significant degree.

## O4 Stopping corrosion

An independent, qualified* third-party laboratory must have conducted a test programme that, based on their expertise, provides documentary evidence of the cleaning process's ability to stop corrosion.

The test is defined by the independent third party but must, as a minimum, include:

- Three days of exposure to a representative liquid (such as cola, coffee or wine) for one or more types of electronic device that correspond to the devices for which a licence is being sought.
- Optical assessment of the corrosion and a check of system functions immediately after cleaning, after one week, after three months and after six months.

* *"Qualified" means that the laboratory has expertise in testing corrosion – including accreditation to perform corrosion tests in accordance with ISO 9227. The laboratory must also comply with Appendix 1.*

✉ Report from qualified third party showing that no further corrosion occurs in products that have been through the cleaning process. The report is to be based on the stipulations above.

### Background to requirement O4

If the process always returns the product to a usable condition, but does not stop the corrosion process, it is only a question of time before the electronic device fails again – and then we have not achieved the full environmental gain and the customer has experienced a poor-quality service. As an important environmental and quality requirement, we have therefore chosen to require documentation that the process stops any corrosion.

## 6.4 Environmental requirements

The requirements in this section are limited only to the cleaning and drying process for the liquid damaged electronic device. They do not relate to energy or water consumption within the business, such as lighting, ventilation, water for the kitchen, and so on.

### O5 Energy consumption

The total average annual consumption for the cleaning and drying process ($A_{energy}$) must not exceed the threshold value for energy consumption ($G_{energy}$). The requirement is to be fulfilled and documented per cleaning location/facility. The permitted energy consumption depends on the number and type of electronics being saved, see the factor values in the table below.

**Table 1 Factor values for energy consumption for cleaning and drying per saved device**

| Type of electronics | Threshold value per saved device ($F_{energy}$) |
|---|---|
| Laptop | 1.60 kWh per unit |
| Tablet | 2.20 kWh per unit |
| Smartphone | 1.10 kWh per unit |
| Smart watch | 2.20 kWh per unit |

$A_{energy} \leq G_{energy}$

Calculation of $G_{energy}$ and $A_{energy}$:

$$G_{energy} = \sum \left[ (Number)_i \cdot (F_{energy})_i \right]$$

$A_{energy}$ = the energy used (electricity consumption) in kWh for cleaning and drying.

$G_{energy}$ = Threshold value for energy consumption in kWh at the workshop for cleaning and drying.

$(F_{energy})_i$ = Factor value for energy use (electricity consumption) in kWh per saved device of type i.

$(Number)_i$ = Number of saved devices of type i that are returned to the customer in a usable condition, see requirement O2.

✉ For each cleaning location/facility: Measurements of energy consumption for the process over a limited period compared with the number of electronic devices that have been saved and returned to the customer in a usable condition.

### Background to requirement O5

To ensure a focus on energy efficiency when saving electronic devices, we have chosen to set an energy requirement and make it relative to the number of devices saved. We are doing this even though the energy consumption saved by avoiding producing new electronics is far greater. The requirement has been set to ensure no unnecessary waste of energy and, combined with our other process and chemical requirements, can help to identify the most environmentally positive methods for saving liquid damaged electronics.

The requirement level has been set based on data gathered from known technology. In order to acknowledge that other technologies in this area may also be environmentally acceptable, even if they use a little more energy, the threshold value has been set slightly higher than the consumption figures that we have available to us.

Each production location must individually meet this requirement in order to ensure that there are no workshops covered by the Nordic Swan Ecolabel licence that only meet the requirements because other workshops covered by the licence have lower energy consumption than the requirement level.

## O6 Water consumption

The total average annual consumption for the cleaning and drying process ($A_{water}$) must not exceed the threshold value for water consumption ($G_{water}$). The requirement is to be fulfilled and documented per cleaning location/facility. The permitted water consumption depends on the number and type of electronics being saved, see the factor values in the table below.

**Table 2 Factor values for water consumption for cleaning and drying per saved device**

| Type of electronics | Threshold value per saved device ($F_{water}$) |
|---|---|
| Laptop | 12 litres per device |
| Tablet | 12 litres per device |
| Smartphone | 6 litres/device |
| Smart watch | 12 litres per device |

$A_{water} \leq G_{water}$

Calculation of $G_{water}$ and $A_{water}$:

$$G_{water} = \sum [(Number)_i \cdot (F_{water})_i]$$

$A_{water}$ = The water used in the process, expressed in litres.

$G_{water}$ = Threshold value for water used in the process at the workshop, expressed in litres.

$(F_{water})_i$ = Factor value for water consumption in litres per saved device of type i.

$(Number)_i$ = Number of saved devices of type i that are returned to the customer in a usable condition, see O2.

✉ For each cleaning location/facility: Measurements of water consumption for the process over a limited period at the workshop(s) compared with the number of electronic devices that have been saved and returned to the customer in a usable condition.

### Background to requirement O6

To ensure a focus on water consumption when saving electronic devices, we have chosen to set a requirement for overall water consumption within the service. It is worth stating, however, that far more resources are consumed if the electronic device is discarded and replaced with a new purchase. The aim of this requirement is to ensure that provision of the service involves no unnecessary waste of water. Combined with our other process and chemical requirements, the requirement can help to identify the most environmentally positive methods for saving liquid damaged electronics.

The requirement level has been set based on data gathered from known technology. In order to acknowledge that other technologies in this area may also be environmentally acceptable, even if they use a little more water, the threshold value has been set slightly higher than the consumption figures that we have available to us.

Each production location must individually meet this requirement in order to ensure that there are no workshops covered by the Nordic Swan Ecolabel licence that only meet the requirements because other workshops covered by the licence have lower water consumption than the requirement level.

### O7 Wastewater

When applying for a licence and then once a year thereafter, the licensee must test wastewater from at least one cleaning facility/machine for the following heavy metals:

- Arsenic (As)
- Lead (Pb)
- Mercury (Hg)
- Copper (Cu)
- Cadmium (Cd)
- Nickel (Ni)
- Chromium (Cr)

The wastewater test is to be performed on the water that is discharged from the cleaning facility/machine into the sewerage system (possibly after treatment).

The test is to be performed by an independent third-party laboratory* that is accredited to test for heavy metals in wastewater.

Test method: EN ISO 11885 or equivalent national standard.

If internal wastewater treatment takes place, the licensee must submit documentation containing, as a minimum, a description of the treatment method and how any waste products are dealt with.

The reason for choosing cleaning facilities/machines from which to collect wastewater samples must be explained, and the reasoning must demonstrate that the licensee is working to ensure a representative sample.

* *Requirement for third-party laboratory, see Appendix 1.*

✉ Description of how wastewater samples from cleaning facilities/machines have been chosen.

✉ Test results for wastewater samples that have been tested for the heavy metals listed in the requirement. The test must be performed in line with the parameters set out in the requirement.

✉ Procedure showing that once a year a wastewater test is performed at a minimum of one cleaning facility/machine, including a description of how the cleaning facilities/machines are chosen for wastewater testing.

✉ If any wastewater treatment is carried out internally: Description of the wastewater treatment method plus description of how any waste products from that process are dealt with.

### Background to requirement O7

There is an acknowledged challenge in the fact that electronic devices contain heavy metals[9], and that the manufacture of electronic equipment leads to heavy metals in the wastewater[10]. There is a small risk that these heavy metals might be flushed out during the cleaning of liquid damaged electronics. The cleaning process may involve small amounts of water that are reused several times before being discharged as wastewater.

Very little is known about the levels of heavy metals in wastewater from the cleaning of liquid damaged electronics. The risk that the cleaning of liquid damaged electronics will lead to major discharges of heavy metals is, however, judged to be very low. Nordic Ecolabelling has therefore chosen not to set an absolute requirement in this first generation of the criteria, and instead has set a requirement that the licensee must test for heavy metals in the wastewater. This is partly to ensure that the licensee focuses on this, and partly to gather more data in this area.

Nordic Ecolabelling is not aware of any facility that conducts its own treatment of wastewater before it is discharged into the public system. If such treatment does exist, we would like to know more about it in applications so that we can incorporate it into future revisions of the criteria. This is why Nordic Ecolabelling requests information on this in the requirement.

## O8 Chemical products

All the chemicals used in the process must carry either:

the Nordic Swan Ecolabel under one of the following criteria:

- Industrial cleaning and degreasing agents,
- Cleaning products,
- Dishwasher detergents for professional use,
- Dishwasher detergents and rinsing agents,
- Hand dishwashing detergents, or

the EU Ecolabel under one of the following criteria:

- All purpose cleaners and cleaners for sanitary facilities,
- Industrial and institutional automatic dishwasher detergents,
- Dishwashing detergents,
- Hand dishwashing detergents, or

Products labelled with Good environmental choice according to the current criteria for ”Chemical products”.

✉ List of chemicals used, with trade name, supplier and licence number for Nordic Swan Ecolabel/EU Ecolabel/Good environmental choice.

[9] Miljøprojekt Nr. 851 2003 Tungmetaller i affald - guide og idékatalog til sortering af tungmetalholdigt affald (*Environmental Project No. 851 2003 Heavy metals in waste – guide and ideas for sorting waste containing heavy metals*). Claus Dahl Thomsen, Carsten Lassen and Elisabeth Holst, COWI A/S; Benedikte Hauge I/S Vestforbrænding, section 4.4.2

[10] https://www.slideshare.net/nitinyadav16/electronic-industry-waste-water

### Background to requirement O8

There can be a considerable variation in the chemicals used in the process, from organic solvents to ecolabelled cleaning products and water. The choice of chemicals for the cleaning can have an impact on the working environment in the workshops that perform the process, and on discharges into the sewerage system. We have chosen to focus on the chemicals used in the process – even though far more chemicals are used in the manufacture of new electronics. Combined with our other process requirements, the requirement can help to identify the most environmentally positive methods for saving liquid damaged electronics.

## O9 Processing of electronic waste

The licensee must have a procedure in place whereby they offer to dispose of unsalvageable electronic devices on behalf of the customer.

All the unsalvageable electronic devices and any discarded components must be sent to an environmentally approved recipient of electronic waste* or sent back to the producer under a Swap scheme**.

If electronic waste is not sent directly to an environmentally approved recipient of electronic waste or via a Swap scheme, but via an approved collector, the collector must provide documentation that they deliver the waste to an approved recipient of electronic waste.

Licensee is responsible for deleting al data on the collected electronic waste. If the licensee is not the party that has the everyday contact with the customers, with this responsibility falling instead to suppliers such as workshops, there must be an agreement with the supplier on how electronic waste is handled so that it ensures that data is deleted.

* ***In Denmark*** *the electronic waste must be sent to an environmentally approved recipient, either directly or via one of the officially approved collectors (approved via the Danish Environmental Protection Agency's collector training scheme[11]).*

***In Sweden*** *the electronic waste is to be deposited at a recycling station that has an agreement with ElKretsen. Alternatively, the electronic waste can be collected by a collector that has ElKretsen approval.*

***In Norway*** *the electronic waste (EE waste) must be deposited with municipalities or retailers who sell equivalent EE products, for example electronics retailers, supermarkets and toy stores. Three recycling companies are currently approved by the Norwegian Environment Agency to deal with all types of EE waste: Norsirk AS, ERP Norway AS and RENAS AS. Importers and producers of EE products must be members of one of these recycling companies.*

***In Finland*** *the electronic waste must be sent to one of the five approved producers' associations: ERP Finland, SER-Tuottajayhteisö, SELT, ICT-Tuottajaosuuskunta or Flip.*

***In Iceland*** *the electronic waste is to be deposited at an approved recycling station.*

** *Under a Swap scheme, the damaged electronic part is sent back to the producer of the electronic device along with an order for a new part of the same kind.*

✉ Description and procedure for ensuring that the licensee offers to dispose of unsalvageable electronic devices on behalf of the customer.

[11] https://mst.dk/affald-jord/affald/indsamleruddannelsen/

☒ Description and procedure for the management of electronic waste, demonstrating fulfilment of the requirement – including who collects and receives the waste.

☒ If a Swap scheme is not used: Documentation from the waste recipient showing that they have environmental approval to receive electronic waste. If a collector is used, the collector must document their approval to collect electronic waste. This must comply with the systems set out in the requirement for each country for which a licence is being sought.

☒ Description of routine for deleting data on electronic waste along with agreement with the company/organization that helps with deletion of data. If the licensee is not the party that has the everyday contact with the customers, there must be an agreement with the supplier on how deleting of electronic waste is handled (either at the licensee or the supplier).

### Background to requirement O9

Electronic waste is the fastest growing category of waste in the world. The UN estimates that there were 65 million tonnes of electronic waste in 2017. Denmark alone is thought to send 40,000 tonnes of electronic waste to incineration plants, where they can cause major harm to the environment, since electronics contain many substances that are hazardous to health and the environment[12]. Electronic waste also contains a number of resources that can be recycled to the benefit of the environment.

Nordic Ecolabelling sets a requirement that electronic waste arising from the process due to unsalvageable devices and/or replacement of individual components is collected and processed correctly. This is done by requiring that the electronic waste is deposited with an environmentally approved recipient. If you do not have a direct agreement with an environmentally approved recipient, but use a collector instead, the collector must also document that they are approved. The systems for this differ across the Nordic countries, and documentation must therefore be provided for each country in which the service will be provided. Waste collectors must also document that they take the electronic waste to a recipient that has an environmental permit to process electronic waste. This ensures that the electronic waste is processed in line with prevailing legislation (WEEE Directive)[13] on recycling and reuse.

A final option for ensuring environmentally correct processing of electronic waste is to return it to the producer under a Swap scheme. According to the WEEE Directive, the producer holds responsibility for ensuring correct processing of its electronic products in the waste phase, and thus the direct take-back of electronic waste by the producer can be one way of complying with the legislation. Under a Swap scheme, the repairer orders a spare part to save the electronic device and in order to receive that spare part, the equivalent damaged part is returned to the producer.

[12] https://www.affald.dk/da/ungdomsuddannelser/elektronik/artikler/143-elektronikskrot-maengder-og-behandling.html
[13] https://eur-lex.europa.eu/legal-content/DA/TXT/PDF/?uri=CELEX:32012L0019&from=EN

In order to provide a good service, and to increase the likelihood of electronic scrap being sent for recycling rather than ending up being incinerated due to incorrect handling by the consumer, the licensee must offer to take care of a customer's electronic device that is unsalvageable and thus has become a waste product. This does not mean that customers must hand over their electronic device to the licensee.

In Norway electronic waste (EE waste) can be deposited, free of charge, with municipalities or retailers who sell equivalent EE products, for example electronics retailers, supermarkets and toy stores. Retailers and municipalities have a duty to accept such waste and to promote this service. All importers and producers must be a member of a returns company approved by the Norwegian Environment Agency to process all EE waste. Three recycling companies are currently approved by the Norwegian Environment Agency to deal with all types of EE waste: Norsirk AS, ERP Norway AS and RENAS AS.

In order to ensure that consumers and businesses using this service do not run the risk of spreading corporate or personal data, because of unsalvageable damaged electronic devices, the licensee must have a routine to ensure that all data on the electronic waste is removed.

## 6.5 Environmental management and regulatory requirements

Quality and regulatory requirements are general requirements that are always included in Nordic Ecolabelling's service criteria. The purpose of these is to ensure that fundamental quality assurance and applicable environmental requirements from the authorities are dealt with appropriately. They also ensure compliance with Nordic Ecolabelling's requirements for the service throughout the period of validity of the licence.

To ensure that the Nordic Ecolabelling requirements are met, a documented management system must be in place, and it must include the following implemented procedures. If the applicant has a quality system that is certified to ISO 9001, or an environmental management system certified under ISO 14 001 or EMAS, and the following procedures are applied, it is sufficient for the certification body's auditor to certify compliance with the requirements.

In this context, there are business models where the licensee is not the party that has immediate contact with customers seeking a repair service, which is why a requirement has been introduced to ensure understanding of and compliance with the criteria by the suppliers that are in contact with the customers.

### O10 Organisation and responsibility

An organisational chart must be drawn up. Responsibility and authority for central environmental functions shall be defined. Responsibility for the Nordic Swan Ecolabel licence, marketing, training and purchasing shall be specified, and the contact person for Nordic Ecolabelling named.

If the licensee is not the party with everyday responsibility for compliance with certain requirements, with this responsibility falling instead to suppliers such as workshops, the following must also be included in the organisational description: The connection between the licensee and the suppliers that have contact with the customers (workshops). Who has contact with the suppliers on behalf of the licensee and in which areas.

✉ Copy of organisational chart as described in the requirement.

## O11 Documentation

The licensee must archive the documentation that is sent in with the application as long as the Nordic Swan Ecolabel licence remains valid. All the documents regarding the licence must be easily available on the premises of the licensee. The contact person for communication with Nordic Ecolabelling is responsible for ensuring that the documentation is updated and available.

🔑 This is checked on site as necessary.

## O12 Technical servicing

The licensee must have procedures/service agreements in place to ensure ongoing technical servicing. The procedures must document that the licensee conducts an inspection of the cleaning facilities/machines at least once a year. In addition, the licensee is to constantly monitor the cleaning facilities/machines to ensure that servicing can be carried out as soon as the need arises.

Service reports must be saved and be readily available.

✉ Copy of the procedure for control and servicing or a service agreement detailing how inspections are conducted.

🔑 Service records, test records and other records will be checked on site.

## O13 Changes, self-assessment and nonconformities

Nordic Ecolabelling must be notified of and approve any planned changes in products and markets, such as the replacement of chemicals, that have a bearing on Nordic Ecolabelling requirements. Unplanned nonconformities that have a bearing on Nordic Ecolabelling's requirements must be reported to Nordic Ecolabelling.

If the licensee is not the party that has everyday contact with the customers, with this responsibility falling instead to suppliers such as workshops, the licensee must inform Nordic Ecolabelling when new suppliers become part of the service provision or a supplier is no longer involved in providing the service.

✉ Copy of procedures for changes and nonconformities.

✉ If the licensee is not the party that has everyday contact with the customers, with this responsibility falling instead to suppliers such as workshops: Submit a copy of the procedure for notifying Nordic Ecolabelling about changes to the suppliers that are involved in providing the service.

## O14 Training

All employees must have the knowledge they need to ensure fulfilment of Nordic Ecolabelling's requirements.

If the licensee is not the party that has everyday contact with the customers, with this responsibility falling instead to suppliers such as workshops:
All workshop personnel who contribute to the service must be trained in how to ensure fulfilment of Nordic Ecolabelling's requirements. Specifically, there must be documentation on how the licensee ensures training of the supplier's personnel in the use of approved chemicals, ongoing compliance with the requirement concerning the quality and speed of the cleaning and Nordic Ecolabelling's requirement regarding the processing of electronic waste.

A procedure must be in place to document who has undergone training.

✉ Copy of the procedure for training employees and contractors.

## O15 Customer information

Customers are to be informed that they are using a Nordic Swan Ecolabelled service for the cleaning of liquid damaged electronics and what that entails. Marketing of the service must comply with Nordic Ecolabelling's guidelines on the use of the logo (see "Regulations for the Nordic Ecolabelling of services" below).

If the licensee is not the party that has everyday contact with the customers, with this responsibility falling instead to suppliers such as workshops, it must be explained in the licensee's procedures and sales/marketing material how they guide the suppliers in their use of the logo and the information about the Nordic Swan Ecolabel that they give to their customers.

*A licensee that is not the party that has everyday contact with the customers should enter a dialogue with Nordic Ecolabelling on the options and limitations that apply to the marketing of the service by the suppliers (e.g. workshops).*

✉ Copy of procedure and sales/marketing material describing how the customers are informed.

## O16 Legislation and regulations

The business must ensure compliance with the applicable legislation regarding the working environment, the external environment, finances, hygiene and health. The business must not have any form of negative criticism from an authority or agency which has not been rectified within the deadline set by the supervisory authority or agency. If this requirement is not met, Nordic Ecolabelling may revoke the licence.

✉ Duly signed application form.

And/or

🔑 The requirement is checked on site.

## O17 Follow-up of licence

The licensee must ensure continued compliance with the requirements throughout the validity period of the licence. The business must conduct an internal audit of its operations at least once a year (no more than six months after the closing of accounts). If the licensee is not the party that has everyday contact with the customers, with this responsibility falling instead to suppliers such as workshops, information from these suppliers must be included in the audit.

The following areas are to be checked:

- Fulfilment of the rescue rate requirement
- Fulfilment of the service speed requirement
- Fulfilment of the requirement concerning energy and water consumption by the service
- Only the cleaning chemicals approved under the licence are used in the service
- Electronic waste is processed in line with Nordic Ecolabelling's requirements
- Wastewater testing for heavy metals has been performed for a minimum of two cleaning facilities/machines

Nordic Ecolabelling may request reports from the internal review and examine a selection, or all, of the requirements. Information on a compliance check is given in advance.

✉ Routine for monitoring licence.

# Regulations for the Nordic Ecolabelling of services

To easily identify Nordic Swan Ecolabelled services, the licence number and a descriptive sub text shall always accompany the Nordic Swan Ecolabel.

The descriptive sub text for 108 Cleaning of liquid damaged electronics is:
**Cleaning of liquid damaged electronics**

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

# Follow-up inspections

Nordic Ecolabelling may decide to check whether the licensee 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 licensee 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.

# Criteria version history

Nordic Ecolabelling adopted version 0.0 of the criteria for XX on DAY MONTH YEAR. The criteria are valid until DAY MONTH YEAR.

# New criteria

In a future revision, Nordic Ecolabelling will look more closely at:

- The scope to tighten up the rescue rate requirement.
- The scope to tighten up the requirement concerning how quickly the service is completed, so that it also includes the screening and any replacement of parts.
- Tighter requirements for energy and water consumption.
- The potential for a requirement concerning the transport that is involved in the service.
- Requirements concerning packaging.

# Appendix 1 Laboratories and methods for testing and analysis

### General requirements for the testing and analysis laboratory

The testing and/or analysis laboratory must fulfil the general requirements of standard ISO 17025 for the competence of testing and calibration laboratories or be an official GLP-approved analysis laboratory.

The analysis laboratory/test institute that conducts corrosion testing must be accredited for ISO 9227.

The analysis laboratory/test institute that conducts testing for heavy metals in wastewater must be accredited for EN ISO 11885 or the equivalent national standard.