About Nordic Ecolabelling of

Imaging Equipment

Version 6.0

Background, Final review proposal

2012-12-20

Nordic Ecolabelling

Nordic Ecolabelling - Background

015/v.6.0

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1 Summary

The criteria revision towards version 6.0 was executed during the autumn of 2012 and spring of 2013, is expected to be granted in June 2013. The criteria where revised for the 5th time. The same product group definition as in version 5.0 continued to version 6.0.

The Relevance/Potential/Steerability (RPS) analysis for this product group shows a high score in energy consumption during the user-phase, flame retardants in plastics double-sided (duplex) copying and consumables coupled to printers, specifically laser-printers. Medium/high score was found for other additives in plastic parts (phthalates for instance) and packaging. All of these topics have requirements coupled to them.

The objective for the revision was to revise the energy consumption requirement and the requirements for heavy metals and flame retardants, propose requirements for additives in plastic parts, examine whether the possibility to propose requirements on re-cycled/re-used plastics and bio-plastics, update the packaging requirements and propose electrical safety requirements.

The most important requirements revised from version 5.0 where the requirement for energy consumption, flame retardants, re-used plastic and double-sided copying. The energy consumption refers to the Blue Angel revised criteria for Office equipment with printing function RAL-UZ 171 and/or the Energy Star specifications for imaging equipment v. 2.0. The flame retardant requirement was sharpened with two additional eco-toxicity risk-phrases and with fewer exceptions.

New requirements added to version 6.0 of the criteria where requirements for phthalates in the imaging equipment's external cables, recycled material used in packaging material, consumables (consumption of toner cartridges in relation to page printing) and code of conduct. Removed requirements from version 5.0 and later modifications, included the harmonization with the Eco Mark, heavy metals, labelling of plastic parts and labelling of plastic packaging, subassemblies and requirements for batteries. Evaluated requirements but not proposed requirements where re-cycled/re-used plastics and bio-based plastics, electrical safety and halogen-free flame retardants.

During the revision process, future requirement and areas in need to be revised in up-coming revision processes where identified. Example of focus areas suggested for up-coming revisions where regulations to minimize the risk of use of "conflict metals" in electronics, emissions of ultra-fine particles, substances in toner powder and ink and software to lower paper use.

2 Basic facts about the criteria

Products which can be labelled

Nordic Ecolabelling has developed a common criteria document for copiers, printers, fax machines, multifunctional devices and scanners i.e. imaging equipment, because the structures of these products are similar. The foundation for the development of the criteria for imaging equipment has many features in common with the Nordic Ecolabelling criteria for personal computers. The requirements are also in many ways similar to the

requirements developed by other ecolabelling organizations, i.e. TCO, Blue Angel, and Eco Mark, though the levels of the requirements differ.

The name of the criteria, Imaging Equipment, is the same as Energy Star has for this product group but Nordic Swan exclude Mailing Machine in this group. The machines may be equipped with external or internal scanners. Detailed descriptions of the individual products are found below.

Copier

A commercially-available imaging product whose sole function is the production of hard copy duplicates from graphic hard copy originals. The unit must be capable of being powered from a wall outlet or from a data or network connection. This definition is intended to cover products that are marketed as copiers or upgradeable digital copiers (UDCs).

Digital Duplicator

A commercially-available imaging product that is sold in the market as a fully-automated duplicator system through the method of stencil duplicating with digital reproduction functionality. The unit must be capable of being powered from a wall outlet or from a data or network connection. This definition is intended to cover products that are marketed as digital duplicators.

Facsimile Machine (Fax Machine)

A commercially-available imaging product whose primary functions are scanning hard copy originals for electronic transmission to remote units and receiving similar electronic transmissions to produce hard copy output. Electronic transmission is primarily over a public telephone system, but also may be via computer network or the Internet. The product also may be capable of producing hard copy duplicates. The unit must be capable of being powered from a wall outlet or from a data or network connection. This definition is intended to cover products that are marketed as fax machines.

Multifunction Device (MFD)

A commercially-available imaging product, which is a physically-integrated device or a combination of functionally-integrated components, that performs two or more of the core functions of copying, printing, scanning, or faxing. The copy functionality as addressed in this definition is considered to be distinct from single sheet copying offered by fax machines. The unit must be capable of being powered from a wall outlet or from a data or network connection. This definition is intended to cover products that are marketed as MFDs or multifunction products (MFPs).

Note: If the MFD is not a single integrated unit but a set of functionally integrated components, then the manufacturer must certify that when installed correctly in the field, the sum of all energy or power use for all MFD components comprising the base unit will achieve the energy or power levels provided in Section 3 to qualify as an Energy Star MFD.

Printer

A commercially-available imaging product that serves as a hard copy output device, and is capable of receiving information from single-user or networked computers, or other input devices (e.g., digital cameras). The unit must be capable of being powered from a wall outlet or from a data or network connection. This definition is intended to cover products that are marketed as printers, including printers that can be upgraded into MFDs in the field.

Scanner

A commercially-available imaging product that functions as an electro-optical device for converting information into electronic images that can be stored, edited, converted, or transmitted, primarily in a personal computing environment. The unit must be capable of being powered from a wall outlet or from a data or network connection. This definition is intended to cover products that are marketed as scanners

Extra equipment

The above products also include various consumer durables, such as OPC (Optical Photosensitive Conductor) kits, drums, toner powder and residual toner cartridges.

If extra equipment such as desks, sorters, feeder and units for double-sided printing are to be included, the individual parts must meet the requirements as to design, materials, chemical requirements during production, requirements as to packaging and requirements as to recycling.

Motives for Nordic Ecolabel, RPS

Relevance

This relevance, potential and steerability section is mainly based on the work by European Commission´s Joint Resource Centre and its Institute for Prospective Technological Studies (JRC/IPTS) in the project on developing EU Ecolabel criteria for Imaging Equipment. The LCA information is mainly deriving from the Ecodesign study on imaging equipment.

These studies identified three areas of environmental significance[1]:

- Paper consumption,
- Energy efficiency in the user-phase, and
- Consumption of toner and inks

1 JRC/IPTS – "Development of European Ecolabel and Greeen Public Procurement Criteria for Imaging Equipment", December 2011, http://susproc.jrc.ec.europa.eu/imaging-equipment/stakeholders.html

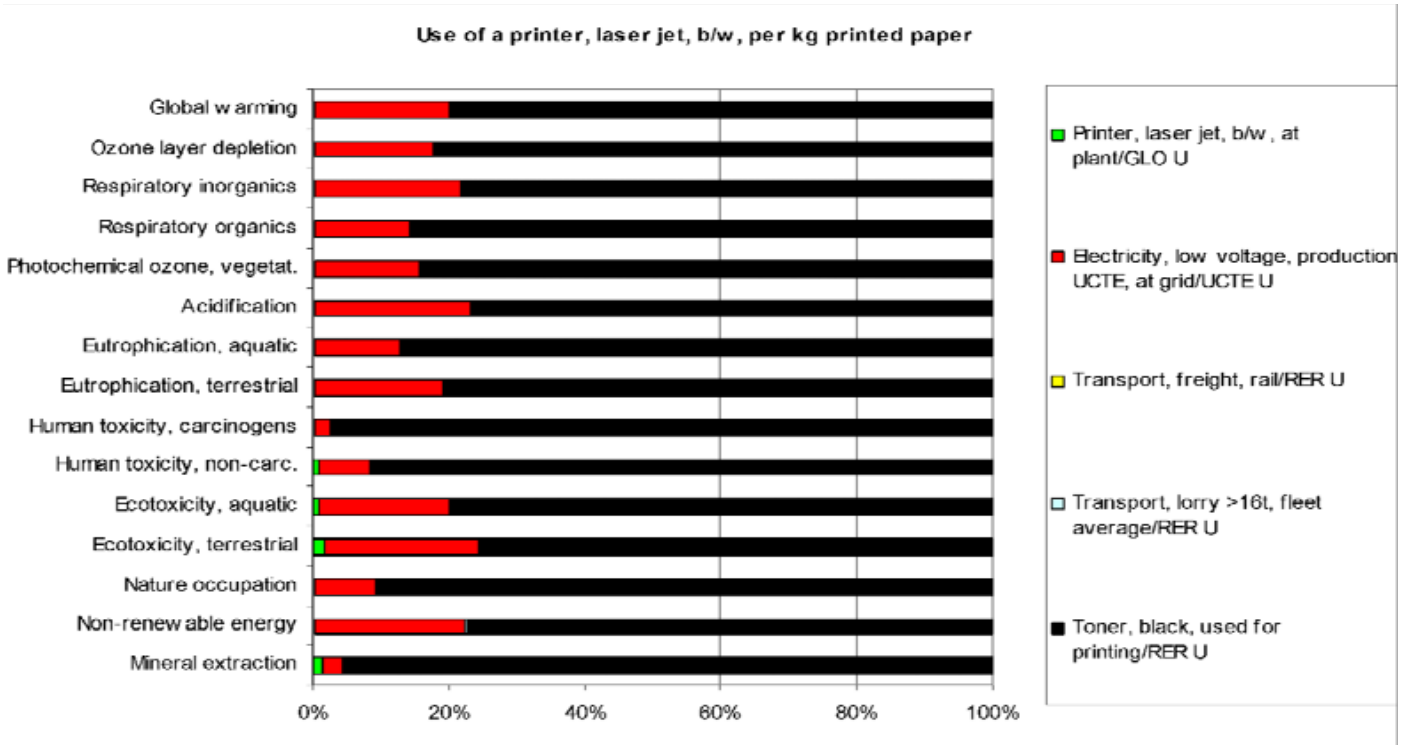


Figure 1 - Impacts on 15 different midpoint environmental indicators of a laser jet printer.

Figure 1 show the impact on 15 different midpoint environmental indicators. Paper consumption is not included in this figure. It should also be noted that the laser jet printer is taken as an example for all imaging equipment in the LCA-study.

Besides the above shown environmental indicators, there are areas that are not necessarily picked up in LCA-studies although they contribute to environmental and health concerns. These are:

- Indoor air emissions, and
- Noise

Paper consumption

The requirement as to double-sided copying for printing devices is an important means of reducing the volume of paper used in printing and consequently also the energy consumption in printing. This is because a significant part of the energy consumption involved in making one print is connected to the manufacturing of the paper. Using double-sided printing will therefore reduce the total energy consumption involved in printing.

Energy consumption

Energy consumption is an important property of the device from an environmental point of view, see figure 1, showing a significant contribution of electricity from the production phase on all environmental impact[1].

Consumption of toner and inks

As shown in figure 1, the environmental load for all environmental impact categories is significant. The impact from the production of toner mainly comes from the production of the toner module, the toner (powder), the production of aluminium and the electricity for manufacturing the toner[1].

During a printing machines life-cycle significant amount of toner cartridges and other consumables are used. These volumes create a number of environmental problems, such as greenhouse gases emitted during transport from manufacturing sites often located in Asia to the Nordic marked and considerable amount of waste after its end use.

The re-use of toner printer cartridges can save 25-40% of the environmental impact, expressed in CO2-equivalents[2].

Design and lifetime extension

Discarded printing equipment represents a considerable waste problem. Large amounts of waste are generated containing hazardous substances such as flame-retardants and heavy metals. Requirements as to re-cycling and re-using parts and materials increase material re-cycling and re-use, thus allowing natural resources to be conserved and the quantity of waste sent to landfill sites or incineration to be reduced. The end of life-treatment is regulated in detail by the Waste electrical electronic equipment Directive (WEEE-Directive, 2012/19/EC). Here the collection, dismantling and the final disposal of electronic waste is regulated.

The ability to re-cycle and re-use parts (remanufacturing) of a printing device is known to reduce negative environmental effects from the manufacturing phase of the toner cartridges. Here the design of a printer/copier is very important. Below is a comparison of two cases, showing the importance of design in an imaging equipment when it comes to environmental impact. The comparison is between a product life-cycle with remanufacturing compared to a product life-cycle without remanufacturing but with the ability of refilling empty cartridges.

Table 1 – Comparison of two different product life-cycles environmental impact aspect [source: JRC/IPTS, December 2011]

Environmental impact aspect	Photocopier non-modular design (refilling)	Photocopier modular design (remanufacturing)
	Environmental savings in percent	
Materials consumption (kg)	25	49
Energy consumption (MJ)	27	68

The table above shows that remanufacturing and refilling is lowering the environmental impact in general, but the energy/material saving is much higher if the photocopier has a modular, or remanufactured design[1]. However, these figures are sometimes ambiguous as they can contradict results from other LCA-studies showing for instance a lowering of printing quality of remanufactured toner cartridges.

2 Development of EU Ecolabel Criteria for Imaging Equipment, JRC presentation at 1st AHWG meeting, April 2011, http://susproc.jrc.ec.europa.eu/imaging-equipment/stakeholders.html

Chemicals

Components in electronic waste can contain a large number of hazardous substances, including heavy metals (mercury, cadmium and lead) and substances used as flame retardants like polybrominated diphenyl ethers (PBDE´s) and tetrabromobiphenol-A (TBBPA).

Heavy metals

A large proportion of the above stated stabilizers are persistent, bio-accumulative and toxic to waterborne organisms, carcinogenic, harmful to the reproductive system or have immunotoxic properties. Heavy metals are used as stabilizers e.g. in PVC and are primarily used in cables or other plastic materials. Lead stabilizers represent approximately 70% of total stabilizer use in Europe. Although cadmium stabilizers are being phased out, cadmium is still found in "old" products. Organic tin compounds are used in some applications of stiff PVC.

Flame retardants

PBB, PBDE or chlorinated paraffins (with a certain chain length) have are well documented hazardous effects on health and the external environment. Plastic containing brominated substances have to be separated from other types of plastic because of specific requirements in the WEEE-directive.

A large proportion of the brominated materials are combusted. Depending on the temperature of combustion, high levels of brominated dioxins and furans can be formed and released as a result of the dioxin precursor properties of aromatic brominated flame retardants[1].

The prohibition of the flame retardant deca-BDE in the RoHS-directive (in line with PBB) is still questioned. Interestingly, there exist data supporting that deca-BDE can degrade to shorter chained brominated biphenyls having high toxicity i.e. giving effects like the chlorinated dioxins and PCB. Many chlorinated paraffins are, similar to heavy metals, persistent and bio accumulative. The use of some flame-retardant are regulated by Restriction of hazardous substances Directive (RoHS-Directive, 2011/65/EU). However, many flame retardants, not regulated by the RoHS-Directive are of environmental concern and are relevant to regulate further.

Chlorine based plastics

The presence of chlorine atoms in materials affords a number of technically desirable properties, but also the formation of dioxin and other persistent organic pollutants during production and disposal.

Emissions/indoor air quality

Imaging equipment is a source of indoor air pollutants, especially ozone, particulate matter, volatile organic compounds (VOC), and semi-volatile organic compounds (SVOC).

Imaging equipment generate ozone in varying amounts while toner and paper dust from printing devises may become airborne, generating respirable particles that include ultrafine aerosols. Also VOC´s are emitted which is at least partly derived from the toner that

is heated during printing. Toxicological effects or potentially significant consequences due to these emission is widely described in literature[1], e.g. ozone and particulate matter have been associated with occupational symptoms such as eye, nose or throat irritation, headache and fatigue.

Noise

It is well known that noise pollution can affect health. Some of the effects are:

- Loss of productivity,
- Physiological effects, and
- Annoyance

See further relevance of noise as an environmental problem under Chapter 5 – Motivation of the requirements, and "sound effect".

Potential

Copiers are the most energy intensive type of office equipment. Because they waste energy sitting idle for several hours each day, there is potential to improve their energy efficiency. Printers are typically left on 24 hours a day, but are active only a small percent of the time, meaning that they waste a lot of energy. Power down can cut a printers electricity use by over 65%. Interestingly, all Energy Star compliant copiers automatically turn off after a period of inactivity[3].

Copiers automatically set to make double sided copies saves energy and paper. Easy and reliable duplex operations will encourage users to copy on both sides.

Likewise, the potential to pose strict requirements for flame retardants used as additives in plastic parts is considered possible and important. Today there are substitutes to brominated flame retardants for many applications within the product group. Moreover, there is a potential to pose requirement on so called consumables (toner cartridges, collecting cartridges etc.) identified as an important environmental load in figure 1.

Improvement options regarding life-time extension are important. Design for re-use of components and re-cycling of materials from imaging equipment's should be highly prioritized. The end-of-life of offices machines will be influenced by the WEEE directive (updated 2011) which set requirements of the handling of products and also on the possibility to identify and remove hazardous substances.

Steerability

The steerability of the most significant environmental parameter, energy consumption in the user-phase, is very high since this is technically achievable and can be communicated to manufacturers in contrast to difficulties related to raw materials such as metals etc. Technological innovation of printing devices also continually pushes the user-phase energy consumption. Moreover, energy consumption is a parameter regulated by several by the industry accepted schemes such as the Energy Star.

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3 Imaging equipment: copiers, faxes, printers, scanners, multifunctional devises (Lot 4), European Commission,
http://www2.mst.dk/common/Udgivramme/Frame.asp?http://www2.mst.dk/udgiv/publications/2009/978-87-92617-03-3/html/kap06_eng.htm

Experience from handling applications shows that information on flame retardants used in different components has been challenging to extract. It has been clear that there is an advantage in having standardized declarations, in order to enhance the dialogue between applicant and sub-supplier. Generally, the steerability for flame retardants in plastics is considered to be lower than that for energy consumption, see above about handling applications. Flame retardants are also products more difficult to substitute while preserving same desired technical functionality as is the case with non-flame retardant chemical products.

The steerability for noise (sound effect) and consumables improvements is considered to be equal to the steerability for energy consumption.

Table 2 – RPS-analysis of individual environmental parameters

Environmental parameter	Relevance	Potential	Steerability	Assessment of RPS
Energy consumption	Very high	High[1)]	High	+++
Plastics	Low	High[2)]	Good	+
Flame retardants in plastics	Very high	High[2)]	Good	+++
Other additives in plastics	High	High[2)]	Good	++
Heavy metals	Indifferent	Indifferent	Indifferent[3)]	0
Double-sided copying and consumables	Very high	High[4)]	High	+++
Indoor air emissions	High[5)]	High	Good	++
Sound effect	High[5)]	Good	Good	+
Environmental impact of production (use or raw materials and energy, transport)	High	High	Poor/Good[6)]	0
Design	High	High	Good	++
Packaging	Low[7)]	High	High	++

1) *Power consumption per unit decreases as product development continues*

2) *Alternatives are available*

3) *Controlling the chain of suppliers is difficult. RoHS restricts the use of heavy metals*

4) *Different patented techniques available for consumables.*

5) *Continued and/or increasing public awareness and concern. Multiple health responses of noise and combination-effects of air emissions relevant*

6) *Poor controllability so far down the production chain*

7) *Low relevance in relation to the final products overall environmental impact*

Based on the above RPS-analysis the product requirement for imaging devices focus on:

- Energy consumption during use
- Plastic parts and their characteristics
- Flame retardants and other additives in plastic parts
- Design as to combined toner cartridges
- Packaging
- Supply of spare parts, double-sided copying and on consumables, and
- Emissions to indoor air and sound effect

Criteria version and validity

The first criteria document for this product group was adopted in 1993, set only for copiers. Version 2 of the criteria was adopted in 1997. The criteria document for copiers, printers, fax machines and multifunctional devices version 3.3 (June 6th 2001-January 7th 2007) was a merger of two criteria documents: Copiers, version 2.2 and Printers/Fax Machines, version 2.1.

During version 3, the Board of Nordic Ecolabelling and Japan Environmental Association decided to develop the so called core criteria following a harmonization program. For the license applicant that meant that a product approved by the Japan Environmental Association and awarded the Eco Mark, needed no further documentation regarding requirements encompassed by the cooperation agreement

Version 4, set criteria for the same type of products as version 3, but the document had a new structure and simpler criteria while still maintaining a strict focus on environmental improvements. In version 4 the harmonization ambition embraced also the Blue Angel. This ambition continued throughout version 5.0 of the criteria in 2007.

The Nordic market

Nearly all manufacturing of products within this product group takes place outside the Nordic region. The product group encompasses two market segments: products sold as office equipment and products sold for home use through home electronics stores. The quality of the machines manufactured for office use is higher than those designed for the consumer market. For business users, factors such as low energy consumption, print speed, cost per page, and working environment requirements are important. For the consumer market, purchase price is the decisive factor.

The Nordic Ecolabelled products cover both printers and copiers. All designed for offices, professionals and regular consumers.

Nordic Ecolabelling licenses

When the revision to version 6.0 of the criteria was undertaken there were four producers having licenses for Imaging Equipment for over 80 products. In the business market, the Nordic Ecolabelling has had a larger impact than on the consumer market where there are not any licenses.

Other labels

Table 3 – Listings of different Ecolabel organizations and their characteristics within this product group

Type 1 labels	
Eco Mark, www.ecomark.jp/english/	The Eco Mark is the Japanese third-party certificate corresponding to the Nordic Ecolabel. Eco Mark has criteria for Copiers Multifunctional devices and Printers. Type-1 label.
The Blue Angel www.Blauer-Engel.de	The Blue Angel ecolabel is the German third-party certificate corresponding to the Nordic Swan. Blue Angel has criteria for Copiers, Multifunctional devices and Printers. Type-1 label
TCO www.tcodevelopment.com	The TCO label is a third-party certificate. TCO has issued criteria for Printers only. The requirements cover the external environment and work environment. Type-1 label
EU Ecolabel www.eco-label.com	The Ecolabel Flower is the EU third party certificate corresponding to the Nordic Swan. They have until yet no criteria for Copiers and printers. Type-1 label.
Other type of labels	
GEEA www.efficient-appliances.org	GEEA is a collaborative project between the energy authorities in France, Switzerland, Sweden, Denmark, Finland, Germany and the Netherlands. The GEEA label is a self-declaration scheme. The organization has the right to withdraw a license if it is revealed that the criteria are not fulfilled. Denmark is the only Nordic country that actively markets the GEEA label.
IT Ecodeclaration www.itecodeclaration.org	IT Ecodeclaration is a collaborative initiative between IT enterprises in Denmark, Norway and Sweden. IT Ecodeclaration is a self-declaration scheme that covers external environmental and working environment parameters.
Energy Star www.energystar.gov	Energy Star is third party scheme run by the US Environmental Protection Agency with the aim of promoting energy-efficient products. Virtually all companies on the market are affiliated to Energy Star.

3 About the revision

Objectives with Criteria/revision

The objective for this criteria development was to revise the criteria for Imaging equipment version 5.4, and construct a proposal for a new criteria document. The goals were specifically to:

- investigate the possibility to sharpen the energy, material, emission and noise requirements through a harmonization ambition,
- investigate the possibility to form a requirement for consumption of toner cartridges during a set period of an Imaging equipment's life-time,
- revise the requirements for heavy metals and flame retardants,
- pose requirements for additives in plastic parts,
- examine whether the possibility to pose requirements on re-cycled/re-used plastics and bio-plastics,
- update the packaging requirements, and
- propose electrical safety requirements.

In order to investigate the possibility for a revision of the energy, material, emission and noise requirements the EU Ecolabel, Eco Mark and Blue Angel were benchmarked. Requirements for flame retardants, additives in plastic parts, re-cycled/re-used/bio-plastic parts, packaging and electrical safety where predominately assessed in a parallel revision project within Nordic Ecolabelling, that of Computers to version 7.0.

About this criteria development/revision

The revision for criteria version 6.0 was undertaken during the autumn of 2012 and spring of 2013. During the process of the criteria revision license holders as well as other stakeholders such as other environmental label organizations, environmental organizations, producers, retailers and industrial organizations where consulted.

The referral period was set from December 2012 – February 2013 during which the proposal for the new criteria document version 6.0 was published in the website of the Nordic Ecolabelling.

The project team for this revision in the Nordic Ecolabelling was the following:

Project leader:	Jimmy Yoler
Denmark:	Jacob Wegener Waidløw
Norway:	Marianne B Eskeland
Sweden:	Ove Jansson

4 Motivation for the requirements

Harmonization with Blue Angel

During the revision to version 5.0, the structure of the criteria was simplified, which made it easier for manufacturers or distributors to apply for the Nordic Ecolabelling if they already held an ecolabel issued by Eco Mark or Blue Angel.

The harmonization ambition was also prioritized during the revision to version 6.0 of the criteria. However, it was concluded that Blue Angel was a more relevant ecolabelling scheme to harmonize with than Eco Mark. The Blue Angel had drafts for new criteria proposals during the time Nordic Ecolabelling revised version 5.0 with later modifycations to version 6.0 (see further motivation under 5-Changes from previous version, and removed requirements), which Eco Mark had not. Therefore, the revision to version 6.0 implied such major changes with corresponding criteria document at Eco Mark that the harmonization ambition was not able to uphold with the Japanese eco-label.

The additional requirements a manufacturer must comply with to receive a Nordic Ecolabel, if the manufacturer holds a valid Blue Angel label, are listed in R1 in the criteria document.

R1 Valid Blue Angel license

If the product has a valid Blue Angel license (RAL-UZ 171, or later versions), the following requirements need to be fulfilled:

- Re-used plastic, R4
- Phthalates in external power cable, R10
- Re-cycled material in packaging, R13
- Double-sided copying, R15
- Consumables, R16
- Code of conduct, R19
- Chapter 5, Quality and regulatory requirements
- Appendix 2

✉ Description as specified above.

Environmental requirements

General description

The intention with this requirement is to see if the product is possible to license, i.e. it is included in the product definition**.**

R2 Description of the product

Describe the product and how it fulfils the definition of a product eligible to carry the Nordic Ecolabel.

✉ Description as specified above.

Energy consumption

Energy consumption is a very important property of the device from an environmental point of view, see more details in 2.2 – RPS-analysis. Also, in the closely related Nordic Ecolabel product groups, "computers" and "audiovisual equipment", there are clear indications that energy consumption during the user-phase is the most important environmental parameter when considering entire product life cycles.

The Nordic Ecolabel has through the years tried to harmonize its requirements as much as possible with worldwide well known standards as for example Energy Star. During the revision process for criteria version 5.0, the Nordic Ecolabelling proposed an energy requirement where the applicant should comply either with Blue Angel criteria (at the time being the most stringent requirement RAL-UZ 122, June 2006) or Energy Star criteria (at the time being version 1.0 May 3 2006).

The harmonization ambition continued throughout version 6.0 of the criteria. During the criteria revision, both Blue Angel and Energy Star had drafts for new criteria – RAL-UZ-171 and Imaging Equipment version 2.0 respectively. The formulation of requirement R3 was decided to be unchanged in relation to version 5.0 with later modifications concerning the reference to Blue Angel and Energy Star. The difference between the two ecolabelling organizations sharpness for this product group and specific requirement was also valid during the revision for version 6.0 as it was during the revision to version 5.0.

For more detail information regarding the energy consumption calculations in the respective labelling organization, Nordic Ecolabelling refers to Blue Angel and Energy Stars respective webpages. The Energy Star specification revision for Imaging equipment had a time plan, during the Nordic Ecolabel criteria revision to version 6.0, with a finalization in January 2013. Nordic Ecolabelling assumed that the original Energy Star revision time-plan would be followed. Therefore, during the external review of the criteria for version 6.0, Nordic Ecolabelling referred to the Energy Star draft specification, available in the specific Energy Star Imaging equipment revision web-page. If the time-plan will not be followed, or any major modifications will be done during the Energy Star revision, necessary measures will be taken by the Nordic Ecolabelling.

R3 Energy consumption

The energy consumption of the product must fulfil the energy requirement in Blue Angel criteria for a corresponding product. Energy consumption must be measured in accordance with the requirements described in the criteria for Blue Angel: (RAL-UZ 171, or later versions)[4].
Or
The energy consumption of the product must fulfil the energy requirement in Energy Star criteria for imaging equipment. Energy consumption must be measured in accordance with the requirements described in the Energy Star criteria for "Imaging Equipment version 2.0"[5] or later versions.

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[4] Blue Angel, RAL-UZ 171, Basic Criteria for Award of the Environmental Label, Office Equipment with Printing Function (2012)
http://www.blauer-engel.de/de/produkte_marken/vergabegrundlage.php?id=259

5 Energy Star, Product Specification for Imaging Equipment, Final Draft Version 2.0 (2012)
http://energystar.gov/products/specs/sites/products/files/Final%20Draft%20Version%202%200%20Imaging%20Equipment%20Specification.pdf

✉ A test report documenting that the product(s) is in compliance with either RAL-UZ 171, or later versions, or Energy Star criteria for "Imaging Equipment version 2.0", or later versions.

Design and materials

Discarded printing equipment represents a considerable waste problem. Large amounts of waste are generated containing hazardous substances such as flame-retardants and heavy metals.

According to Sweden's business sectors service company for the collection and recycling of electrical and electronical products (El-kretsen), "office equipment and other IT and telecommunication equipment", in which printing equipment is a part, where recycled with 26 846 tons in 2009, 28 690 tons in 2010 and 28 355 tons in 2011[6]. According to the Swedish Environmental Protection Agency, Sweden has a good frequency of re-cycling. In 2009, 94% of the same abovementioned category was re-cycled, of which 91% was either re-used or material re-cycled[7]. El-kretsen show in their statistics that "miscellaneous" electronic waste (excluded are TV-sets and monitors) lead to an extraction of approximately 17% plastics.

Requirements as to re-cycling and re-using parts and materials increase material re-cycling and re-use. The background for the requirement that at least one part >25g shall be made of re-used or post-consumer and pre-consumer plastic is derived from Eco Mark. The intention of Eco Mark was to initiate a process to use re-used or re-cycled plastics. The formulation of the requirement has during the revision phases been altered so that a re-used plastic part can be accepted as well as a post or pre-consumer re-cycled plastic. The Nordic Ecolabelling recognizes that there is a challenge in the availability of post-consumer plastics with good enough quality, therefore pre-consumed/post-industrial plastics are allowed. In the revision towards version 6.0 of the criteria, the pre-consumed/post-industrial plastics are allowed, as long as they are not derived from the same production facility where the final product is made (internal waste/spillage). They are therefore steering natural resources to be conserved and waste sent to landfill sites or incineration to be reduced meanwhile speeding up the trend towards increased plastic re-cycling. This requirement supports the Waste Electrical and Electronic Equipment Directive (WEEE-Directive), 2012/19/EU, and also provides a scope for up-grading and ease of re-pair. Another advantage of these criteria is that they can be used for product development purposes by manufacturers. This requirement is partly harmonized with Blue Angel and Eco Mark.

In general, the requirements focus on plastic casing parts >25 g as the significant level for material re-use or re-cycling. The imaging product must have an environmentally friendly design, using few plastics materials (e.g. homo-polymer, co-polymer or polymer

6 El-kretsen, Sweden´s business sectors service company for the collection and recycling of electrical and electronical products, Annual report 2011 – In Swedish http://www.el-kretsen.se/sitespecific/elkretsen/files/arsrapport2011/elk_0066_arsrapport_2011_webb.pdf

7 Swedish Environmental Protection Agency, report 6482 (2012), "Collect, re-cycle!, a follow-up of the producer responsibility" – in Swedish
http://www.naturvardsverket.se/Documents/publikationer6400/978-91-620-6482-2.pdf

blends), which are separable. To promote post-consumer re-cycling at least one part >25g must be made of re-used or re-cycled plastic.

R4 Re-used plastic

List the plastic materials used. At least one part > 25 g must contain re-used plastic part or post-consumer and post-industrial* re-cycled plastic.

** Post-industrial plastics cannot be from internal production.*

✉ Declaration from the manufacturer of the imaging equipment, showing that the requirement is fulfilled by filling out Appendix 4.

✉ A list from the manufacturer of the imaging equipment showing the plastic materials used, by filling out Appendix 5.

✉ Description from the manufacturer of the imaging equipment of all plastic part comprising of re-cycled (post-consumer/post-industrial)* or re-used plastic parts.

Products with combined toner cartridge

Some printing devices use a combined toner cartridge (drum, developer and toner in one unit*)* instead of one separate and removable unit. These combined toner cartridges may be accepted if the cartridges have been designed for re-use. Products must also accept remanufactured cartridges.

R5 Special requirements as to products with combined toner cartridges

Products with combined toner cartridge may be accepted if the cartridge is not designed to prevent re-use.

Products must accept re-manufactured toner cartridges.

In order to ensure that the toner cartridges are returned for re-use, a return system must be offered for re-cycling combined toner cartridges and information to user about the return system must be provided.

Combined toner cartridge = Drum, developer and toner in one unit.

✉ Declaration from the manufacturer of the imaging equipment showing that the requirement is fulfilled by filling out Appendix 4.

✉ The applicant/manufacturer must document the existence of a functional return system and describe the structure of this system.

Plastics in casings and their components

The requirement in this and the following chapter, i.e. chlorine-based plastics, flame retardants, phthalates in the external cable in plastic parts and chemicals during production are intended to stimulate the phasing out, or a substitution of environmentally dangerous substances and products.

Numerous and complicated process stages are required to produce the electronic parts for an imaging equipment product, such as a printing device. Large volumes of chemicals are used and the volume of waste generated often is significant in volume and complexity.

Many substances are used in the production of printing equipment and some have properties that are hazardous to health or harmful to the environment, for instance:

- Chlorinated solvents used as cleaning agents during production
- Cadmium, for example in nickel cadmium batteries.
- Lead, for example, in solder and lead oxide in cathode ray tubes.
- Copper, for example, in cables and circuit boards.
- Halogenated flame retardants in printed circuit boards and in plastic materials.

The following requirements are partly harmonized with the Blue Angel and the Eco Mark.

Single and combined plastic casing parts

R6 Single plastic casing parts

Single plastic casing parts > 25 g must be made of a homopolymer or copolymer. Polymer blends (polymer alloy) are permitted.

✉ Declaration from the manufacturer of the imaging equipment showing that the requirement is fulfilled by filling out Appendix 4.

R7 Combined plastic casing parts

Combined plastic casing parts > 25 g must be made of four or fewer types of mutually separable polymers or polymer blends.

✉ Declaration from the manufacturer of the imaging equipment showing that the requirement is fulfilled by filling out Appendix 4.

Chlorine-based plastics

PVC plastic parts >25g are excluded from use in imaging equipment. The presence of chlorine atoms in materials affords a number of technically desirable properties, but there are adverse environmental impacts coupled to the disposal of PVC plastics as they usually contain additives with undesirable health effects. When PVC ends up in the waste stream for incineration, this means effectively more chlorine in the waste stream. Chlorine is a prerequisite for the formation of the highly toxic dioxins in the flue gas, but since there are several other sources of chlorine than PVC, an increased incineration of PVC will not necessarily lead to an increased amount of dioxin, as chlorine is not the limiting factor for the formation of dioxins in incinerator[8,9] . The extra amount of PVC will, however, increase the formation of acidic gases and consequently will increase the need for gas cleaning with gas cleaning equipment.

Combustion of 1 kg of PVC produces up to 1.7 kg of salt in flue gas cleaning[8]. In practice, it means that more waste is generated than the amount of waste that was sent into the incinerator. This is due to the neutralizing process carried out in order to avoid

8 Hjelmar, 2002: Forbrænding af PVC: Påvirkning af massestrømmene gennem et forbrændingsanlæg. DHI – Institut for Vand og Miljø

9 Erichsen & Hauschild, 2000: Technical data for waste incineration – background for modelling of product specific emissions in a life cycle assessment context. Department of manufacturing engineering, Technical University of Denmark, 2000

hydrochloric acid to be formed and create a corrosive environment in the incinerator. Not all waste incineration facilities are able to incinerate PVC-products in the Nordic region. Old fractions of PVC have a high probability of containing hazardous additives such as lead and cadmium creating rest materials that need to be taken care of. In the case of incinerators that cannot incinerate such PVC waste, the stream is usually landfilled. In the case of incinerators being able of incinerating such PVC waste, the rest products (the fly ash and bottom slag) are treated specially; the fly ash being landfilled in special landfills, and the bottom slag also landfilled or used as construction material for landfills.

During the revision to version 6.0 it was decided to remove the exception in previous versions of the criteria for re-used/re-cycled chlorinated polymers. The motivation for this is that producers do not tend to re-use/re-cycled chlorine-based plastics, due to a set of reasons such as availability and content. The modified requirement for chlorine-based plastics requirement, without the exception for re-used/re-cycled chlorinated plastics became therefore more like similar equal requirements for close related product groups of audiovisual equipment and computers.

Suggested **modification** of the requirement:

R8 Chlorine-based plastics

Plastic parts >25g must not contain chlorinated polymers.

✉ Declaration from the manufacturer of the imaging equipment, showing that the requirement has been met.

Flame retardants

Plastic parts in imaging equipment contain flame retardants in order to protect them from taking fire. According to the Swedish Environmental Protection Agency, in 2009 the total amount of plastics considered to contain flame retardants from collected electrical and electronical waste was around 1 400-3 600 tones. The use of some flame retardants are regulated by RoHS-Directive from the 1st of July 2006. Those are PBB (polybrominated biphenyls) and PBDE (polybrominated diphenyl ethers). The directive has been revised 2011/65/EU (also called RoHS 2) and takes effect in the beginning of 2013. No new substances have been subjected to prohibition or limitations[10].

As in the case of chlorinated plastic materials, halogenated flames retardant are not permitted in plastic materials unless they are close to electrical component. Halogenated organic flame retardants are still prohibited to be used in all plastic parts, including those <25 g for imaging equipment due to their well-documented hazardous effects on health and the external environment. There exist for instance data supporting that the flame retardant deca-BDE can degrade to shorter chained brominated biphenyls having high toxicity i.e. giving effects similar to those of chlorinated dioxins and PCB. Many chlorinated paraffins are persistent and bio-accumulative.

Beside as additive to plastic materials, flame retardants are used on printed circuit boards and can technically be used as an additive or as a reactive. It is best for the environment to use reactive flame retardants compared to flame retardant used as additives to circuit boards. When reactively bound the flame retardant is physically prevented in leaking to

10 Electric and electronic equipment – RoHS Directive – in Swedish http://www.kemi.se/rohs

the environment i.e. on landfills, motivating the exception given for printed circuit boards. However, printed circuit boards may not consist of plastic parts treated with PBB, PBDE, decaBDE or chlorinated homogenous materials.

It is important to have strict requirements in place applicable to those flame retardants which still are used even though halogenated flame retardants are prohibited. The Nordic Ecolabelling has in the previous criteria revision (to version 5.0) harmonized its criteria with Blue Angel and permitted only flame retardants which had not been assigned any of specified risk phrases at the time of application: R 40 (possible risk of cancer), R45 (may cause cancer), R46 (may cause heritable genetic damage), R 48 (danger of serious damage to health by prolonged exposure), R49 (may cause cancer by inhalation), R60 (may impair fertility), R61 (may cause harm to unborn child), R62 (possible risk of impaired fertility) and R63 (possible risk of harm to unborn child). This harmonization continues during the criteria revision for version 6.0. Based on data retrieved from licensing processes, the Nordic Ecolabel assess that it now is possible to sharpen the requirement on flame retardant in plastics used. It is therefore suggested that two risk phrase combinations addressing eco-toxicity in combination with long term effects on aquatic environment are listed in the requirement. By listing these risk phrases, the risks associated with the use of such plastic products in imaging equipment are minimized throughout the imaging equipment´s life cycle.

These additional risk phrases are H400, H410 and H411 corresponding to R50/53 (very toxic to aquatic organisms, my cause long-term adverse effects in the aquatic environment) and R51/53 (toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment).

Limit values for impurity concentrations of halogenated flame retardant are mentioned in the requirement in accordance with the permissible concentrations in the RoHS-Directive – at the limit of 0.1% by weight.

The knowledge about flame retardants that are used in printed circuit boards is still limited to us. Today TBBPA is the most used flame retardants in printed circuit boards. TBBPA has been assessed by EU and found "acceptable" regarding human health. Regarding aquatic and terrestrial ecosystems EU has concluded that there is a need for further investigation[11]. TBBPA is currently used in over 90 % of the printed circuit boards on the market according to a report from US Environmental Protection Agency[12]. The market situation when revising these criteria in 2012 motivated the exception for printed circuit boards from the halogenated flame retardant prohibition requirement. The exception is also for plastic parts <25 g and special plastic components installed in direct vicinity of heating and fusing units due to extreme heat development on those particular parts in the device. However, above mentioned parts that are exempted from the halogenated flame retardant prohibition requirement shall not be treated with PBB, PBDE, decaBDE or chlorinated paraffins.

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11 Communication from the Commission on the results of the risk evaluation and the risk reduction strategies for the substances: sodium chromate, sodium dichromate and 2,2',6,6'-tetrabromo-4,4'-isopropylidenediphenol (tetrabromobisphenol A), (2008/C 152/02) http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:C:2008:152:0011:0020:EN:PDF

12 Design for the Environment, An EPA Partnership Program, "Flame retardants in Printed Circuit Boards", (2007) http://www.epa.gov/dfe/pubs/projects/pcb/index.htm

Moreover, in the requirement to version 6.0 the criteria, cable insulation are excluded from this requirement, as they are in version 5.0 and later modifications. The version 6.0 has also removed the exceptions for fluoroorganic additives and fluorinated plastics such as PTFE. The reason for the exceptions stipulated in version 5.0 with later modifications was the harmonizing ambition with the Eco Mark and the Blue Angel.

Suggested **modification** of the requirement:

R9 Flame retardants

Flame retardants are assessed on flame retardant product level, i.e. not on their individual ingredient level.

The use of flame retardants that can be assigned one or more of the following risk phrases at the time of application, in accordance with EU chemical legislation, is prohibited:

- H350 (R45) (may cause cancer)
- H340 (R46) (may cause heritable genetic damage)
- H360F (R60) (may impair fertility)
- H360D (R61) (may cause harm to the unborn child).
- H400 and H410 (R50/53) (Very Toxic To Aquatic Organisms, May Cause Long-Term Adverse Effects In The Aquatic Environment)
- H411 (R51/53) (Toxic To Aquatic Organisms, May Cause Long-Term Adverse Effects In The Aquatic Environment)

Plastic parts must not contain halogenated organic flame retardants.

The maximum permitted concentration for impurities is 0.1% by weight in homogenous material.

The manufacturer of the flame retardant must certify that there are reasonable grounds for concluding that the flame retardant used cannot be considered to have the health and environmental effects according to the risk phrases listed above.

Exempted from the requirement are:

- Printed circuit boards and cable insulations. These parts must not, however, contain any PBB (polybrominated biphenyls), PBDE (polybrominated diphenyl ethers), decaBDE or chlorinated paraffins (maximum permitted concentration for impurities is 0.1% by weight in homogenous material).
- Plastic parts < 25 g. These parts must not, however, contain any PBB (polybrominated biphenyls), PBDE (polybrominated diphenyl ethers), decaBDE or chlorinated paraffins (maximum permitted concentration for impurities is 0.1% by weight in homogenous material).
- Plastics that are demonstrably re-used in accordance with requirement R4. These parts must not, however, contain any PBB (polybrominated biphenyls), PBDE (polybrominated diphenyl ethers), decaBDE or chlorinated paraffins.
- Special plastic components installed in direct vicinity of heating and fusing units. These parts must not, however, contain any PBB (polybrominated biphenyls), PBDE (polybrominated diphenyl ethers), decaBDE or chlorinated paraffins.

✉ The manufacturer of the imaging equipment must provide a list of plastics used in plastic parts >25 g in the product signed by filling out Appendix 5 – Plastics in imaging equipment, Manufacturer´s Declaration.

The plastic manufacturer must provide a list with flame retardants used in plastic parts > 25g, by filling out Appendix 6 – Flame retardants in plastics, Plastic manufacturer´s declaration.

The manufacturer of flame retardants**,** used in plastic parts >25g, must certify that the requirements are fulfilled by filling out Appendix 7 – Flame retardant manufacturer´s declaration and submit an MSDS for each flame retardant.

Confidential information can be sent directly to the Nordic Ecolabel.

NEW: Phthalates in external power cable

Phthalates are commonly used in cables. Power cables, and cables as part of the AC-adapter of the imaging equipment, are cables that the user gets in contact with.

Phthalates are mainly used as plasticizers in plastics and rubber, and the content of phthalates can be up to 40 % of the final product. Particularly notable is the use of DEHP (di(ethylhexyl) phthalate), as plasticizer in PVC. Softeners are not firmly bound to the PVC polymer. Phthalates can therefore leak out from plastic products throughout their life time. This diffuse distribution means that phthalates are found almost everywhere in the environment.

The phthalates DEHP, dibutyl phthalate (DBP) and benzyl butyl phthalate (BBP) are classified as toxic and may impair fertility and cause birth defects. DBP is also classified as environmentally hazardous and highly toxic to aquatic organisms. The three most dangerous phthalates (DEHP, DBP and BBP) are banned for use in toys and childcare articles above the concentration of 0.1% of the softened material. The three less hazardous phthalates (DINP, DIDP and DNOP) are banned above the concentration of 0.1% of the plasticized material in toys and childcare articles that can be placed in the mouth[13]. The regulation of phthalates in toys and childcare articles for the abovementioned six phthalates can be found in REACH regulation 1907/2006, in its appendix XVII.

In June 2011 two new phthalates were added to the EU Candidate list by the European Chemical Agency, ECHA. These new phthalates are to be found as plasticizers in floor coverings, cables etc. All together there are seven phthalates in the EU Candidate list today (October 2012) and they are:

Table 4 – REACH Candidate list of phthalates in June 2012.

Substance:	**CAS-nr:**
Diisoheptyl phthalate	71888-89-6
Butyl benzyl phthalate (BBP)	85-68-7
1,2-Benzenedicarboxylic acid, di-C7-11-branched and linear alkyl esters	68515-42-4
Dibutyl phthalate (DBP)	84-74-2
Bis(2-ethylhexyl) phthalate (DEHP)	117-81-7
Diisobutyl phthalate (DIBP)	84-69-5
Bis(2-methoxyethyl) phthalate	117-82-8

13 The Swedish Chemicals Agency, Phthalates in toys (2009) – in Swedish
http://www.kemi.se/Documents/Publikationer/Trycksaker/Faktablad/FbFtalaterileksakerNov2011.pdf

About 25 per cent of all softened PVC[14] is used by the wire, cable and electrical industries. PVC's ability to be bent and twisted without cracking is a safety feature which makes it suitable for a wide range of applications.

When it comes to the computing market for instance, it seems that not all suppliers to computer manufacturers and not all computer manufacturers seem to yet have started to plan for the future restriction regarding phthalates. Nordic Ecolabelling assesses therefore the steerability in this area to be relatively low at the moment. However, Nordic Ecolabelling reasons that the effect of a limited requirement on the use of phthalates would be valuable in order to set focus on the problems associated with the use of phthalates. The suggestion here therefore is to only focus on the power cable used to connect the imaging equipment to the mains. Only cables with male/female connector to connect to the imaging equipment set or AC-adapter are addressed, not cables that are hardwired to the equipment.

The motivation for the requirement is that the volume of the plastic in a ”normal” power cable to for instance a printer is considerably high in relation to the volume of the plastic in other cables inside the printer, making the requirement relevant. Cables used internally in a printer are limited to short distances and are of a lower diameter compared to external power cables due to the lower voltage levels inside the printer. The power cable is also exposed more for human contact and mechanical stress.

Alternatives such as halogen-free cables are available on the market today. If not halogen free alternatives would be preferred phthalates, others than those listed in the REACH candidate list still can be used in cables, such as PINP and DIDP. In the coming revisions we will evaluate if a more comprehensive requirement will be possible to introduce.

Proposed **new** requirement:

R10 Phthalates in external power cable

The external power cable delivered with the imaging equipment should be free from the phthalates listed in the following table:

Substance:	**CAS-nr:**
Diisoheptyl phthalate	71888-89-6
Butyl benzyl phthalate (BBP)	85-68-7
1,2-Benzenedicarboxylic acid, di-C7-11-branched and linear alkyl esters	68515-42-4
Dibutyl phthalate (DBP)	84-74-2
Bis(2-ethylhexyl) phthalate (DEHP)	117-81-7
Diisobutyl phthalate (DIBP)	84-69-5
Bis(2-methoxyethyl) phthalate	117-82-8

The maximum permitted concentration for impurities is 0.1% by weight in homogenous material.

✉ Declaration from the manufacturer of the cable showing that the requirement is fulfilled.

14 Initiative of the European Council for plasticisers and intermediates, http://www.dehp-facts.com/cables

Chemicals and materials during production

Chemicals used in production

To prevent emissions to the atmosphere of ozone depleting substances during production, a prohibition of emissions during production for the specific substances CFCs (five types), other CFCs, carbon tetrachloride, 1,1,1-trichloroethane, and HCFCs is defined. This is based on the Law concerning the Protection of the Ozone Layer through the Regulation of Specified Substances and Other Measures, which is a Japanese regulation, ratified from the Montreal Protocol of ozone depleting substances. Though it is assumed that none of these substances are used in the manufacture of copiers at present, in view of the fact that certain countries and regions where copiers are manufactured may not have laws and regulations or have moratoriums on these substances, it was decided that this item should remain as a criteria to ensure that the use of ozone layer depleting substances are prohibited.

R11 Chemicals used during production

Chemicals containing the following substances regulated in the Montreal Protocol must not be used in the end production of the machines or in the production of circuit boards: CFCs, HCFCs, 1.1.1 trichloro-ethane or carbon-tetrachloride.

✉ Declaration from the manufacturer of the imaging equipment and the direct suppliers (suppliers during the final stages of the supplier chain) showing that the requirement is fulfilled by filling out Appendix 9.

NEW: Packaging

Packaging constitutes for some products a significant part of the volume and weight. For other products, the packaging is secondary. Packaging components may consist of materials that have harmful effects on the environment and/or health such as PVC or other halogenated plastics, which can cause environmental problems during disposal. Another important aspect is the recycling of the materials used in the packaging. Re-cycling of the packaging material is mandatory in the Nordic countries. Producers and retailers have to be joined to a recycling solution. In Sweden producers have joined REPA to fulfil their obligations regarding the recycling of packaging material. Corresponding systems in Norway and Finland are Grønt Punkt and PYR. In Denmark the Danish Ministry of the Environment is managing the producer responsibility for packaging waste.

According to the European Commission Green Public Procurement Training Toolkit, module 3 of Purchasing Recommendations, a brief environmental life cycle of packaging equipment includes resource consumption, primary energy consumption whilst making the packaging, environmental effects of chemicals used in the packaging (particularly chlorinated plastics), the process of making it and waste generation[15]. It the same Green Public Procurement Toolkit it is assessed that packaging material contribute little of the total environmental impact of, in the report, office IT equipment. However it is important to consider packaging although their overall environmental impact is low, mostly because it is manageable for procurers to put simple requirements in place when ten-

15 European Commission Green Public Procurement (GPP) Training Toolkit – Module 3: Purchasing Recommendations – Office IT Equipment, Background Product Report (2008) http://ec.europa.eu/environment/gpp/pdf/toolkit/office_IT_equipment_GPP_background_report.pdf

dering packaging products. Important parameters which can be influenced are for instance quantity, type of packaging and opportunities for re-cycling.

During the revision project of the parallel Nordic Ecolabelling´s revision project of the computer criteria document during 2012 it was concluded that manufacturers of IT equipment have a clear interest to use re-cycled material in their packaging. Regarding cardboard the optimum level of re-cycled content in a packaging box has not been possible to find. One producer required the usage of more than 50% re-cycled material in the cardboard box. Another manufacturer claimed that the quality/function of the box deteriorates when that portion of re-cycled cardboard becomes too high lowering the stability and strength quality of the packaging. Re-cycling cardboard requires only 75% of the energy required to make new cardboard[16]. Weak packaging can also result in damaged products which in turn can lead to production of replacement products. The optimum level of re-cycled material depends on the weight and volume of the good contained in the packaging.

New packaging solutions are clearly available and are also being developed. Some of these solutions will surely be adopted in a large scale in the future. The traditional packaging materials will still be very much used and is actually increasing more in volume in relation to the global economic growth according to EC Nova Institute on behalf of EU[17]. The expansion depends mostly on plastic material packaging.

Nordic Ecolabelling finds it most reasonable according to the context of packaging materials described above, to focus on cardboard material regarding re-cycled content and limit the use of halogenated plastics. An introduction of a new requirement on the use of re-cycled material was therefore suggested to version 6.0 of the criteria. The requirement as to halogenated organic substances in packaging is intended to prevent the use of chlorinated plastic materials in packaging and consequently the formation of dioxins and other persistent organic pollutants in their production and disposal phase, a requirement title modification in relation to the criteria version 5.0.

These two requirements, along with the requirement on labelling of plastic parts to facilitate re-cycling, comprise the packaging requirements in this criteria document.

Proposed **modification** of requirement:

R12 Plastic materials in packaging

Plastic material used as packaging material must not consist of, or contain, halogenated organic substances.

✉ Declaration from the manufacturer of the imaging equipment showing that the requirement is fulfilled, by filling out Appendix 8.

✉ Description of the packaging materials used.

Proposed **new** requirement:

16 Bureau of International Recycling – The Industry, Paper http://www.bir.org/industry/paper/

17 European Comission, Community Research – Material Change, the world is looking for new materials: industrial crops (2006)
http://ec.europa.eu/research/energy/pdf/gp/gp_events/biorefinery/bs4_05_gahle_en.pdf

R13 Re-cycled material in packaging

When cardboard boxes are used, they shall be made of at least 80% post-consumer recycled material. Only primary packaging, as defined in Directive 2005/20/EC, is subject to the requirement.

✉ Declaration from the manufacturer of the imaging equipment showing that the requirement is fulfilled.

Other environmental requirements

Supply of spare parts

This requirement is included to secure the supply of spare parts for repairs in order to extend the commercial life of the product. This requirement contributes to a reduction in resource consumption per unit produced.

R14 Supply of spare parts

The availability of spare parts must be guaranteed for at least five years after production of the specified ecolabelled machine comes to an end.

✉ Declaration from the manufacturer of the imaging equipment showing that the requirement is fulfilled by filling out Appendix 10.

Double-sided copying

The requirement for double-sided copying for printing devices is an important means of reducing the volume of paper used in printing. A significant part of the energy consumption involved in making one print is connected to the manufacturing of the paper. Using double-sided printing will therefore reduce the total energy consumption involved in printing.

Since some users do not require the double-sided copy function and the introduction of this function into all models is questionable, it was decided that as with Energy Star, the double-sided copy function is not required in models with a copy speed of less than 20 sheets and large-size copiers, but is required in models with copy speeds of above 20 A4 sheets but less than 44 sheets or can be added on later. This requirement is harmonized with Eco Mark. For models with copy speeds of above 45 sheets, the double-sided copy function is required to maintain consistency with Blue Angel.

This requirement was revised during the revision to version 6.0 in correlation with the suggested criteria proposal from the EU Ecolabel for duplex printing. The requirement was revised from 45 sheets per minute for A4 size paper to 19 sheets per minute. Also, the formulation for appliances with an operating speed of 20 to 44 sheets per minute was removed. In this requirement the draft for Blue Angel criteria, RAL-171 and the draft for Imaging Equipment EU Ecolabel criteria differ, and Nordic Ecolabelling choses to harmonize with the EU Ecolabels more stringent requirement.

R15 Double-sided copying

Appliances with a maximum operating speed of >19 sheets per minute for A4 size paper must be equipped with automatic double-side copying (a duplex-unit).

✉ Declaration from the manufacturer of the imaging equipment showing that the requirement is fulfilled by filling out Appendix 10.

NEW: Consumables

There are currently a number of different technologies to print text and images on paper. These techniques create different volumes of consumables, such as toner cartridges and waste toner boxes. The largest amount today is traditional toner cartridges for xerographic printing. One technique the lowers the volume of consumables is inkjet, but during the revision to version 6.0 of these criteria, such technology could not produce printouts to the same quality and price as laser toner technology.

The market indicates that different manufacturers have developed different technologies, some of which reduces the volume of consumables for imaging equipment. However, such technologies are often protected by patents, making it difficult for the Nordic Ecolabelling to develop requirements for specifics technologies.

Conventional printers use an imaging cartridge which contains drum, developer and toner into a single, disposable unit. When the toner has depleted, the entire cartridge must be disposed of or sent to re-cycling and replaced with a new or re-cycled unit. In some imaging equipment the drum and developer is separate from the toner. This is often common in larger imaging equipment, used in business office environments. Some manufacturer has developed solutions for smaller xerographic printers[18] with the advantage of creating less waste and volume of consumables needed to be transported to the Nordic market.

Nordic Ecolabelling reasons that the potential to develop some limit values for the amount of consumables, used for xerographic imaging equipment in order to lower the environmental impact from the transportation volumes of consumables and to create less end-of-product waste, is relatively high. During the revision of these criteria to version 6.0, none ecolabelling organisation had any similar requirement, making Nordic Ecolabelling first to develop such a requirement.

Nordic Ecolabelling collected some data from license holder and non-license holders within the product group Imaging Equipment and developed a first suggestion of limit values. It is very important for the Nordic Ecolabelling to receive comments on this requirement in our review of the criteria, in order to adjust/set correct levels on the use of consumables used for ecolabelled devices.

It is important to differentiate the limit values for the different types of equipment depending on the different technologies used for different categories of users. It is important that a private consumer has the possibility to purchase a Nordic Ecolabelled Imaging Equipment for home office purposes. A limit value of Images Per Minute (IPM) ≤ 19 was set, corresponding to the same level as for duplex printing, see R15.

18 Kyocera, Ecosys (2012) – ”Kyocera Document Solutions´banbrytande tekniska genombrott” (in Swedish), http://www.kyoceradocumentsolutions.se/index/om_oss/ecosys.html

The limit values are expressed as maximum values, which the devices´ consumables must fall beneath. The proposed limits are not very strict, around 80% of the printers can fulfil the requirement, however it is assessed that not every device are able to fulfil the requirement. This is particular relevant for some small colour/monochrome laser printers for consumers or small/medium sized companies that have a higher challenge in fulfilling the requirement. The requirement is steering towards toner cartridges with higher content of toner, otherwise expressed as more prints per kg of toner cartridges which in turn lowers the environmental load created during a printers life-time.

Proposed **new** requirement:

R16 Consumables

All consumables* that the end user can change by themselves for the Nordic Ecolabelled Imaging Equipment must meet set maximum limits below.

If the Nordic Ecolabelled Imaging Equipment can use different types of toner cartridges, the one with the highest index for weight/1000 pages must meet set limits below.

** For instance toner cartridges, waste toner box and residual toner container.*

Images Per Minute (IPM)	Monochrome (Kg/1000 pages according to ISO/IEC 19752)	Color (Kg/1000 pages according to ISO/IEC19798)
IPM >19	0,65	2
IPM ≤ 19	1	3

✉ Declaration from the manufacturer of the imaging equipment showing that the requirement is fulfilled.

✉ All consumables that the end user can change by themselves shall be listed with gross weight (Kg) including packaging and number of pages according to ISO/IEC 19752 and ISO/IEC19798.

Performance properties

Emissions

Imaging equipment used in office environments are known for many years to be a source of ozone, volatile organic compounds (VOC) and semivolatile organic compounds (SVOCs). Effects of such emitted substances include for instance eye, nose and throat irritation, headache and fatigue. It is interesting that common LCA constructed for imaging equipment usually do not cover indoor air emission, nevertheless, these emissions are important to monitor. According to previously mentioned review [JRC/IPTS December 2011], VOC levels where highest from laser printers in on mode.

During the revision to version 5.0 of these criteria, The Federal Institute for Materials Research and Testing (BAM) in Germany, improved their new test method for determining emissions from hardcopy devices. The test method was then broadened with Total Volatile Organic Compounds (TVOC) and benzene. The broadening of the scope in relation to previous emission requirements was to meet the growing focus on the indoor environment.

During the revision for version 6.0 of these criteria, the draft from Blue Angel RAL-171 suggested a limit value for so called Ultra-Fine Particles (UFP), suspected to emit from printing devices. RAL has also developed measuring procedures and tested them in test laboratories for detecting the emission of such particles. Simultaneously, in the EU, Green Public Procurement work for Imaging Equipment, and also the draft for the EU Ecolabel decided not to pose a similar requirement mostly due to the fact that a direct link between UFP and health impacts could not be proved [JRC/IPTS December 2011]. The definition according to RAL and BAM for UFP, is particles having a particle diameter less than or equal to 0.1µm[19].

Due to the fact that the Blue Angel criteria draft RAL-171 finalization date was uncertain during the time of revision for these criteria to version 6.0, the Nordic Ecolabel chose in area of UFP to harmonize with the EU Ecolabel. Also, significant uncertainties related to the strictness of the proposed requirement for UFP and for test laboratories to adhere to the test standards developed by BAM are relevant for harmonizing with the EU Ecolabel.

However, Nordic Ecolabelling chose in the criteria document version 6.0 to harmonize with the Blue Angel in the requirement for emissions with the additional parameter "not identified single substances VOC". The Nordic Ecolabelling assess that the parameter is capturing residual VOC not included in TVOC, making the requirement more holistic in terms of volatile organic compound identification and regulation.

Suggestion **modification** of the requirement:

R17 Emissions

The product must fulfill the maximum limit values expressed in the table below and the emission rates must be measured in accordance with the requirements described in Blue Angel: RAL-UZ 171.

Substance	**Emission rate Print phase (mg/h)**		**Emission rate Ready phase (mg/h)**	
	Colour Printing Total in ready + print phase	**Monochrome printing Total in ready + print phase**	**Desktop products**	**Floor-mounted equipment (volume > 250 litres)**
TVOC	18	10	1	2
Not identified single substances VOC	0.9	0.9		
Benzene	< 0.05	<0.05		
Styrene	1.8	1.0		
Ozone	3.0	1.5		
Dust	4.0	4.0		

Table with limited values of emission according to Blue Angel RAL-UZ 171.

✉ Test report containing the results of the emission test according to the methods specified in RAL-UZ 171.

19 BAM.De, Test Method for the Determination of Emissions from Hardcopy Devices, within the Award of the Blue Angel Ecolabel, for Equipment with Printing Function according to RAL-UZ-171

Sound effect

Regarding noise we would like to refer to the background work made by the EU Ecolabel[20] in 2011-2012.

Noise pollution is an environmental impact category which, similar to the case of indoor air pollution, cannot be captured by a product environmental assessment based on a life-cycle assessment. The sources of noise, as well as the modelling of noise pollution, is currently not sufficient enough and therefore considered non-operational in the context of LCA methodology. Noise is often an underestimated threat that can cause a number of short and long term health problems.

In common use, the word noise means any unwanted sound[21] . Noise pollution can affect health, yet the effects are very difficult to quantify. Some of the potential adverse effects can be summarized as:

- Annoyance – it creates annoyance to the receptors due to sound level fluctuations
- Physiological effects – the physiological features like breathing amplitude, blood pressure, heart-beat rate, pulse rate, blood cholesterol are affected
- Loss of productivity – noise has negative impacts on cognitive performance. For attention and memory, a 5 dB(A) reduction in average noise level results in approximately a 2 – 3 % improvement in performance
- Nervous system – it causes pain, ringing in the ears, feeling of tiredness, thereby effecting the functioning of human system

Of the abovementioned potential adverse effects, annoyance is considered to be the most widespread problem caused by environmental noise. Annoyance reflects the way that noise affects daily activities. It has been estimated by the WHO that 20 % of the population is exposed to levels exceeding 65 dB(A) during the daytime which is a value close to the noise levels caused by operating printers and/or copiers. The noise exposure time is also a significant parameter which becomes even more important if we consider working environments with many imaging devices operating at the same time, e.g. copy/print centres as then the overall effective sound level is higher.

Although noise impacts are very difficult to quantify, in many ecolabel schemes, one of the environmental impact categories addressed is noise. For instance in the EU Ecolabel criteria for the product group of personal computers one criterion refers to noise requirements during operation. Blue Angel and Japanese EcoMark criteria for imaging equipment also include noise as an environmental impact category area.

Moreover, imaging equipment manufacturers have focused on reducing unwanted noise, e.g. by introducing a feature that allows users to adjust the sound level of the printer. Some printers have the option of quiet mode in which the operating noise level of printers can be additionally lowered by three decibels. Other alternatives are to avoid beep sounds while typing hard-on buttons.

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20 JRC, Jiannis Kougoulis, Oliver Wolf. Development of European Ecolabel and Green Public Procurement Criteria for Imaging Equipment, Working Document Input to 1st AHWG on 21st March 2011 page 29-31.

21 Noise, Wikipedia the free encyclopedia, http://en.wikipedia.org/wiki/Noise

A comparison between the Blue Angel and EU Ecolabel limits gives the following data, calculated from a device with 19 IPMs and 44 IPMs. Detailed noise equations from Blue Angel and EU Ecolabel are found in appendix 3

Table 5 – Comparison between Blue Angel and EU Ecolabels result of permitted noise values for devices with different copier speed.

IPM	EU Ecolabel(dB)		Blue Angel(dB)		Nordic Ecolabelling version 5.0 with later modifications
	Monochrome	Colour	Monochrome	Colour	Both monochrome and colour
19	65,6	66,6	65,7	66,7	65,6
44	71,3	72,3	74,4	74,2	74,4

The comparison shows that the EU Ecolabel has slightly tougher requirements on sound effect limit values than Blue Angel, however, in the line with Nordic Ecolabellings harmonization ambition it was accepted to refer to both system.

The modification of this requirement to version 6.0 serves partly as sharpness and easing. In the case of a colour printer with 44 IPM, the modification of the requirement from version 5.0 and later modifications imply a stricter sound effect level, meanwhile for a colour printer with 19 IPM, the modification of the requirement from version 5.0 and later modifications imply an eased sound effect level, see table 5. In the criteria version of the Blue Angels requirement for imaging equipment, only section 3.5.1 is relevant as 3.5.2 is a section comprising new ways of measuring and expressing sound effect levels, lacking any data at the moment[22].

For the sound effect requirement, Nordic Ecolabelling referred to EU Ecolabels ecological draft criteria for the award of the EU Ecolabel for imaging equipment. The EU Ecolabel revision had a time plan with a finalization in March 2013. Nordic Ecolabel assumed that the original EU Ecolabel time-plan would be followed. Therefore, during the external review of the criteria for version 6.0, Nordic Ecolabelling referred to the EU Ecolabel draft criteria, available in the webpage for EU Ecolabel and Green Public Procurement. If the time-plan will not be followed, or any major modifications will be done during the EU Ecolabel revision, necessary measures will be taken by the Nordic Ecolabelling.

Suggested **modification** of requirement:

R18 Sound effect

The product shall comply with the requirements for Noise in The Blue Angel RAL-UZ 171 (section 3.5.1) or the noise requirement in EU Ecolabel for Imaging equipment[23].

✉ Test report containing the results of the sound effect according to the methods specified in RAL-UZ 171 (section 3.5.1) or EU Ecolabel for Imaging equipment, or their respective later versions.

22 Contact with Mr. Buttner, RAL 2012-12-07

23 Revised EU Ecolabel criteria (2012)
http://susproc.jrc.ec.europa.eu/imaging-equipment/stakeholders.html

New: Code of Conduct

In certain parts of the world the production of heavy metals used in components essential for imaging equipment involves heavy manual labour. Some of the constituent substances in imaging equipment are very harmful to health and are handled manually. Working conditions must accordingly be good in order to avert permanent damage to the health of the workers as a result of this work. At the same time, however, companies using a high proportion of manual labour are often located in countries in which the scope for securing good working conditions and freedom of speech is limited. There are for instance examples of strikes amongst battery factory workers who have been exposed to high concentrations of toxic substances and whose working conditions are also poor in other respects[24].

Nordic Ecolabelling believes that ecolabelled products should not only be the best choice in terms of the environment, but also in terms of working conditions. For this reason, in the version 6.0 of the criteria, Nordic Ecolabelling chose to impose the requirement that licence holders must have a code of conduct in place and that this code should be communicated to suppliers/subcontractors.

Nordic Ecolabelling appreciates that it may be very difficult to ensure that the working environment at all sub-contractors in all parts of the imaging equipment production chain is satisfactory. Nevertheless, Nordic Ecolabelling is confident that the more production facilities and raw material suppliers are confronted with a requirement/signal from their customers that a code of conduct must be met, the more likely it will become that such conditions in fact will be improved.

Proposed **new** requirement:

R19 Code of Conduct

The license holder must have a code of conduct in place in accordance with the ten principles provided for in the United Nations Global Compact.

The license holder must ensure that the code of conduct is communicated to all suppliers/subcontractors together with a request that these should also comply with a code of conduct that follows the ten principles provided for in the United Nations Global Compact.
NB: The principles embodied in the United Nations Global Compact include the following: human rights, employee rights, environmental protection and anti-corruption safeguards. Further information can be found at http://www.unglobalcompact.org.

☒ Copy of the license holder's "Code of Conduct".

☒ Description of the way in which subcontractors and producers are notified of the licence holder's code of conduct and of the licence holder's request that they have a code of conduct in place that follows the ten principles in the United Nations Global Compact.

24 International Network on Human Rights and Sustainability in Electronics – JOIN GoodElectronics in its urgent appeal to Gold Peak (2010)
http://goodelectronics.org/news-en/chinese-battery-producer-fails-to-be-a-decent-employer/

Quality and regulatory requirements

Information to consumers

It is important that consumers are given instructions on how to reduce the environmental impact of the printing device by for example utilizing the available energy saving setting or using the double-sided function to minimize the paper use. Important environmental benefits from this requirement are lower energy consumption from printing.

Producers/local distributors may adjust the national instruction manual to fulfil the requirement as to how to minimize the environmental impact associated with using the machine. Requirements in accordance with Nordic Ecolabelling should be implemented in the instruction manual.

R20 Information to consumers

The following information must be specified in user information:

- Maximum power consumption during operation, stand by-, low energy- and off-modes.
- Information on the function of the energy management system.
- Recommendation that the machine be turned off when not in use for a long time.
- Information on the use of double-sided copying, the presence of a duplex unit or its availability as an upgrade and information that double-sided copying will save the environment and money.
- Instructions on the positioning of the machine.
- Information about where used products and packaging can be deposited in accordance with local legislation.
- Information about the return system for re-cycling combined toner cartridges.
- Information on disposal of used OPC kit/photosensitive drums, toner containers and containers for used toner.
- Information that used batteries should be disposed of in accordance with local legislation.
- Print capacity (copies per minute and copying volume per year or month).
- Recommendation that ecolabelled paper be used.
- Maximum sound effect level during operation and stand by-modes. In the case of machines with a sound effect level of more than 63 dB Lwad during operation and 40 dB Lwad in stand-by, the manufacturer should recommend that the machine be located in a room in which no employee has his/her regular work station.
- Maximum value of emission rate of TVOC in printing phase, benzene, styrene, ozone and dust. For colour printer the values must be shown for colour and monochrome printing.
- Warranty period. For products sold to private consumers. For products only sold to companies conditions of guarantee should be stated in the contract.
- Information that offers supply of spare parts for 5 years.

The following technical information must be specified in the service manual:

- A specification of how frequently ozone filters (if such exists in current product) require replacement.

✉ The applicant must submit copies of all relevant pages of the user manual/service manual with information as specified in the requirement.

Re-cycling and re-use of consumer durables and parts that wear out

Waste is also generated as a result of the replacement of parts that wear out, e.g. combined toner cartridges. As a consequence, enhanced re-cycling of waste electrical and electronic equipment should be a major factor in preserving resources, in particular energy.

The requirement provides information for the user or service personnel about the procurement of spare parts and that scrapped parts must be taken back by the applicant or distributor to ensure re-use and re-cycling.

R21 Re-cycling and re-use of consumer durables and parts that wear out

The license applicant and/or the local representative of the license applicant must have a system in place for ensuring that consumer durables and parts that wear out as far as possible are sorted and re-covered/re-used.

Consumer durables and parts that wear out are those parts that service personnel replace when the machine is serviced or that can be replaced by the consumer after reading the instructions for use.

Collected toner cartridges, drum kits, light-sensitive drums and residual toner containers collected by the license applicant or the representative of the license applicant must be re-used or re-cycled.

✉ The applicant must prepare information material to the service personal and the users informing about how parts wear out and how these parts shall be re-cycled or re-used.

Service and support

In order to ensure good quality and a high service feeling when consumers or businesses purchase labelled imaging equipment, service and support must be offered by the producer. The service must be in the official Nordic language in the country where the product will be sold.

R22 Service and support

The license holder must offer service and support in the official Nordic language in the country in which the Nordic Ecolabelled product is on sale.

✉ Description of service and support organization.

Quality system

The requirements for the quality system are intended to ensure that the license holder fulfills the criteria and that the requirements are verifiable during the period of validity of the license, including the possibility to trace the products. To complement this system, Nordic Ecolabelling needs also to have an appointed contact person at the license holder ensuring that the criteria are fulfilled during the period of validity of the license. The contact person is also responsible to inform Nordic Ecolabelling in case of planned changes or unplanned non-conformities affecting the licenses products. Following requirements are found in all Nordic Ecolabelling criteria document.

R23 The quality of the product

The license holder must guarantee that the quality (at the time of application) of the Nordic Ecolabelled products leaving the production is maintained throughout the validity period of the license.

✉ Procedures for collating and, where necessary, dealing with claims and complaints regarding the quality of the Nordic Ecolabelled product.

Documentation to guarantee the above.

R24 Nordic Ecolabel licence contact

The company must appoint a person responsible for ensuring that the Nordic Ecolabel requirements are fulfilled, and a contact person for communications with Nordic Ecolabelling.

✉ A chart of the company's organizational structure detailing who is responsible for the above.

R25 Documentation

The license holder must be able to present a copy of the application, as well as the facts and calculation data on which the documents submitted in the application are based (including test reports, documents from suppliers and suchlike).

☺ Checked on site.

R26 Planned changes

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

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

R27 Unplanned nonconformities

Unplanned nonconformities that have a bearing on the Nordic Ecolabel requirements must be reported to Nordic Ecolabelling in writing and also journal led.

✉ Procedures detailing how unplanned nonconformities are handled.

R28 Traceability

The license holder must have a traceability system for the production of the Nordic Ecolabelled product.

✉ Description of/procedures for the fulfilment of the requirement, relevant for the whole corporate chain.

R29 Take-back system

Relevant national regulations, legislation and/or agreements within the sector regarding the recycling systems for products and packaging shall be met in the Nordic countries in which the Nordic Ecolabelled Imaging Equipment are marketed.

✉ Declaration from the applicant regarding adherence to existing recycling/take-back agreements.

Legislation and regulations

The license holder must guarantee adherence to safety regulations, working environment legislation, environmental legislation and conditions/concessions specific to the operations at all sites where the Nordic Ecolabelled product is manufactured. No documentation is required when the license is granted, but Nordic Ecolabelling may revoke the license if the requirement is not fulfilled.

R30 Legislation and regulations

The license holder must guarantee adherence to safety regulations in force, working environment legislation, environmental legislation and conditions/concessions specific to the operations at all sites where the Nordic Ecolabelled product is manufactured. In addition the license holder must guarantee adherence to product specific regulations in all the Nordic countries where the product is on sale.

No documentation is required, but Nordic Ecolabelling may revoke the license if the requirement is not fulfilled.

Marketing

The requirement as to marketing has been set to ensure that that the ecolabelling criteria are fulfilled and that they are verifiable during the period of validity of the license. The requirement is common to all Nordic Ecolabelling criteria documents.

R31 Marketing

Marketing of the Nordic Ecolabelled product must comply with "Regulations for the Nordic Ecolabelling of products" 22 June 2011 or later version.

✉ Appendix 1 duly completed.

5 Changes from previous version

All modification of the requirements from version 5.0 with later modifications to version 6.0 is summarized in the following table. The most important ones are considered to be requirements for energy consumption, flame retardants and packaging.

New requirements, removed requirements and evaluated requirements are described further down.

Table 6 – Summary over modification of the requirements from criteria version 5.0 with later modification to version 6.0

Requirement **Title in version 5.0**	**Chapter in version 5.0**	**Correspond with chapter in version 6.0**	**Change**
Valid Blue Engel license	R2	R1	Revised referred criteria document at Blue Engel and with a bulled list over additional requirements need to be fulfilled for the Nordic Ecolabelling
Energy consumption	R4	R3	Revised energy requirement referring to revised criteria documents of Blue Engel and Energy Star versions.
Re-used plastics	R5	R4	Revised formulation for pre-consumer/post-industrial re-cycled plastics. They are allowed, as long as they are not derived from internal production.
Chlorine-based plastics	R11	R8	Exception for re-used/re-cycled chlorine-based plastic parts removed.
Additives	R12	R9	Requirement title changed to "Flame retardants". New risk-phrases added: H400 and H410 (R50/53) and H411 (R51/53). Exemption for "re-used plastic parts" changed into "re-used plastics". Exemptions for fluoroorganic additives and fluorinated plastics PTFE no longer given.
Chlorine-based packaging materials	R15	R12	Requirement title change into: "Plastic materials in packaging".
Supply of spare parts	R17	R14	-
Double-sided copying	R18	R15	The limit value for duplex copying revised to 19 sheets per minute.
Emissions	R21	R17	Revised with additional parameter "not identified single substance VOC", harmonization with Blue Angel
Sound effect	R22	R18	Reformulated requirement. Reference directly to EU Ecolabel and Blue Angel schemes for sound effect requirement.
Information to consumers	R23	R20	-
Re-cycling and re-use of consumer durables and parts that wear out	R24	R21	-
Quality and regulatory requirements	R23 – R32	R23 – R31	Revised order of requirements. Traceability requirement stricter including compliance to the requirement for the whole corporate chain.
Marketing	R33	R31	-

Removed requirements from version 5.0 and later modifications

Harmonization with Eco Mark

During the revision to version 6.0 of the criteria, the harmonization towards Blue Angel and EU Ecolabel was more constructive in terms of energy requirements, material requirements and requirements for emissions and sound effect. This had to do with the fact that both Blue Angel and EU Ecolabel had, at the time of the revision to version 6.0 of the criteria, constructed drafts for new criteria proposals, in contrast with Eco Mark which had modified their criteria without extensive revisions.

This fact motivated Nordic Ecolabelling to temporarily lift Eco Mark out from the initial requirement, granting products licensed with Eco Mark licenses the Nordic Ecolabel so long the quality system requirements where fulfilled.

However, such a requirement is not impossible to be re-formulated in later modifications or revisions.

Labelling of plastic parts and plastic packaging

European waste legislation, such as the WEEE-Directive, and legislation for packaging (97/129/EC) ensures that plastic parts and plastic packaging are labelled in accordance with standardized procedures stipulated in abovementioned legislations. Moreover, when dealing with certification, no problems or uncertainties have come up in relation to labelling of plastic parts and plastic packaging, which indicates that all manufacturers have procedures for labelling in place.

Subassemblies

The recycling industry has developed their recycling equipment, making the requirement for subassemblies irrelevant. The requirement for subassemblies wanted to insure that products where not produced in such a way that incompatible materials where impossible to separate. Today the recycling industries machinery is able to demolish extract and separate incompatible material. The requirement for subassemblies is also catered by the requirement for single and combined plastic casing parts, R6 and R7 respectively.

Heavy metals

The scope of the requirement for heavy metals covered all parts, also plastic parts < limit 25 grams. The main reason was that cadmium could be found in for instance "old" products PVC-products and that lead stabilizers represent approximately 70% of total stabilizer use in Europe. The stabilizers are for instance persistence and bio accumulative. Their effects are toxic to waterborne organisms, harmful to reproductive systems, toxic to the immune system and carcinogen.

The requirement on heavy metals was removed for version 6.0 of the requirement with the motivation that the directive RoHS (2002/95/EC) captures the problem with use of heavy metals in electrical and electronical equipment. The RoHS-directive poses both absolute requirements, points out limit values and exceptions of use in certain areas. As such legislation works effectively, making producers generally to comply with its

requirement, the motivation for Nordic Ecolabelling having own requirements in this area is not supported by relevance.

Batteries

The requirement for batteries (R13 in version 5.0 with later modifications) aimed are the phasing out of batteries containing heavy metals cadmium, mercury, lead, and their compounds, with the exception of technically unavoidable impurities. Such impurities could not exceed the limit values specified in the previous EU Battery Directives (91/157/EG and 98/101/EG).

Considering the entire life-cycle of a printing device from an environmental perspective, the impact from batteries is not very significant. It is important to prevent the use of nickel-cadmium batteries to prevent the environmental effects coupled to the disposal of the battery and its content of cadmium. This aim will be achieved by setting the limits provided for in the Battery Directives.

New requirements that have been added to the criteria document version 6.0

New requirements in version 6.0 of the criteria are:

- Phthalates in external power cable, R10
- Re-cycled material in packaging, R13
- Consumables, R16
- Code of conduct, R19
- Take-back system, R29

Evaluated requirements that were considered to the criteria document version 5.0

R32 Re-cycled/Re-used plastics and bio-based plastics

Positive initiatives from related computer manufactures can be seen regarding use of post-consumer re-cycled plastic, for instance monitors with 65 % recycled content. Also TV-sets are found to contain an environmentally interesting plastic produced from re-cycled DVDs and TV screens with an efficient sodium sulphate based flame retardant which has led to a 80 % lower CO_2-emission than for conventional plastics in the manufacturing phase, according to this manufacturer.

Although the development is positive, and is in line with Nordic Ecolabellings ambition to promote post-consumer re-cycled plastic, there are two central challenges connected with post-consumer plastics. The first challenge is the content of post-consumer plastic parts and the second challenge is the availability of post-consumer plastic parts with good enough quality aspects. The low availability of good enough post-consumer re-cycled

plastic parts has a consequence that manufacturers demanded volumes of such plastic parts cannot always be guaranteed, making volume-products vulnerable for large-scale production due to raw material insufficiency.

When it comes to bio-based plastics, The Nordic Ecolabel is looking very positive on the development of using more bio-plastics in manufacturing, but is also aware of some problem connected with the use of bio-based plastics that have to be investigated further. These are for instance health and safety hazards in production, land-use and GMO as well as cultivation methods. Similarly with the use of re-cycled plastic we see that the availability to use bio-based plastic in products is limited for only some niche products.

According to resent research at EU level[25], there are also questions that bio-based plastics are not as sustainable as they seem. Although in some aspects bio-based plastics are more sustainable than traditional plastics, the analysis identified several environmental and occupational health and safety hazards in their respective production. Some bio-based plastics are preferable from a health and safety perspective. These include polyhydroxy-alkanoates (PHAs), poly-lactic acid (PLA) and starch. However, also they have some potential hazards. For instance, the production of PHA may expose workers to chemicals that are possibly carcinogenic, and PLA production uses a tin-based chemical that could have toxic effects on the hormonal system. Some bio-based plastics are preferable from an environmental perspective, such as starch, PHA and soy protein. However, all bio-based plastics require land for production, which may compete with land needed for food. In addition the feedstock for bio-based plastics may be genetically modified or grown using toxic pesticides, polluting the environment.

Therefore, in this criteria revision Nordic Ecolabelling is not ready to introduce a general requirement posing a certain level of post-consumer or bio-based plastic parts. The consequence of doing so would be that only some few niche products would be able to acquire a license. However, developing this kind of requirements to increase the use of post-consumer plastic is something that Nordic Ecolabelling would like to do in the future.

R33

R34 Electrical safety

Electrical safety concerns the electrical design of apparatus with respect to its electrical insulation and other arrangements that are intended to prevent accidents resulting from contact with live components, and the risk of fire or explosion as a result of electrical flash-over due to inadequate or faulty electrical insulation.

It is the manufacturer who is responsible for ensuring that a product is safe. In order to assess the safety of products, the authorities together with the industry have compiled standards for different product groups. The manufacturer always has the possibility to use an independent test body to test the product. A number of test bodies are accredited to certify products.

25 Alvarez-Chavez, C.R., Edwards, S., Moure-Eraso, R. & Geiser, K. (2012) Sustainability of bio-based plastics: general comparative analysis and recommendations for improvement. Journal of Cleaner Production. 23:47-56.

In the Nordic countries there are governmental organizations conducting inspections of electrical safety, especially in the form of market surveillance. In Sweden the Swedish National Electrical Safety Board has this responsibility.

The Nordic Ecolabelling does not find any reasons to develop a new requirement for electronic safety. Nordic Ecolabelling has been in contact with the Swedish National Electrical Safety Board. They agree that there are no reasons to have specific requirements for electric safety. The CE-label still covers electrical safety and there are well-developed market controls done by governmental organizations in the Nordic countries and the EU. Nordic Ecolabelling concludes therefore that there is no need of requirements of electrical safety in the criteria document.

R35

R36 Flame retardants

Halogen-free alternatives are becoming more available on the market. However, our knowledge about the properties of the new flame retardants used in printed circuit boards is very limited so it is not possible for the Nordic Ecolabelling at this revision to sharpen the requirement when it comes to halogen-free flame retardants.

6 New requirements

In the next revision process for Imaging Equipment, Nordic Ecolabelling will be focus on the following areas:

- Ultra-fine particles
- Substances in toner powder and ink
- Software to lower the use of paper
- Regulations to minimize the risk of use of "conflict metals" in electronics
- Evaluate the feasibility in a "white list"-approach for plastics additive approval
- Ban of PVC and phthalates in all plastic parts