Nordic Ecolabelling of

Grease-proof paper
Supplementary Module

Background to ecolabelling

Version 4
Consultation draft



Nordic Ecolabelling

Background to Nordic Ecolabelled grease-proof paper

049/Version 4.0 consultation paper

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1 Summary

The criteria for Nordic Ecolabelled grease-proof paper have been revised. The Nordic Ecolabel's criteria for grease-proof paper are included in a module system, meaning that many of the requirements for grease-proof paper can be found in the Basic and Chemical Modules. These documents were revised in 2011. The revision of the requirements in the Basic and Chemical Modules entails a significant tightening of the requirements for grease-proof paper. The revision work on the Supplementary Module for grease-proof paper focused on the following areas: adaptation of the new requirements to the Basic and Chemical Modules, energy consumption and emissions from paper manufacturing, as well as the use of chemicals specific to grease-proof paper.

With these revised requirements for grease-proof paper, Nordic Ecolabelling aims to help lessen the environmental impact, especially through requirements for energy efficient productions and bans on chemicals harmful to human health and the environment. Nordic Ecolabelled grease-proof paper must meet stringent environmental requirements and be free from chemicals that could be harmful to human health. The requirements apply to both paper manufacturers and converters.

Grease-proof papers are cellulose-based papers coated with various substances. The paper factories normally use finely milled cellulose which is coated with various waxes and silicones.

Version 2 of the Basic Module contains general requirements relating to forestry, emissions, energy and waste from pulp and paper production. The most important changes to version 2 of the basic module are:

- Requirements relating to energy and CO_2 emissions have been tightened.
- CO_2 requirements for transport have been introduced
- Requirements for certified, sustainable raw material have been tightened.

Version 2 of the Chemical Module relates to general requirements for chemicals used to manufacture pulp and paper. The most important changes to version 2 of the Chemical Module are:

- A general ban on classified chemicals, minimal limit introduced.
- The requirement relating to classified residual monomers has been extended.
- A ban on GMO in starch has been introduced.

The most important changes to the requirements in the **Supplementary Module for grease-proof paper** are:

- The requirements have been adapted to the revised requirements in the Basic and Chemical Modules, version 2.
- Reference values for the paper machine's energy consumption (fuel and electricity) have been introduced.
- New limit values for energy (fuel and electricity) have been introduced.
- New limit values for CO_2 have been introduced.
- The reference values for paper machine emissions (COD, S and NOx) have been changed.
- Tightened requirements for coating chemicals and a ban on the use of fluoride impregnation chemicals.

This document outlines the background to the requirements in the Supplementary Module for grease-proof paper. The background to the Basic and Chemical Modules can be found in the background document for the Basic and Chemical Module.

2 General facts about the criteria

2.1 Products that can be labelled

Grease-proof papers are cellulose based papers coated with various substances. Grease-proof paper that comes into contact with foodstuffs must be made from virgin fibre. The paper factories normally use finely milled cellulose which is coated with various waxes and silicones.

In order to be awarded a Nordic Ecolabel licence, the relevant requirements in the Basic and Chemical Modules must be met, in addition to those of the Supplementary Module for the paper product concerned. If the requirements for a given area differ between the Basic and Chemical Modules and the Supplementary Module, the levels stated in the Supplementary Module shall apply.

The product group includes:

- grease-proof paper (parchment paper) such as baking paper and food paper, and interlay paper, baking tray liner, sandwich paper and other grease-proof paper used for food wrapping, various types of 'high density paper' (e.g. for tracing).
- converted products from the aforementioned paper types. Examples of converted products include baking cases (e.g. cupcake and muffins cases).
- Various types of release paper and grease-release paper. (Release paper is used, for example, as a base for adhesive labels).

The project group has discussed the definitions for the criteria for 'Disposables for food' as this product group also includes food packaging. The definition is as follows: when grease-proof paper is used to wrap food, e.g. sandwich paper, etc., the paper can be Nordic Ecolabelled under the Supplementary Module for grease-proof paper. The same applies to grease-proof paper that is converted into various types of baking cases. However, if the grease-proof paper has been converted into/is used in various types of disposable items, these cannot be Nordic Ecolabelled through the criteria for grease-proof paper. They can, however, be labelled based on the criteria for Nordic Ecolabelling of Disposables for food. These in turn require the grease-proof paper used in the disposable items to meet the criteria contained in the Supplementary Document for grease-proof paper.

If you are not sure which products are covered by these requirements, contact Nordic Ecolabelling.

2.2 Justification for Nordic Ecolabelling

This section outlines the RPS (Relevance, Potential and Steerability) of the environmental effects resulting from the production and use of grease-proof paper. The relevant environmental impacts are described and the potential for improvement within the industry assessed. The steerability with regard to ensuring that the matter develops in the right direction is also examined. Please see also the Background document to the Basic Module and the Chemical Module, version 2, which contains a general description of RPS for the paper industry.

Relevance (environmental impact)
The environmental impact of grease-proof paper production is somewhat different from the environmental impact associated with standard paper production. In order to achieve a surface that repels water and grease, the fibre pulp used to manufacture grease-proof paper undergoes far more extensive milling that that used to produce other types of paper. This results in a far greater energy consumption at the point of milling, dewatering and drying. One other specific impact relating to grease-proof paper is the use of special coating and impregnation chemicals.

The environmental impact of paper production derives from the extraction of raw materials, production of pulp and paper and conversion. The raw materials used in paper production are mainly cellulose based. Forestry operations can have a marked impact on forest life through changed and fragmented habitats, changes to landscapes and disruption to the lives of wild animals and birds, particularly during the latter's nesting period. In some areas forestry operations may also impact on the living conditions of aboriginal peoples. These are relevant environmental impacts both in tropical areas and in the Nordic ecosystems. It is therefore important to ensure that the extraction of lumber and pulp wood is sustainable and considerate in order to protect the forest as a habitat and preserve biodiversity.

The production of cellulose pulp impacts on the environment in several ways. Overall, the environmental impact of cellulose pulp production is greater than that of paper production. Different production processes result in different environmental effects. However, all production of cellulose pulp and paper is resource intensive. The production of grease-proof paper consumes more energy than other paper products as the pulp needs to be more finely milled in order to achieve the desired properties. The generation and use of energy results in various environmental impact factors. In addition to the climate effect and air pollution resulting from combustion, the environment is affected through the production of energy raw material and the landfill disposal of waste products. It is thus important to focus on energy consumption when trying to reduce the environmental impact of the paper industry.

Emissions to the air and to water are also relevant environmental aspects of the paper industry. Emissions to the air are primarily dependent on the energy production deriving from emissions of substances with an acid effect such as sulphur and nitrous oxides, NOx, and CO_2. Emissions to water include substances that lead to over-fertilisation such as nitrogen (N) and phosphorus (P). These can cause algal bloom and result in a scarcity of oxygen in the aquatic environment. Emissions of COD, i.e. organic compounds that consume oxygen as they break down, have the same effect. Emissions of chlororganic compounds, AOX, are also relevant even if problems relating to these have been curbed

significantly in the past 10 years thanks to better bleaching chemicals, more efficient water purification methods and improved production processes.

The pulp and paper industry uses various types of chemicals. These include coating agents, wet strength agents, colours and different process chemicals such as biocides, dispersants and retention agents. Some chemicals are not readily biodegradable and can bioaccumulate in organisms. Other chemical may be carcinogenic and disruptive to endocrine functioning. Toxic substances that are not degradable pose a serious risk to the environment. It is therefore important to reduce the use of harmful chemicals and to ensure that production facilities have cleansing plants capable of limiting emissions.

Various chemicals can be used for the manufacture of grease-proof paper, for example to coat and impregnate the paper. Several of the substances used as coating agents can be harmful to human health and the environment. One example is N-ethyl perfluorooctane sulfonamidoethanol (N-EtFOSE)[1], which can be a precursor to PFOS, and is suspected of breaking down to form volatile perfluorooctane sulphonate (PFOS)[2]. PFOS is a type of perfluorinated organic compound (PFAS), the shared name for a large group of chemicals, the knowledge of which varies greatly. The compounds are found all over the world, including in the Arctic; proof that they can be spread over large distances. Several of the compounds, including PFOA (perfluorinated octane acid) and PFOS, are not readily biodegradable and have serious implications for human health and the environment[3]. N-EtFOSE was found in slurry samples from 8 Norwegian water treatment plants in 2010, as well as in waste water leaving these plants. N-EtFOSE is found in commercial products and can also result from the formation of MeFOSE in the water treatment plant. The compound binds to the slurry and is thus removed from the waste water. An analysis of the different perfluorinated compounds found in cardboard and paper food packaging was performed in Denmark in 2012. The study showed that these compounds can migrate to food[4].

Other substances used to coat baking paper are polymethylsiloxane which may contain cyclic siloxanes, e.g. octamethylcyclotetrasiloxane, D4, and These siloxanes are also found in the environment and have even been found in the Arctic[5]. A study by the Norwegian Institute for Water Research in 2012 showed high concentrations of D5 in fish from Mjøsa[6]. D4 and D5 are not readily degradable in the environment and accumulate in the food chain. D4 is also classed as toxic to aquatic organisms and reproduction toxic[3]. Another environmental and health problem is the use of organotin

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[1] Government programme for pollution monitoring, The Climate and Pollution Agency (2011), Occurrence of selected organic micro pollutants and silver at wastewater treatment plants in Norway. Report no. 1090/2011
TA 2784 Performed by The Norwegian Institute for Water Research in collaboration with The Norwegian Institute for Air Research

[2] Shoeib M, Harner T, Ikonomou M, Kannan K. (2004) Indoor and outdoor air concentrations and phase partitioning of perfluoroalkyl sulfonamides and polybrominated diphenyl ethers. Environ Sci Technol. 38 (5):1313-20.

[3] State Of the Environment (SOE) Norway, PFOS-PFOA-og-andre-PFCs (19 March 2013): http://www.miljostatus.no/Tema/Kjemikalier/Noen-farlige-kjemikalier/PFOS-PFOA-og-andre-PFCs/

[4] The Danish Veterinary and Food Administration 2012, Migration af fluorerede stoffer fra fødevarekontaktmaterialer af pap og papir, , J. nr.: 2010-20-793-00107

[5]State Of the Environment Norway, Siloxanes (19 March 2013): http://www.miljostatus.no/Tema/Kjemikalier/Noen-farlige-kjemikalier/Siloksaner/

[6] Borgå et al., Food Web Accumulation of Cyclic Siloxanes in Lake Mjøsa, Norway, Environ. Sci.Technol., 2012, 46 (11), pp 6347-6354

compounds as catalysts in the silicone coating of grease-proof paper, since the tin compounds have been shown to migrate into the food that is in contact with the paper. At a European Silicones Centre meeting in 2003, the EU's Scientific Committee on food was informed that no European manufacturers use Butyltin as a catalyst[7]. The manufacture of baking paper has slowed down in Europe, meaning that there is a risk of increased imports of baking paper containing organotin compounds.

Chromium can also be used as an impregnation chemical. Chromium compounds are not readily degradable and can accumulate in organisms to varying degrees[8]. Hexavalent chromium compounds are classified as very toxic aquatic organisms. Trivalent chromium compounds are generally somewhat less toxic, however, individual species may be particularly sensitive to these. Trivalent chromium can also oxidise to form hexavalent chromium under certain conditions. The emission of chromium to the waste system from factories or factory waste water should thus be avoided. Coating agents containing chromium are used for e.g. baking paper. However, such paper cannot be reused.

Several studies and research institutes report that nanocellulose, also known as micro fibrillated cellulose, can be used to provide barrier properties or increase the paper's strength[9,10, 11, 12, 13, 14]. Nanocellulose is nano size cellulose fibre with a diameter of 10-50 nm and a length of ~ 1000 nm. These are produced through mechanical homogenisation. However, the need to achieve fibre delamination has resulted in an energy intensive process. In 2012, Swedish research institute Innventia demonstrated that it is possible to reduce energy consumption by 98%, down to about 0.5 MWh per tonne[15]. Research is also being conducted on various pre-treatments using chemicals and enzymes. This new technology is not yet commercially available. As cellulose is biodegradable and there are no concerns over the use of nanocellulose and its impact on human health or the environment, Nordic Ecolabelling has not set any requirements in this regard in this revision.

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[7] Opinion of the Scientific Committee on Food on Potential risks from organotin compounds used as catalysts in silicone-coated baking papers (expressed on 5 March 2003).
[8] State Of the Environment Norway (19 March 2013):
http://www.miljostatus.no/Tema/Kjemikalier/Noen-farlige-kjemikalier/Krom/
[9] Inventia (2013), Nanocellulose. Stockholm, Sweden. Available at: http://www.innventia.com/sv/Det-har-kan-vi/Nya-material/Nanocellulosa/ (accessed 20 May 2013)
[10] Paper and Fiber Institute (2013) Nanocellulose research and applications, Trondheim, Norway. Available at: http://www.pfi.no/Info-Center/Focus-on/Topics/Nanocellulose-research-and-applications/ (accessed 20 May 2013)
[11] Christian Aulin, Mikael Gallstedt, Tom Lindstrom, Cellulose (2010) 17:559–574
[12] Mindaugas Bulota (2013), Breakthroughs in nanocellulose, Bumaga BV – Kennis in Productie, Nederland. Available at: http://www.kcpk.nl/algemeen/bijeenkomsten/presentaties/20130130-nanocellulose (accessed 20 May 2013)
[13] Yulin Deng and Art Ragauskas (2012), Green nanocellulose barriers, Georgia Institute of Technology, USA. Available at: http://www.ipst.gatech.edu/meeting/2012/2012_presentations/17-Deng,%20Yulin%20--%20Nano%20Coating-2.pdf (accessed 20 May 2013)
[14] Wikipedia (2013) Nanocellulose. Available at: http://en.wikipedia.org/wiki/Nanocellulose(accessed 20 May 2013)
[15] Thomas Boel (2012)Supermaterialet nanocellulose er nu billigt nok til masseproduktion. On-line article in Danish publication *Ingenioren* 23 September 2012. Available at:
http://ing.dk/artikel/supermaterialet-nanocellulose-er-nu-billigt-nok-til-masseproduktion-132549
(accessed 21 may 2013)

The use of optical whiteners, colours and printing processes also involves chemicals that contribute to the overall environmental impact resulting from the manufacture of grease-proof paper.

The usage properties of grease-proof paper are also relevant when it comes to assessing environmental impact. From the point of view of consumption and waste reduction, it is positive that e.g. baking paper can be used several times.

Potential and steerability
Traditionally, the paper industry has had a considerable impact on the environment with major emissions to water and air and a heavy use of chemicals, Care for the environment has increasingly become a focus are and this environmental impact has been reduced. However, there is still potential for further improvement. The raw materials used by the paper industry are not always derived from sustainable forestry operations. Emissions to the air and water could be reduced by optimising the production processes and adapting the use of chemicals for improved health and environmental effects. Energy optimisation is also important when it comes to reducing environmental impact. Studies show that food packaging can contain substances that can be of concern when it comes to human health and the environment, for example chromium and PFOS. Nordic Ecolabelling has set out requirements for various types of paper for many years and has seen the paper industry improve their production processes. By imposing absolute requirement for, among other things, sustainable forestry operations, energy consumption and chemicals, Nordic Ecolabelling is able to steer the industry in a more environmentally friendly direction. There are ecolabelled alternatives on the market today and public authorities and other organisations in the Nordic countries have identified the Nordic Ecolabel as a good choice for the environment and for human health. The Norwegian website erdetfarlig.no[16] and Grønn Hverdag i Norge[17] recommends e.g. Nordic Ecolabelled food and baking paper. A report from the Swedish Chemicals Agency[18] on the use of per-fluorinated substances in Sweden mentions that these are banned in Nordic Ecolabelled baking and food paper. Today there is more interest and focus on the environmental impact of the entire product lifecycle, from raw material to use and waste. Nordic Ecolabelling sees its label as a good tool for the industry to use when it wishes to take full responsibility for the environmental impact of a product across its entire lifecycle.

2.3 Version and validity of criteria

The criteria (the Supplementary Module) for grease-proof paper (food and baking paper) version 3 were approved by NMN in October 2003 and revised in 2007. There have been no major changes to version 3. The criteria have been extended a number of times. The current version (3.4) of the criteria for grease-proof paper is valid until 31 March 2015.
Version 1 of the Basic Module and the Chemical Module apply to version 3.4 of the Supplementary Module. For version 4 of the Supplementary Module it is version 2, or

[16] The consumer website of the Norwegian Climate and Pollution Agency (22 March 2013): http://www.erdetfarlig.no/produkter/Husholdning/Husholdningspapir/
[17] Grønn Hverdag (22 March 2103):http://gronnhverdag.no/nor/Aktuelt/Mat-pakkes-inn-i-fluor/(language)/nor-NO
[18]The Chemicals Agency, 2006: Perfluorerade ämnen - användningen i Sverige, Report nr. 06/06

more recent, of the Basic Module and the Chemical Module that should be applied. Version 4 of the Supplementary Module applies from xxxx to xxxx.

2.4 The Nordic market

There are a few main producers of grease-proof paper in the Nordic region. The lion's share of their production is exported to Europe, the US and Asia. Once of the main producers, Nordic Paper, exports more than 90% of its production. The main export destinations are the US and Europe; Italy, England and Germany being the most important countries here[19].
According to Dow Corning Europe, the use of baking paper has doubled in the past 5 years and with approx. 178,000 tonnes used each year, the use of silicon treated baking paper in the food industry now accounts for 81% of all baking paper used[20].

Grease-proof paper is converted into various types of baking and cooking paper (e.g. cases for muffins, cupcakes and buns), interlay paper and other special papers (often called catering paper, cooking paper, etc.). The industrial market is far larger than the consumer market. Licensees feel that the Nordic Ecolabel carries more weight in the consumer market.

The market has long been stable and has recently seen an upturn due to the increased consumption of various types of cupcakes and muffins.

The increased fast-food sales have not increased demand for what we would traditionally call grease-proof paper. Although paper is often used to wrap sandwiches, hamburgers, etc. these types of paper are not grease-proof based on the traditional production method. Their grease proof properties have been achieved through various types of chemicals coatings, e.g. using fluoride and fluoride-like chemicals. These are harmful to both human health and the environment and the increased levels of these compounds in the environment represent a significant problem. For further information, please see 2.2. Traditional manufacturing of grease-proof paper uses FINELY cellulose pulp which in itself if fluid and grease-repelling, thus requiring a lesser degree of coating (using waxes and/or silicones).

Nordic Ecolabel licences
There are currently 7 Nordic Ecolabel licences and 8 registrations for grease-proof paper. Registration in one country means that the licence is approved via the labelling body in another Nordic country, but that the products are registered as Nordic Ecolabelled also in the country where it is registered.

The licences relate to a number of different products, above all baking and food papers (baking tray and sandwich paper) and muffins cases.

[19] Nordic Paper, Kenneth Boström 29 April 2013.
[20] Kris Verschueren and Christian Parein (2012), Silicone Coatings Offer New Opportunities for Food Contact Paper Performance, Dow Corning Europe S. A. Available at http://www.dowcorning.com/content/publishedlit/30-1247-01.pdf (accessed 20 may 2013)

Table 1. Overview of Nordic Ecolabel licences for greaseproof papers in the Nordic region.

2013-05-17

Country	Licence	Registrations
Denmark	2	2
Finland	3	0
Norway	1	3
Sweden	1	3

2.5 Different labelling and management systems

The industry incorporates environmental work on various levels, e.g. through legislative requirements and voluntary measures. The most common voluntary tools are environmental management, environmental declarations and ecolabelling. Society is increasingly starting to call for the environment to be taken into account in connection with public procurement. There are a number of ecolabelling systems in Sweden in addition to Nordic Ecolabelling.

Ecolabelling
Ecolabelling makes it easy for consumers to choose the products that represent the best options for the environment. The products are approved based on established environmental requirements and the organisations administering the system make all the complex assessments relating to the products' environmental impact. The system excludes products that fail to meet the requirement and compliance is monitored by an independent third party. The Nordic Ecolabel follows ISO 14 025, type 1 standard for a lifecycle-based and voluntary ecolabelling.

In addition to the Nordic Ecolabel, there are also other ecolabelling systems assessing paper products. There has been a review of ecolabels that are members of GEN, Global Ecolabelling Network. The majority of these ecolabels set criteria for various paper products of 'food packaging' but it is not specified whether these include the same type of paper as the Nordic Ecolabel's criteria for grease-proof paper. The US ecolabel Green Seal does have requirements regarding paper products used for cooking. According to label's website, the criteria were introduced in 1997 and there are consequently no new, updated requirements. The American manufacturer Wausau Paper uses the national ecolabel Green Seal and sells baking paper produced by Metsä Tissue to bakeries in the USA. The EU Ecolabel does not set criteria for grease-proof paper.

Environmental management
Environmental management systems bring order to a company's own environmental operations and produce improvements based on the company's own targets in the environmental field. However, an environmental management system does not contain any specific requirement levels (threshold values) for the products or their production. The most important systems are EMAS, which was developed by the EU, and ISO 14001, which is an international standard.

Environmental product declarations
Environmental product declarations give detailed environmental information without any particular requirements being placed on the products. There are thus no predetermined requirement levels. The usefulness of the declarations depends on the purchaser's knowledge of the environmental conditions surrounding the product to be bought. There is no international system for environmental product declarations, but work is underway in this area within ISO. In order to make an environmental product declaration, product category rules (PCRs) must be in place or created.

It is difficult to compare various environmental declarations as these are often based on different system limits. This produces different results and the declaration cannot be used to say which is the best product with regard to environmental impact.

Raw materials labelling; FSC and PEFC.
A paper product can be given the FSC label if it contains a certain volume of FSC certified fibres. This raw materials labelling scheme only shows that a certain volume of certified wood raw material is used in the product; it does not say anything about environmental impact later on in the product lifecycle. FSC/PEFC does not set requirements concerning energy consumption, emissions, waste or the use of chemicals; neither in pulp or paper production or later in connection with printing and conversion.

3 About the revision

3.1 Purpose of the revision

Nordic Ecolabelled grease-proof paper must meet stringent environmental requirements and be free from chemicals that could be harmful to human health.

The assessment of the Supplementary Module for grease-proof paper conducted in 2007 concluded that the product group's major environmental gains are derived from the requirements contained within the Basic and Chemical Modules. These were revised in 2011. The revision work on the Supplementary Module for grease-proof paper focused on the following areas: adaptation to the new requirements of the Basic and Chemical Modules, energy consumption in connection with paper manufacture and the use of chemicals in coatings/surface treatments (especially fluoride compounds and siloxanes).

3.2 About this revision

The revision has been performed based on the conclusions from the evaluation. Contact has been established with paper manufacturers and converters and the consultation document has been sent to all licensees and other stakeholders for consultation. Information can also be found on Nordic Ecolabelling's websites.

The revision project group has consisted of Maria Göransson from Sweden (project manager), Eline Olsborg Hansen and Elisabeth Magnus from Norway and Jaakko Suursalmi from Finland.

4 Justification for the requirements

The Nordic Ecolabel's criteria for grease-proof paper are included in a module system, meaning that many of the requirements set for grease-proof paper can be found in the Basic and Chemical Modules. These documents were revised in 2011. The revision of the requirements in the Basic and Chemical Modules entails a significant tightening of the requirements for grease-proof paper. The Basic Module and the Chemical Module contain the general requirements for pulp and paper manufacturing.(see below). The background to the major changes to the requirements for grease-proof paper from version 3 is therefore available in the Background Document to the Basic Module and the Chemical Module, version 2, June 2011.

This background report only describes the background to the requirements set out in the Supplementary Module for grease-proof paper. The Supplementary Module for grease-proof paper contains supplementary requirements that are not included in the Basic Module or the Chemical Module or requirements that are product-specific as they have been adapted for the manufacture of grease-proof paper. The revision work on the Supplementary Module for grease-proof paper focused on the following areas: adaptation of the new requirements to the Basic and Chemical modules, energy consumption and emissions from paper manufacturing, as well as the use of chemicals specific to grease-proof paper.

The Basic Module contains general requirements relating to forestry, emissions, energy and waste from pulp and paper production. The most important changes in version 2 of the Basic Module are:

- Requirements relating to energy and CO_2 emissions have been tightened.
- CO_2 requirements for transport have been introduced.
- Requirements for certified, sustainable raw material have been tightened.

Version 2 of the Chemical Module relates to general requirements for chemicals used to manufacture pulp and paper. The most important changes to version 2 of the Chemical Module are:

- A general ban on classified chemicals has been introduced, with a minimal limit.
- The requirement relating to classified residual monomers has been expanded.
- A ban on GMO in starch has been introduced.

The most important changes to the requirements in the **Supplementary Module for grease-proof paper** are:

- The requirements have been adapted to the revised requirements in the Basic and Chemical Modules, version 2.
- Reference values for the paper machine's energy consumption (fuel and electricity) have been introduced.
- New limit values for energy (fuel and electricity) have been introduced.
- New limit values for CO_2 have been introduced.
- The reference values for paper machine emissions (COD, S and NOx) have been changed.
- Tightened requirements for coating chemicals and a ban on the use of fluoride impregnation chemicals.

4.1 Description of the grease-proof paper

Description of the product, raw materials and manufacturing process

One ecolabelling licence is awarded to one paper product, which is why it is important that the applicant give as detailed a description of the product as possible. In order to be able to determine whether or not the product meets the ecolabelling criteria, detailed information is required about the manufacturing processes and the raw materials used.

O1 Description of the product and the manufacturing process

Describe the product and how it meets the definition of a product that can be given the Nordic Ecolabel (see above under the heading 'What can carry the Nordic Ecolabel?').

Describe the manufacturing process, including conversion. State the trade name of the finished product, the type designation, grammage (g/m^2), weight by volume (kg/m^3) and moisture content.

✉ Description and documentation pursuant to the above. Product samples must be submitted on Nordic Ecolabelling's request.

4.2 Requirements for pulp and paper manufacturing

Basic criteria for pulp and paper manufacturing

The manufacture of the Nordic Ecolabelled grease-proof paper and all pulp used must meet the requirements specified in the Basic Module and Chemical Module (version 2 or more recent) where relevant and unless otherwise stated in the requirements below. These revised Basic Module and Chemical Module requirements entail significant changes to the requirements for grease-proof paper. The background to these requirements will not be stated here but is available in the document: Background to Nordic Ecolabelling of Paper Products – Basic Module and Chemical Module, version 2, 22 June 2011.

The calculations for pulp and paper production are to be performed in line with the calculation structure set out in the Basic Module. The reference values for energy (O4) and emissions (O6) that should be used for paper machines manufacturing grease-proof papers are not found in the Basic Module but in this Supplementary Module. Similarly, the limit values to be used for energy and CO_2 for the grease-proof paper are also found in this Supplementary Module (O4 and O5).

The chemical requirements for grease-proof paper can be found under section 4.3 of the Supplementary Module.

If Nordic Ecolabelling has previously approved the pulp(s) in question for use as grease-proof paper pursuant to the Basic Module, version 2 or more recent, this should be documented in requirement O2. Note that the supplementary requirement for grease-proof paper pulp, O3, must also be met if the paper comes into contact with foodstuffs.

The following applies to converters: if Nordic Ecolabelling has previously approved the paper grade in question for use as grease-proof paper in line with the criteria for such, version 4 or more recent, this should be documented in requirement O2. This removes the need for requirements O3-O6 to be documented separately.

O2 Basic requirements for pulp and paper manufacturing

Production of the grease-proof paper must meet the requirements specified in the Basic Module and the Chemical Module, version 2 or more recent, where relevant and unless otherwise stated in the Supplementary Module requirements. The reference and limit values below should be used when calculating energy (requirement O4), CO_2 (requirement O5) and emissions (requirement O6).

For documentation of the requirements in the Chemical Module, see requirement O7.

Has the pulp or paper been assessed by Nordic Ecolabelling before?

☒ Documentation showing the pulps/paper types used. Trade name of the pulp/paper, name of supplier and manufacturing plant.

☒ Documentation showing how the requirements of the Basic Module, version 2 or more recent, are met. Documentation of the Chemical Module requirements should be documented in O7.

☒ If pulps used to manufacture the Nordic Ecolabelled grease-proof paper have already been approved by Nordic Ecolabelling pursuant to the Basic Module, version 2, or more recent versions; documentation stating the name of the pulps and the time of approval should be attached.

☒ If the paper used to manufacture the Nordic Ecolabelled grease-proof paper has already been approved by Nordic Ecolabelling pursuant to the criteria for grease-proof paper, version 4 or more recent versions; documentation stating the name of the pulps and the time of approval should be attached.

Requirements for pulp used to manufacture paper for contact with foodstuffs

If the paper is intended for use in contact with foodstuffs, the pulp must be made up of virgin fibre only. No recycled fibre may be used. This requirement has not been changed in this revision.

O3 Requirement for pulp used to manufacture paper for contact with food.

Only virgin fibre may be used in the pulp used to manufacture the paper.

☒ Declaration from the pulp supplier/suppliers that the requirement is met.

Energy, CO_2 and emission requirements applicable to production

Paper machines for grease-proof paper are relatively old and there tends to be a low frequency of new investment due to the relatively low sales volumes for this product.

Production of grease-proof paper must meet all the requirements of the Basic Module, version 2, or more recent versions. All calculations shall be based on the formula shown in the Basic Module requirements, version 2, or more recent versions. It should be noted that the reference values below should be used when calculating the paper machine's energy consumption and emissions.

These reference values, and the new limit values for energy and CO_2, have been obtained by calculating the total energy consumption based on the Basic Module's new, tightened reference values for pulp and dialogue with manufacturers.

The calculations apply to the entire paper product; both the paper production and the pulps used. The calculations should be made on a calculation sheet developed by Nordic Ecolabelling. A more in-depth description of the background to the energy, CO_2 and emission requirements can be found in the Background to the Basic Module and the Chemical Module, version 2, June 2011.

Energy

The evaluation of the Nordic Ecolabel's paper criteria resulted in a consensus that the energy and CO_2 requirements represent one of the most important points of the revision. New limit values for energy and CO_2 have therefore been added to this Supplementary Module.

In version 3 of the Supplementary Module for grease-proof paper, the paper must meet the Basic Module's (version 1) energy requirements for pulp and there are no reference values for the energy consumption of paper machines. This revision (version 4) introduces the new Basic Module's (version 2) way of calculating energy, i.e. using a separate points system for electricity and fuel. The calculations apply to the entire paper product; both the paper production and the pulp production. The energy consumption for raw material transport and the conversion and packaging is not included in the energy calculation.

The energy score is calculated using a technical description of the production processes where the energy consumption is compared with the reference values for production (see the Basic Module). Reference values for various pulps can be found in the Basic Module version 2 or more recent versions.

This revision introduces reference values for the energy consumption of paper machines used to manufacture grease-proof paper. Aside from the comparison with the reference value, the energy consumption is governed by a new limit score for grease proof paper in version 4. This limit score defines how much the paper's total energy consumption can exceed the optimal ratio.

This limit score for energy is the same for grease-proof paper as for the Nordic Ecolabel's other Supplementary Modules for paper (tissue and printing paper), i.e. 1.15. This limit score states that the average for the paper's total energy consumption must not be more than 15% higher than if the energy consumption is on a par with the reference value. The score model allows for a higher energy consumption in order to give the paper manufacturer flexibility.

In order to achieve a liquid and grease-repellent surface, the fibre pulp used for grease-proof paper is milled much more finely than that used to manufacture other paper grades. This means that the energy consumption is far higher for milling, dewatering and drying. The reference values for the paper machine's energy consumption are therefore relatively high compared to other paper machines. The reference value for paper machines used to manufacture grease-proof paper has been set at 3,000 kWh/tonne paper for fuel and 2,000 kWh/tonne paper for electricity.

A more detailed description of the documentation requirement and calculation methods is found in the Basic Module version 2 which also defines $P_{electric}$ and P_{fuel}.

O4 Energy requirements

For Nordic Ecolabelled grease-proof paper, the total electricity and fuel scores must each be less than 1.15.

$P_{electric\ (total)} < 1.15$

$P_{fuel\ (total)} < 1.15$

$P_{electric\ (total)}$ and $P_{fuel\ (total)}$ includes the energy scores for both paper production and pulp production.

The reference values for the paper machine's fuel are 3,000 kWh/tonne and for electricity 2,000 kWh/tonne.

✉ Calculation pursuant to Appendix 2 in the Basic Module, version 2, showing that the score requirement is fulfilled. The calculations should be made on a calculation sheet developed by Nordic Ecolabelling.

CO_2

Within the EU, intense work is currently underway to develop legislation relating to energy optimisation and the lowering of greenhouse gas emissions from various activeties. The Nordic Ecolabel is a complement to legislation. With tightened CO_2 requirements for grease-proof paper, Nordic Ecolabelling wishes to highlight the pulps and papers manufactured in an energy efficient manner with low greenhouse gas emissions. A detailed description of the background to the CO_2 emission requirements can be found in the Background to the Basic Module and the Chemical Module, version 2, June 2011.

The Supplementary Module for grease-proof paper, version 3, sets CO_2 emission requirements only for CO_2. Version 1 of the Basic Module set requirements only for the internal combustion of fossil fuels.

Version 2 contains a changed calculation system for CO_2 emissions. It is therefore not possible to compare the CO_2 requirement in the Supplementary Module for grease-proof paper, version 3, with the CO_2 requirements in version 4. Pursuant to version 2 of the Basic Module, CO_2 emissions from electricity purchased and the combustion of fossil

fuels for heat generation and own electricity production shall be included in the calculation. The calculation includes CO_2 emissions both from paper production and from the production of the pulps used.

The CO_2 requirement in the Supplementary Module for grease-proof paper has therefore been adjusted in this revision. A new requirement (O5) is introduced for total CO_2 emissions. The calculation includes CO_2 emissions from both pulp and paper production. The limit values for CO_2 given in the Basic Module, version 2, cannot be directly applied to grease-proof paper since this paper manufacturing process involves a different milling process and thus also a different energy consumption. The limit value for grease-proof paper has therefore been set at 1,500 kg CO_2/tonne paper.

O5 CO_2 emissions

CO_2 emissions from purchased electricity and from the combustion of fossil files for heat generation and own electricity production must not exceed 1,500 CO_2/tonne paper. The calculation contains CO_2 emissions both from paper production and from the production of the pulps used.

✉ Calculation pursuant to the Basic Module, version 2, showing that the requirement is met. The calculations should be made on a calculation sheet developed by Nordic Ecolabelling.

Emissions to air and water

The requirement has been changed. New reference values have been created for the paper machine's COD, S and NOx emissions to adapt them to the tightened constituent substance requirements in the Basic Module. A more detailed description of this chapter's requirements can be found in the Background to the Basic Module and the Chemical Module, version 2, June 2011.

By setting requirements concerning COD, P, S and NOx, Nordic Ecolabelling can help limit emissions of these harmful substances to air and water. LCAs have shown that the environmental effects in the air are primarily the result of the energy-intensive pulp and paper industry's energy requirement. Air pollution includes acidifying substances such as sulphur (S) and substances resulting in eutrophication, e.g. nitrogen oxides (NOx) and substances that contribute to the greenhouse gas effect. Emissions to water from the manufacture of cellulose pulp and paper involve substances that cause eutrophication, e.g. nitrogen (N), phosphorus (P), or substances that upset the balance between N and P. This can cause algal blooms and a shortage of oxygen in cases where the recipient body of water is vulnerable. The effect is the same as for COD emissions, i.e. organic compounds that consume oxygen when they break down in aquatic environments[21].

The requirement applies to emissions to water and air and the structure remains unchanged from the previous versions. The requirement has been formulated as a matrix, where the real COD, P, S and NOx emissions are compared against reference values for each substance. The difference between the real emissions and the reference value represents an emission score. In the matrix, emissions equal to the reference value = 1. If the emissions are lower, the score is < 1. If the emissions are higher than the reference

[21] The Background document to the Basic Module, version 2

value, the score is > 1. The total score for each parameter is calculated by looking at the emissions from both pulp and paper production. The max. score allowed for Nordic Ecolabelled paper products is 1.5. The total emission score corresponds to the total of all emission scores and must not exceed 4. There are separate reference values for pulp and paper production. The reference values for emissions from pulp production are found in the Basic Module, version 2.0, while the reference values for the manufacture of paper for the production of grease-proof paper are product-specific and have therefore been added to the Supplementary Module for grease-proof paper. The fact that the production of grease-proof paper calls for more intense milling and drying than other paper products is reflected in higher emission references.

The changes to the paper machine's reference values are based on analyses of available data and calculations based on the emission values shown for the Nordic licences. Unfortunately there are no BAT values available for emissions from these types of paper machines.

COD has been lowered from 8.0 to 4.0 kg/tonne. The reference value for phosphorus remains unchanged. There are relatively few figures relating to emissions as some of the paper machines do not emit any phosphorus. The reference value for sulphur has been lowered slightly, from 0.6 to 0.5 kg/tonne. The NOx value was previously linked to fuel consumption where the reference value for the paper machine's fuel consumption was multiplied by 0.29. However, there is no direct link between NOx and how much fuel is used. NOx is formed on combustion, mainly using the nitrogen in the air. In this new version of the Basic Module, there are reference values for each process and the result is no longer calculated using the individual sub-processes. This means that the NOx emissions for each specific process have their own reference value stated as kg/tonne paper or pulp in the same way as the other parameters. The new reference value for NOx from the paper machine for grease-proof paper has been set at 0.7 kg/tonne paper. The value is based on a review of the levels in the licences and the consequences of the new method for calculating NOx emissions.

O6 Total emission score, $P_{emissions}$ total

A total emission score, $P_{emissions}$ total, shall be calculated for grease-proof paper.

This score must not exceed 4.0.

$P_{emission\ total} = P_{COD} + P_P + P_S + P_{NOx} \leq 4.0$

No individual emission score ($P_{COD} + P_P + P_S + P_{NOx}$) may be ≥ 1.5

In the calculation of the product's individual and total emission scores for pulp and paper manufacturing emissions, product-specific reference values for paper manufacturing (see Table 2 below) are used together with reference values for various pulp types found in the Basic Module, version 2 (Appendix 3, Table 3.1).

Table 2 Reference values for emissions from paper machines manufacturing grease-proof paper.

Paper type	Reference values for emissions (kg/tonne paper)			
	COD_{ref}	P_{ref}	S_{ref}	$NO_{x,ref}$
Grease-proof paper	4.0	0.01	0.5	0.7

✉ The paper manufacturer shall submit calculations and background data showing that the requirement is fulfilled. The calculations should be made on a calculation sheet developed by Nordic Ecolabelling.

4.3 Chemical requirements

As described in chapter 3, Justification for Ecolabelling, there are various methods for giving the paper the desired grease/water-repellent properties. Normally, the pulp undergoes extra milling to make it less porous and turn it into a 'high density' paper. Super calendaring makes the paper opaque (glassine) and afterwards it can also be surface treated in different ways.. Another method used to give the paper these properties, making it suitable for baking paper, is treatment with diluted sulphuric acid or zinc oxide followed by immediate washing. These methods dissolve the paper and gelify it. The paper thus created is called 'paper parchment' and has a high density, good stability, low surface tension and high resistance to heat[22].

The paper can be surface treated using starch, alginates, CMC (carboxylmethylcellulose), chromium compounds, fluoride chemicals or silicone. According to Dow Corning Europe, the use of baking paper has doubled in the past 5 years and with approx. 178,000 tonnes used each year, the use of silicone-treated baking paper in the food industry now accounts for 81% of all baking paper used[23]. Dow Corning explains that the concerns relating to toxic emissions in connection with combustion are the reason why the market has moved away from chromium coating and toward voluntary initiatives for reducing the use of fluoride-based chemicals. Furthermore, they state that wax paper can be an issue as the wax is not biodegradable.

Fluoride chemicals are not only used as coating agents. Since the price of the chemicals has fallen, they are now also added to the pulp. The result is that the paper can contain up to 10 times more fluoride compounds than if it was just coated[24]. A test of muffin cases in Tænk in December 2012 found that two of the ten cases tested contained fluoride substances[25].

In the past, silicone coatings were applied using a solvent-based process. However, this method is currently being phased out due to a wish to stop the use of solvents. The European industry phased out organotin catalysts for hardening silicone coatings in 2002[26]

The term constituent substance refers to all substances in the product, including additives in the ingredients (such as preservatives and stabilisers) but does not include impurities from primary production. Impurity refers to residues from primary production which may be found in the finished product at concentrations below 100 ppm (0.010% by weight, 100 mg/kg), but not substances that have been added to a raw material or the product actively and for a particular purpose, irrespective of quantity. Impurities of over

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[22] Wikipedia (2013) Parchment paper (baking). Available at: http://en.wikipedia.org/wiki/Parchment_paper_(baking)#cite_note-1 (accessed 20 may 2013)
[23] Kris Verschueren and Christian Parein (2012), Silicone Coatings Offer New Opportunities for Food Contact Paper Performance, Dow Corning Europe S. A. Available at http://www.dowcorning.com/content/publishedlit/30-1247-01.pdf (accessed 20 may 2013)
[24]Personal communication with Xenia Trier, the National Food Institute of the Technical University of Denmark, department for Food Chemistry (30 August 2012).
[25] Tænk (2012) Muffins cases, Denmark. *Tænk* Dec/2013: 8 – 11.
[26] European Commission (2007), Impact Assessment of Potential Restrictions on the Marketing and Use of Certain Organotin compounds, Final Report – October 2007, Directorate-General Enterprise and Industry. Available at: http://ec.europa.eu/enterprise/sectors/chemicals/files/studies/organotins_en.pdf (accessed 20 May 2013)

1% concentration in the primary product are, however, regarded as constituent substances. Substances known to be degradation products of the constituent substances are also themselves considered to be constituent substances.

Production chemicals

Under the chemical requirements, the manufacturers must submit an overview of all chemicals used specifically in the production of grease-proof paper or for conversion of the same (e.g. size or printing inks). All chemicals used to produce pulp or paper must meet the requirements contained in the Chemical Module, version 2 or more recent versions. The type, trade name, supplier, field of application and volume per tonne of grease-proof paper shall be stated for each chemical. Chemicals used specifically for grease-proof paper must also meet the Chemical Module requirements.

The Chemical Module limits the use of chemicals classified as harmful to the environment, very toxic, carcinogenic, mutagenic or reproduction toxic. It also sets a series of requirements concerning chemicals with specific functions such as defoamers, coating agents, water purification chemicals, etc. The background to the requirements in the Chemical Module is found in the background documents to the Basic Module and the Chemical Module and the requirements were adopted in 2011. The classification requirement in the Chemical Module states, for example, that the use of zinc oxide (ZnO) as a chemical product is not allowed. ZnO is registered in REACH with the classification H410 (very toxic to aquatic life with long lasting effects). The registration does not specify whether this applies to the nano or the bulk form of ZnO.

O7 Production chemicals

The pulp/paper manufacturer must report all chemicals used in production and in converting, providing documentation in respect of the product's complete name, product safety data sheets, function, classification, area of use, supplier and quantities used in kg/tonnes pulp/paper. All chemical products used in the production of pulp and paper and in conversion must be fully documented. The requirement further applies to internal and external water treatment.

All chemicals must fulfil the requirements in the chemical module, version 2 or later.

This requirement also applies to chemicals used for printing on the paper, but not for packaging printing.

The safety data sheet/product sheet must comply with Appendix II to REACH (Regulation 1907/2006/EC)

✉ Complete declaration of all production chemicals used, pursuant to Appendix 3, and complete safety data sheets for all chemical products. Documentation showing that the chemicals meet the requirements.

Optical whiteners

The optical whitener requirements remain unchanged from the previous version of the criteria. The requirement has been included to limit the use of chemicals that can have a harmful effect on human health and the environment either at the point of use or production, and these are not normally used in the production of grease-proof paper today. Optical whiteners include derivatives of 4,4-diaminostilbene-2,2-disulphonic acid. Normal use has been 5-10 kg/tonne paper and the compounds have a low retention on the paper machine, i.e. they do not only adhere to the paper but also enter the waste water stream. These compounds are not biodegradable. A study from 2012 showed that a

significant increase in brightness was achieved using 1.5 to 2 kg/tonne on the size press[27]. Optical whiteners can contain up to 30% urea as a stabilising agent, which may result in an overdose of nitrogen in the biological treatment plant. Optical whiteners are banned under the German Blue Angel paper criteria, and in the background document to the EU's document for public procurement of paper (GGP for Copying and graphic paper)[28] a ban is based on the fact that optical whiteners can cause allergies and are toxic and not readily degradable in aquatic environments. The use of optical whiteners such as stilbene sulphonic acid derivatives is approved at concentrations up to 0.3% in paper that comes into contact with foodstuffs pursuant to the German BfR regulations. However, it must be possible to prove that these do not migrate into food[29].

Antibacterial compounds

A substance with an antibacterial effect is defined as 'An antibacterial chemical that impedes or stops the growth of microorganisms such as bacteria, fungi or protozoa (unicellular organisms)'. Silver compounds, nanosilver and nanogold are also considered antibacterial substances in this context.
Antibacterial substances are biologically active and often harmful to the environment. There is a concern that the increased use of such substances can increase bacteria's resistance to antibiotics[30]. Both nanosilver and silver ions pose a threat to aquatic organisms. One problem is that silver particles can reduce the effectiveness of water treatment plants. Silver can also continue into the aquatic environment and cause damage there. Nordic Ecolabelling has therefore introduced a requirement stating that substances with an antibacterial effect must not be added.

There are food papers on the market that claim to impede the formation of mould, some of which claim to contain only natural extracts. Neither the efficacy nor the health and environmental effects of such papers have been studied in detail in this revision; however, we will assess whether or not to include it in the next revision. As a precautionary measure, all such additives are banned.

O8 Optical whiteners and antibacterial substances

Optical whiteners must not be used.

Chemicals intended to provide antibacterial properties must not be added.

An antibacterial chemical is a chemical that impedes or stops the growth of microorganisms such as bacteria, fungi or protozoa (unicellular organisms).

Silver compounds, nanosilver and nanogold are considered antibacterial substances.

✉ Declaration from the pulp/paper manufacturer stating that the requirement is fulfilled.

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[27] Liu et al. (2012), OBA use in high yiels furnish, *BioResources* 7(2), 2581-2591. Available at: http://ncsu.edu/bioresources/BioRes_07/BioRes_07_2_2582_Liu_SNYZZ_Review_of_OBA_Prodn_HYP_Paper_2618.pdf (accessed 21 may 2013)
[28]EU GPP criteria (2008) Copying and graphic paper: Technical background report. Available at: http://ec.europa.eu/environment/gpp/pdf/toolkit/paper_GPP_background_report.pdf (accessed 21 may 2013)
[29] Database BfR Recommendations on Food Contact Materials (2012) Federal Institute for Risk Assessment in Germany. Available at: http://www.bfr.bund.de/en/database_bfr_recommendations_on_food_contact_materials__formerly__plastics_recommendations__-1711.html (accessed 21 may 2013)
[30] Forbrugerkemi (2010) «Nanosølv bekymrer i Tyskland». Available at: http://www.forbrugerkemi.dk/nyheder/nanoteknologi/nanosolv-bekymrer-i-tyskland/?searchterm=nanosølv (accessed 21 may 2013)

Chemicals used for impregnation and coating

The requirement stating that coating agents must not contain chromium compounds or fluoride compounds remains unchanged from the previous version. It has, however, been expanded to include impregnation substances and chemicals that are added to the pulp. The background to the requirement is concerns for human health and the environment previously outlined in chapter 2. Even though chromium coatings are no longer used in Europe, the requirement has been included to prevent their reintroduction via grease-proof paper imported from other parts of the world.

As in the previous version of the Supplementary Module, silicone coating is allowed.

Silicone is the common name for a group of siloxane compounds. Siloxanes are substances consisting of a chain of Si-O to which one or several organic or hydrogen molecules bind to the silicon atom. These have a general chemical formula $[R_2SiO]_n$, where R = hydrogen or organic groups such as: methyl, ethyl or phenyl[31]. When it comes to coating, the most commonly used agent is an emulsion consisting of polydimethyl-siloxane (PDMS). PDMS is formed through polycondensation of linear siloxanes or through polymerisation of cyclic siloxanes such as D4 or D5. The amount of residual monomers will depend on the reaction type and the process conditions[32, 33]. D4, D5 and D6 can also be formed as by-products from polymerisation[34]. The linear and cyclic siloxanes are formed through hydrolysis of dimethyldichlorosilane[35]. PDMS is applied in liquid form and hardened as the vinyl side groups cross-link with e.g. hydrogen in the Si-O chain with the help of a catalyst such as a salt complex consisting of platinum, palladium or rhodium.

As described in chapter 2, siloxanes are a group of substances that have long been a focus area for the environmental authorities. The reason for this is that some of the substances are not readily degradable and tend to bioaccumulate in organisms. According to the Norwegian Climate and Pollution Agency (Klif) the ring-shaped siloxanes octamethylcyclotetrasiloxane (D4) and decamethylcyclopentasiloxane (D5) in particular are problematic as these are not readily degradable in water and sediment and may accumulate in organisms[36].

Silicones such as PDMS are not biodegradable but are easily absorbed in slurry, making treatment plant removal possible. Combustion results in the formation of amorphous silica, carbon dioxide and water. Silicones are not very mobile but will break down abiotically at a slow rate in soil and sediment to form dimethylsilandiol. This substance is water soluble and can break down to form carbon dioxide, water and inorganic silica

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[31] Wikipedia.no: http://no.wikipedia.org/wiki/Silikon (Sept 2012)
[32] Huse, A and Aas-Aune, S. (2009) Kartlegging av bruk, forekomst, og omfang av siloksaner i Norge. Report SFT TA-2557/2009
[33] Lassen et al. (2005) Siloxanes - Consumption, Toxicity and Alternatives. Rapport Miljøstyrelsen no.1031 2005
[34] Environment Canada Health Canada (2011) Screening Assessment for the Challenge Siloxanes and Silicones, di-Me, hydrogen-terminated. Available at: http://www.ec.gc.ca/ese-ees/4996570F-FFC7-4214-A693-7C55757CF6D7/Batch%2011_70900-21-9_EN.pdf(accessed 27 May 2013)
[35] Polydimethylsiloxanes (PDMS). From the European Silicones Center website. Available at: http://www.silicones-science.com/chemistry/polydimethylsiloxanes-pdms/cyclic-polymerisation (accessed 28 may 2013)
[36]The website of the Norwegian Climate and Pollution Agency: http://www.klif.no/Sok/?query=siloksan (Sept 2012)

(proven in laboratories)[37]. The main concern when it comes to silicones is thus their cyclic siloxane, e.g. D4 and D5, content.

One type of baking paper was studied as part of a mapping of siloxanes in Norway. No oligomeric siloxanes were found over the detection limit[38].

O9 includes a ban on the use of octamethylcyclotetrasiloxane (D4) and (CAS 556-67-2) decamethylcyclopentasiloxane (D5) in the silicone coat. Impurity refers to residues from primary production which may be found in the finished product at concentrations below 100 ppm (0.01% by weight, 100 mg/kg), but not substances that have been added to a raw material or the product actively and for a particular purpose, irrespective of quantity.

O9 Chemicals used for impregnation and coating

Chemicals added to the pulp or to impregnation/coating agents must not contain chromium or fluoride compounds.

The following requirements must be met in connection with silicone treatment of the paper:

- Solvent-based painting/coating agents must not be used.
- Octamethylcyclotetrasiloxsane, D4, (CAS 556-67-2) and decamethylcyklopentasiloxsane, D5, (CAS 541-02-6) must not be used. D4 and D5 impurities are exempt from this requirement*.
- Organotin catalysts may not be used.

** Impurity refers to residues from primary production which may be found in the finished silicon polymer (calculated based on dry residue in the commercial product) at concentrations below 100 ppm (0.01% by weight, 100 mg/kg), but not substances that have been added to a raw material or the product actively and for a particular purpose, irrespective of quantity.*

✉ Declaration from the pulp-/ paper manufacturer stating that the product does not contain chromium or fluoride compounds. Declaration from the chemical supplier stating that the requirement for silicone treatment is fulfilled. Appendices 4 and 5 can be used.

[37] Linear polydimethylsiloxanes (2011) European Center for Ecotoxitiy and Toxicology of Chemicals, Jacc report No 55. available at: http://www.ecetoc.org/index.php?mact=MCSoap,cntnt01,details,0&cntnt01by_category=3&cntnt01order_by=Reference%20Desc&cntnt01template=display_list_v2&cntnt01display_template=display_details_v2&cntnt01document_id=5338&cntnt01returnid=91(besøkt 27.05.2013)

[38] Huse, A and Aas-Aune, S. (2009) Kartlegging av bruk, forekomst, og omfang av siloksaner i Norge. Report SFT TA-2557/2009

4.4 Product function requirement

The requirement remains unchanged. There are no international standards for use characteristics for grease-proof paper. Reference to own test methods is thus sufficient.

O10 Function properties

The product must meet the function requirements applicable within the industry.

It must be possible to reuse baking paper. See also O13 Labelling.

✉ Overview of tested function properties and the associated test results. Example of technical information about this.

4.5 Requirement for paper that comes into contact with foodstuffs

Nordic Ecolabelling has introduced a new requirement for paper that comes into contact with foodstuffs. The requirement has been set to ensure safe use. Chemicals used to manufacture paper and cardboard may contain substances that are harmful to human health. Materials that come into contact with food must comply with general legislation for the area (regulation no. 1935/2004). However, paper and cardboard that comes into contact with foodstuffs is not regulated in detail within the EU/EEA and none of the Nordic countries set any special requirements for these materials[39]. Furthermore, the products that are ecolabelled may also be produced in countries outside of Europe. The requirement represents additional assurance that the products are safe to use, regardless of the country of manufacture.

The requirement refers licence applicants to three different guidelines and/or recommendations. The guidelines of the European Council resolution, BfR's recommendation or the CEPI Industry guideline. All three have been included to give applicants the opportunity to use the guidelines that they are already working with. The European Council policy statement concerning paper and board materials and articles intended to come into contact with foodstuffs, version 4, 2009[40] includes specific descriptions of what additives may be used, test methods and Good Manufacturing Practice (GMP) for the production of paper and cardboard that is to come into contact with food. CEPI has developed the guidelines: "Industry guideline for the Compliance of Paper & Board Materials and Articles for Food Contact: Issue 2"[41]. The German risk assessment institute, Bfr, has issued recommendations relating to paper and cardboard that comes into contact with foodstuffs: 'XXXVI. Paper and board for food contact'[42], found in their database.

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[39] European Commission, Summary of the national legislation, Sanco E6/MS(28/09/2010):http://ec.europa.eu/food/food/chemicalsafety/foodcontact/documents_en.htm

[40] Resolution ResAP (2002): Policy statement concerning paper and board materials and articles intended to come into contact with foodstuffs, version 4 2009

[41] Industry guideline for the Compliance of Paper & Board Materials and Articles for Food Contact: Issue 2

[42] http://bfr.zadi.de/kse/faces/DBEmpfehlung_en.jsp (accessed 23 may 2013)

Fulfilment of the requirements must be certified by an independent third party. In Sweden and Norway respectively, Normpack and Emballasjekonvensjonen help companies to ensure that their disposable items and food packaging meet the applicable laws and regulations. Denmark does not have any such regulatory framework. Nordic Ecolabelling does not restrict which organisations may perform such third party assessments, meaning that others in addition to above mentioned, may also perform these.

O11 Paper that comes into contact with foodstuffs

Paper marketed as coming into contact with foodstuffs must comply with the following regulations:

- European Council 'Policy statement concerning paper and board materials and articles intended to come into contact with foodstuffs', version 4, 2009, or more recent versions, or
- BfR's recommendation XXXVI. Paper and board for food contact, March 2011 or more recent versions.
- CEPIs Industry guideline for the Compliance of Paper & Board materials and articles for food contact, Issue 2, September 2012 or more recent versions.

Fulfilment of the requirements must be certified by an independent third party.

✉ Copy of certificate or declaration from an independent control body (third party) stating that the requirement is fulfilled.

4.6 Packaging requirements

Packaging material requirements

The standard packaging materials for grease-proof paper are cardboard or plastic. The requirements have not changed since the last version of the criteria. Nordic Ecolabelling still believes that it is important to limit the use of chlorine-based plastics in packaging and promote packaging where the materials can be recycled. Over their lifetime, chlorine-based plastics such as PVC create a large number of compounds that are toxic, not readily biodegradable and possibly bioaccumulative. They can also pose a problem in connection with material recycling of plastic packaging.

Grease-proof paper such as baking paper can be used several times, reducing consumption and quantities of waste. This is why there is a requirement that the product must be labelled to this effect.

O12 Packaging materials

Packaging (item, group or transport packaging) used for the Nordic Ecolabelled product must not be made using chlorine-based plastics.

It must be possible to recycle packaging made from a combination of materials.

✉ Description of the material composition of various packaging types.

O13 Labelling

The following text must be visibly printed on baking paper packaging: "The paper can be used more than once before being discarded".

For labelling with the Nordic Ecolabel's 'Swan' logo, see the section on 'Design of the Nordic Ecolabel' at the end of these criteria.

✉ Examples of packaging labelling should be submitted, showing the label and any text for baking paper, if applicable.

Packaging optimisation for transport purposes

Transport requirements were discussed as part of the revision of the Basic Module for paper. The conclusion was that there is not enough steerability to make it possible to set transport requirements. See chapter 6.2 of the Basic Module. The Basic Module does, however, include a requirement for reporting CO_2 emissions from transport to the paper factory.

But it is still an important issue to optimise packaging for transport purposes and most manufacturers already do this. Requirements are therefore set as a means to make sure that manufacturers of ecolabelled grease-proof paper are obliged to use the optimised transport packaging solutions, for example by placing grouped packaging on the loading pallet to increase capacity use on the pallet within the vehicle.

O14 Packaging design

The product packaging shall be optimised for transport.

✉ Description of how the requirement is fulfilled.

4.7 Waste requirement

The requirement remains unchanged and is set as a means to ensure responsible waste handling. This requirement is also found in the Basic Module for pulp and paper manufacturers and is extended to include converters here.

O15 Waste

Factory area waste should be separated and the various fractions reused as far as this is possible. The waste fractions and the handling of these should be outlined.

If the waste comes under a national definition of hazardous waste, this too should be stated.

No further documentation is required in cases where the paper manufacturer and converter are certified to ISO 14001.

✉ The paper manufacturer/converter shall account for the following:

- Waste sorting process.
- Sorting fractions.
- Handling of the individual fractions (internal and external recycling, energy use, landfill or other).

4.8 Quality and regulatory requirements

The requirements ensure that the licensee holding the Nordic Ecolabelling licence is responsible for safety, working environment, environmental legislation and for ensuring that site specific conditions/conventions are met in connection with the production of ecolabelled products.
These requirements are set as a means to ensure that the ecolabelling criteria are fulfilled throughout the validity period of the licence.

O16 Laws and regulations

The licensee must guarantee compliance with the safety, working environment, environmental legislation and/or plant-specific conditions/concessions applicable to the operations at all sites where the Nordic Ecolabelled product is manufactured.

Documentation is not required. However, Nordic Ecolabelling may revoke the licence if the requirement is not fulfilled.

O17 Licence administrators

The company shall appoint an individual responsible for ensuring the fulfilment of Nordic Ecolabel requirements, and a contact person for communications with Nordic Ecolabelling.

✉ Organisational chart showing who is responsible for the above.

O18 Documentation

The licensee must be able to present a copy of the application and factual and calculation data supporting the documents submitted with the application (including test reports, documents from suppliers and suchlike).

☺ On-site inspection.

O19 Product quality

The licensee must guarantee that the quality of the Nordic Ecolabelled product is maintained throughout the validity period of the licence.

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

O20 Planned changes

Planned changes affecting the Nordic Ecolabel's requirements must be approved by Nordic Ecolabelling in writing.

✉ Procedures detailing how planned changes are dealt with.

O21 Unforeseen non-conformities

Unforeseen non-conformities that affect Nordic Ecolabel requirements must be reported to Nordic Ecolabelling in writing and logged.

✉ Procedures detailing how unforeseen non-conformities are handled.

O22 Traceability

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

✉ Description of/procedures for fulfilment of the requirement.

O23 Take-back system

Relevant national regulations, legislation and/or agreements within the sector regarding take-back systems for products and packaging shall be complied with in all the Nordic countries where the Nordic Ecolabelled product is marketed.

✉ Declaration from the applicant regarding affiliation to existing recycling/processing agreements.

O24 Annual reporting

The environmental requirements must be followed-up annually based on a checklist (Appendix 3 to this document or the Basic Module) from Nordic Ecolabelling. The checklist should be signed by the person responsible for the Nordic Ecolabel licence and then sent to Nordic Ecolabelling. Note that this applies to both paper and pulp.

✉ Duly completed Appendix 2.

4.9 Marketing

The requirement ensures that "Regulations for the Nordic Ecolabelling of Products" are applied when marketing Nordic Ecolabelled products. These regulations outline the design of the label and its positioning, as well as how the licensee can utilise the Nordic Ecolabel in the rest of the Nordic region and what documentation is required for registration.

O25 Marketing

Marketing of Nordic Ecolabelled products must comply with the "Regulations for the Nordic Ecolabelling of Products" dated 22 June 2011 or later versions.

✉ Duly completed Appendix 1.

5 Changes from the previous version

- The requirements have been adapted to the revised requirements in the Basic and Chemical Modules, version 2.
- Reference values for the paper machine's energy consumption (fuel and electricity) have been introduced.
- New limit values for energy (fuel and electricity) have been introduced.
- New limit values for CO_2 have been introduced.
- The reference values for paper machine emissions (COD, S and NOx) have been changed.
- Tightened requirements for coating chemicals and a ban on the use of fluoride impregnation chemicals.

6 New criteria

The following points should be followed up and reviewed in the next revision:

- Energy and CO_2 requirement levels and air and water emission requirements.
- Requirement relating to certified raw material.
- Requirement relating to impregnation and coating chemicals.

7 Abbreviations

COD: Chemical Oxygen Demand
NOx: Nitrogen oxides
P: Phosphorus
S: Sulphur

8 References

References have been added to the text on an ongoing basis.

Appendix 1 Marketing of Nordic Ecolabelled grease-proof paper

We hereby certify that we are well acquainted with the regulations governing the use of the Nordic Ecolabel, as detailed in "Regulations for the Nordic Ecolabelling of Products" dated 22 June 2011 or later versions. We agree to follow these regulations when marketing the Nordic Ecolabelled grease-proof paper.

Further, we confirm that we are familiar with the content of the criteria document regarding the Nordic Ecolabelling of grease-proof paper.

We undertake to advise those individuals within the company involved in marketing the Nordic Ecolabelled grease-proof paper of the criteria for the Nordic Ecolabelling of grease-proof paper and the "Regulations for the Nordic Ecolabelling of Products" dated 22 June 2011 or later versions.

Place and date	Company

Signature, contact person

Name (block capitals)	Telephone

Signature, Marketing Manager

Name (block capitals)	Telephone

In the event of a change in personnel, a new declaration must be submitted to Nordic Ecolabelling.

Appendix 2 Annual reporting to Nordic Ecolabelling

Form for annual reporting for paper covered by a Nordic Ecolabel licence.
Form for paper manufacturers:
Year: _____
Factory name: _____
Paper name: _____
Produced volume _____ tonnes paper
The produced volume is the volume of paper referred to when talking about emissions/year.

Emissions from the paper machine (if not integrated):
COD _____ kg/tonne paper
P _____ kg/tonne paper
S _____ kg/tonne paper
NOx _____ kg/tonne paper
CO_2_____kg/tonne paper

Form for annual reporting for paper covered by a Nordic Ecolabel licence.
Form for pulp manufacturers:
Year: _____

Factory name:	**Unit**
Pulp name:	
Produced volume*:	**tonnes of pulp**
% of material from certified forestry:	**%**
COD	**kg/tonne 90% pulp**
P	**kg/tonne 90% pulp**
S	**kg/tonne 90% pulp**
NOx	**kg/tonne 90% pulp**
AOX	**kg/tonne 90% pulp**
Chlorate	**kg/tonne 90% pulp**
EDTA/DTPA	**kg/tonne 90% pulp**
CO_2	**kg/tonne 90% pulp**

*The produced volume is the volume of paper referred to when talking about emissions/year.

Appendix 3 Information about production chemicals

Pulp/paper manufacturer or converter:

_____

List of production chemicals:

Chemical name	Function	Manufacturer/ supplier	Volume used (kg/tonne)	Process in the factory	Safety data sheet (X) with date	Classification

We hereby certify that the above classifications are correct pursuant to the safety data sheets submitted (the classification applies at the date of signing).

Pulp/paper manufacturer's or converter's signature.

Company	Date
Signature	Title/position
Name (block capitals)	Tel./E-mail

Appendix 4 Chemicals used for coating/impregnating or as a pulp component

Certificate from the pulp/paper manufacturer.

What chemicals have been used for coating/impregnating or as a pulp component?

_____
_____
_____
_____

Do any of the chemicals listed above contain chromium or fluoride compounds?

Yes □ No □

We hereby certify that Nordic Ecolabelling will be notified immediately in the event of any changes to the product composition.

Pulp/paper manufacturer's signature:

Company	Date
Signature	Title/position
Name (block capitals)	Tel./E-mail

Appendix 5

Silicones used for coating/impregnating or as a pulp component

Certificate from the chemical supplier.

Product name:
Function:
Manufacturer/supplier:

1. Is the product solvent-based?

   Yes □ No □

2. Are organotin compounds used?

   Yes □ No □

3. Does the product contain octamethylcyclotetrasiloxane, D4, (CAS 556-67-2) or decamethylcyklopentasiloxane, D5, (CAS 541-02-6)? D4 and D5 impurities are exempt from these requirements.

   Yes □ No □

   Impurity refers to residues from primary production which may be found in the finished silicon polymer (calculated based on dry residue in the commercial product) at concentrations below 100 ppm (0.01% by weight, 100 mg/kg), but not substances that have been added to a raw material or the product actively and for a particular purpose, irrespective of quantity.

We hereby certify that Nordic Ecolabelling will be notified immediately in the event of any changes to the product composition.

Chemical supplier's signature:

Company	Date
Signature	Title/position
Name (block capitals)	Tel./E-mail

Nordic Ecolabelling
Background to ecolabelling 049/version 4
15 July 2013