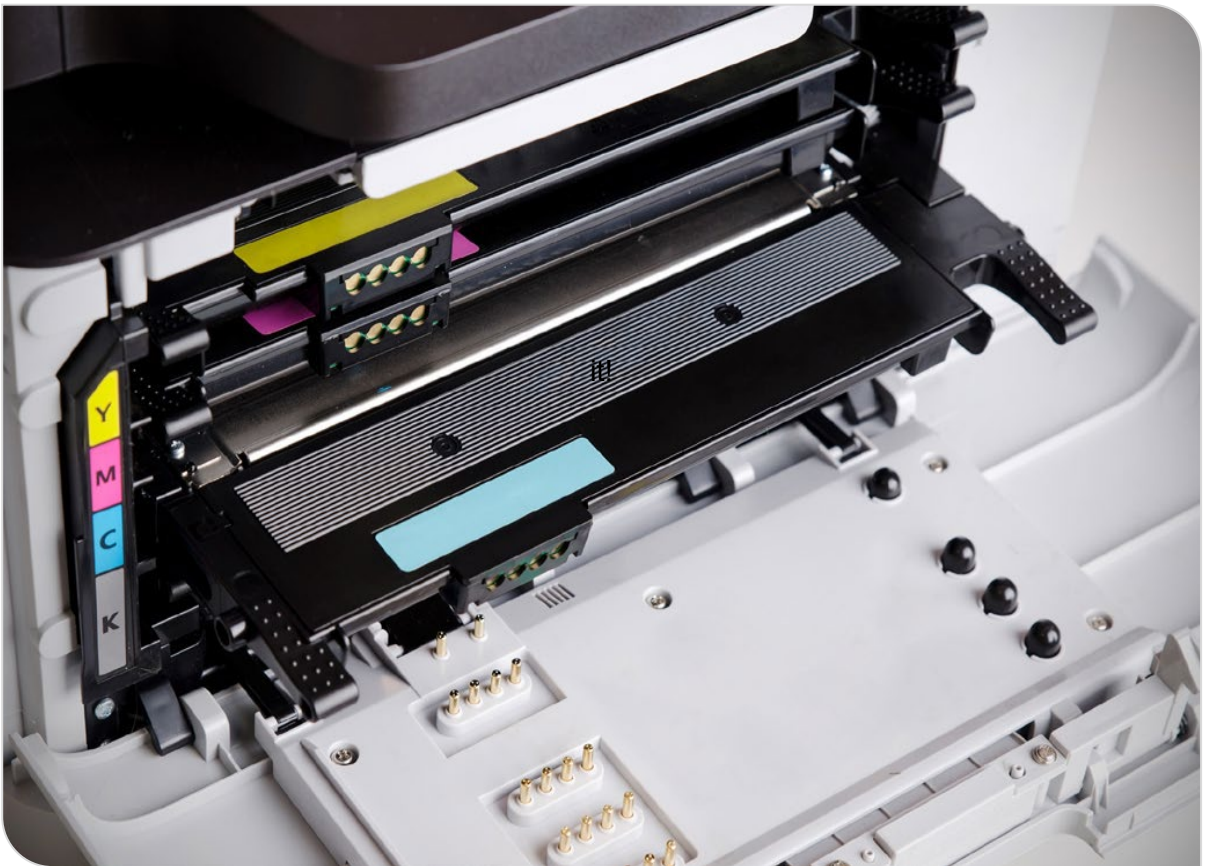


Nordic Ecolabelling for
**Remanufactured OEM Toner and Ink
Cartridges**



Version 6.0 • date – date

CONSULTATION

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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:

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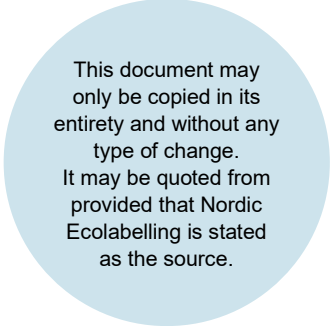
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1 Environmental communication guideline for Nordic Swan Ecolabel Remanufactured OEM Toner and Ink Cartridges

The overall environmental impact in the lifecycle of this product group and Nordic Swan Ecolabel identification of where ecolabelling can have the greatest effect is described in “Environmental impact of Remanufactured OEM Toner and Ink Cartridges”.

Nordic Swan Ecolabelled toner and ink cartridges are originally manufactured by the OEM (Original Equipment Manufacturer), and are then reused, after refurbishment and refilling with toner powder or ink.

Nordic Swan Ecolabel Remanufactured OEM Toner and Ink Cartridges have a reduced environmental impact throughout their lifecycle. Used cartridges are collected via a take-back system and remanufactured into new cartridges. This means less waste and less energy and raw material consumption – and promotes circular economy.

Nordic Swan Ecolabel Remanufactured OEM Toner and Ink Cartridges:

- Contain a minimum of 75 % reused parts and have a good printing quality and capacity.
- Meet strict environmental and health requirements for the toner powder and ink used in the products e.g. PFAS, endocrine disruptors and bisphenols are not allowed. Furthermore, the contents of heavy metals and VOC must be tested and meet limits.
- Promote circular material flows by being included in a take-back system for used cartridges.

2 What can carry the Nordic Swan Ecolabel?

Product group definition

Toner cartridges and ink cartridges that may carry the Nordic Swan Ecolabel are originally manufactured by the OEM (Original Equipment Manufacturer), and then they are remanufactured and reassembled with toner powder or ink, drum and the necessary drive mechanism. Remanufactured OPC units (Optical Photosensitive Conductor cartridges containing only drum) are also included in the product group. The cartridges are used for monochrome and colour electrophotographic printing and similar reproduction processes.

2.1 Justification of the product group definition

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

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:

- ✉ Enclose
- 🔍 Requirement checked on site

To be awarded a Nordic Swan Ecolabel licence:

- All obligatory requirements must be fulfilled.
- Nordic Ecolabelling must inspect the site.

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

The product group includes remanufactured toner cartridges, ink cartridges and OPC units (Optical Photosensitive Conductor cartridges containing only drum) that are originally manufactured by the OEM (Original Equipment Manufacturer) as described in section 2 "What can carry the Nordic Swan Ecolabel?".

The criteria set requirements for the amount of reused materials in the cartridge, the chemicals used in the toner powder or ink, print quality, print capacity, take-back system for used cartridges, customer information and packaging.

The most important requirements are amount of reused materials in the cartridge, the chemicals used in the toner powder or ink, print quality, print capacity and take-back system for used cartridges.

Changes and updates from generation 5 to 6

The most important changes are described below.

See also overview of changes in table in section 4.1.

Product group definition:

The product type ink cartridge has been added.

Structure of the criteria:

The structure of the criteria has been changed so that it is clearer.

Requirements for ingoing substances in toner powders and inks have been tightened (O3 and O4):

Several new classifications have been banned.

Ban against the following have been added:

- Diethylenetriamine pentaacetate (DTPA) and its salts.
- Organic chlorine compounds, hypochlorites and hypochlorous acid (instead of sodium or calcium hypochlorite).
- Bisphenols and bisphenol derivatives (34 bisphenols).
- Halogenated organic compounds.

List for endocrine disruptors have been updated to EU's List I, II and III.

Requirement for carcinogenic aromatic amines in toner powders and inks has been tightened (O5):

Azo dyes that may release carcinogenic aromatic amines must not be used. Before where a limit for the amount of carcinogenic aromatic amines.

Requirement for heavy metals in toner powders and inks has been tightened (O6):

Now the content of lead (limit 25 mg/kg), cadmium (limit 5 mg/kg), mercury (limit 2 mg/kg), chromium VI (limit 3 mg/kg) and chromium (total) (limit 1 mg/kg) must be tested and have a lower limit value. Before it was declared that these heavy metals (except chromium (total), which is new) did not exceed 100 ppm.

Requirement for cobalt and nickel is the same.

Requirement for VOC and tin organic compounds in toner powders and inks has been tightened (O6):

The limit value for benzene has been lower from 1 mg/kg to 0.35 mg/kg, so that the limit is the same as in "TÜV Rheinland LGA Products GmbH" analysis methods.

Test methods and limit values for tin organic compounds have been updated in line with "TÜV Rheinland LGA Products GmbH" analysis methods.

The option to use the test method BGW-VW-SG2 04 has been deleted, as the test method is no longer relevant.

Requirements for print quality and print capacity for ink cartridges have been added (O10 and O11):

In this generation of the criteria the product group ink cartridges have been added, and therefore also requirements for print quality and capacity for ink cartridges have been added.

Requirement for labour conventions has been added (O17):

The licensee must ensure that sites where cartridges are manufactured comply with the ILO Conventions stated in the requirement.

4.1 Changes compared to previous generation

The most important changes compared to the previous generation are briefly listed in below table. Ink cartridges have been included in generation 6 of the criteria.

Figure 1 Overview of changes to criteria for Remanufactured OEM Toner and Ink Cartridges generation 6 compared with previous generation 5.

| Requirement generation 6 | Requirement generation 5 | Same requirement | Change | New requirement | Deleted requirement | Comments |
|--------------------------|--------------------------|------------------|--------|-----------------|---------------------|--|
| O1 | R1 | | X | | | Almost the same, smaller update of text. |
| O2 | R2 | | X | | | Classifications EUH070, EUH029, EUH031 and EUH032 have been deleted. Exception has been added for inks, which are classification as H317 due to preservatives. |
| O3 | R3 | | X | | | Classifications H370, H372, EUH380, EUH381, EUH430, EUH431, EUH450 and EUH451 have been added. |
| O4 | R3 | | X | | | The following have been added: <ul style="list-style-type: none"> - Diethylenetriamine pentaacetate (DTPA) and its salts. - Organic chlorine compounds, hypochlorites and hypochlorous acid (instead of sodium or calcium hypochlorite). - Bisphenols and bisphenol derivatives (34 bisphenols). - Halogenated organic compounds. <p>For endocrine disruptors: EU's priority list of endocrine disruptors in Annex L of the Final Report of the DHI study has been replaced by EU member state initiative "Endocrine Disruptor Lists" List I, List II and List III.</p> |
| O5 | R5 | | X | | | Azo dyes that may release carcinogenic aromatic amines must not be used. Before were a limit for the contents of carcinogenic aromatic amines. |

| | | | | | | |
|-----|---------|---|---|---|--|---|
| O6 | R4 + R6 | | X | | | <p>Before it was declared that the heavy metal lead, cadmium, mercury and chromium VI did not exceed 100 ppm. Now the content of these heavy metals and chromium (total) must be tested and have a lower limit value of 25 mg/kg for lead, 5 mg/kg for cadmium, 2 mg/kg for mercury, 3 mg/kg for chromium VI and 1 mg/kg for chromium (total).</p> <p>Requirement for cobalt and nickel is the same.</p> <p>The limit value for benzene has been lower from 1 mg/kg to 0.35 mg/kg.</p> <p>Test methods and limit values for tin organic compounds have been updated.</p> <p>Test methods and test conditions have been updated.</p> |
| O7 | R13 | X | | | | |
| O8 | R15 | X | | | | <p>Small change in text regarding OEM-manufactures.</p> <p>Some text in documentation text moved to requirement text.</p> |
| O9 | R16 | X | | | | Some text in documentation text moved to requirement text. |
| O10 | - | | | X | | Print quality for ink cartridges. |
| O11 | - | | | X | | Print capacity for ink cartridges. |
| O12 | R10 | X | | | | |
| O13 | R11 | | X | | | Added option of take-back of cartridges as part of service of imaging equipment. |
| O14 | R9 | X | | | | |
| O15 | R24 | X | | | | <p>Added that QR code can be used for information in point b) to d).</p> <p>Added that information about how to send used cartridge back for remanufacturing must be on packaging.</p> |
| O16 | R7 | X | | | | |
| O17 | R22 | | X | | | Added that licensee must ensure that all manufacturing sites comply with the stated ILO Conventions. |
| O18 | R17-R20 | | X | | | Updated to Nordic ecolabelling standard requirement. |

| | | | | | | |
|------------|-----|---|---|--|---|---|
| O19 | R21 | | X | | | Updated to Nordic ecolabelling standard requirement. |
| - | R12 | | | | X | |
| Appendix 1 | R14 | X | | | | Requirements for analysis laboratory moved to appendix. |

5 Requirements and justification of these

Definitions

| Terms | Definition |
|--------------------|---|
| OEM | Original Equipment Manufacturer |
| OPC units | Optical Photosensitive Conductor cartridges containing only drum |
| Ingoing substances | All substances in the toner powder or ink regardless of amount, including additives (e.g., preservatives and stabilizers) in the raw materials. Substances known to be released from ingoing substances (e.g., formaldehyde, arylamine, in situ-generated preservatives) are also regarded as ingoing substances. |
| Impurities | Residuals, pollutants, contaminants etc. from production, incl. production of raw materials, that remain in the toner powder or ink in concentrations less than 100 ppm (0.0100 w%). Impurities in the raw materials exceeding concentrations of 1000 ppm (0.1000 w%) are always regarded as ingoing substances, regardless of the concentration in the toner powder or ink. Examples of impurities are residues of the following: residues or reagents incl. residues of monomers, catalysts, by-products, scavengers, and detergents for production equipment and carry-over from other or previous production lines. |

5.1 Description of the product

O1 Description of the product

Describe the product and how it meets the definition of a product that is entitled to carry the Nordic Swan Ecolabel.

List all product names, trade names, product types (e.g. toner cartridge) and brand name to which the cartridge fits (e.g. HP, Brother).

List of trade names of all toner powder and ink used, including manufacturer/supplier and product name of cartridge where it is used.

Company name and production site (full address and country) where remanufacturing of cartridges takes place.

- Description as stated above plus declaration from the applicant that only cartridges originally manufactured by the OEM will be given the Nordic Swan Ecolabel.

Background to requirement O1 Description of the product

The purpose of this requirement is to obtain a clear description of the product, the used toner powder or ink and at which production sites remanufacturing take place, as well as all trade names and trademarks. Licensing usually involves many different names and trademarks. This requirement will simplify and clarify licensing.

The requirement is also to ensure that only cartridges originally manufactured by the OEM can be given the Nordic Swan Ecolabel. This requirement will help to improve the quality of Nordic Swan Ecolabelled toner cartridges and to ensure that newly manufactured copies/clones of cartridges which may infringe various patents are not given the Nordic Swan Ecolabel.

5.2 Toner powder and ink

Remanufactured OPC units (Optical Photosensitive Conductor cartridges) containing only drum are exempted from requirements in section 5.2.

O2 Classification of toner powder and ink

The toner powder or ink must not be classified according to the hazard classes described in the table below.

Table 1 Classification of toner powder or ink CLP Regulation 1272/2008

| Classification | Hazard class and category | Hazard code |
|--|---------------------------|-------------|
| Hazardous to the aquatic environment | Aquatic Acute 1 | H400 |
| | Aquatic Chronic 1 | H410 |
| | Aquatic Chronic 2 | H411 |
| | Aquatic Chronic 3 | H412 |
| | Aquatic Chronic 4 | H413 |
| Hazardous to the ozone layer | Ozone | H420 |
| Acute toxicity | Acute Tox. 1 or 2 | H300 |
| | Acute Tox. 1 or 2 | H310 |
| | Acute Tox. 1 or 2 | H330 |
| | Acute Tox. 3 | H301 |
| | Acute Tox. 3 | H311 |
| | Acute Tox. 3 | H331 |
| Specific target organ toxicity: Single or repeated exposure | STOT SE 1 or 2 | H370 |
| | STOT SE 1 or 2 | H371 |
| | STOT RE 1 or 2 | H372 |
| | STOT RE 1 or 2 | H373 |
| Aspiration hazard | Asp. Tox. 1 | H304 |
| Skin sensitisation | Skin Sens. 1, 1A or 1B | H317** |
| Respiratory sensitisation | Resp. Sens. 1, 1A or 1B | H334 |
| Carcinogenicity* | Carc. 1A or 1B | H350 |
| | Card. 2 | H351 |
| Germ cell mutagenicity* | Muta. 1A or 1B | H340 |
| | Muta. 2 | H341 |

| | | |
|------------------------|----------------|------|
| Reproductive toxicity* | Repr. 1A or 1B | H360 |
| | Repr. 2 | H361 |
| | Lact. | H362 |

* The classifications concern all classification variants. For example, H350 also covers classification H350i.

** For inks: Classification H317 due to preservatives are exempted from the requirement.

- Safety data sheet in accordance with Annex II of REACH (Regulation 1907/2006) for each toner powder and ink.
- Appendix 2 completed and signed by the applicant that all the toner powders or inks used in the Nordic Swan Ecolabelled cartridges meet the requirement.
- Appendix 3 completed and signed by the producer or supplier of the toner powder/ink for each toner powder/ink.

Background to requirement O2 Classification of toner powder and ink

Based on the precautionary principle the requirement prohibits a wide range of the most problematic substances in toner powder and ink. The aim is to eliminate the most hazardous chemicals in toner powder and ink.

O3 Classification of ingoing substances

Ingoing substances* in toner powder or ink must not be classified with the hazard codes listed in the table below, in accordance with CLP Regulation 1272/2008.

* See in section Definitions.

Table 2 Classification of ingoing substances

| Classification | Hazard class and category | Hazard code |
|--|---------------------------|-------------|
| Carcinogenicity**, *** | Carc. 1A or 1B | H350 |
| | Carc. 2 | H351 |
| Germ cell mutagenicity** | Muta. 1A or 1B | H340 |
| | Muta. 2 | H341 |
| Reproductive toxicity** | Repr. 1A or 1B | H360 |
| | Repr. 2 | H361 |
| | Lact. | H362 |
| Specific target organ toxicity: single exposure or repeated exposure | STOT SE 1 | H370 |
| | STOT RE 1 | H372 |
| Endocrine disruption for human health**** | ED HH 1 | EUH380 |
| | ED HH 2 | EUH381 |
| Endocrine disruption for the environment***** | ED ENV 1 | EUH430 |
| | ED ENV 2 | EUH431 |
| Persistent, Bioaccumulative and Toxic properties**** | PBT | EUH440 |
| | vPvB | EUH441 |
| Persistent, Mobile and Toxic properties Very Persistent, Very Mobile properties | PMT | EUH450 |
| | vPvM | EUH451 |

** Including all combinations of stated exposure routes and stated specific effect. For example, H350 also covers classification H350i.

*** Titanium dioxide (CAS 13463-67-7) is exempted from the requirement.

**** See also O4 Excluded substances for additional requirements for potential or identified endocrine disruptors and PBT/vPvB substances.

- Appendix 2 completed and signed by the applicant that all the toner powders or inks used in the Nordic Swan Ecolabelled cartridges meet the requirement.
- Appendix 3 completed and signed by the producer or supplier of the toner powder/ink for each toner powder/ink.

Background to requirement O3 Classification of ingoing substances

In addition to the requirement on classified toner powder and ink, there are a number of substances that are prohibited from use. Nordic Ecolabelling sets requirements based on the precautionary principle for environmental and health classification of ingoing substances to ensure that products that are toxic or harmful to the environment and/or health cannot be Nordic Swan ecolabelled.

We are aware that the classification of titanium dioxide is under discussion. Loose powder is the one generating the largest inhalation exposure according to SCCS/1617/2065. According to SCCS/1661/23, genotoxicity from titanium dioxide cannot be ruled out in oral products and products that can be inhaled. Titanium dioxide is exempted, because it is needed as a pigment for colouring, which is the function for toner powders and inks. Requirement O16 contains work environment requirements regarding handling of loose powder so that the exposure of loss powder is reduced.

O4 Excluded substances

The following substances or substance groups must not be present as ingoing substances* in toner powder or ink.

* See in section Definitions.

- Substances on the REACH Candidate list of SVHC substances
<https://www.echa.europa.eu/candidate-list-table>
- PBT and vPvB substances in accordance with REACH Annex XIII, including substances under investigation according to the ECHA PBT assessment list
<https://echa.europa.eu/pbt/-/dislist/details/0b0236e1889ab857>
- Potential or identified endocrine disruptors, according to any of the following EU member state initiative "Endocrine Disruptor Lists" List I; II and III
N.B. A substance which is transferred to one of the corresponding sublists called "Substances no longer on list" and no longer appears on any of List I-III, is no longer excluded. The exemption is those substances on sublist II which were evaluated and where concern for endocrine disruption may remain. Nordic Ecolabelling will evaluate the circumstances case-by-case, based on the background information indicated on the sublist.
- Per- and polyfluoroalkyl substances (PFAS)
- Ethylenediamine tetraacetate (EDTA, CAS No. 6381-92-6) and its salts and Diethylenetriamine pentaacetate (DTPA, CAS No. 67-43-6) and its salts

- Organic chlorine compounds, hypochlorites and hypochlorous acid
 - Alkylphenols (AP) (e.g. butylated hydroxy anisole (BHA, CAS No. 25013-16-5), alkylphenol ethoxylates (APEO), and other alkylphenol derivatives (APD))
 - Bisphenols and bisphenol derivatives, defined as the 34 bisphenols that have been identified by ECHA¹ for further EU regulatory risk management because they are known or potential endocrine disruptors for the environment or for human health, or can be identified as toxic for reproduction
 - Halogenated organic compounds*
 - * Exemptions for:
 - a) Pigments that meet the EU's requirement concerning colourants in food packaging under Resolution AP (89) point 2.5
 - b) Preservatives in inks.
- Appendix 2 completed and signed by the applicant that all the toner powders or inks used in the Nordic Swan Ecolabelled cartridges meet the requirement.
- Appendix 3 completed and signed by the producer or supplier of the toner powder/ink for each toner powder/ink.
- If halogenated organic pigments are used, a declaration is required from the pigment supplier confirming that the pigment meets the EU's requirement concerning colourants in food packaging under Resolution AP (89) point 2.5.

Background to requirement O4 Excluded substances

In addition to the requirement on classified toner powder and ink, there are a number of substances that are prohibited from use. Nordic Ecolabelling sets requirements for environmental and health classification of ingoing substances to ensure that products that are toxic or harmful to the environment and/or health cannot be Nordic Swan ecolabelled.

Substances on the REACH Candidate list of SVHC (Substances of Very High Concern)

The Candidate List identifies substances of very high concern which fulfil the criteria in article 57 of the REACH Regulation (EC 1907/2006). The list includes carcinogenic; mutagenic; and reprotoxic substances (CMR, categories 1A and 1B in accordance with the CLP Regulation); and PBT (persistent, bioaccumulative and toxic) and vPvB (very persistent and very bioaccumulative) substances (as defined in REACH Annex XIII). In addition, two more substance groups are included if they are of equivalent level of concern (ELoC) as the ones previously mentioned. These are endocrine disruptors and substances which are environmentally hazardous without fulfilling the requirements for PBT or vPvB. Based on these adverse characteristics, Nordic Ecolabelling prohibits substances on the Candidate

¹ EC/List No. 201-245-8 (BPA), 201-025-1 (BPB), 401-720-1 (4,4'-Isobutylethylidenediphenol), 216-036-7 (BPAF) and its 8 salts (278-305-5; 425-060-9; 443-330-4; 468-740-0; 469-080-6; 479-100-5; 943-265-6; 947-368-7), 201-250-5 (BPS), 201-240-0 (BPC), 204-279-1 (TBMD), 201-618-5 (6,6'-di-tert-butyl-4,4'-butylidenedi-m-cresol), 242-895-2, 248-607-1, 405-520-5 (D8), 217-121-1 (DAB), 227-033-5 (TMBPA), 210-658-2 (BPF), 411-570-9, 277-962-5 (contains BPS), 500-086-4 (contains BPA), 500-263-6 (contains BPA), 500-607-5 (contains BPA), 701-362-9, 904-653-0 (contains BPA), 908-912-9 (contains BPF), 926-571-4 (contains BPA), 931-252-8 (contains BPA), 941-992-3 (contains BPS), 943-503-9 (contains BPA).

[1] Assessment of regulatory needs: Bisphenols. ECHA – 16 December 2021: Section 2.1: Bisphenols for which further EU RRM is proposed <https://echa.europa.eu/documents/10162/5e60f2fe-12d0-7f6b-5868-f199cfd7f984>

List. This means that we act ahead of the legislation and ban the substances before they are subject to authorisation and restriction in accordance with REACH.

PBT and vPvB substances in accordance with REACH Annex XIII

PBT and vPvB are abbreviations for substances that are persistent, bioaccumulative and toxic, and very persistent and very bioaccumulative, respectively, in accordance with REACH Annex XIII². This means that they are not biodegradable and that they accumulate in living organisms. Based on these adverse characteristics they pose a threat to the environment and human health. They are prohibited in all Nordic Swan Ecolabel products.

Potential or identified endocrine disruptors substances

Endocrine disruptors (EDs) are chemicals that alter the functioning of the endocrine (hormone) system and consequently cause adverse health effects. The hormone system regulates many vital processes in living organisms and when normal signalling is disturbed, adverse effects may result. EDs raise high concern for their risk of causing serious negative impact on the environment as well as on human health specifically. Special concern is raised for effects on reproduction and development and about possible links to increases in public health diseases. While effects in wildlife populations have been confirmed, evidence is pointing to effects also in humans. By excluding both identified and prioritised potential EDs which are under evaluation, Nordic Ecolabelling ensures a restrictive policy on EDs.

The ED lists I-III on <https://edlists.org/> are dynamic, and the companies are responsible for keeping track of updates, in order to keep labelled products compliant with the requirement throughout the validity of the licences. Nordic Ecolabelling acknowledges the challenges associated with new substances being introduced on particularly List II and III, and in some cases also List I. We will evaluate the circumstances and possibly decide on a transition period on a case-by-case basis.

A number of substances that are moved from ED List II to sublist II, but can still be considered potential endocrine disruptors, is also prohibited.

Per- and polyfluorinated substances (PFAS)

Per- and polyfluorinated substances (PFAS) are used in inks for scratch resistance, modifying slip properties, matting effects and more³. Perfluorinated and polyfluorinated alkylated substances (PFAS) are a group of substances with undesirable properties. The substances are persistent and are readily absorbed by the body. PFASs are defined as fluorinated substances containing at least one fully fluorinated methyl or methylene carbon atom (without any H / Cl / Br / I atom attached to it), i.e., with a few listed exceptions, all chemicals with at least one perfluorinated methyl group (–CF₃) or a perfluorinated the methylene group (–CF₂–) is a PFAS as described in the OECD recommendations.

² Europaparlamentets och rådets förordning (EG) nr 1907/2006 av den 18 december 2006 om registrering, godkännande och begränsning av kemikalier (REACH)<http://eur-lex.europa.eu/legal-content/sv/TXT/PDF/?uri=CELEX:02006R1907-20160203>

³ <https://www.clariant.com/en/Corporate/Blog/2022-Blog-Posts/12/Shaping-the-future-of-printing>, visited 10 March 2025.

Ethylenediamine tetraacetate (EDTA, CAS No. 6381-92-6) and its salts and Diethylenetriamine pentaacetate (DTPA, CAS No. 67-43-6) and its salts.

EDTA, DTPA and their salts are not readily degradable, furthermore, they are both classified toxic for reproduction and poses a risk to consumers. For EDTA, the EU's risk assessment states that under the conditions at municipal water treatment plants EDTA is either not broken down or only breaks down to a slight degree. To-date in Europe, EDTA has been replaced in virtually all consumer products by readily biodegradable alternatives such as MGDA (methylglycine diacetic acid) and GLDA (glutamic acid diacetic acid).

Organic chlorine compounds, hypochlorite and hypochlorous acid

Chlorine-based substances generally have undesirable health and environmental properties. Both hypochlorite and hypochloric acid can lead to formation of organic chlorine compounds and byproducts that are toxic and bioaccumulative, like trihalomethanes and haloacetic acids. Hypochlorous acid is not classified, and hypochlorite have the classification Very toxic to aquatic life (H400) and thus, they are not covered by the general requirement concerning environmentally hazardous substances. However, both pose an environmental risk due to the possibility of organic chlorine compounds forming.

Alkylphenols (AP), alkylphenol ethoxylates (APEO) and other alkylphenol derivatives (APD)

The non-ionic APEO group of surfactants are produced in large volumes and their uses lead to widespread release to the aquatic environment. APEOs are highly toxic to aquatic organisms and degrade to more environmentally persistent compounds (APDs). Ethoxylated nonylphenol and several other alkylphenols are included in the Candidate List due to endocrine disrupting properties.

Bisphenols and bisphenol derivatives

Several bisphenols with the general bisphenol structure and 'bisphenol derivatives' which have constituents with structural properties common to bisphenols are now prohibited. Based on the potential for widespread use and available information on potential endocrine disruptors, reproductive toxicity and PBT/vPvB properties, 34 substances were identified in need for further regulatory risk management in EU⁴.

Halogenated organic compounds

Halogenated organic substances contain halogenated substances such as chlorine, bromine, fluorine, or iodine. Halogenated organic substances include many substances that are harmful to health and the environment, in that they are very toxic to aquatic organisms, carcinogenic or harmful to health in some other way. Halogenated organic substances persist in the environment, which means they pose a risk of having harmful effects.

There is an exemption of the preservatives in inks and for pigments fulfilling the EU requirements for pigments in food packaging according to Resolution AP (89) point 2.5. The

⁴ Assessment of regulatory needs: Bisphenols. ECHA – 16 December 2021: Section 2.1: Bisphenols for which further EU RRM is proposed <https://echa.europa.eu/documents/10162/5e60f2fe-12d0-7f6b-5868-f199cfd7f984>

reason for including a requirement that pigments need to fulfil Resolution AP (89) is that the Nordic Ecolabelling does not wish to allow PCBs at all but since it is not possible to set a zero limit for pigments, the Nordic Ecolabelling has chosen to use the same limit as in food packaging (Resolution AP (89) point 2.5). This level has been chosen since it is a well-known method in the industry and the low level used in food packaging is considered strict enough for toner powders and inks in cartridges.

O5 Aromatic amines

Azo dyes that may release carcinogenic aromatic amines listed in Regulation (EC) No 1907/2006, Annex XVII, Appendix 8, must not be used in toner powder and ink.

- Appendix 2 completed and signed by the applicant that all the toner powders or inks used in the Nordic Swan Ecolabelled cartridges meet the requirement.
- Appendix 3 completed and signed by the producer or supplier of the toner powder/ink for each toner powder/ink.

Background to requirement O5 Aromatic amines

Carcinogenic aromatic amines shall be avoided. Therefore, azo dyes that may release carcinogenic aromatic amines listed in Regulation (EC) No 1907/2006, Annex XVII, Appendix 8, must not be used in toner powder and ink.

O6 Analysis for heavy metals, tin organic compounds and VOC

A test report shall declare that the analyse results for all toner powders and inks to be used for Nordic Swan Ecolabelled cartridges must be smaller or equal to the limit values listed in Table 3, Table 4 and Table 5 below.

The toner powders and inks must be analysed according to "TÜV Rheinland LGA Products GmbH" analysis methods. Toner powders and inks can also be analysed by testing the cartridges in accordance with current methods in the Blue Angel Criteria RAL-UZ 177.

Coloured toner powder/ink (e.g., cyan, magenta and yellow) may be mix in equal shares and hereafter analysed. Black toner powder/ink must be analysed separately.

The test laboratory shall meet the requirements in Appendix 1.

Table 3 Limit values for metals

| Test parameters | Limit value [mg/kg] |
|------------------|---------------------|
| Cobalt | 25 |
| Nickel | 70 |
| Cadmium | 5 |
| Lead | 25 |
| Mercury | 2 |
| Chromium (total) | 1 |
| Chromium VI | 3 |

Table 4 Limit values for tin organic compounds

| Test parameters | Limit value [mg/kg] | |
|--|---------------------|------------|
| | Method A* | Method B** |
| Method A is valid when extracted with methanol. If the limit value of method A is exceeded, method B applies (extraction using artificial sweat solution). | | |
| Total of tributyltin (TBT) and dibutyltin (DBT) | 0.5 | 0.05 |
| Total of other tin organic compounds*** | 5 | 0.5 |

* Test method: Derivatization with sodium tetraethyl borate, extraction with methanol, determination by means of GC/MS.

** Derivatization with sodium tetraethyl borate, extraction with artificial sweat solution (DIN EN ISO 105-E04), determination by means of GC/MS.

*** Total of butyltin, tetrabutyltin, octyltin, dioctyltin, tricyclohexyltin and triphenyltin.

Table 5 Limit values for volatile organic contents

| Test parameters | Limit value [mg/kg] |
|-----------------|---------------------|
| TVOC | 300 |
| Styrene | 40 |
| Benzene | 0.35 |

- Appendix 2 completed and signed by the applicant that all the toner powders and inks used in the Nordic Swan Ecolabelled cartridges meet the requirement.
- Appendix 3 completed and signed by the producer or supplier of the toner powder or the ink for each toner powder/ink.
- A Test Report for every toner powder and ink analysed, comprising the following:
 - Details of the place, time and type of analyse performed.
 - Information that states that the test laboratory meets requirement in Appendix 1.
 - Designation of the toner/ink or module.
 - Analysis results.
 - Test report(s).

Background to requirement O6 Analysis for heavy metals, tin organic compounds and VOC

To ensure low levels of heavy metals, tin organic compounds and volatile organic compounds (VOC), all toner powders and inks for Nordic Swan Ecolabelled cartridges must be tested.

It is possible to test emissions from the cartridges, but it is also possible to test the content in the toner powder and ink instead, which is a more cost-effective solution. In addition, testing content of unwanted substances in the toner or ink is also assuring that not only health in use phase is considered, but also reducing the risk of distribution of unwanted chemicals for instance via the printed matter. It is therefore the content in the toner powder and ink that must be tested.

Test methods must be according to TÜV Rheinland's "List of criteria for testing and certification of printing modules with toner"⁵. However, also tests according to methods in the Blue Angel Criteria RAL-UZ 177 are accepted.

The limit values are the same as set in TÜV Rheinland's "List of criteria for testing and certification of printing modules with toner"⁶.

The test methods and limit values in the requirement are the same for both toner powders and inks. In the Blue Angel Criteria RAL-UZ 177 "Remanufactured toner cartridges and ink cartridges for printers, copiers and multifunction devices" the same applies, where the content of heavy metals and tin organic compounds of both toner powders and inks must be tested in line with TÜV Rheinland's test and have the same limit values. However, in the Blue Angel Criteria VOC must be tested by emissions tests and test and limit values are divided for toner powders and inks, respectively.

Heavy metals

Heavy metals can be used to e.g. pigments/colour production. The requirement includes particularly environmentally and health-damaging heavy metals, which are specified in the requirement.

Heavy metals are restricted because they are toxic to people and other organisms, both on land and in the aquatic environment^{7,8,9}. On forested land, metals can end up in microorganisms in such a way that the degradation of dead organic material and thus the release of nutrients are slowed. On agricultural land, metals can disrupt the organisms in the soil or have a directly toxic effect on plants. Metals on agricultural land can also be taken up by crops to varying degrees, leading to human exposure.

Tin organic compounds

Organotin compounds can be bioaccumulative and health-damaging^{10,11,12}.

Several of the tin-organic compounds are banned for selected areas of use through REACH Annex XVII entry 20 and the following three; TBTO, DBTC and DOTE are on the EU Candidate List.

⁵ <https://www.tuv.com/world/en/voc-and-formaldehyde-emission-testing.html>

⁶ As set by TÜV Rheinland's "List of criteria for testing and certification of printing modules with toner" per February 2025.

⁷ Toxic heavy metals: impact on the environment and human health, and treatment with conducting organic polymers, a review, Sall, M.L., Diaw, A.K.D., Gningue-Sall, D. et al., 2020.

⁸ Heavy metals: toxicity and human health effects, Jomova, K., Alomar, S.Y., Nepovimova, E. et al., 2025.

⁹ Toxicity, mechanism and health effects of some heavy metals:

<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4427717/>

¹⁰ Forekomst af organiske tinforbindelser i planter og dyr fra danske farvande: Akkumulering og fødekæderelationer, Arbejdsrapport fra DMU, nr. 135, Miljø- og Energiministeriet Danmarks Miljøundersøgelser 2000, https://www2.dmu.dk/1_viden/2_Publikationer/3_arbrapporter/rapporter/AR135.pdf

¹¹ <https://www.bispebjerghospital.dk/giftlinjen/alt-om-gift/kemikalier/kemikalielisten/Sider/tinforbindelser.aspx>, visited 24 February 2025.

¹² <https://miljostatus.miljodirektoratet.no/tema/miljogifter/prioriterte-miljogifter/tbt-og-andre-organiske-tinnforbindelser/>

VOC (volatile organic contents)

Several organic solvents are associated with harmful health effects^{13, 14}. Organic solvents can be absorbed through the lungs and skin and cause damage to several organs. The injuries can be acute or chronic.

Acute harmful effects after inhalation of vapours are shown, such as headaches, fatigue etc. After prolonged exposure, organic solvents can cause chronic damage to the brain and nervous system. Certain organic solvents cause other irreparable health damage, such as cancer and reproductive damage (birth defects).

In addition, certain organic solvents contribute to the greenhouse effect, some to photochemical ozone formation and some to the depletion of the ozone layer.

5.3 Quality

O7 Production quality

The annual average level of complaints relating to Nordic Swan Ecolabelled products must not exceed 1%. Only complaints relating to Nordic Ecolabelling criteria shall be included in this calculation.

The level of complaints shall be calculated monthly for each type of Nordic Swan Ecolabelled cartridge. These complaint figures shall be used actively to assure and raise the quality. If the level of complaints exceeds 1% for a month, a report shall be submitted detailing the reasons and remedial actions. If the level of complaints exceeds 2%, contact Nordic Ecolabelling.

- Specification of complaints shall include types of product-related complaint, how claims are dealt with, the follow-up of production and contact with Nordic Ecolabelling.

Background to requirement O7 Production quality

High product quality is essential. Poor quality risks eroding the credibility of Nordic Ecolabelling and the user's faith in remanufactured cartridges. This requirement is measured by the number of complaints received for each type of cartridge. The limit value is set at 1%. Data from previous licensing shows that this level is reasonable. Only complaints associated with Nordic Ecolabelling requirements shall be included in the statistics, such as print quality and capacity. Complaints regarding damage during shipping, for example, are not included.

O8 Print quality for toner cartridges

All toner cartridges must be tested to and comply with one of the following standards/test methods:

- DIN Technical Report 155
- ASTM F:2036 for monochrome printouts

¹³ European Parliament Pilot Project on Exposure to Indoor Air Chemicals and Possible Health Risks, European Commission Joint Research Centre, 2008.

¹⁴ Bruckner, J. V., Anand, S. S., & Warren, D. A. (2008). Toxic effects of solvents and vapors. Casarette and Doull's Toxicology: The Basic Science of Poison, 7th Ed. Klaassen CD (Eds.), 981-1051.

- DIN 33870-1 for monochrome printouts
- DIN 33870-2 for colour printouts

The print quality must be at the same level as the equivalent OEM toner cartridge.

For applications and the extension of a licence, each Nordic Swan Ecolabelled toner cartridge type shall be tested.

If the toner powder and/or the drum are changed during the licence period, the relevant cartridge type shall be tested.

Independent auditor from a third-party company (e.g. TÜV, STMC, Dekra, Intertek etc.) must confirm that testing has been carried out in line with the requirement. The third-party company must confirm in writing that the auditor is familiar with the applied test method and provide a CV to support this expertise. Alternatively, the applicant may be certified under the STMC certification system.

During the licence period, print quality must be tested annually for 50% of the Nordic Swan Ecolabelled toner cartridge types. However, for OEM-manufactures the applicant shall declare that the same toner powder and spare parts are used in the remanufactured OEM cartridges as are used in the new manufactured OEM cartridges. Otherwise, 50% of the toner cartridge types must be tested annually.

Analysis laboratories performing tests must meet the requirements in Appendix 1.

- Confirmation from independent auditors from a third-party company that testing has been carried out in line with the requirement and documentation for expertise in this area. Alternatively, documentation for that the applicant is certified under the STMC certification system.
- Specify the test standard used and describe the test process in production.
- Documentation showing that the analysis laboratory fulfils the requirements in Appendix 1.
- Appendix 4 completed and signed by the applicant.
- For OEM-manufactures: In addition to above, declaration from applicant that the same toner powder and spare parts are used in the remanufactured OEM cartridges as are used in the new manufactured OEM cartridges.
- Test results must be available during inspection visits. The documentation shall be available to Nordic Ecolabelling on request.

Background to requirement O8 Print quality for toner cartridges

High print quality is of central importance to the user. Print quality shall be on a par with that of the equivalent OEM toner cartridge. If the applicant is an OEM-manufacturer this must also be shown.

All toner cartridges must be tested to and comply with DIN Technical Report 155¹⁵, ASTM F:2036¹⁶ (applies to monochrome printouts), DIN 33870-1 for monochrome printouts or DIN 33870-2 for colour printouts. These are recognised test methods, which can be used by

¹⁵ DIN Technical Report 155 – Information Technology: Office and data technology – Requirements for refilled modules with toner (monochrome/colour).

¹⁶ ASTM F:2036 – Standard Test Method for Evaluation of Larger Area Density and Background on Electrophotographic Printers.

players both large and small within the industry. 50% of the Nordic Swan Ecolabelled toner cartridges are to be tested annually while the licence remains valid. However, if the applicant is an OEM-manufacturer they can instead declare that the same toner powder and spare parts are used in the remanufactured OEM cartridges as are used in the new manufactured OEM cartridges.

It is required that an independent auditor certify that testing complies with the standard. Alternatively, the company may be certified in line with the industry's own certification system, known as the Standardized Test Methods Committee (STMC) system¹⁷.

The licensee must make the test results available during inspection visits, plus the documentation must also be made available to Nordic Ecolabelling on request.

O9 Print capacity for toner cartridges

All toner cartridges must be tested to and comply with one of the following standards/test methods:

- DIN Technical Report 155
- ISO/IEC 19752 for monochrome cartridges
- ISO/IEC 19798 for colour cartridges
- DIN 33870-1 for monochrome cartridges
- DIN 33870-2 for colour cartridges
- ASTM F:1856

Requirement level for print capacity for each cartridge type in application, in a comparison of the test results between the remanufactured OEM cartridge type and the equivalent OEM cartridge type: The average value for the remanufactured OEM cartridge type must not fall below -10% in the above comparison*.

Please note specific requirements for high-capacity cartridges, see requirement O12.

For applications and the extension of a licence, each relevant toner cartridge type shall be tested.

If the toner powder and/or the drum are changed during the licence period, the relevant cartridge type shall be tested in accordance with the chosen test method as outlined above.

Independent auditor from a third-party company (e.g. TÜV, STMC, Dekra, Intertek etc.) must confirm that testing has been carried out in line with the requirement. The third-party company must confirm in writing that the auditor is familiar with the applied test method and provide a CV to support this expertise. Alternatively, the applicant may be certified under the STMC certification system.

During the licence period, print capacity must be tested annually for 50% of the Nordic Swan Ecolabelled toner cartridge types*.

Analysis laboratories performing tests must meet the requirements in Appendix 1.

** However, for OEM-manufactures the applicant shall declare that the same toner powder and spare parts are used in the remanufactured OEM cartridges as are used in the new*

¹⁷ <https://i-itc.org/what-is-stmc/>

manufactured OEM cartridges. Otherwise, the requirement regarding comparison must be met and 50% of the toner cartridge types must be tested annually.

The above requirement level is applicable irrespective of the standard or test method used.

- Confirmation from independent auditors from a third-party company that testing has been carried out in line with the requirement and documentation for expertise in this area. Alternatively, documentation for that the applicant is certified under the STMC certification system.
- Specify the test standard used and describe the test process in production.
- Documentation showing that the analysis laboratory fulfils the requirements in Appendix 1.
- Appendix 4 completed and signed by the applicant.
- For OEM-manufactures: In addition to above, declaration from applicant that the same toner powder and spare parts are used in the remanufactured OEM cartridges as are used in the new manufactured OEM cartridges.
- Test results must be available during inspection visits. The documentation shall be available to Nordic Ecolabelling on request.

Background to requirement O9 Print capacity for toner cartridges

Print capacity is one of the most important requirements in the criteria. Print capacity equal to or better than the equivalent OEM toner cartridge is something all users expect and assure credibility to the remanufactured toner cartridges. The number of printouts is to be tested in line with one of the following testing standards: DIN Technical Report 155, ISO/IEC 19752 for monochrome cartridges¹⁸, ISO/IEC 19798 for colour cartridges¹⁹, DIN 33870-1 for monochrome cartridges, DIN 33870-2 for colour cartridges or ASTM F:1856²⁰.

All types of toner cartridge shall be tested on application. 50% of the Nordic Swan Ecolabelled toner cartridges are to be tested annually while the licence remains valid.

To ensure that the remanufactured OEM toner cartridge can produce the required yield of printouts, it is to be tested and compared against the capacity of the equivalent OEM cartridge. The capacity of the remanufactured OEM cartridge must not fall below the capacity of the OEM cartridge by more than 10%.

Alternatively for OEM-manufactures regarding annual test of 50% of the cartridges and not fall below 10% capacity, the applicant can declare that the same toner powder and spare parts are used in the remanufactured OEM cartridges as are used in the new manufactured OEM cartridges.

It is required that an independent auditor to certify that testing complies with the standard. Alternatively, the company may be certified in line with the industry's own certification system, known as the Standardized Test Methods Committee (STMC) system²¹.

¹⁸ ISO/IEC 19752 – Method for the determination of toner cartridge yield for monochromatic Electrophotographic printers and multi-function devices that contain printer components.

¹⁹ ISO/IEC 19798:2017 – Method for the determination of toner cartridge yield for colour printers and multi-function devices that contain printer components.

²⁰ ASTM F:1856 – Standard practice for Determining Toner Usage for Printer cartridges.

²¹ <https://i-itc.org/what-is-stmc/>

The licensee must make the test results available during inspection visits, plus the documentation must also be made available to Nordic Ecolabelling on request.

O10 Print quality for ink cartridges

All ink cartridges must be tested to and comply with the following standard/test method:

- DIN 33871-1

The print quality must be at the same level as the equivalent OEM ink cartridge.

For applications and the extension of a licence, each Nordic Swan Ecolabelled ink cartridge type shall be tested.

If the ink powder is changed during the licence period, the relevant cartridge type shall be tested.

Independent auditor from a third-party company (e.g. TÜV, STMC, Dekra, Intertek etc.) must confirm that testing has been carried out in line with the requirement. The third-party company must confirm in writing that the auditor is familiar with the applied test method and provide a CV to support this expertise. Alternatively, the applicant may be certified under the STMC certification system.

During the licence period, print quality must be tested annually for 50% of the Nordic Swan Ecolabelled ink cartridge types. However, for OEM-manufactures the applicant shall declare that the same ink and spare parts are used in the remanufactured OEM cartridges as are used in the new manufactured OEM cartridges. Otherwise, 50% of the ink cartridge types must be tested annually.

Analysis laboratories performing tests must meet the requirements in Appendix 1.

- Confirmation from independent auditors from a third-party company that testing has been carried out in line with the requirement and documentation for expertise in this area. Alternatively, documentation for that the applicant is certified under the STMC certification system.
- Specify the test standard used and describe the test process in production.
- Documentation showing that the analysis laboratory fulfils the requirements in Appendix 1.
- Appendix 5 completed and signed by the applicant.
- For OEM-manufactures: In addition to above, declaration from applicant that the same ink and spare parts are used in the remanufactured OEM cartridges as are used in the new manufactured OEM cartridges.
- Test results must be available during inspection visits. The documentation shall be available to Nordic Ecolabelling on request.

Background to requirement O10 Print quality for ink cartridges

High print quality is of central importance to the user. Print quality shall be on a par with that of the equivalent OEM toner cartridge. If the applicant is an OEM-manufacturer this must also be shown.

All ink cartridges must be tested to and comply with DIN 33871-1²². DIN 33871-1 specifies the principles for recycling as well as testing of colour rendition quality and yield. The aim of the standard is to achieve constant print quality with black or coloured ink of the refillable inkjet print heads and inkjet tanks. 50% of the Nordic Swan Ecolabelled inkjet cartridges are to be tested annually while the licence remains valid. However, if the applicant is an OEM-manufacturer they can instead declare that the same ink and spare parts are used in the remanufactured OEM cartridges as are used in the new manufactured OEM cartridges.

It is required that an independent auditor to certify that testing complies with the standard. Alternatively, the company may be certified in line with the industry's own certification system, known as the Standardized Test Methods Committee (STMC) system²³.

The licensee must make the test results available during inspection visits, plus the documentation must also be made available to Nordic Ecolabelling on request.

O11 Print capacity for ink cartridges

All ink cartridges must be tested to and comply with one of the following standards/test methods:

- DIN 33871-1
- ISO/IEC 22505 for monochrome cartridges
- ISO/IEC 24711 for colour cartridges

Requirement level for print capacity for each cartridge type in application, in a comparison of the test results between the remanufactured OEM cartridge type and the equivalent OEM cartridge type: The average value for the remanufactured OEM cartridge type must not fall below -10% in the above comparison*.

Please note specific requirements for high-capacity cartridges, see requirement O12.

For applications and the extension of a licence, each relevant ink cartridge type shall be tested.

If the ink is changed during the licence period, the relevant cartridge type shall be tested in accordance with the chosen test method as outlined above.

Independent auditor from a third-party company (e.g. TÜV, STMC, Dekra, Intertek etc.) must confirm that testing has been carried out in line with the requirement. The third-party company must confirm in writing that the auditor is familiar with the applied test method and provide a CV to support this expertise. Alternatively, the applicant may be certified under the STMC certification system.

During the licence period, print capacity must be tested annually for 50% of the Nordic Swan Ecolabelled toner cartridge types*.

** However, for OEM-manufactures the applicant shall declare that the same ink and spare parts are used in the remanufactured OEM cartridges as are used in the new manufactured OEM cartridges. Otherwise, the requirement regarding comparison must be met and 50% of the ink cartridge types must be tested annually.*

²² DIN 33871-1 Office machines, inkjet print heads and inkjet tanks for inkjet printers - Part 1: Preparation of refilled inkjet print heads and inkjet tanks for inkjet printers.

²³ <https://i-itc.org/what-is-stmc/>

The above requirement level is applicable irrespective of the standard or test method used.

Analysis laboratories performing tests must meet the requirements in Appendix 1.

- Confirmation from independent auditors from a third-party company that testing has been carried out in line with the requirement and documentation for expertise in this area. Alternatively, documentation for that the applicant is certified under the STMC certification system.
- Specify the test standard used and describe the test process in production.
- Documentation showing that the analysis laboratory fulfils the requirements in Appendix 1.
- Appendix 5 completed and signed by the applicant.
- For OEM-manufactures: In addition to above, declaration from applicant that the same ink and spare parts are used in the remanufactured OEM cartridges as are used in the new manufactured OEM cartridges.
- Test results must be available during inspection visits. The documentation shall be available to Nordic Ecolabelling on request.

Background to requirement O11 Print capacity for ink cartridges

Print capacity is one of the most important requirements in the criteria. Print capacity equal to or better than the equivalent OEM ink cartridge is something all users expect. The number of printouts is to be tested in line with one of the following testing standards: DIN 33871-1²⁴, ISO/IEC 22505²⁵ for monochrome cartridges or ISO/IEC 24711²⁶ for colour cartridges.

All types of ink cartridge shall be tested on application. 50% of the Nordic Swan Ecolabelled ink cartridges are to be tested annually while the licence remains valid.

To ensure that the remanufactured OEM ink cartridge can produce the required yield of printouts, it is to be tested and compared against the capacity of the equivalent OEM cartridge. The capacity of the remanufactured OEM cartridge must not fall below the capacity of the OEM cartridge by more than 10%.

Alternatively for OEM-manufactures regarding annual test of 50% of the cartridges and not fall below 10% capacity, the applicant can declare that the same ink and spare parts are used in the remanufactured OEM cartridges as are used in the new manufactured OEM cartridges.

It is required that an independent auditor to certify that testing complies with the standard. Alternatively, the company may be certified in line with the industry's own certification system, known as the Standardized Test Methods Committee (STMC) system²⁷.

The licensee must make the test results available during inspection visits, plus the documentation must also be made available to Nordic Ecolabelling on request.

²⁴ DIN 33871-1 Office machines, inkjet print heads and inkjet tanks for inkjet printers - Part 1: Preparation of refilled inkjet print heads and inkjet tanks for inkjet printers.

²⁵ ISO/IEC 22505 - Method for the determination of ink cartridge yield for monochrome inkjet printers and multi-function devices that contain ink.

²⁶ ISO/IEC 24711 - Method for the determination of ink cartridge yield for colour inkjet printers and multi-function devices that contain printer.

²⁷ <https://i-itc.org/what-is-stmc/>

5.4 Reuse and take-back system

O12 Reuse

The remanufactured OEM cartridge must comprise a minimum of 75% by weight reused parts, as an average of at least 100 units.

The weight of the toner powder or ink shall not be included in this total weight. For OPC units the weight of the drum shall not be included in this total weight.

For remanufactured OEM cartridges that can be expanded to produce more printouts and that deliver at least 50% more printouts than the equivalent OEM high capacity (HC) cartridge type, the proportion by weight of any new toner or ink container is excluded when calculating the proportion of reused parts.

Example: An OEM cartridge comes in an "A" and an "X" version. The "X" version is an HC cartridge that delivers 4,000 prints as specified by the OEM. A remanufactured OEM "A" or "X" cartridge that is expanded with the addition of a new toner or ink container must deliver at least $4,000 + 2,000 = 6,000$ printouts to fulfil the requirement.

- ☒ Specification of the proportion by weight of reused parts in each cartridge type and which parts are replaced during remanufacturing and refilling.
- ☒ The specification for the expanded cartridge type with a new toner or ink container must contain information on the number of printouts from the remanufactured OEM cartridge type. Testing is to be carried out in accordance with the chosen method in O9 for toner cartridges and O11 for ink cartridges. The specification from the OEM may be used to state the number of printouts from the equivalent OEM HC cartridge type.

Background to requirement O12 Reuse

After use the cartridge or container must be collected, cleaned, checked for defects, repaired and refilled with toner powder or ink.

The primary aim of the criteria is to reduce resource consumption through the reuse of materials, in particular plastics. Accordingly, Nordic Ecolabelling considers the requirement that toner cartridges comprise at least 75% reused materials to be the most important. This level has been used in previous generations of the criteria and has proven to be a suitable level. The maximum possible proportion of reused parts in a cartridge depends to a large extent on the design of the OEM cartridge, something Nordic Ecolabelling are unable to influence through these criteria.

The licensee is sometimes able to expand toner cartridges by adding new toner or ink containers that house more toner powder or ink and so give a higher print capacity than the original OEM cartridges. OEM toner cartridges are available for the same printers but with different print capacity. The printer may be delivered with a "Starter" cartridge that is then replaced with a "Standard" toner cartridge. In some cases, cartridges may be available with increased print capacity, and these may be referred to as "High Capacity" (HC), "More Capacity" or "X" toner cartridges. HC cartridges are generally used to increase print capacity. Nordic Swan Ecolabelled HC cartridges with new toner or ink containers must deliver at least 50% more printouts than the specified number from the equivalent of OEM HC cartridges. If an HC cartridge is available for the printer in question, the increased number of printouts is to be calculated from this level. Otherwise, the level is calculated from the specified number

of printouts from the standard cartridge. For this type of HC cartridge, the remanufacturing company may exclude any new toner/ink container from the 75% requirement if the toner/ink container needs to be replaced. This type of cartridge must naturally also meet the performance requirements for print quality (O8 or O10) and print capacity (O9 or O11).

O13 Take-back system for remanufacturing

To ensure that the cartridges are returned for remanufacturing, a cartridge take-back system must be in place.

Agreements between the manufacturers and distributors/resellers shall include a clause stating that the distributor/reseller shall, via their website, provide a take-back system.

Private consumers

Private consumers must be able to return individual cartridges free of charge, e.g. by prepaid address label or packaging for return. The licensee may also recommend other free methods of returning single cartridges for private consumers.

Business customers

The return system may comprise one or more of the following measures:

- The licensee's / distributor's / reseller's business customers should be able to order and return collection boxes from the licensee.
- Prepaid address label or packaging for return supplied with individual products.
- If maintenance service of the imaging equipment (e.g., printer, multifunctional device) is offered, take-back of cartridges is part of the service.

Nordic Ecolabelling may approve alternative take-back systems.

- Description of the take-back system including how it is user-friendly and easy to use.
- The terms of agreements between the licensee and distributors / resellers detailing rules on how the take-back system must be designed in order to fulfil the requirement.
- Signed agreements from all distributors and resellers shall be kept by the licensee and be available for presentation on a site visit. The documentation shall be available to Nordic Ecolabelling on request.

Background to requirement O13 Take-back system for remanufacturing

The collection of used cartridges is fundamental to the reuse of cartridges.

The aim of the requirement is to make it easy for end users to return used cartridges for remanufacturing. The take back systems must be user friendly and easy to use.

Private consumers must be able to return individual cartridges free of charge. The licensee may resolve this issue in various ways, including offering free postage or recommending that individual cartridges can be deposited at the nearest store or take-back point.

The licensee must set up agreements with resellers and distributors to ensure that they also offer take-back systems.

5.5 Packaging

O14 Chlorinated plastics in packaging

The product packaging must not contain chlorinated plastics.

- Specification of materials used for packaging and product information for the packaging.

Background to requirement O14 Chlorinated plastics in packaging

Chlorinated plastics, e.g. PVC, must not be used in packaging because it is problematic in the waste sorting and treatment. Read more about Nordic Ecolabelling's position on PVC here: [PVC](#).

5.6 Customer information

O15 Customer information

The following end-user information requirements must be fulfilled:

- a) The packaging must be clearly marked with:
 - The Nordic Swan Ecolabel logo and the licence number.
 - Information that the cartridge is part of a recycling process.
 - Information that the empty cartridge should be sent for remanufacturing, not thrown away.

Information about how to send cartridge for remanufacturing, e.g. website (directly to the website describing this).

If the cartridge is sold along with packaging for return, this must be specified in the information. It must also be stated that the pre-paid envelope (if provided) can be used for return.
- b) Information that the cartridge is originally an OEM cartridge that has been remanufactured, refilled and quality controlled. There should be reference to Nordic Ecolabelling's website.
- c) The end-user of the toner cartridge must be given clear, simple information that inhaling of toner powder can be harmful to health, plus instructions on how to handle any loose toner powder that may arise, due to a damaged cartridge.
- d) The consumer should also be provided with information regarding warranty and complaint procedures. The information shall be provided in writing in the Nordic languages applicable to the markets in which the product is sold.

QR code can be used for information in point b) to d).

- Example of the labelling of packaging (copy or photo) and product information provided to the customer.
- Procedures detailing how the applicant ensures that the product information required is provided with the product packaging.

Background to requirement O15 Customer information

Important customer information must accompany the product in order to gain the environmental effect of take-back and remanufacturing. Information in point a) must be on the packaging. Information in point b) to d) can be on the packaging, in leaflet in the packaging or by QR code on/in packaging.

If information about how to send used cartridge for remanufacturing is on a website, the website address on the packaging must be directly to the website describing this (not start website of the company).

Information about warranty and complaint procedures are to be given in all Nordic languages. If the products will not be sold on the Nordic market, such translation is not necessary.

Point c) only applies for toner cartridges.

5.7 Working environment and legislation

O16 Handling of loose toner powder

Suction shall be provided for all handling of loose toner powder*. Alternatively, the powder shall be handled in a closed process or workers handling loose toner powder shall wear breathing masks of the quality prescribed by the local authorities.

** Examples of tasks that may involve loose toner powder include disassembly of the cartridge, all handling of loose toner powder when refilling the remanufactured OEM toner cartridge and when adding loose toner powder to the remanufactured OEM cartridges before test printing takes place.*

Description of the handling of loose toner powder in production.

Background to requirement O16 Handling of loose toner powder

There may be a health risk when handling large quantities of loose toner powder, for example when refilling toner cartridges. To minimise the risk of inhaling loose toner powder, breathing masks and extraction fans or full mechanisation in the production of Nordic Swan Ecolabelled toner cartridges must be used. This must be documented in a description of how the requirement is fulfilled in the production process, and it is to be checked during on-site inspections.

O17 Legislation and labour conventions

The licensee must guarantee adherence to applicable patent legislation, safety regulations, working environment legislation, environmental legislation and conditions/concessions specific to the operations at all sites where the Nordic Swan Ecolabelled toner cartridge are manufactured.

The licensee must also ensure that all sites where the Nordic Swan Ecolabelled cartridge are manufactured comply with the following ILO Conventions*:

- Prohibition of forced labour (ILO Conventions Nos. 29 and 105)
- Prohibition of child labour (ILO Conventions Nos. 138 and 182)

- No discrimination (ILO Conventions Nos. 100 and 111)
- * The International Labour Organisation Conventions.
- Declaration from the applicant that the requirement is met and the contact details of the regulatory authorities for health and safety issues, environmental legislation and site-specific terms/concessions. Appendix 6 can be used.

Background to requirement O17 Legislation and labour conventions

The licensee must fulfil legislation. Respect of patents is of special concern in the industry^{28,29}, and Nordic Ecolabelling want to stress that this issue is important.

Nordic Ecolabelling requires that basic ILO conventions are respected at all sites where the Nordic Swan Ecolabelled cartridge are manufactured.

5.8 Licence maintenance

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

O18 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.

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

Background to requirement O18 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.

O19 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

²⁸ Imaging equipment and its consumables. Preparatory Study for Ecodesign., European Commission, Joint Research Centre, 2024.

²⁹ <https://www.etira.org/posts/etiras-2025-vision-tackling-non-compliance-and-championing-sustainability/>

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.

Your routine or a description.

Background to requirement O19 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 Remanufactured OEM Toner and Ink Cartridges

The relevant environmental impacts found in the life cycle of Remanufactured OEM Toner and Ink Cartridges are set out in a MECO scheme (please see 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).

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

RPS scheme

| Life cycle stages | Area and assessment of R, P, S (high, medium or low) | Comments |
|----------------------|--|---|
| Raw materials | | |
| Plastic | Plastic R: High | High RPS for requirements for reuse of plastic. Plastic is used in this product group. |
| Metal | P: High S: High | Plastic production is energy and resource intensive. This can be reduced by remanufacturing the cartridges (reuse plastic). Recycled plastic and bio-based plastics also have reduced climate impact compared to virgin plastic. |

| | | |
|--|--|---|
| | | <p>However, the greatest reduction is achieved by reusing the plastic (remanufacturing of the cartridges).</p> <p>A high proportion of the plastic parts of the used cartridges can often be reused, where only a few parts need to be changed and then can be refilled with toner powder/ink. There is therefore a high potential for setting requirement for the amount of reused parts in the cartridges.</p> <p>The amount of reused parts in the cartridges can be measured at the remanufacturing site. Hereby there is a high steerability for amount for wt% reused materials in the cartridges.</p> |
| | <p>Metal</p> <p>R: Medium</p> <p>P: Low</p> <p>S: Medium</p> | <p>Low to medium RPS for requirements for metal.</p> <p>Some parts in metal are used in especially toner cartridges.</p> <p>Production of metal is energy-intensive, however there are limited possibility to replace metal with other materials in this product group, because of functionality and durability. In addition, this product group only covers remanufactured OEM cartridges, and metal is very durable, so it is expected that metal parts most often are reused in the products.</p> |
| Production/distribution | | |
| <p>Chemicals harmful to the environment and health</p> <p>Energy consumption</p> <p>Loose toner powder in production</p> | <p>Chemicals</p> <p>R: High</p> <p>P: High</p> <p>S: High</p> | <p>High RPS for requirements for toner powder and ink, where harmful substances should be limited.</p> <p>Health exposure during remanufacturing, if cartridges is damaged or emissions during use are relevant.</p> <p>Also, harmful substances from printed matter are relevant when the printed matter are to be recycled.</p> <p>There is potential and steerability to reduce harmful substances in and/or emissions from toner powders and inks. Requirements can be set by not allowing the most harmful substances and to test and set limits for specific relevant harmful substances such as heavy metals and VOC.</p> <p>These requirements ensure that both end-users and workers are exposed to as little harmful chemicals as possible.</p> |
| | <p>Energy consumption</p> <p>R: Low</p> <p>P: Medium</p> <p>S: Medium</p> | <p>Low RPS for requirements for energy consumption during remanufacturing of the products.</p> <p>The primary energy consumption is probably in the raw material phase. Knowledge about energy consumption during remanufacturing of the cartridges is low, but energy consumption at this phase is expected not to be high and not to have a significant environmental impact.</p> <p>The potential is low to medium because of the expected low energy consumption. The steerability is low to medium because of difficult to separate energy consumption used for remanufacturing from other activities at production sites.</p> |
| | <p>Loose toner powder in production</p> <p>R: High</p> <p>P: High</p> <p>S: Medium</p> | <p>High RPS for requirements for handling of loose toner powder during remanufacturing of the cartridges.</p> <p>Handling of toner powder during remanufacturing has high relevance, because of the risk for inhalation by workers.</p> <p>The potential is high to minimise the amount of loose powder exposure e.g. by having suction at workstations or use breathing masks.</p> |

| | | |
|-----------------------------------|---|--|
| | | It is not possible to have full steerability because it is difficult to control if workers actually use the means provide to reduce exposure of loose powder. |
| Use phase | | |
| Print quality and capacity | Print quality and capacity R: High P: High S: Medium | High RPS for requirements for print quality and capacity of the cartridges. Both a good print quality and print capacity will mean less paper waste and less frequent cartridge replacements, which lower the carbon footprint ^{30, 31} . The potential and steerability are high because standards and test methods for printing quality and capacity exist which can be used in requirements. By setting requirements that printing quality and capacity must be at same level as OEM cartridges, low quality is avoided. |
| End of life | | |
| Take-back system Recycling | Take-back system for remanufacturing R: High P: High S: Medium | High RPS for requirements for take-back system for remanufacturing of cartridges. To ensure that the cartridges are returned for remanufacturing it is important that a take-back system is established. The potential is high because a take-back system is the first step to reuse the cartridges and hereby save materials and reduce CO ₂ -impact. Steerability is only medium because in the end it is the end-user who decide if they want to use the take-back system or not. |
| | Materials in the packaging R: Medium P: Low S: High | Low to medium RPS for requirements that the packaging shall not contain chlorinated plastics, e.g., PVC. Chlorinated plastics should be avoided in packaging because it is more difficult to recycle than PP and PE ³² . The potential is low because PVC is not often used in packaging. However, it is still important to avoid any use of PVC in packaging. The steerability is high, as it is easy to avoid PVC and to document this. |

³⁰ [Lot 4 - Imaging equipment - Revision Task 1-7.pdf](#), 2019.

³¹ Imaging equipment and its consumables. Preparatory Study for Ecodesign., European Commission Joint Research Centre, 2024.

³² Nordic Ecolabelling's position on PVC: [PVC](#).

MECO scheme

| | Raw material | Production | Use | End of life | Transport |
|-----------------|---|---|--|---|--|
| Material | <p>Cartridges typically consist of³³:</p> <ul style="list-style-type: none"> • 50–95% plastics such as ABS, PS, PP/PE (Crude oil) • 2–5% toner powder and ink chemicals. Pigments in the form of metals and others. • 1-20% metals such as steel and aluminium. | <p>Energy sources during production:</p> <ul style="list-style-type: none"> • Crude oil, gas and electricity. • Recycled materials can potentially be used in the production. • Remanufacturing of existing cartridges and design for remanufacturing. | <p>Paper consumption³⁴:</p> <ul style="list-style-type: none"> • Toner cartridges yield approximately 7,500 (A4) to 25,000 (A3) pages • Ink cartridges yield about 300 pages <p>Print quality impacts the use of paper and the capacity has an impact on the yield.</p> | <p>Fate of Ink and Toner Cartridges³⁵:</p> <ul style="list-style-type: none"> • 15 % are remanufactured • 32 % are recycled • 35 % are incinerated • 18 % end up in landfills <p>A take-back system facilitates remanufacturing and material recycling, ensuring proper handling of waste toner/ink, plastic, and metal.</p> | <p>Fuel for distribution, material transport and take-back systems.</p> |
| Energy | <p>Energy for extraction of raw materials³⁶:</p> <ul style="list-style-type: none"> • Plastics: 80 - 100 MJ/kg • Steel: 25–35 MJ/kg • Aluminium: 150–200 MJ/kg • Toner powder: 140–160 MJ/kg • Ink: 50-60 MJ/kg | <p>Energy consumption for:</p> <ul style="list-style-type: none"> • Polymer manufacturing. • Production of plastic granules and metal processing. • Production of toner powder, ink, additives, pigments and process chemicals. | <p>Nothing.</p> | <p>Minimal impact at end-of-life: When plastic components are incinerated, the released energy can be recovered and utilized for heat and electricity generation</p> | <p>Energy consumption when transporting raw materials, products and remanufactured products.</p> |

³³ Imaging equipment and its consumables. Preparatory Study for Ecodesign., European Commission Joint Research Centre, 2024.

³⁴ Imaging equipment and its consumables. Preparatory Study for Ecodesign., European Commission Joint Research Centre, 2024.

³⁵ [Lot 4 - Imaging equipment - Revision Task 1-7.pdf](#), 2019.

³⁶ Based on data from ecoinvent, and other databases

| | | | | | |
|------------------|---|---|---|---|---|
| | Total impact per 1000 printed pages ³⁷ : 6 to 8,6 MJ and 0,25 to 0,38 kg CO ₂ | <ul style="list-style-type: none"> production and remanufacturing of cartridges. <p>Total impact per 1000 printed pages³⁸: 6,1 to 11 MJ and 0,35 to 0,60 kg CO₂</p> | | Total impact per 1000 printed page ³⁹ : -1.4 to -1.9 MJ and -0.05 to -0.07 kg CO ₂ | Total impact per 1000 printed pages ⁴⁰ : 0,16 to 0,29 MJ and 0,01 to 0,02 kg CO ₂ |
| Chemicals | Raw materials: Emissions of e.g. VOC, Sox, Nox during extraction and refining processes | <p>Polymer manufacturing:</p> <ul style="list-style-type: none"> Emissions of VOCs, monomers (styrene, benzene), solvents, and additives (plasticizers, flame retardants). <p>Plastic granules & metal processing:</p> <ul style="list-style-type: none"> Emissions of VOCs, particulate matter, heavy metals (e.g., chromium, nickel), acid gases, and lubricants. <p>Toner powder & ink manufacturing:</p> <ul style="list-style-type: none"> Fine particulates (carbon black, pigment dust), VOC emissions from solvents, | <p>Potential exposure to toner powder/ink in case of leakage (inhalation, skin irritation).</p> <p>Ultrafine particles emission and emission of ozone from office laser printers⁴¹.</p> <p>Emissions of TVOCs (Total Volatile Organic Compounds) from non-OEM toner cartridges during printing⁴².</p> | <p>Emissions from incineration: Particulates, PAHs, VOCs, potential heavy metals from toner pigments.</p> <p>Environmentally hazardous substances from toner powder and inks that end up in recycled paper fibres when the written paper is recycled.</p> | <p>Maintenance chemicals such as lubricating oils, cleaning agent.</p> <p>Emission to air of PAH, CO₂, NOx, SOx, particulate matter etc.</p> |

³⁷ Imaging equipment and its consumables. Preparatory Study for Ecodesign., European Commission Joint Research Centre, 2024.

³⁸ Imaging equipment and its consumables. Preparatory Study for Ecodesign., European Commission Joint Research Centre, 2024.

³⁹ Imaging equipment and its consumables. Preparatory Study for Ecodesign., European Commission Joint Research Centre, 2024.

⁴⁰ Imaging equipment and its consumables. Preparatory Study for Ecodesign., European Commission Joint Research Centre, 2024.

⁴¹ <https://www.sciencedirect.com/science/article/abs/pii/S0021850215300574>

⁴² <https://h20195.www2.hp.com/v2/GetDocument.aspx?docname=c08126273>

| | | | | | |
|--------------|--|---|--|--|--|
| | | <p>and potential heavy metal exposure.</p> <ul style="list-style-type: none"> • Cartridge remanufacturing: Airborne toner/ink particles, • VOCs from cleaning solvents, and residual chemical exposure during cartridge cleaning. | | | |
| Other | <p>Social aspects and ethical aspects of raw material extraction.</p> <p>Agricultural raw materials can cause land-use change.</p> | Social and ethical aspects of remanufacturing. | Information for the user about take-back system for remanufacturing. | | |

7 Areas without requirements

In generation 6 of the criteria ink cartridges were added as a new product type. Because drying out ink cartridges is a special issue for ink cartridges (both new and remanufactured), it was investigated if any standards/test methods about drying out ink cartridges exist. However, no standards/test methods were found and therefore no requirements are set for drying out. In the criteria there are requirements for print quality and print capacity for ink cartridges.

8 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.

On-site inspection

In connection with handling of the application, Nordic Ecolabelling normally performs on-site inspection visit/-s to ensure adherence to the requirements. For such an inspection, data used for calculations, original copies of submitted certificates, test records, purchase statistics, and similar documents that support the application must be available for examination.

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.

Nordic Ecolabelling may decide to check whether remanufactured OEM toner and ink cartridges 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 remanufactured OEM toner and ink cartridges 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 Laboratories for testing, sampling and analysis

General requirements

The laboratory/institute must be competent and impartial.

If accreditation is not required separately, the testing, sampling and/or analysis laboratory must meet the general requirements of ISO 17025 standard for quality control of laboratories or be an official GLP-approved laboratory.

The applicant's analysis laboratory may be approved for testing, sampling and analysis if:

- testing, sampling and analysis is monitored by the authorities, or
- the manufacturer's quality assurance system covers testing, analyses and sampling and is certified to ISO 9001 or ISO 9002, 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.

Appendix 2 Declaration from the applicant: Toner powder/ink

This is a summary declaration for all toner powders and/or inks used in the Nordic Swan Ecolabelled cartridges.

This declaration is based on the knowledge we have at the time of the application, based on declarations from manufacturer/supplier of toner powders and/or inks (appendix 3), with reservations for new advances and new knowledge. Should such new knowledge arise, the undersigned is obliged to submit an updated declaration to Nordic Ecolabelling.

| Summary declaration for all toner powders and/or ink used in the Nordic Swan Ecolabelled cartridges. | Is the requirement fulfilled? | |
|--|-------------------------------|--------------------------|
| | YES | NO |
| O1 Full list of all toner powders and/or inks, including for each: <ul style="list-style-type: none"> • Trade name • Manufacturer/supplier • Product name of cartridge where it is used Is the above list attached? | <input type="checkbox"/> | <input type="checkbox"/> |
| O2 Classification of toner powder and ink | <input type="checkbox"/> | <input type="checkbox"/> |
| O2 Safety data sheet of toner powders and inks Is safety data sheet in accordance with Annex II of REACH (Regulation 1907/2006) for each toner powder and/or ink attached? | <input type="checkbox"/> | <input type="checkbox"/> |
| O3 Classification of ingoing substances | <input type="checkbox"/> | <input type="checkbox"/> |
| O4 Excluded substances | <input type="checkbox"/> | <input type="checkbox"/> |
| O5 Aromatic amines | <input type="checkbox"/> | <input type="checkbox"/> |
| O6 Analysis for heavy metals, tin organic compounds and VOC | <input type="checkbox"/> | <input type="checkbox"/> |

In the event of any changes of the toner powders and/or inks, a new declaration of fulfilment of the requirements is to be submitted to Nordic Ecolabelling.

| | |
|----------------------------|---|
| Place and date: | Company name: |
| Responsible person: | Signature of responsible person: |
| Telephone: | Email: |

Appendix 3 Declaration from manufacturer/supplier of toner powder or ink

To be used in conjunction with an application for a licence for the Nordic Swan Ecolabel of Remanufactured OEM Toner and Ink Cartridges.

This declaration is based on the knowledge we have at the time of the application, based on tests and/or declarations from raw material manufacturers, with reservations for new advances and new knowledge. Should such new knowledge arise, the undersigned is obliged to submit an updated declaration to Nordic Ecolabelling.

| |
|---|
| Manufacturer/supplier: |
| Trade name of the toner powder or ink: |

Ingoing substances and impurities are defined as:

- Ingoing substances: All substances in the toner powder/ink, including additives (e.g. preservatives and stabilisers) in the raw materials. Substances known to be released from ingoing substances (e.g. formaldehyde, arylamine, in situ-generated preservatives) are also regarded as ingoing substances.
- Impurities: Residuals, pollutants, contaminants etc. from production, incl. production of raw materials that remain in the toner powder/ink in concentrations less than 100 ppm in the rinse-off product and less than 10 ppm in the leave-on product.
- Impurities in the raw materials exceeding concentrations of ≥ 1000 ppm are always regarded as ingoing substances, regardless of the concentration in the toner powder/ink.

Examples of impurities are residues of the following: residues or reagents incl. residues of monomers, catalysts, by-products, scavengers, and detergents for production equipment and carry-over from other or previous production lines.

| Type and colour | | |
|--|---------------------------------------|------------------------------|
| Is the product a toner powder or an ink? | Toner powder <input type="checkbox"/> | Ink <input type="checkbox"/> |
| Colour of the toner powder/ink: | | |
| Black | <input type="checkbox"/> | |
| Cyan | <input type="checkbox"/> | |
| Magenta | <input type="checkbox"/> | |

| | |
|----------------|--------------------------|
| Yellow | <input type="checkbox"/> |
| Another colour | <input type="checkbox"/> |

| O2 Classification of the toner powder/ink: | | |
|---|--------------------------|--------------------------|
| According to CLP Regulation 1272/2008. Incl. all classification variants. For example, H350 also covers classification H350i. | | |
| Is the toner powder/ink classified with any of the hazard phrases below? | YES | NO |
| Aquatic Acute 1 H400 | <input type="checkbox"/> | <input type="checkbox"/> |
| Aquatic Chronic 1 H410 | <input type="checkbox"/> | <input type="checkbox"/> |
| Aquatic Chronic 2 H411 | <input type="checkbox"/> | <input type="checkbox"/> |
| Aquatic Chronic 3 H412 | <input type="checkbox"/> | <input type="checkbox"/> |
| Aquatic Chronic 4 H413 | <input type="checkbox"/> | <input type="checkbox"/> |
| Ozone H420 | <input type="checkbox"/> | <input type="checkbox"/> |
| Acute Tox. 1 or 2 H300 | <input type="checkbox"/> | <input type="checkbox"/> |
| Acute Tox. 1 or 2 H310 | <input type="checkbox"/> | <input type="checkbox"/> |
| Acute Tox. 1 or 2 H330 | <input type="checkbox"/> | <input type="checkbox"/> |
| Acute Tox. 3 H301 | <input type="checkbox"/> | <input type="checkbox"/> |
| Acute Tox. 3 H311 | <input type="checkbox"/> | <input type="checkbox"/> |
| Acute Tox. 3 H331 | <input type="checkbox"/> | <input type="checkbox"/> |
| STOT SE 1 or 2 H370 | <input type="checkbox"/> | <input type="checkbox"/> |
| STOT SE 1 or 2 H371 | <input type="checkbox"/> | <input type="checkbox"/> |
| STOT RE 1 or 2 H372 | <input type="checkbox"/> | <input type="checkbox"/> |
| STOT RE 1 or 2 H373 | <input type="checkbox"/> | <input type="checkbox"/> |
| Asp. Tox. 1 H304 | <input type="checkbox"/> | <input type="checkbox"/> |
| Skin Sens. 1, 1A or 1B H317* | <input type="checkbox"/> | <input type="checkbox"/> |
| <i>* For inks: Classification H317 due to preservatives are exempted from the requirement.</i> | | |
| If yes to H317: Is the classification H317 due to preservatives? | <input type="checkbox"/> | <input type="checkbox"/> |
| If yes to H317 and due to preservatives: Please state chemical name, CAS No. and amount (in ppm, wt% or mg/kg) of the preservative(s): | | |
| Resp. Sens. 1, 1A or 1B H334 | <input type="checkbox"/> | <input type="checkbox"/> |
| Carc. 1A or 1B H350 | <input type="checkbox"/> | <input type="checkbox"/> |
| Card. 2 H351 | <input type="checkbox"/> | <input type="checkbox"/> |
| Muta. 1A or 1B H340 | <input type="checkbox"/> | <input type="checkbox"/> |
| Muta. 2 H341 | <input type="checkbox"/> | <input type="checkbox"/> |

| | | |
|---|--------------------------|--------------------------|
| Repr. 1A or 1B H360 | <input type="checkbox"/> | <input type="checkbox"/> |
| Repr. 2 H361 | <input type="checkbox"/> | <input type="checkbox"/> |
| Lact. H362 | <input type="checkbox"/> | <input type="checkbox"/> |
| Is safety data sheet in accordance with Annex II of REACH (Regulation 1907/2006) for the toner powder/ink attached? | <input type="checkbox"/> | <input type="checkbox"/> |

O3 Classification of ingoing substances:

According to CLP Regulation 1272/2008. Incl. all classification variants. For example, H350 also covers classification H350i.

| Do the toner powder/ink has any ingoing substances classified with any of the hazard phrases below? | YES | NO |
|--|--------------------------|--------------------------|
| Carc. 1A or 1B H350 | <input type="checkbox"/> | <input type="checkbox"/> |
| Card. 2 H351* <i>* Titanium dioxide (CAS 13463-67-7) is exempted from the requirement.</i> | <input type="checkbox"/> | <input type="checkbox"/> |
| Muta. 1A or 1B H340 | <input type="checkbox"/> | <input type="checkbox"/> |
| Muta. 2 H341 | <input type="checkbox"/> | <input type="checkbox"/> |
| Repr. 1A or 1B H360 | <input type="checkbox"/> | <input type="checkbox"/> |
| Repr. 2 H361 | <input type="checkbox"/> | <input type="checkbox"/> |
| Lact. H362 | <input type="checkbox"/> | <input type="checkbox"/> |
| STOT SE 1 H370 | <input type="checkbox"/> | <input type="checkbox"/> |
| STOT RE 1 H372 | <input type="checkbox"/> | <input type="checkbox"/> |
| ED HH 1 EUH380 | <input type="checkbox"/> | <input type="checkbox"/> |
| ED HH 2 EUH381 | <input type="checkbox"/> | <input type="checkbox"/> |
| ED ENV 1 EUH430 | <input type="checkbox"/> | <input type="checkbox"/> |
| ED ENV 2 EUH431 | <input type="checkbox"/> | <input type="checkbox"/> |
| PBT EUH440** <i>** See also O4 Excluded substances for additional requirements for potential or identified endocrine disruptors and PBT/vPvB substances.</i> | <input type="checkbox"/> | <input type="checkbox"/> |
| vPvB EUH441** <i>** See also O4 Excluded substances for additional requirements for potential or identified endocrine disruptors and PBT/vPvB substances.</i> | <input type="checkbox"/> | <input type="checkbox"/> |
| PMT EUH450 | <input type="checkbox"/> | <input type="checkbox"/> |
| vPvM EUH451 | <input type="checkbox"/> | <input type="checkbox"/> |

O4 Excluded substances:

| Do the toner powder/ink has any ingoing substances or substance groups below? | YES | NO |
|---|--------------------------|--------------------------|
| Substances on the REACH Candidate list of SVHC substances https://www.echa.europa.eu/candidate-list-table | <input type="checkbox"/> | <input type="checkbox"/> |
| PBT and vPvB substances in accordance with REACH Annex XIII, including substances under investigation according to the ECHA PBT assessment list https://echa.europa.eu/pbt/-/dislist/details/0b0236e1889ab857 | <input type="checkbox"/> | <input type="checkbox"/> |
| Potential or identified endocrine disruptors, according to any of the following EU member state initiative "Endocrine Disruptor Lists" List I; II and III | <input type="checkbox"/> | <input type="checkbox"/> |

| | | |
|--|--------------------------|--------------------------|
| <i>N.B. A substance which is transferred to one of the corresponding sublists called "Substances no longer on list" and no longer appears on any of List I-III, is no longer excluded. The exemption is those substances on sublist II which were evaluated and where concern for endocrine disruption may still remain. Nordic Ecolabelling will evaluate the circumstances case-by-case, based on the background information indicated on the sublist.</i> | | |
| Per- and polyfluoroalkyl substances (PFAS) | <input type="checkbox"/> | <input type="checkbox"/> |
| Ethylenediamine tetraacetate (EDTA, CAS No. 6381-92-6) and its salts and Diethylenetriamine pentaacetate (DTPA, CAS No. 67-43-6) and its salts | <input type="checkbox"/> | <input type="checkbox"/> |
| Organic chlorine compounds, hypochlorites and hypochlorous acid | <input type="checkbox"/> | <input type="checkbox"/> |
| Alkylphenols (AP) (e.g. butylated hydroxy anisole (BHA, CAS No. 25013-16-5), alkylphenol ethoxylates (APEO), and other alkylphenol derivatives (APD)) | <input type="checkbox"/> | <input type="checkbox"/> |
| Bisphenols and bisphenol derivatives, defined as the 34 bisphenols that have been identified by ECHA for further EU regulatory risk management because they are known or potential endocrine disruptors for the environment or for human health, or can be identified as toxic for reproduction | <input type="checkbox"/> | <input type="checkbox"/> |
| Halogenated organic compounds Exemptions for: a) Pigments that meet the EU's requirement concerning colourants in food packaging under Resolution AP (89) point 2.5 b) Preservatives in inks. | <input type="checkbox"/> | <input type="checkbox"/> |
| For halogenated organic compounds: Are any of the exemptions used? | <input type="checkbox"/> | <input type="checkbox"/> |
| For halogenated organic compounds, if any exemptions are used: Please state if it is pigments or preservatives: | | |
| For halogenated organic compounds, if exemption is for pigments: Do the pigments meet the EU's requirement concerning colourants in food packaging under Resolution AP (89) point 2.5? | <input type="checkbox"/> | <input type="checkbox"/> |

| O5 Aromatic amines: | | |
|--|--------------------------|--------------------------|
| | YES | NO |
| Do the toner powder/ink contain any azo dyes that may release carcinogenic aromatic amines listed in Regulation (EC) No 1907/2006, Annex XVII, Appendix 8? | <input type="checkbox"/> | <input type="checkbox"/> |

| O6 Analysis for heavy metals, tin organic compounds and VOC: | | | | | | | | | | | | | | | | | |
|---|--|-----------------|---------------------|--------|----|--------|----|---------|---|------|----|---------|---|------------------|---|-------------|---|
| A test report shall declare that the analyse results for toner powder/ink is maximum the limit values listed in the table 1, 2 and 3 below: | | | | | | | | | | | | | | | | | |
| Tabel 1, Limit values for heavy metals: | | | | | | | | | | | | | | | | | |
| | <table border="1"> <thead> <tr> <th>Test parameters</th> <th>Limit value [mg/kg]</th> </tr> </thead> <tbody> <tr> <td>Cobalt</td> <td>25</td> </tr> <tr> <td>Nickel</td> <td>70</td> </tr> <tr> <td>Cadmium</td> <td>5</td> </tr> <tr> <td>Lead</td> <td>25</td> </tr> <tr> <td>Mercury</td> <td>2</td> </tr> <tr> <td>Chromium (total)</td> <td>1</td> </tr> <tr> <td>Chromium VI</td> <td>3</td> </tr> </tbody> </table> | Test parameters | Limit value [mg/kg] | Cobalt | 25 | Nickel | 70 | Cadmium | 5 | Lead | 25 | Mercury | 2 | Chromium (total) | 1 | Chromium VI | 3 |
| Test parameters | Limit value [mg/kg] | | | | | | | | | | | | | | | | |
| Cobalt | 25 | | | | | | | | | | | | | | | | |
| Nickel | 70 | | | | | | | | | | | | | | | | |
| Cadmium | 5 | | | | | | | | | | | | | | | | |
| Lead | 25 | | | | | | | | | | | | | | | | |
| Mercury | 2 | | | | | | | | | | | | | | | | |
| Chromium (total) | 1 | | | | | | | | | | | | | | | | |
| Chromium VI | 3 | | | | | | | | | | | | | | | | |

Tabel 2, Limit values for tin organic compounds:

| Test parameters | Limit value [mg/kg] | |
|--|---------------------|------------|
| | Method A* | Method B** |
| Method A is valid when extracted with methanol. If the limit value of method A is exceeded, method B applies (extraction using artificial sweat solution). | | |
| Total of tributyltin (TBT) and dibutyltin (DBT) | 0.5 | 0.05 |
| Total of other tin organic compounds*** | 5 | 0.5 |

* Test method: Derivatization with sodium tetraethyl borate, extraction with methanol, determination by means of GC/MS.

** Derivatization with sodium tetraethyl borate, extraction with artificial sweat solution (DIN EN ISO 105-E04), determination by means of GC/MS.

*** Total of butyltin, tetrabutyltin, octyltin, dioctyltin, tricyclohexyltin and triphenyltin.

Tabel 2, Limit values for volatile organic contents:

| Test parameters | Limit value [mg/kg] |
|-----------------|---------------------|
| TVOC | 300 |
| Styrene | 40 |
| Benzene | 0.35 |

| | YES | NO |
|--|--------------------------|--------------------------|
| The toner powder shall be analysed according to "TÜV Rheinland LGA Products GmbH" analysis methods. Toner powder can also be analysed by testing the toner cartridge in accordance with current methods in the Blue Angel Criteria RAL-UZ 177. <i>Coloured toner powder (e.g., cyan, magenta and yellow) may be mix in equal shares and hereafter analysed. Black toner powder must be analysed separately.</i> | <input type="checkbox"/> | <input type="checkbox"/> |
| Is test report(s) attached and analyse preformed according to above? | <input type="checkbox"/> | <input type="checkbox"/> |
| Do the test report(s) show that the limit values are smaller or equal to listed in the table 1, 2 and 3 above? | <input type="checkbox"/> | <input type="checkbox"/> |
| Do the test laboratory which has performed the test(s) fulfil the requirements: The laboratory must be competent and impartial. The laboratory must meet the general requirements of ISO 17025 standard for quality control of laboratories or be an official GLP-approved laboratory. | <input type="checkbox"/> | <input type="checkbox"/> |

In the event of any change to the composition of the toner powder/ink, a new declaration of fulfilment of the requirements is to be submitted to Nordic Ecolabelling.

| | |
|----------------------------|---|
| Place and date: | Company name: |
| Responsible person: | Signature of responsible person: |
| Telephone: | Email: |

Appendix 4 Declaration from the applicant: Toner cartridges - Print quality and capacity testing

OEM-manufacture or not

| | YES | NO |
|--|--------------------------|--------------------------|
| Are you an OEM-manufacture, who remanufacture your own OEM toner cartridges? | <input type="checkbox"/> | <input type="checkbox"/> |

Print quality for toner cartridges (O8)

| | YES | NO |
|---|--------------------------|--------------------------|
| Do all toner cartridges in the application comply with and have been tested in line with the requirement? | <input type="checkbox"/> | <input type="checkbox"/> |
| State which test standard has been used: | | |
| Has description of test process been attached? | <input type="checkbox"/> | <input type="checkbox"/> |

Print capacity for toner cartridges (O9)

| | YES | NO |
|--|--------------------------|--------------------------|
| Do all toner cartridges in the application comply with and have been tested in line with the requirement? | <input type="checkbox"/> | <input type="checkbox"/> |
| All toner cartridge types in the application meet the requirement level* for print capacity for each cartridge type: | <input type="checkbox"/> | <input type="checkbox"/> |
| State which test standard has been used: | | |
| Has description of test process been attached? | <input type="checkbox"/> | <input type="checkbox"/> |
| For OEM-manufacture: Are the same toner powders and spare parts used in the remanufactured OEM cartridges as are used in the new manufactured OEM cartridges? | <input type="checkbox"/> | <input type="checkbox"/> |

* Definition: Requirement level for print capacity for each cartridge type in application, in a comparison of the test results between the remanufactured OEM cartridge type and the equivalent OEM cartridge type:

The average value for the remanufactured OEM cartridge type must not fall below -10% in the comparison as defined above.

However, for OEM-manufactures the applicant may instead declare that the same toner powder and spare parts are used in the remanufactured OEM cartridges as are used in the new manufactured OEM cartridges.

Analysis laboratory and third-party (O8 and O9)

| | YES | NO |
|---|--------------------------|--------------------------|
| Do the analysis laboratory fulfil the requirements in Appendix 1? | <input type="checkbox"/> | <input type="checkbox"/> |
| An independent auditor from a third-party company must confirm that testing has been carried out in line with requirements O10 and O11. In addition, the auditor must confirm that he/she is familiar with these test methods for print quality and print capacity for remanufactured OEM toner cartridges and confirms to have expertise in assessing how the applicant is applying the test methods used. | <input type="checkbox"/> | <input type="checkbox"/> |
| Is above confirmation from third-party company attached? | | |
| Alternative to the above appendices: The applicant is certified under the STMC certification system. Evidence must be enclosed showing that the applicant has a valid STMC certificate. Is valid STMC certificate attached? | <input type="checkbox"/> | <input type="checkbox"/> |

We declare that all cartridges in the application comply with and are tested in line with requirements O8 and O9 for toner cartridges in the criteria for Nordic Ecolabelling of Remanufactured OEM Toner and Ink Cartridges generation 6.

| | |
|----------------------------|---|
| Place and date: | Company name: |
| Responsible person: | Signature of responsible person: |
| Telephone: | Email: |

Appendix 5 Declaration from the applicant: Ink cartridges - Print quality and capacity testing

OEM-manufacture or not

| | YES | NO |
|--|--------------------------|--------------------------|
| Are you an OEM-manufacture, who remanufacture your own OEM ink cartridges? | <input type="checkbox"/> | <input type="checkbox"/> |

Print quality for ink cartridges (O10)

| | YES | NO |
|---|--------------------------|--------------------------|
| Do all ink cartridges in the application comply with and have been tested in line with the requirement? | <input type="checkbox"/> | <input type="checkbox"/> |
| State which test standard has been used: | | |
| Has description of test process been attached? | <input type="checkbox"/> | <input type="checkbox"/> |

Print capacity for ink cartridges (O11)

| | YES | NO |
|---|--------------------------|--------------------------|
| Do all ink cartridges in the application comply with and have been tested in line with the requirement? | <input type="checkbox"/> | <input type="checkbox"/> |
| All ink cartridge types in the application meet the requirement level* for print capacity for each cartridge type: | <input type="checkbox"/> | <input type="checkbox"/> |
| State which test standard has been used: | | |
| Has description of test process been attached? | <input type="checkbox"/> | <input type="checkbox"/> |
| For OEM-manufacture: Are the same inks and spare parts used in the remanufactured OEM cartridges as are used in the new manufactured OEM cartridges? | <input type="checkbox"/> | <input type="checkbox"/> |

* Definition: Requirement level for print capacity for each cartridge type in application, in a comparison of the test results between the remanufactured OEM cartridge type and the equivalent OEM cartridge type:

The average value for the remanufactured OEM cartridge type must not fall below -10% in the comparison as defined above.

However, for OEM-manufactures the applicant may instead declare that the same inks and spare parts are used in the remanufactured OEM cartridges as are used in the new manufactured OEM cartridges.

Analysis laboratory and third-party (O10 and O11)

| | YES | NO |
|---|--------------------------|--------------------------|
| Do the analysis laboratory fulfil the requirements in Appendix 1? | <input type="checkbox"/> | <input type="checkbox"/> |
| An independent auditor from a third-party company must confirm that testing has been carried out in line with requirements O10 and O11. In addition, the auditor must confirm that he/she is familiar with these test methods for print quality and print capacity for remanufactured OEM ink cartridges and confirms to have expertise in assessing how the applicant is applying the test methods used. Is above confirmation from third-party company attached? | <input type="checkbox"/> | <input type="checkbox"/> |
| Alternative to the above appendices: The applicant is certified under the STMC certification system. Evidence must be enclosed showing that the applicant has a valid STMC certificate. Is valid STMC certificate attached? | <input type="checkbox"/> | <input type="checkbox"/> |

We declare that all ink cartridges in the application comply with and are tested in line with requirements O10 and O11 for ink cartridges in the criteria for Nordic Ecolabelling of Remanufactured OEM Toner and Ink Cartridges generation 6.

| | |
|----------------------------|---|
| Place and date: | Company name: |
| Responsible person: | Signature of responsible person: |
| Telephone: | Email: |

Appendix 6 Declaration from the applicant: Legislation and labour conventions

Declaration of legislation and labour conventions compliance

We hereby declare adherence to applicable patent legislation, safety regulations, working environment legislation, environmental legislation and conditions/concessions specific to the operations at all sites where the Nordic Swan Ecolabelled toner cartridge are manufactured.

We hereby declare that all sites where the Nordic Swan Ecolabelled cartridge are manufactured comply with the following ILO Conventions (The International Labour Organisation Conventions):

- Prohibition of forced labour (ILO Conventions Nos. 29 and 105)
- Prohibition of child labour (ILO Conventions Nos. 138 and 182)
- No discrimination (ILO Conventions Nos. 100 and 111)

| Contact information for the regulatory authority for: | See appendix/appendices: |
|---|--------------------------|
| Working environment: | |
| Environmental legislation: | |
| Site-specific terms/concessions: | |
| | |
| | |
| | |

| | |
|---------------------|----------------------------------|
| Place and date: | Company name: |
| Responsible person: | Signature of responsible person: |
| Telephone: | Email: |