

About Nordic Swan Ecolabelled
Sanitary Products



Version 6.11

**Background to ecolabelling
08 September 2026**

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Appendix 1 Requirement for regenerated cellulose

Appendix 2 Guidelines for standard, renewable commodities

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

Contact information

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

Denmark

Ecolabelling Denmark
www.svanemaerket.dk

Norway

Ecolabelling Norway
www.svanemarket.no

Iceland

Ecolabelling Iceland
www.svanurinn.is

Sweden

Ecolabelling Sweden
www.svanen.se

Finland

Ecolabelling Finland
<https://joutsenmerkki.fi/>

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1 Summary

Nordic Ecolabelling has had criteria for sanitary products for over 20 years, covering products such as diapers and sanitary towels. The criteria have now been revised to generation 6. In this revision, the product group has been expanded to include more products in the health sector. This document describes the environmental impact in the life cycle of sanitary products and how Nordic Ecolabelling has selected the requirements that have to be fulfilled in order for the products to qualify for the Nordic Swan Ecolabel.

The products that may be Nordic Swan Ecolabelled are breast pads, children's diapers, incontinence care products, sanitary towels, tampons, cotton buds, cotton wadding, cotton pads, cotton wool, sauna underlays, bibs, plasters, compresses, mattress covers/protectors, draw sheets, bed linen, wash cloths, surgical gowns, patient gowns/patient covers, surgical masks and caps. Products with added cosmetics, medication/medicines, disinfecting substances and similar cannot be ecolabelled in this product group. It is possible to ecolabel similar products under other Nordic Ecolabelling criteria documents, including reusable diapers under the criteria for textiles, serviettes and paper towels under the criteria for tissue paper and wet wipes under the criteria for cosmetics.

It has been shown that the majority of the environmental impact from disposable sanitary products comes from the production of the constituent materials. The primary materials used in sanitary products are cellulose pulp, superabsorbents, cotton, regenerated cellulose like regenerated cellulose and various polymers. The environmental impact of the products can be reduced by setting strict requirements concerning the production of the materials used, by shifting to less environmentally problematic materials or by reducing the quantity of materials used in the products. The latter area is difficult for Nordic Ecolabelling to influence, because even small changes in the product composition can change the function or other properties of the products which consumers appreciate. The products that fall under the umbrella of sanitary products have an absorbent, protective and/or removing function for body fluids or faecal matter. They vary greatly and can have extremely complex material combinations. This makes it difficult to set general requirements concerning the composition of the products in order to reduce the use of the more environmentally problematic materials. Part of the environmental impact comes from the handling of the products in the waste phase. However this is an area of low steerability, since it is difficult for Nordic Ecolabelling to influence how consumers handle the products after use. Nordic Ecolabelling also has little influence over municipal waste management systems.

In this revision, Nordic Ecolabelling has continued to set detailed requirements concerning the constituent materials and chemicals used in the manufacture of sanitary products. Nordic Ecolabelling also wishes to promote the use of renewable raw materials and recycling and sets a requirement to the material composition of the sanitary product and the packaging. In this generation of the criteria the requirement can be fulfilled by having a high percentage renewable raw material in the product, a percentage bio-based polymers/recycled material in the product or recycled or renewable raw materials in the primary packaging.

The burden of requirements for a specific material is set in relation to their weight percentage in the finished product. The higher percentage of a specific material, the more requirements are set. In many cases the limits for the different requirements to occur, are divided into several levels according to the material type, with limits of 1, 5, 10 and/or 20 % by weight.

The requirements for fluff pulp and paper are updated in relation to updates in the Nordic Ecolabelling's general requirements for these types of materials, which mean stricter requirements. One of the biggest amendment is that there is now requirements for the renewable raw materials used in polymers. Below is an overview of the most important requirements that have been tightened from generation 5 to generation 6:

- The requirements to chemicals have been tightened as there now is also requirements for the ingoing chemical substances in the chemical products used in the production of the sanitary product. Earlier there was only requirements to the classification of the chemical products.
- The general chemical requirements are also applicable for additives to the materials/components, like polymers, nonwoven, superabsorbents, regenerated cellulose etc.
- There are new requirements to polymers, both fossil based and biobased. This includes specific requirements to polyurethane and polyamide and requirements to certified raw materials if palm oil, soy or sugar cane is a part of the renewable raw materials.
- The limit for emission of COD from the production of regenerated cellulose is lowered from 55 to 45 kg/ton regenerated cellulose, and there are requirements to the emission of AOX (organically bound halogens) and OCl (organically bound chlorine)
- For fluff/cellulose pulp there is a new requirement to the wood raw materials with a certification limit of 30% compared to 20% in earlier generation, In addition there is a requirement to CoC-certification. The requirements to energy and emissions are also tightened and the calculation is based on the Basic module version 2 compared to version 1 in earlier generation.
- For paper the requirements are also tightened as it refers to the basic module version 2 and the additional modules and the energy and emission requirements in these criteria. There is also a separate forest requirement instead of referring to the basis module. The forest requirement has a certification percentage of 50 instead of 30% in the basic module. There is also reference values for packaging paper based on the least stringent values from the paper modules as this kind of paper do not have reference values in the basic module today and can be a part of the product, like used as release paper.
- There are requirements to recycled plastic that is a part of the primary packaging and/or used in the sanitary product.

2 Basic facts about the criteria

2.1 Sanitary products that may carry the Nordic Swan Ecolabel

Products that can be labelled

The criteria document carries the following description of which products can be Nordic Swan Ecolabelled:

The product group "Sanitary products" covers disposable products with an absorbent and/ or protective/ removing function for bodily fluids and faecal matter. The function of the products may furthermore be to facilitate bodily cleansing of such fluids or to facilitate the removal of products applied intentionally to the body, such as cosmetics. The disposable products can be found either in private bathrooms or in a more public environment such as a care institution. Disposable products like bed linen marketed toward other segments than hospital, nursing home etc., like tourism, cannot be ecolabelled after the requirements in this criteria.

Products included are: breast pads, children's diapers, incontinence care products, (panty-liners, formed diapers and diapers with tape strips), sanitary towels (pads and panty-liners), tampons, cotton buds, cotton pads, cotton wool, sauna underlays, bibs, plasters, compresses, mattress covers/protectors, draw sheets, bed linen, wash cloths (except paper cloths), surgical gowns, patient gowns/patient covers, surgical masks and caps.

Relevant disposable products in addition to those specified above may be included in the product group upon request if they are viewed as sanitary products. This applies only to products made of materials for which requirements are imposed in the criteria. Nordic Ecolabelling will determine which new products may be included in the product group.

It is thus specified that only the disposable products that are covered by the product group, and that only products made from materials for which requirements are imposed in this document may be included. Products that can be labelled are either for personal hygiene or a more public environment such as hospitals and care institutions. Products that are marketed towards other segments, like disposable bed linen for the tourist industry or washing clothes to for instance kitchen and cleaning are not a part of the product group.

Requirement O2, Percentage composition, states that at least 95% of the materials used must be materials subject to requirements in the criteria. This means other materials that appear in small quantities may be included without specific requirements being met. Such other materials may be rubber (elastic), CaCO₃ and wax to prevent leakage via the seams.

Relevant products may, however, have been overlooked, which is why the definition allows for other disposable sanitary products to be included with the consent of Nordic Ecolabelling. It is thus up to Nordic Ecolabelling to determine which products may be included. This is because it is important to assess whether there are other performance and quality requirements that the new products should meet, or whether the product could already be Nordic Swan Ecolabelled in accordance with other criteria documents. It is important that the new products comprise materials for which requirements have been set in the criteria, so that the set of criteria does not become too extensive. Further information is provided in section 7.1.

Sanitary products that cannot be ecolabelled

The following definition describes which types of product cannot be Nordic Swan Ecolabelled under this product group:

Serviettes, wet wipes, dry wipes, paper towels or wash cloths made of paper, multiple use wash cloths, mesh pants, disposable gloves and toothpicks are not eligible for a Nordic Swan Ecolabel under these criteria for sanitary products. Many of these products can, however, be labelled under other criteria for the Nordic Swan Ecolabel or the EU Ecolabel.

Products that can be ecolabelled according to the criteria for tissue paper or cosmetic products (i.e. products that comply with the product group definitions in these criteria documents) cannot be ecolabelled according to the criteria for sanitary products.

Other, similar, products that have a function other than absorbing and/or protecting against bodily fluids/faecal matter or cleansing of cosmetic products, for example, cannot be ecolabelled under the criteria for sanitary products. Please contact Nordic Ecolabelling for more information.

Products with added cosmetics, medication/ medicines, disinfecting substances and similar cannot be ecolabelled in this product group.

Cotton buds where the stick is plastic or a mixture of materials such as plastic and paper can not be ecolabeled.

The definition of what may not be included covers various potential products that, in some cases, could be granted a licence in accordance with other criteria documents. Alternatively, the examples have a function that does not fully match the product group definition. More information and justification of why these products are not included can be found in section 7.1.

2.2 Justification for Nordic Ecolabelling

It has been shown that much of the environmental impact from disposable sanitary products comes from the production of the constituent materials. This applies in particular to those used as primary materials, but also materials that have a larger carbon footprint per kilo, for example, than other materials since they are more energy-intensive to produce and/or come from fossil raw materials. The primary materials used in sanitary products include cellulose pulp, superabsorbents, cotton, regenerated cellulose and polymers. The environmental impact of the products can be reduced by setting strict requirements concerning the production of the materials used, or by shifting to renewable materials, as long as they do not have other undesirable effects. It is thus important to set requirements concerning the chemicals that are found in the product.

The environmental impact of sanitary products can also be reduced through the manufacturers focusing on a reduction in the weight of the end product, and on optimising the material composition of the products. The latter area is, however, difficult for Nordic Ecolabelling to influence, because even small changes in the product composition can change the function or other properties of the products which consumers appreciate. The products that fall under the umbrella of absorbent, protective and removing sanitary products vary greatly and can have extremely complex material combinations, something which also makes it difficult to set general requirements concerning the composition of the products in order to reduce the use of the more environmentally problematic materials.

Part of the environmental impact comes from the handling of the products in the waste phase, but this is another area of low steerability, since it is difficult for Nordic Ecolabelling to influence how consumers handle the products after use. Nordic Ecolabelling also has little influence over municipal waste management systems.

Section 6 provides a more in-depth assessment of the environmental conditions surrounding disposable sanitary products. In addition, many of the materials used are described in more detail in section 7, which also explains the requirements that have been set.

Nordic Swan Ecolabelled sanitary products:

- Meet strict environmental requirements concerning the materials in the product and the production process
- Promote good health through tough chemical requirements concerning the materials and the end-product
- Promote materials from renewable/recycled sources in the product and its packaging.

3 About the criteria revision

Purpose of the criteria revision

Before this revision began, an evaluation of the criteria for the Nordic Swan Ecolabelling of sanitary products was conducted in order to check whether the requirements have an environmental benefit, have the correct limit values/levels, are not too complex and restrictive for the development of the product types, and so on. The conclusion of the evaluation was that the criteria should be revised, with the aim of version 6 of the criteria being:

- to tighten the requirements concerning various polymers, including bio-based superabsorbent polymers (SAP)
- to assess and improve the requirements concerning energy and climate, particularly for renewable raw materials
- to update requirements concerning paper and pulp in order to harmonise them with corresponding requirements for the Nordic Swan Ecolabelling of paper products
- to review all the requirements in terms of requirement levels, nominal limits and scope for simplifying the requirements.

About this criteria revision

The work was conducted as an internal review by the Nordic secretariats of Nordic Ecolabelling in 2014 and 2015. The working group maintained ongoing contact with the industry through licensees and other industry players, including material manufacturers and industry organisations.

Eline Olsborg Hansen of Ecolabelling Norway has been the project manager in 2016, while Rebecca Uggla of Ecolabelling Sweden was project manager in the earlier phase of the revision. Ingvild Kvien and Elisabeth Magnus of Ecolabelling Norway also participated in the project.

3.1 Earlier versions of the criteria

This is the background document for generation 6 of the criteria for sanitary products.

Sanitary products are one of the older product groups within Nordic Ecolabelling. Originally, there were separate criteria for diapers and feminine hygiene products. The criteria for diapers were first adopted in June 1994 and the criteria for feminine hygiene products were adopted in December 1996. These two sets of criteria were merged to create the criteria for sanitary products, generation 4, which was approved on 27 August 2001.

New types of sanitary product have continuously been included in the product group, with generation 5 of the criteria, for example, adding the following products: cotton buds, cotton wadding, toothpicks, mattress covers, draw sheets, bed linen, wash cloths, surgical gowns and massage table paper roll. Version 5 was approved in March 2008 and will remain valid until 31 December 2017.

Through all the revisions, new requirements have gradually been introduced with regard to manufacture, emissions, chemical substances, waste management and waste quantities, plus packaging and product information. Generation 5 gained a specific focus on climate impact when we introduced requirements concerning Global Warming Potential (GWP) or alternative requirements on the proportion of renewable raw materials or bio based polymers.

As part of the revision work for the sixth generation of the criteria, plasters and other products for healthcare have been included, as well as disposable materials used by dentists and products that may be used in operations (patient gowns, exam table paper, surgical masks and caps), plus products used primarily within the care sector.

3.2 Nordic Swan Ecolabel licences in the Nordic Market

The number of licences has generally risen over the years. There are a total of 38 Nordic Swan Ecolabel licences for sanitary products in the Nordic region as of April 2016 based on generation 5 of the criteria. Each licence may include several products, so it is estimated that a total of 487 products were covered in April 2016.

Figure 1 below shows how the 30 Nordic licences are distributed across the different product categories. Many of the licensees include more than one type of product under their licence, which is why for example sanitary towels/panty-liners/tampons have been put together as one product category. It is clear that the three groups, sanitary towels/panty-liners/tampons, diapers and incontinence care products; make up the greatest proportion of Nordic Swan Ecolabelled sanitary products in the Nordic market. The category “other” is a catch-all category for remaining product types.

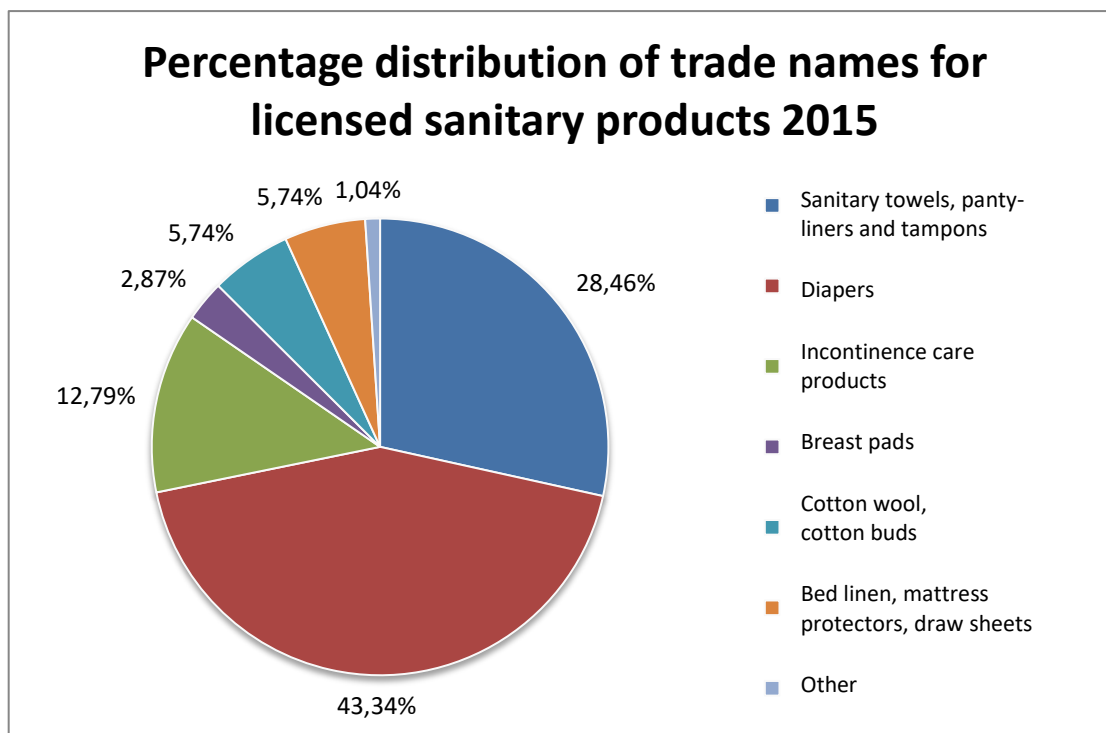


Figure 1 Distribution of licensed sanitary products in the Nordics as of January 2015. The products, which are covered by 30 different licences, have been divided into seven categories. The percentage distribution relates to the total number of licences, and has no relevance to share of market or sales.

The trade names stated in the licences are thus largely associated with children's diapers, with these accounting for almost half of the total trade names. Sanitary towels and panty-liners are the second largest group, followed by incontinence care products. Altogether, these account for over 80% of the trade names

4 The Nordic market

An assessment of Nordic Swan Ecolabelled sanitary products in 2011¹ indicated that they have considerable penetration in the Nordic market. Exact figures are unavailable, but an estimate shows that in 2015 ecolabelled products account for around 30% of the children's diaper market in Finland, with figures of 65% in Sweden and 60% in Norway. The assessment also concluded that the market share for sanitary towels and panty-liners was around 25% in Finland and 2% in Denmark. Nordic Swan Ecolabelled products have a negligible share of the incontinence care product market, except in Denmark, where market share is around 50% in public procurement. Most of the information below on the market has also been taken from the 2011 assessment.

Manufacturers of sanitary towels and panty-liners sold on the Nordic market include SCA Hygiene Products, Procter & Gamble, Johnson & Johnson, Delipap, Ontex and Bodywise, with SCA and Procter & Gamble as the market leaders.

¹ Utvärdering av Svanenmärkta Hygienprodukter Version 5. Rapport till Nordisk Miljömärkningsnemd. 21 november 2011. Kan fås ved å kontakte Nordisk Miljømerking.

According to a study by SCA², women in Western Europe aged 15-49 use around 350 sanitary towels per year. Market share for branded sanitary towels and tampons is dominated in the Nordic region and the rest of Europe by just a few major manufacturers and their brands. In addition to these brands, there are several supermarket chains and pharmacies that have private label products. Supermarkets and pharmacies are the leading sales channels for this type of product. They are, however, also sold in health food stores and online.

During the evaluation of the criteria for the Nordic Swan Ecolabelling of sanitary products, the manufacturers noted the following developments:

- Sanitary towels and diapers are becoming thinner, softer and at the same time more effective. More SAP and less fluff.
- Dyes and print are being used more.
- Biomaterials are likely to play a greater role in future product developed. Biomaterials used today include compostable polymers such as PLA.

The two major players in incontinence care products in the Nordic region are: SCA Hygiene Products AB (the “Tena” range) and Abena A/S (the “Abri” range). Other market share is accounted for by private label products such as Matas in Denmark and Attends and Hartmann in Norway. Both Abena and SCA state that the market is largest in the professional segment (institutions, hospitals, care homes). Incontinence care products are purchased primarily via public procurement. The products are used by hospitals and institutions, or they are provided to citizens in private homes. However, incontinence care products can also be found in supermarkets such as Matas and in pharmacies, and they can be purchased online. Sales of incontinence care products are rising, as the population ages and more people suffer from incontinence. The condition is considered a widespread disease, with one in ten Danes over the age of 67 suffering from incontinence, for example³. The predicted trend is for the products to be increasingly available in supermarkets.

There appears to be an increased interest in other types of sanitary products which are primarily used in the care sector. Players in the current market include Cellkomb, which manufactures a number of disposable products for the health service⁴. Other industry players are 3M (Nexcare), Beiersdorf (Hansaplast), Cederroth (Salvequick), Johnson & Johnson (Compeed), Mölnlycke Health Care and Norgesplaster. ASAP Norway AS is a small company, which has developed an absorbent disposable sheet for birthing beds⁵.

5 Other labels

There are very few other labelling systems for sanitary products in the Nordic market. The most common label on diapers is the Asthma and Allergy label. There are also

² SCA. Marknad - Mensskydd. 2015-03-24.

http://www.sca.com/sv/Om_SCA/Var_verksamhet/Personliga_hygienprodukter/Marknad-menstruationsskydd-SCA/ (hentet 13. april 2015)

³ Retsinformation Danmark. Forslag til folketingsbeslutning om styrkelse af inkontinensindsatsen. Fremsat den 12. april 2011 <https://www.retsinformation.dk/Forms/R0710.aspx?id=136752> (hentet 13. april 2015)

⁴ www.cellkomb.com/healthcare (hämtat 22 april 2015)

⁵ <http://www.svanemerket.no/aktuelt/nyheter/laken/> (hämtat 22 april 2015)

organic labels for products such as cotton wool, cotton buds and breast pads. Such schemes apply to the cotton in the products, which may also carry the Fairtrade label.

Type 1 ecolabels

Type 1 ecolabels are the labels that make it easiest for consumers to choose. Products are approved according to set environmental requirements, and an independent third party checks that the products meet these requirements. Ecolabelling sets fixed requirements (limit values) for products. These requirements are based on a cradle-to-grave assessment, and are developed according to standard ISO 14 024. The system excludes products that do not meet the requirements. The criteria for the Nordic Swan Ecolabel are updated in an open process involving the participation of public agencies, consumers, industry, researchers, environmental movements and retailers, for example, and the requirements are formulated to promote the best products. The official ecolabels that are members of the Global Ecolabelling Network (GEN) and have requirements for sanitary products include the EU Ecolabel, which has criteria for “absorbent hygiene products”⁶. These were adopted in October 2014. Another ecolabel that is a member of GEN is Green Seal in the USA, which has criteria for paper products, amongst them paper diapers. One of their requirements is that 50% of the materials must be “post-consumer material”⁷.

Environmental product declarations (type 3 ecolabels)

Environmental product declarations (EPDs) do not set requirements for the products, but provide documentation of the product’s environmental impact associated with production, use and disposal, based on a life cycle analysis of the product. In order to produce an EPD, Product Category Rules (PCR) must be in place for the product category. For sanitary products, there is version 2 of a PCR from EPD International called “Absorbent hygiene products”⁸. As mentioned, there are no requirement levels in the EPDs, and it is difficult to compare different EPDs, since there are no standardised methods for calculating the environmental impact of factors such as energy consumption.

Private labelling schemes

The Nordic Asthma and Allergy Associations have different criteria for labelling their products, and only some of those criteria are public. In Norway, the products are assessed by an independent expert panel comprising two doctors and one researcher⁹. In Denmark, the web page for diaper manufacturers states that declared products must contain no fragrance, dyes, formaldehyde or formaldehyde donors¹⁰.

Purchasing rules

Both the EU and several individual countries have their own purchasing rules and Green Public Procurement (GPP) scheme. The EU has so far not developed anything for

⁶ EU Ecolabel. Product Groups and Criteria. Absorbent Hygiene Products. Commission Decision of 24 October 2014. <http://ec.europa.eu/environment/ecolabel/products-groups-and-criteria.html> (hentet 15. april 2015)

⁷ Green Seal Standard for Sanitary Paper Products, 3rd Edition. Hentet fra: <http://www.greenseal.org/Portals/0/Documents/Standards/GS-1/GS-1%20One%20Pager%203rd%20Ed.pdf> (21. januar 2015)

⁸ EPD International AB, Sweden, PCR Absorbent hygiene products. 2015. Hentet fra: http://envirodec.com/en/PCR/Detail/?id=158&epslanguage=en&Pcr=7900#.VL_7M7B0yUk (hentet 13. april 2015)

⁹ NAAF. Norge Astma og Allergi Forbund i Norge. Produktvurderingsutvalg. 08.09.2014. http://www.naaf.no/no/om_naaf/Egne-rad-og-utvalg/Produktutvalget/ (hentet 13. april 2015)

¹⁰ Astma-Allergi Danmark. Bleer og dyner. <http://www.astma-allergi.dk/den-bla-krans/bleer-og-dyner> (hentet 13. april 2015)

sanitary products, but Sweden has, and the industry organisation for nonwovens (EDANA) has drawn up a number of requirements.

The requirements set under these schemes are summarised in a written report for the development of the EU Ecolabel's criteria for absorbent hygiene products¹¹.

Current EU regulations allow considerable scope to use the requirements on which ecolabelling and environmental certification are based in public procurement. Article 23, paragraph 6 of Directive 2004/18/EC of the European Parliament and of the Council states which criteria apply in order for ecolabels to be used. These are criteria that the Nordic Swan Ecolabel fulfils. In addition, there is now a new EU Directive on public procurement, 2014/24/EU, which opens the way for even more aggressive use of ecolabelling and environmental certification in public procurement. This directive is in the process of being transposed into law in the Nordic region, but the final text for each country has not yet been agreed. The Norwegian draft for consultation states that clients may require a particular labelling scheme as documentation that the goods, services or building and construction work has environmental, social or other properties as stated in the specification of requirements, tendering criteria or contractual terms¹². The Nordic Swan Ecolabel and the EU Ecolabel are both labelling schemes that constitute sufficient documentation as regards this consultation draft for Norwegian public procurement.

6 Environmental assessment of sanitary products

6.1 Disposable products

There has been a long-standing debate about disposable products versus reusable products and which are best from an environmental perspective. It is a simple fact that disposable diapers and sanitary products are widely used, both by consumers and the health service. In the years since the first disposable diapers came onto the market just before the Second World War, the products have undergone constant development in terms of form, function and material composition.

There have been many studies and life cycle analyses aimed at determining whether textile or disposable diapers are best. A British LCA study of diapers for the Environment Agency "Life Cycle Assessment of Disposable and Reusable Nappies in the UK"¹³ from 2005 was updated in 2008 and concluded that there is no significant difference in environmental impact between the three diaper systems studied: disposable diapers, textile diapers laundered at home and textile diapers with a collection system for laundering. The report gives recommendations on reducing the environmental impact of all three systems. For disposable diapers, the key point is to reduce the environmental impact of the materials used in the product by reducing the weight and/or improving the

¹¹ EU Ecolabel for Sanitary Products. Preliminary report_5th draft. March 2013. Page 44 - 48. <http://susproc.jrc.ec.europa.eu/sanitaryproducts/whatsnew.html> (hentet 14. april 2015)

¹² Den norske regjeringen. Ny forskrift om offentlige anskaffelser. Høringsnotat 2. <https://www.regjeringen.no/contentassets/a20179ad1beb4de9b4d7f5ccce80c094/horingsnotat-2-forskrift-offentlige-anskaffelser.pdf> (hentet 16. mai 2015)

¹³ Defra (the British Environment Agency). Life Cycle Assessment of Disposable and Reusable Nappies in the UK, 2005 with update in 2008. ISBN: 1-84-432427-3. <https://www.gov.uk/government/publications/an-updated-lifecycle-assessment-for-disposable-and-reusable-nappies> (hentet 13. april 2015)

manufacture of the materials. A similar study “Life Cycle Assessment: Reuse and disposable nappies in Australia”¹⁴ from 2009 shows similar results.

This study assessed water consumption, non-renewable energy, waste and use of productive land for disposable and reusable diaper systems. The greatest difference between the systems was that the consumer has greater control over the environmental impact when using reusable diapers. Unsurprisingly, diapers laundered in cold water and air dried had the lowest environmental impact.

A life cycle analysis of surgical gowns for wet operations (specialist gowns) “Lifecycle analysis of surgical gowns”¹⁵ from 2003 concludes that reusable gowns have less of an environmental impact than equivalent disposable products. Both the products contain similar amounts of polyester, but that is where the similarities end. None of the gowns contain bio based polymers. The disposable gowns also contain regenerated cellulose, cellulose, PE and 1% other plastics. The primary material in the reusable gowns is “Gore Surgical Barrier”, which is a membrane based on polytetrafluorethylene (PTFE) from DuPont (Teflon). This material also contributes to the reusable gowns’ impact on ozone depletion. The LCA study of surgical gowns assessed fewer environmental factors than the British LCA study of diapers, focusing on the factors: effect on the climate, depletion of stratospheric ozone, acidification, eutrophication and photochemical ozone formation. The study does not seek to examine factors such as chemicals and biodiversity. In the years since 2003, there has been a growing concern about hormone-disruptive effects from the use of fluorinated substances, which could mean that surgical gowns with a fluorinated coating would receive a different assessment today. Today’s health sector uses large amounts of disposable gowns and other protection, and Nordic Ecolabelling therefore believes it is important to set sound requirements concerning the manufacture of this type of disposable product. Other, more recent life cycle analyses show that reusable products have a lower environmental impact than disposable products. One of these is the US study “Life Cycle Assessments Of Single Versus Multiple Use Surgical Gowns”¹⁶, in which reusable polyester (PET) surgical gowns washed 50 times were compared with equivalent disposable polypropylene (PP) products. The article shows that the disposable products were widely introduced due to concerns regarding blood-borne diseases such as Hepatitis and HIV/AIDS. A degree thesis¹⁷ from Karlstad University in Sweden shows that the energy consumption for washable cotton/polyester bed linen is lower than for disposable regenerated cellulose products (Tencel) and negligibly less than for disposable polypropylene products. Both disposable products were laminated with a thin biofilm.

¹⁴ O'Brien, K. R., Olive, R., Hus, Y.C., Bell, R., Morris, L. and Kendall, N. (2009). Life Cycle Assessment: Reusable and disposable nappies in Australia. In: Australian Life Cycle Assessment Society Conference 2009. 6th Australian Conference on Life Cycle Assessment, Melbourne, (1-14). 17-19 February. Life Cycle assessment: Reuse and disposable nappies in Australia. 2009.

http://s3.amazonaws.com/zanran_storage/www.crdc.com.au/ContentPages/44777470.pdf (20. juli 2015)

¹⁵ Eriksson, E og Berg, H: “Livscykelanalys av operationsrockar”, CIT Ekologik Ab

Chalmers Industriteknik, En rapport på uppdrag av Westma, Göteborg 2003.

¹⁶ Van den Berghe, AJ and Zimmer, C. Life Cycle Assessments Of Single - Versus Multiple- Use surgical Gowns. Finnes på nettsiden til Sustainability Roadmap for Hospitals

http://www.sustainabilityroadmap.org/pims/pdfs/pim247_lifecycle_assessment_disposable_versus_reusable.pdf (hentet 22. juli 2015)

¹⁷ Strömner, F. Jämförande LCA av engångssängkläder och tvättbara sängkläder i sjukvården. Examensarbete ved Karlstad Universitet, Fakulteten för hälsa, natur- och teknikvetenskap. 2014. <http://kau.diva-portal.org/smash/record.jsf?pid=diva2%3A731948&dswid=-6427> (hentet 22. juli 2015)

The US website “Sustainability Roadmap for Hospitals”¹⁸, run by the American Hospital Association, recommends using reusable medical textiles because they provide less waste, lower costs and better patient comfort, and they are generally a better environmental option than disposable products in the health service.

Nordic Ecolabelling is nevertheless open to labelling disposable products in the hygiene sector, in order to promote the best disposable products where these are the preferred choice. Reusable textile products can already be Nordic Swan Ecolabelled under the criteria for Nordic Swan Ecolabelling of textiles, hides/skins and leather.

The large amount of waste associated with disposable products is also a major environmental problem. This is particularly the case if the products end up in the ocean. It is estimated that regular diapers that end up in the ocean will take 450 years to break down, according to the website Miljøstatus (Environmental status), run by the Norwegian authorities, which refers to the National Oceanic and Atmospheric Administration (NOAA)¹⁹.

Various compostable diaper products have been launched, but they have not achieved any great commercial success. Manufacturers currently have no steerability when it comes to the waste management of their products, and most of the composting facilities in the Nordic region would rather not compost diapers for hygiene reasons. Diapers are therefore sorted out by composting facilities and sent for incineration, even if they are made from compostable materials. There are also no recycling facilities for sanitary products in the Nordic region. The alternative is thus incineration, with or without energy recovery, or landfill. In the Nordic countries, a high proportion of household waste is incinerated. Of the two alternatives incineration and landfill, incineration accounted for 97% in Sweden, Denmark and Norway, while the figure was 63% in Finland and 11% in Iceland in 2013, according to the statistical office of the European Union, Eurostat²⁰.

A company called Knowaste²¹ in the UK has launched a technology for separating incontinence care products and diapers, and recycling both the paper and the plastic materials. They sterilise the waste and remove all moisture before sorting. The plastic is pelleted and used in various products, while the fibre is washed, dried and processed before being used as an additive in concrete, asphalt, building blocks and installation materials.

Although it is the waste management systems in each country that determine whether a compostable material really can become composted, some manufacturers have nevertheless expressed a desire to use compostable materials. One example of such a bioplastic is the polymer polylactide (Polylactic Acid, PLA), which is produced from starch deriving from plants such as maize.

Biodegradability and compostability are among the most commonly named sales parameters for bioplastics, and the degradation time for different types of bioplastic is

¹⁸ Sustainability Roadmap for Hospitals. Choose reusable textiles.

<http://www.sustainabilityroadmap.org/pims/247#.Va9X6LA4Gul> (hentet 22. juli 2015)

¹⁹ Miljødirektoratet. Forsøpling av havet. Miljøstatus. Publisert 21.01.2015. <http://www.miljostatus.no/Tema/Hav-og-kyst/Forsopling-av-havet/> (hentet 4. februar 2015)

²⁰ Eurostat. Waste generated by households by year and waste category.

<http://appsso.eurostat.ec.europa.eu/nui/submitViewTableAction.do> (hentet 22. juli 2015)

²¹ Knowaste. Recycling Process. <http://www.knowaste.com/> (13. april 2015)

reported at between 90 and 180 days, depending on thickness and quality²². According to standard EN 13432, 90% of the material must break down within 180 days.

However, not all types of bioplastic meet the requirements in the international standards for biodegradability and compostability, EN13432 and ASTM D6400, while there are conventional plastics that in some cases are able to meet these standards²³. Biogas plants can also have a problem with bio-based plastics. The poor degradation is due to the lack of oxygen in the digestion chamber, which means that the degradation does not function in the way that the manufacturers of the material intended²⁴. Due the conditions described above and the fact that most diapers in the Nordic region are sent for incineration after use, no requirements have been set concerning compostability for Nordic Swan Ecolabelled sanitary products. In addition, it is assumed that most other sanitary products included in the product group share the same fate as diapers after use.

6.2 Material composition

Sanitary products are often complex and composed of many different materials. This translates into a complex environmental impact. The greatest differences on the environmental front between the different manufacturers are due to the product's composition and the manufacturer's choice of raw materials, such as fluff (cellulose pulp), tissue paper, polymers, cotton and SAP. According to the article "Evolution of disposable baby diapers in Europe"²⁵ from 2015, the average European diaper is based on four primary components. The top layer that is in direct contact with the body is made from a permeable nonwoven PP fabric. The next component is a layer that temporarily stores the urine and distributes it onwards to the absorbent layer. These components are both made from fluff pulp and SAP. The outer layer has to hold the diaper together and prevent leakage. It may contain small micro-holes to allow air to pass through. This layer is made from PE. In addition, a diaper contains a fastening system such as tape, plus elastic and dyes and print. The results of the study show a clear link between the environmental impact of disposable diapers and the quantity of materials in the product. They also show that the weight reductions of recent years are probably due to the improved performance of the materials, components and product layout. The clear link between the quantity of the various materials and the product's environmental impact is also confirmed by other studies of sanitary products. Table 2 shows the material composition of average European diapers from the EU Ecolabel's study during its development of criteria for absorbent hygiene products. The diapers have 37% fluff pulp, 31% SAP and 16% nonwoven PP.

Few independent LCA studies of sanitary products have been published. The best known is the British study, mentioned above, which compared disposable diapers with reusable diapers. It outlines the contribution of the different materials to the overall environmental impact of the diapers, and gives the following advice: "disposable nappy manufacturers should focus on weight reduction and improvements in materials

²² <http://worldcentric.org/biocompostables/bioplastics> (hämtat 22. april 2015)

²³ FORCE Technology (som en del af innovationsnetværket PlastNet). Engangsartikler i bioplast i Danmark. Marked, egenskaber og miljø. December 2010. http://www.plastnet.dk/images/stories/downloads/engangsartikler_i_bioplast_i_danmark_med_bilag.pdf (hentet 1. juni 2015)

²⁴ Mailkorrespondens med Carline Steinwig, Avfall Sverige (13 maj 2015).

²⁵ Mauro Cordellaa et al. Evolution of disposable baby diapers in Europe: life cycle assessment of environmental impacts and identification of key areas of improvement. *Journal of Cleaner Production*, Volume 95, 15 May 2015, Pages 322–331. <http://www.sciencedirect.com/science/article/pii/S0959652615001535> (20. juli 2015)

manufacturing; and reusable users should focus on reducing energy consumed in washing and drying.”

2012 saw the publication of a comparative study of Pampers diapers²⁶. Two of Pampers’ 2007 diaper models were compared with their newly developed 2010 versions. The study gives the same recommendation as the British diaper study: “designing more effective products and influencing behaviours in the supply chain are the most impactful things that a corporation can do to achieve sustainable product development and enable more sustainable living.” The study showed that the newly developed versions of the diapers, which were lighter and also had different material composition, had a lower environmental impact from the use of non-renewable energy and emissions of greenhouse gases, as well as a few other indicators. The results suggest that the reduction is associated with lower energy use due to lower material consumption, and is not directly related to the production process or the use of the products. The lower environmental impact was also attributed to the reduced amount of waste. The more recent study “Evolution of disposable baby diapers in Europe”²⁷ shows that disposable diapers have achieved significant environmental improvements over the past few years by designing lighter products and introducing superabsorbents. The study also indicates that these improvements could continue through careful selection of materials in the design phase, checks on health and environment risks and ensuring functionality and performance requirements are met. More efficient use of resources is also important during manufacture, and there is a need for structural changes to waste systems if the products are going to require special waste management. The article suggests that the results of the study could be used to support design work and ecolabelling of disposable children’s diapers in order to promote the production and use of products with a lower environmental impact. The study has also revealed a distinct lack of statistically representative data for products on the market, something that is fundamental for eco-based benchmarking of the products. But as the report points out, it is important to take a precautionary approach and not to make broad generalisations based on the results of individual studies.

In its preliminary report²⁸ for the development of criteria for absorbent hygiene products, the EU Ecolabel describes various LCAs for several of the products defined as sanitary products (children’s diapers, sanitary towels, breast pads and tampons). The purpose was to identify the critical environmental impacts associated with these products. The EU Ecolabel has conducted its own cradle-to-grave LCA focused on diapers, sanitary towels, tampons and breast pads. They sourced information on the composition of the products from the available literature, while environmental data was taken from the LCA database GaBi. Once again, the conclusion is that the constituent materials in a children’s diaper, for example, account for the highest proportion of the environmental impact (see Table 1). The table shows the extent to which the materials are responsible for the environmental impact of the various parameters in relation to the rest of the disposable diaper’s life cycle. The other phases, such as transport, manufacture of the diaper, packaging and the use phase, have less of an impact on the results in the

²⁶ Weisbrod, Anne V. and Hoff, Gert Van. LCA-measured environmental improvements in Pampers® diapers. *Int J Life Cycle Assess* (2012) 17:145–153. Published online with open access at Springerlink.com. 10 November 2011. <http://link.springer.com/article/10.1007%2Fs11367-011-0343-1#page-1> (hentet 14. April 2015)

²⁷ Mauro Cordella et al. Evolution of disposable baby diapers in Europe: life cycle assessment of environmental impacts and identification of key areas of improvement. *Journal of Cleaner Production*, Volume 95, 15 May 2015, Pages 322–331. <http://www.sciencedirect.com/science/article/pii/S0959652615001535> (20. juli 2015)

²⁸ EU Ecolabel for Sanitary Products. Preliminary report_5th draft. March 2013. <http://susproc.jrc.ec.europa.eu/sanitaryproducts/whatsnew.html> (hentet 15. april 2015)

life cycle analysis. The relative effects of the materials are similar for the other products that were assessed (sanitary towels, tampons and breast pads). A study by Mauro Cordella et al from 2015 (Evolution of disposable baby diapers in Europe) gives similar results and also used GaBi (version 5). The authors of this study are from the same institutions as those that drew up the EU Ecolabel preliminary report and the study is thus probably an updated LCA based on the same information, but focusing solely on children's diapers. The material composition is the same in both studies.

Table 1: The table illustrates in percent that the overwhelming majority of the environmental impact from children's diapers derives from the constituent materials. The table is taken from the EU Ecolabel for Sanitary Products, Preliminary report²⁹ and Mauro Cordella et al (Evolution of disposable baby diapers in Europe)²⁷.

Impact category	Environmental impact of constituent materials in relation to product's whole life cycle in %	
	Data from EU Ecolabel	Data from Mauro Cordella et al.
Abiotic Depletion Potential (ADP) (kg Sb-Eq)	95	98
Acidification Potential (AP) (kg SO ₂ -Eq)	85	91
Eutrophication Potential (EP) (kg PO ₄ ³⁻ -Eq)	66	70
Global Warming Potential (GWP) (kg CO ₂ -Eq)	62	63
Photochemical Ozone Creation Potential (POCP) (kg Ethene-Eq)	92	92
Primary Energy Demand (renewable and non-renewable) (MJ)	92	96
Primary Energy Demand (renewables) (MJ)	97	99
Primary energy Demand (non-renewable) (MJ)	90%	94

Table 1 shows that the environmental impact of the materials is most significant in the life cycle of sanitary products. Table 2 sets up a comparison of how the different materials contribute to this environmental impact. The table is taken from the same report that came out of the criteria development for the EU Ecolabel. The contribution from the individual materials depends on the quantity used, so the weight of the different materials is included in a separate column. The table illustrates how (split into different environmental parameters) and to what extent the individual materials have an environmental impact.

The constituent materials that generate the greatest environmental impact are: fluff, SAP and nonwovens. Elastics account for a substantial part of ADP and affect POCP. The main effect of LDPE (low density polyethylene) is on POCP.

Looking at the environmental parameter GWP, the table shows that fluff, SAP and nonwovens are the greatest contributors in this area. In terms of weight, nonwovens account for less than half of the fluff weight. The correlation between weight of constituent material and contribution to GWP appears to vary for the different materials, with PP having a higher GWP value per kilo of material. Comparing nonwovens with

²⁹ EU Ecolabel for Sanitary Products. Preliminary report_5th draft. March 2013. Table 21, page 113.
<http://susproc.jrc.ec.europa.eu/sanitaryproducts/whatsnew.html> (hentet 15. april 2015)

fluff, the table shows that although nonwovens amount to less than half the weight of the fluff, nonwovens' contribution to the GWP value is not half the size. The study does not include indicators that assess health factors, for example from the chemicals used. This is generally a weakness of life cycle analyses and work is underway to make improvements. This EU study and the British LCA study also do not appear to have environmental indicators such as biodiversity and land sequestration.

Table 2: Relative contributions of single materials to the overall impacts due to materials for a children's diaper. The table is taken from EU Ecolabel for Sanitary Products, Preliminary report, tables 18 and 23³⁰.

Material	Weight (g)	Relative contributions of single materials to the overall impacts due to materials for a children's diaper. For abbreviations, see Table 1		
Fluff	13.18	ADP 43% AP 69% EP 82%	GWP 29% POCP 53%	Total energy 56% renewable 98% non-renewable 31%
SAP	11.05	ADP 16% AP 15% EP 9%	GWP 25% POCP 17%	Total energy 14% renewable 1% non-renewable 23%
LDPE	2.23	ADP 1% AP 4% EP 2%	GWP 7% POCP 10%	Total energy 5% renewable 0% non-renewable 8%
PP nonwoven	5.76	ADP 9% AP 7% EP 4%	GWP 22% POCP 11%	Total energy 16% renewable 1% non-renewable 26%
Adhesives	1.01	ADP 1% AP 2% EP 1%	GWP 6% POCP 4%	Total energy 3% renewable 0% non-renewable 5%
Elastics	0.14	ADP 30% AP 4% EP 2%	GWP 7% POCP 10%	Total energy 5% renewable 0% non-renewable 8%
Other materials (PP nonwovens) -Tape -Elastic back ear -Frontal tape -Various synthetic polymers	2.63 (0.47) (0.15) (0.5) (0.5)	ADP 0% AP 1% EP 0%	GWP 2% POCP 1%	Total energy 1% renewable 0% non-renewable 2%
Total	36	ADP 7.0E-08 kg Sb-eq AP 5.5E-04 kg SO ₂ -eq EP 1.3E-04 kg PO ₄ -eq	GWP 1.3E-01 kg CO ₂ -eq POCP 6.2E-05 kg Ethene-eq	Total energy 4.3E+00 renewable 1.5E+00 non-renewable 2.8E+00

For sanitary towels, the EU Ecolabel has shown that fluff generally accounts for the greatest environmental impact. In terms of weight, the fluff also makes up the largest proportion of a sanitary towel (approx. 66% of the total weight). It is also worth mentioning that release paper has a significant impact on ADP (due to the silicone) and that nonwovens, PET, LDPE and adhesive affect GWP.

When it comes to tampons, cotton accounts for the largest environmental impact associated with the product, and the accompanying polypropylene applicator also has an

³⁰ EU Ecolabel for Sanitary Products. Preliminary report_5th draft. March 2013. Table 18 and 23, page 111 and 115.
<http://susproc.jrc.ec.europa.eu/sanitaryproducts/whatsnew.html> (hentet 15. april 2015)

impact on several environmental parameters (ADP, AP, GWP, POCO, Primary Energy Demand non-renewable). Once again, cotton is the largest constituent material by weight in the product (approx. 90% if the applicator is excluded).

Cotton buds and cotton wadding are products that employ the same materials as tampons. Cotton buds may have a shaft of wood, plastic or cardboard. Individual measurements of purchased products have shown that the weight of the shaft can be up to 2 or 3 times the weight of the cotton in the products.

In breast pads, which are mostly fluff (approx. 78%) and SAP (approx. 19%), the greatest environmental impact at material level unsurprisingly comes from fluff (all environmental parameters) and SAP (GWP and primary energy demand). The release paper, which is a very small part of the product (approx. 2%) does, however, affect ADP³¹.

Disposable wash cloths may be made of various materials, such as regenerated cellulose, nonwoven fabric or polyether/polyurethane, which are included in this version. As such, wash cloths made of regenerated cellulose, polymer or combinations of materials, for example in nonwoven products, may be Nordic Swan Ecolabelled.

Other disposable products, such as disposable bed linen, mattress covers and draw sheets, surgical gowns and diaper liners, contain many of the same materials as diapers, incontinence care products and sanitary towels. Mattress covers, for example, may be made from several layers of cellulose, nonwoven fabric and a plastic coating. They may also contain fluff pulp to increase absorption. Some products state that they have seams which are strong enough that the patients can be lifted and that they have edges treated with paraffin to ensure against leakage. The plastic film, which stops moisture from permeating through the products, may be polyethylene (PE), for example, or a bio-based plastic film. The products may be laminated with plastic glued in place (water-based dispersion adhesive or hotmelt adhesive), or the plastic film may be directly extruded onto the product. Use of nonwoven products has risen in recent years, particularly in the health sector, in place of cotton/polyester products. There are various ranges of disposable bed linen on the market that are made from nonwoven fabric with PP fibres, for example.

The British LCA study shows that one of the main causes of environmental impact in the manufacture of diapers, i.e. combining the materials to form the product, is the generation of electricity. Today's production is a fully automated process, where the diapers are packed at the end of the conveyor belt. The fluff pulp used often undergoes mechanical fluffing in the factory. It is assumed that the manufacturing process is similar for other sanitary products.

While the majority of sanitary products such as diapers, sanitary towels and incontinence care products are becoming thinner and lighter, there may be practical obstacles to further weight reduction. One example is tampons, with a number of customers preferring an applicator tube, and it appears that use of this varies from country to country. Tampax makes products with cardboard and plastic applicators³². Another factor for sanitary products is that products may need individual packaging so that

³¹ EU Ecolabel for Sanitary Products. Preliminary report_5th draft. March 2013. Tabell 18, 23, 24, 25 och 26 samt text på sidan 107. <http://susproc.jrc.ec.europa.eu/sanitaryproducts/whatsnew.html> (hentet 15. april 2015)

³² Procter & Gamble. Tampax. How to insert a tampon. <http://www.tampax.co.uk/en-gb/firsttampon/how-to-insert-a-tampon> (hentet 13. april 2015)

customers can carry one in their handbag, for example. Products are therefore sold with and without packaging around each individual item.

This revision for sanitary products has expanded the product group to also include plasters and other equipment used in the health sector.

Generally, a plaster is made up of an absorbment pad (wound pad/gauze) which is attached to a strip of tightly woven fabric, plastic or latex rubber, covered by an adhesive and plastic strip or silicone treated paper ("liner"). Manufacturers of plasters must comply with the EU Medical Device Directive (93/42/EEC). An examination of the materials in plasters has shown that they mainly comprise of: cotton, paper, regenerated cellulose, polyamide, polypropylene, polyester and polyurethane. Plasters can also contain nano-silver and other antibacterial agents, or fluoride-based materials like Gore-tex. Nordic Ecolabelling believes it is unnecessary to use both antibacterial agents and fluoride-based materials and chemicals in "normal" sanitary products due to their damaging impacts on health and environment. A newer type of material found in plasters is hydrocolloids, providing a gelled material which may be based on carboxymethylcellulose mixed with gelatin. The plaster then has a top layer based on rubber and an adhesive layer beneath which attaches it to the body.

6.3 Environmental conditions for the materials

The manufacturers of diapers, sanitary towels and panty-liners rarely produce the various material components in the products themselves. They buy in cellulose pulp, tissue paper, cotton, nonwoven, SAP, plastic film and so on from suppliers. Larger manufacturers have good scope to set requirements for their suppliers, but this is more difficult for smaller manufacturers. It is easier the more eco-aware players there are in the market. Many of the component/raw material producers are major global players. Below are brief descriptions of the environmental impact from the individual materials. Some of these themes are described in more detail in section 7, where the background to the requirements set for the materials is outlined.

Cellulose pulp and paper

Sanitary products may include cellulose pulp (fluff pulp), paper (for example silicone paper), and tissue paper (e.g. air-laid). From a life cycle perspective, energy consumption, chemical use, emissions to water and air, and forestry are the key areas of environmental impact within paper manufacture. According to the aforementioned article by Cordella et al., 90% of fluff pulp is produced in the USA. According to the criteria for the Nordic Swan Ecolabelling of tissue paper (version 5.0), tissue paper for sanitary products can currently be manufactured using the conventional and air-laid technique. There is high potential for environmental improvements in the production of cellulose pulp, since there are considerable opportunities to set requirements concerning the factory's emissions to air and water, energy consumption and energy efficiency, chemical requirements and requirements concerning management of the forests from which the wood is sourced. Nordic Ecolabelling has had criteria for paper since 1991, and the environmental impact from the production of cellulose pulp and paper is described in more detail in the background document for the Nordic Swan Ecolabelling of paper products³³.

³³ Nordisk Miljömerking. Bakgrund till Svanenmärkning av pappersprodukter – basmodul och kemikaliemodul version 2. 2011. <http://www.svanen.se/Foretag/Kriterier/kriterie/Pappersmoduler/> (hentet 16. april 2015)

Air-laid is a technique where the paper is manufactured using air instead of water. Air-laid typically comprises cellulose pulp and possibly a binder. Air-laid may also contain other materials, such as superabsorbents, in addition to the cellulose pulp and binder. It is assumed that the greatest potential for environmental improvements lie more with the constituent materials used and less with the process of making the actual air-laid material, although defibering of the pulp also requires energy.

Cotton

The cultivation and harvesting of cotton is associated with serious environmental and health problems. This is largely due to the use of pesticides and other chemicals in production, but other factors, such as water consumption, can also have a major impact on the environment. The environmental and social consequences of using genetically modified cotton plants in conventional cultivation are also a much debated subject. The environmental impact of cotton cultivation and processing, and the availability of organic cotton, is described in more detail in the background document for the Nordic Swan Ecolabelling of textiles, hides/skins and leather³⁴, which dates from 2012.

Polymer materials and nonwovens

The environmental impact from the manufacture of superabsorbents and other polymer materials, and the potential for improvement, is difficult to estimate, since there is only very limited factory-specific data available. The EU Ecolabel's work on developing criteria for absorbent hygiene products revealed that SAP and polypropylene nonwovens in disposable diapers have a significant impact on GWP. In other words, there is considerable relevance in setting requirements concerning these constituent materials. According to EDANA, however, the majority of the contribution to GWP for nonwovens comes upstream from the actual material production³⁵. This could mean that the production of the polypropylene is largely responsible for the GWP impact in relation to the nonwovens in sanitary products.

Even if the majority of the environmental impact in the constituent materials lies upstream of production, there may be great potential for improvement in the manufacturing process for nonwovens. Nonwovens are made from short fibres that form a "sheet" that is bound together mechanically (e.g. with needles or water jets), with the help of adhesive or thermally after the addition of a binder that melts at high temperatures. The majority of the nonwovens used in sanitary products are made using a technique called spunbond. Sometimes a method for binding together the fibres called point-bond hot calendering is also used. This is associated with high energy consumption and high heat generation. "Spin finish" is added to the nonwovens during production. This is an organic chemical that prevents the build-up of static electricity, amongst other things. As mentioned before, air-laid is a type of nonwoven based on cellulose pulp.

Regenerated cellulose used to be used much more widely in nonwovens. One reason why more PET and PP is used today may be that modern production methods for nonwovens in PP and PET give the same cotton-like feel that the regenerated cellulose products were known for, but with material properties that provide greater development opportunities in terms of process technology. Neither the British LCA study nor the report from the EU Ecolabel used environmental data from regenerated cellulose production, but regenerated cellulose may occur in tampons and other types of sanitary

³⁴ Nordisk miljømerking. Om Svanemerkete Tekstiler, skinn og lær. 2012. <http://www.svanemerket.no/for-bedrifter/sok-om-svanemerket/svanens-krav/tekstiler-skin-og-lar/> (hentet 16. april 2015)

³⁵ Mailkorrespondens med Pierre Conrath, EDANA, 2 juni 2015

product. Nordic Ecolabelling has previously described the environmental impact of regenerated cellulose in the background document for the Nordic Swan Ecolabelling of textiles³⁶.

Polymers such as PET (polyethylene terephthalate) and the polyolefins PP (polypropylene) and PE (polyethylene), PUR (polyurethane) and polyether are currently made primarily from fossil raw materials. Depending on the polymer type, there may be many stages in the production process that leads to the final monomer, and various additives appear in the different polymers, depending on what the plastic is going to be used for. PlasticsEurope provides LCA information on the environmental impact from the production of the various materials in Europe, but it only gives average figures for each plastic type, with no factory-specific data. The EU also has a reference document showing the best available technology, but unfortunately the most recent document is from 2007³⁷, and the data on which it is based is therefore older than the information from PlasticsEurope. It has been difficult for Nordic Ecolabelling to access factory-specific data for the production of polymers, in contrast to the availability of information from the paper industry in the Nordic region, for example. Awareness of more eco-friendly processes and raw materials has also gradually grown within the petrochemical industry, but due to a lack of available data, it remains difficult, from an environmental perspective, to choose materials that come from the best production sites. The lack of data also makes it difficult to set good requirements concerning the production of polymers for the various ecolabels. When developing its criteria in 2014, the EU Ecolabel attempted to set requirements concerning the production of polymers, but as it states in the minutes from the last meeting “Moreover, it was highlighted that the possibilities to select more eco-friendly polymers and plastics are limited with the current set of criteria.”³⁸

Regenerated cellulose

Regenerated cellulose is made from cellulose fibre of various kinds, mainly wood fibre, although bamboo fibre has grown in popularity in recent years. The environmental impact comes from the sourcing of the raw material (e.g. the management of the forests), the production of pure cellulose fibre and its subsequent processing into regenerated cellulose fibre. The materials are based on renewable raw materials, but various chemicals and energy are used during production, and there are emissions to both water and air. An LCA by Utrecht University³⁹ shows that the different regenerated cellulose fibres produced by Lenzing (Regenerated cellulose, Modal and Tencel) have a lower environmental impact – in terms of use of non-renewable energy, greenhouse gas emissions, toxic impact, water consumption and land use – than other fibres made from cotton, PET and PP. The study also shows that there are variations in the environmental parameters for the different regenerated cellulose fibres. The study made use of factory-specific data for the regenerated cellulose fibres, but data from available literature was used for the other materials. Such comparisons say nothing about which parameters are easiest to influence, but Nordic Ecolabelling has long-standing experience in setting

³⁶ Nordisk Miljømerking. Om Svanemerke Tekstiler, skinn og lær. 2012. <http://www.svanemerke.no/for-bedrifter/sok-om-svanemerke/svanens-krav/tekstiler-skin-og-lar/> (hentet 16. april 2015)

³⁷ EU Best Available Techniques Reference Document (BREFs). Reference Document on Best Available Techniques in the Production of Polymers. August 2007. <http://eippcb.jrc.ec.europa.eu/reference/> (hentet 1. juni 2015)

³⁸ EU Ecolabel for Absorbent hygiene products. 2nd Ad-Hoc Working Group Meeting for the development of the EU Ecolabel Criteria for absorbent hygiene products. Brussels, 24 April 2013. Minutes of the meeting. <http://susproc.jrc.ec.europa.eu/Absorbenthygieneproducts/whatsnew.html> (hentet 23. juli 2015)

³⁹ LIFE CYCLE ASSESSMENT OF MAN-MADE CELLULOSE FIBRES
Li Shen and Martin K. Patel: Life cycle assessment of man-made cellulose fibres. 2010.
<http://dspace.library.uu.nl/handle/1874/203542> (hentet 1. juni 2015)

requirements for regenerated cellulose in its criteria for both textiles and sanitary products. The main focus of the requirements has been on the final part of the regenerated cellulose fibre production, and it is only in the most recent version of the textile criteria that requirements have been set all the way back to the management of the forests.

Bio based polymers

There is considerable potential for environmental improvements if new techniques can be found for producing biopolymers with equivalent properties to today's polymers of fossil origin. The problem, as it stands today, is that the biopolymers available on the market may have worse properties than those of fossil origin, and many are first-generation biopolymers, leaving scope for major environmental improvements in the production process.

Biopolymers may be produced using biological systems, for example fermentation with microorganisms, or they may be chemically modified from biological source material. One example is PLA (polylactate), which is polymerised from lactic acid monomers produced by fermenting carbohydrates from maize or wheat. Green PE is made from ethylene produced from biological materials such as sugar cane, and is known as a "drop-in" bio based polymer, with similar material properties to fossil PE.

One of the best-known bio-based plastic films is Mater-Bi from Novamont in Italy. This is a biodegradable thermoplastic made from natural components (such as maize starch and vegetable oil derivatives) and from biodegradable synthetic polyester. The material is thus certified as biodegradable and compostable, but it is not 100% from renewable sources.

A third alternative is the production of biobased polymers from bio-naphtha instead of the ordinary fossil-based naphtha. This is currently done by applying the mass balance approach, where part of the naphtha is replaced with bio-naphtha and the renewable proportion in the end product is calculated based on an allocation system.

Section 7.2.8 provides an in-depth review of bio based polymers and the environmental impact from their production.

Superabsorbent polymers (SAP)

Superabsorbent materials are hydrophilic polymer networks that can quickly absorb liquids to many times their own mass. They can also retain this liquid under a certain pressure and are therefore suitable for use in sanitary products such as diapers and sanitary towels. Today superabsorbents usually mean the sodium salt of polyacrylic acid, which is a superabsorbent polymer. It is under development in a host of variants, e.g. through modification of the chain or the addition of different side groups to give new properties. A variant introduced by BASF is SAP with a calculated renewable content based on the mass balance approach. A bio-based superabsorbent, often called bioSAP, is also in production, and that is based on starch. According to previous information from manufacturers of sanitary products, bio-based SAP has a lower absorption capacity than SAP of fossil origin⁴⁰. There is a great deal of research and development work underway in this area, and this is expected to result in a wider range of commercial

⁴⁰ Nordisk Miljømerking. Høringssammenstilling for Svanemerking av hygieneprodukter for høringsutkastet til versjon 5.0. Forslag til NMN 13. februar 2008.
http://www.ecolabel.dk/kriteriedokumenter/023_5_H%C3%B8ringssammenstilling.pdf (16. august 2015)

products offering better quality and environmental performance in the near future. SAP and its biological variant are described in more detail in section 7.2.8.

Other materials

Diapers also contain composite materials such as tape and elastic materials to hold the diaper in place. In addition to nonwoven fabric and adhesive, these composite components may contain polymer types other than those named above, such as elastane, polystyrene and styrene ethylene butadiene styrene (SEBS) copolymers. Overall, these polymers account for a low proportion of the product (diaper).

Constituent substances named in the British diaper study, over and above the primary materials previously mentioned, are adhesive, calcium carbonate, tape, elastic and lotion. There are tampons that have added lactic acid bacteria and diapers that have tea leaves to counteract rashes. Incontinence care products in particular may contain odour control substances, such as active carbon, zeolites, cyclodextrin, etc. According to a patent on the Procter & Gamble website, cyclodextrin may be a suitable matrix for fragrance, and the fragrance will only become active when the cyclodextrin becomes damp. Cyclodextrin is a cyclical oligosaccharide which can be produced from starch. What is used in practice is often a commercial secret.

Plasters can comprise many different material types, including renewables and non-renewables, such as cotton, paper, regenerated cellulose, polyamide, polypropylene, polyester and polyurethane/polyether foams.

Packaging

Diapers tend to come in primary packaging containing several products, with examples of packaging material including PE and paperboard/cardboard. With other sanitary products such as tampons and sanitary towels, the products may also be individually packaged before being contained in a single pack. Stretch wrap, wood and wire mesh are often used in the transport packaging.

The British LCA study states that diaper consumption over the 2.5 years that a baby may be in diapers adds up to 170 kg. A total of 230 kg materials are used to make the diapers, while the primary packaging uses 7.43 kg PE and 5.8 kg paperboard. According to the article by Cordella et al. (Evolution of disposable baby diapers in Europe), packaging makes a marginal contribution to the environmental impact in relation to its weight

6.4 Renewable versus fossil-based materials

Renewable materials contribute to sustainable development through reduced CO₂ emissions and reduced use of materials from fossil sources. However materials based on renewable raw materials are not automatically sustainable. There are several key problems concerning the cultivation and production of the renewable materials, such as land use in competition with food production, use of genetically modified organisms and energy and chemical use in the production processes. Although there is a general desire to switch from fossil raw materials to increased use of biomass, there is a debate in many quarters about how quickly this transition can take place and which areas should be prioritised. In a number of areas, people have embraced many of the good properties of synthetic materials, and for bio-based materials to compete, their properties have to match those of the synthetic materials.

Nordic Ecolabelling has long-standing experience in setting requirements concerning cultivation, forest management and the production of traditional renewable materials for sanitary products such as fluff pulp, paper and cotton, and these requirements are aimed at limiting many of the negative environmental consequences of such products.

The production of bio-based plastic materials is, however, a recent development that is showing two main trends. One is the appearance of new types of plastic (such as PLA) and the other is the use of renewable materials for the production of traditional plastic types such as polyethylene, known as drop-in bioplastics. In 2010, the dominant force was first-generation renewable raw materials, which were raw materials produced on agricultural land, but raw materials are also under development based on forest raw materials or waste products (such as bagasse from sugar production) and these are known as second-generation bio-based raw materials. In the development of the new bio-based plastic types (such as PLA), a great deal of emphasis has been placed on properties such as degradability. Bio-based polymers are described in more detail in section 7.5.6.

Nordic Ecolabelling wishes to contribute to the “green shift” through increased use of bio-based materials, but at the same time wishes to see sanitary products that offer sufficient quality and performance in their areas of use. It therefore remains relevant to require only renewable materials in Nordic Swan Ecolabelling sanitary products. Whatever the origin of the raw materials, requirements need to be set for the production of the materials. When it comes to procuring the raw materials, it is paradoxical that it is easier to set strict requirements for cultivation and forest management with regard to renewable raw materials than it is to set requirements for the extraction of fossil raw materials. One of the reasons why it is so difficult to set requirements for the extraction of the fossil raw materials is the lack of traceability systems.

Nordic Ecolabelling also wishes to promote the use of recycled materials. For the majority of the materials, material recovery would require fewer resources than extraction/cultivation and production of new materials. It would also lead to the processing of used materials, so that they do not end up as waste. However, the use of recycled material may also carry risks such as the spread of substances harmful to health and the environment, which may have been used in the original manufacturing process. It is therefore important that this risk is assessed and that requirements are drawn up with regard to recycled materials.

6.5 Relevance, Potential and Steerability

Nordic Ecolabelling uses an analysis tool called the RPS model, where RPS stands for Relevance, Potential and Steerability. The purpose of this model is to identify which environmental problems are most relevant in the life cycle of the products and to assess the potential for reducing negative environmental impacts within these specific areas. In addition, it is important to consider how the manufacturers in particular can influence the products in order to release this potential for environmental improvement. This is set out in the ISO standard that the Nordic Swan Ecolabel, as a type 1 ecolabel, follows (ISO 14024). The standard states that the requirements must be product-specific and that they must enable the best environmental products in the area to be ecolabelled. The Nordic Swan Ecolabel is also a multi criteria-based labelling scheme, which means that it sets requirements within several environmental parameters, in contrast to a label such as the Carbon Footprint, which focuses exclusively on one parameter. Another area that needs to be assessed is how the requirements should be documented.

The ecolabel should set requirements that can be documented and the main requirements can thus not be environmental management requirements. Finally, the burden of documentation must also be assessed in relation to the environmental effect of the requirements set.

The previous sections describe which raw materials commonly occur in sanitary products, and the fact that environmental problems are caused by both the manufacture of the products and the large quantity of waste generated. While the ecolabel cannot control whether consumers and purchasers choose disposable products, or how the products are processed as waste, there is considerable potential for improving the products by setting requirements for the production phase.

It has been shown that much of the environmental impact from disposable sanitary products comes from the production of the constituent materials. This applies in particular to those used as primary materials, but also materials that have a larger carbon footprint per kilo, for example, than other materials since they are more energy-intensive to produce. It is therefore relevant to set requirements concerning the substances used as raw materials in the manufacture of sanitary products. It is also important to set requirements to chemical products that may be used in the production of the ingoing materials and the sanitary product.

Nordic Ecolabelling has long-standing experience in setting material requirements for sanitary products and in other criteria for Nordic Swan Ecolabelled products, and knows that there is potential for environmental improvement in this area. This applies for materials such as cellulose pulp, cotton, regenerated cellulose and polymers. Nordic Ecolabelling also knows from experience that manufacturers are able to impose requirements on their suppliers and choose the best materials within each material type, so that both the raw materials and the production conditions are among the best they can be. One way of reducing the impact on the climate is to use materials from renewable sources, assuming that the production of such materials does not generate greater greenhouse gas emissions than for materials from non-renewable sources.

Another method of reducing the environmental impact of the materials in the product may be to use recycled materials. One of the problems with this is the risk of environmental toxin migration, which can occur in recycled materials. Good enough systems are not yet in place to ensure that recycled materials do not contain chemicals that are harmful to health and the environment. Nordic Ecolabelling is not aware of any recycled cellulose pulp being used in sanitary products. The most relevant recycled materials would be paper and paperboard, but there is currently a shortage of recycled paper in the Nordic region. Since sanitary products come into close contact with the body and many of the products are intended for young children, the use of recycled materials in the Nordic Swan Ecolabelled products is prohibited. However, Nordic Ecolabelling wishes to promote the use of recycled materials in the packaging and in the release paper that is removed from the products before use, and thus does not come into contact with the user.

The environmental impact of sanitary products can also be reduced through the manufacturers focusing on a reduction in the weight of the end product, and on optimising the material composition of the products. The latter area is, however, difficult for Nordic Ecolabelling to influence, because even small changes in the product composition can change the function or other properties of the products which consumers appreciate.

The products that fall under the umbrella of absorbent, protective and removing sanitary products vary greatly and can have extremely complex material combinations, something which also makes it difficult to set general requirements concerning the composition of the products in order to reduce the use of the more environmentally problematic materials. In RPS terms, there is low steerability in this area, despite there being relevant environmental problems and potential for environmental improvement.

Part of the environmental impact comes from the handling of the products in the waste phase, but this is another area of low steerability, since it is difficult for Nordic Ecolabelling to influence how consumers handle the products after use. Nordic Ecolabelling also has little influence over municipal waste management systems.

In this revision, Nordic Ecolabelling has continued to set detailed requirements concerning the constituent materials and chemicals used in the manufacture of sanitary products. Version 5 of the criteria set a requirement to ensure that the product has either a high proportion of renewable materials, a certain proportion of biopolymers among the plastic materials or limited CO₂ emissions calculated as GWP (Global Warming Potential). The options in the requirement have been removed, and the requirement is now that there must be a proportion of renewable and/or recycled material in the product or the packaging. The EU Ecolabel also came to the conclusion, in developing its criteria for absorbent hygiene products in 2014, that it is not possible to set requirements concerning the product's total GWP, due to a lack of both the data and the methodology for this⁴¹.

7 Justification of the requirements

This section describes in more detail the individual requirements and the background to these. Detailed requirements have been set concerning the production of the constituent materials in the product and the chemical substances added during the manufacture of the sanitary products, from both a health and an environmental perspective. It is also made clear whether the requirements have been changed since the previous revision. In the text, the new requirements are shown before the background text explaining them.

7.1 Product group definition

The purpose of the product group definition (see section 2.1) is to focus on the types of disposable products that can be found either in private bathrooms or in a more public environment such as a care institution. In other words, it excludes tablecloths, for example, which are more likely to be found in other places. To clarify which disposable products are included within the definition, it focuses on the type of function that the product has (absorbent, protective and removing). The definition also makes it clear what is being absorbed, protected or removed (bodily fluids and faecal matter, or cosmetics). Products that have a similar function but a different purpose are excluded. An example of this can be found in the distinction between wash cloths and dry wipes. The products can be assumed to have the same size and material composition. However, it can be reasonably assumed that wipes are intended for cleansing of both bodily fluids and faecal

⁴¹ EU Ecolabel for absorbent hygiene products. 2nd Ad-Hoc Working Group Meeting for the development of the EU Ecolabel Criteria for absorbent hygiene products. Brussels, 24 April 2013. Minutes of the meeting. <http://susproc.jrc.ec.europa.eu/Absorbenthygieneproducts/whatsnew.html> (hentet 23. juli 2015)

matter, and cosmetics. Dry wipes, which could be used to wipe away the same matter, could also be used to clean a counter.

In theory, they could also be cut into larger sizes to serve as a paper towel. The function of the towel is certainly to absorb, but it is most likely to be water that is absorbed. The line between what should and should not be included is clearly a fine one, but it has to be drawn somewhere. Therefore wash cloths (not those made only of paper) are included in the product group definition, but not dry wipes. The reason that serviettes are not included in the product group definition is that they are mainly intended to wipe away something else (food).

7.1.1 Sanitary products included in the definition

A number of products have been added to the sixth generation of the criteria – plasters, compresses, cotton wool, surgical wear (clothing/gowns, surgical masks and caps) and exam table paper. This means that disposable materials used in dental practices (for example the protective sheet placed on the chest during examinations and the cotton wool that looks like a tampon) can also be Nordic Swan Ecolabelled. In 2014 regenerated cellulose massage table paper was included following an interpretation review by the licensing managers at Nordic Ecolabelling. In the new product group definition, it is proposed that massage table paper (which is readily associated with a spa) is replaced with exam table paper (which belongs more in a healthcare context) and that this underlay may be made from any of the materials addressed in the criteria document.

Disposable wash cloths that are not made of paper were included in generation 5 of the criteria. That generation did not set any requirements concerning polyurethane/polyester, but the new generation does. As such, wash cloths made of regenerated cellulose, various polymers (e.g. PET, PP, PET and PUR) or combinations of materials, for example in nonwoven products, may be Nordic Swan Ecolabelled. It shall be noted that disposable washing clothes for kitchen or cleaning cannot be labelled, as the criteria for sanitary products encompass products for personal hygiene and public environments like hospitals and nursing homes.

7.1.2 Products not included in the definition

The judgment of whether a new product should or should not be included in the criteria for sanitary products is not based exclusively on the product group definition. Nordic Ecolabelling looks at products from a life cycle perspective and in making its judgment, must also consider the status of what could be called the product type. In this context, product type is a broader definition than the design and material composition of the disposable product. There may be different variants of the product within a particular product type. Such variants may be disposable/reusable, being made of entirely different materials (perhaps cotton or paper) or availability in different sizes. The argument that a particular product has the same material composition as other products that are already included is not sufficient for the inclusion of the product in question. The reason why product type is prioritised over product is that it should be environmentally better to manufacture the individual product with an entirely different material composition than the intended product has (compare the material composition of a reusable towel with an equivalent disposable product of another material). Nordic Ecolabelling has specified that products like disposable bed linen for other segments like tourism cannot be labelled after these criteria. Nordic Ecolabelling does not want to promote the use of disposable articles in such segments, and refer to the criteria for textile for labelling of bed linen. It

is also important to assess whether there are other performance and quality requirements that the new products should meet, or whether the product could already be Nordic Swan Ecolabelled in accordance with other criteria documents.

Disposable paper towels made from cellulose fibre that can be ecolabelled under the criteria for tissue paper, cannot be ecolabelled under the criteria for sanitary products. This also applies to products such as serviettes, tablecloths and so on.

Products with added cosmetics, medication/medicines, disinfecting substances and similar cannot be ecolabelled in this product group, since no requirements have been set or environmental assessments conducted for cosmetics or medical additives for this product group. Packaging also cannot be ecolabelled as an independent product.

Nordic Ecolabelling has developed ecolabelling criteria for over 60 different products and services, and while it may appear that a product could be ecolabelled under several criteria, it is Nordic Ecolabelling that determines which criteria document the product is covered by. Examples of products that may not be Nordic Swan Ecolabelled under the sanitary products criteria, but may be under other criteria:

- Wet wipes can be ecolabelled under the criteria for the Nordic Swan Ecolabelling of cosmetic products.
- Dry wipes, serviettes and paper wash cloths can be ecolabelled under the criteria for the Nordic Swan Ecolabelling of tissue paper.
- Reusable wash cloths, textile diapers and mesh pants can be ecolabelled under the criteria for the Nordic Swan Ecolabelling of textiles, hide/skins and leather, or the EU Ecolabel criteria for textile products.
- Microfibre cloths can be ecolabelled under the criteria for the Nordic Swan Ecolabelling of supplies for microfibre based cleaning.
- Disposable gloves and toothpicks cannot be ecolabelled under the criteria for sanitary products. Disposable gloves were assessed previously, but because they can be made from many different materials for which there are no requirements in the criteria, disposable gloves are not included in the product group. Disposable gloves are also not usually absorbent products, although they can protect against bodily fluids. However, gloves might be included in the criteria for ecolabelling of disposable bags, tubes and accessories for health care. The reason that toothpicks are not included is that their function does not match the product group definition. Toothpicks were included in version 5 of the criteria, but no licence has been issued for this type of product. Nordic Ecolabelling will consider whether toothpicks may be granted a licence under the criteria for disposables for food.

On 18 September 2018 the Nordic Ecolabelling Board decided to ban the use of plastic and the mixture of materials such as plastic and paper in cotton buds. In January 2018, the EU has come up with a new plastic strategy. One of the main features of this strategy is related to littering and the negative environmental impact of the plastic. The follow-up

of the EU's plastic strategy has resulted in a proposal for a new directive⁴² to ban and limit the use of plastic in single disposable products, including cotton buds in plastic. Nordic Ecolabelling has had a requirement that the material in cotton buds must be renewable, but have allowed biobased plastics.

However, biobased plastic is not a guarantee that the plastic breaks down in nature, as biobased plastics like green PE have exactly the same properties as fossil plastic. The swan requires clear labeling on the product packaging that cotton buds should not be thrown in the toilet - unfortunately, it is a fact that many consumers throw them in the toilet and not in the garbage bin. At present, the treatment plants do not have good methods of capturing these products, and especially at high loads on the sewage system, these products will end up in nature. Nordic Ecolabelling has therefore introduced a ban on plastic and blend of plastics and paper in order to limit littering and to comply with the proposal in the EU directive.

7.2 Environmental requirements in general

There are detailed requirements for the production of the constituent materials and the chemical substances used within the sanitary products as well as for any additional components and the primary packaging. The requirements are based upon both health and environmental perspectives. Generally speaking, most of the materials are subject to some obligatory requirement, and the levels in the requirements change in relation to the weight percentage of the material used in the final product. The weight % of a specific material is related to the total weight of the materials in the sanitary products and in the additional components in a pack. To make it clear the definitions below are used. Chapter 9 "Definitions and Abbreviations" contains an extended list of terms, definitions and abbreviations.

Definitions

- Sanitary products: refers to the product used, i.e. excluding additional components, information sheets and primary packaging. S = the weight of the materials in the sanitary product.
- Additional component: Components belonging to the hygiene product that are removed before use of the product. Examples include release paper, a plastic film around a tampon, a sanitary towel or an applicator for tampons. A = the weight of the materials in the additional components.
- Primary packaging: The packaging around the sanitary products and additional components as sold in retail outlets or directly to the customer. Primary packaging does not include transport packaging. P = the weight of the materials in the primary packaging.
- Material: For example material types like: fluff pulp, PP, PE, PET, SAP, paper, regenerated cellulose and cotton. A material type can be used in more than one component.

⁴² Proposal for a Directive of the European parliament and of the Council on the reduction of the impact of certain plastic products in the environment, 28.5.2018

- Component: Part made out of one or several materials and chemical products that together fulfil a desirable function. For example: a layer of nonwoven, an outer barrier film or an absorbent core of fluff pulp and super absorbents.

The weight of the individual material in the sanitary products and in the additional components is further in the document referred to as (S+A). The weight % of a specific material can thus refer to this amount as:

The weight % of a specific material = $(m_S + m_A) / (S + A)$

m_S = the weight of the specific material in the sanitary product

m_A = the weight of the specific material in the additional component

S = the weight of the materials in the sanitary product

A = the weight of the materials in the additional components.

In addition to the different requirements for the materials used, Nordic Ecolabelling wishes to promote the use of materials based on renewable and recovered sources, see requirement O36.

If there are several inputs which contain the same type of material, these must be added together. E.g. cellulose pulp or polyethylene (PE) from multiple suppliers must be summarised. An exception to this is if the material type is already found in parts that require different production processes like fibre, film or foam. Examples of this can be polypropylen (PP) or polyethylene terephthalate (PET). However, if the PP fibres use different nonwoven materials, then the amount of PP fibres must be added together and all the PP fibres need to fulfil the requirement. PUR foams and thermoplastic polyurethane are regarded as different types of materials. If a polymer/plastic contained in four or more components reaches the weight limits, the requirement only needs to be met by a minimum of 50.0% of weight of the material. This is an easing of demands to reduce amount of documentation and difficulty in gathering information from many subcontractors.

Constituent materials that are already Nordic Swan Ecolabelled or EU Ecolabelled and that are a part of the sanitary product or additional components, such as various textile fibres or paper, do not require any additional documentation for the material requirements.

As described in O2, sanitary products may contain a maximum of 5.0% by weight of materials and additives for which no requirements have been set, but only 2.0% of each material type.

As shown in table 3, the material requirements are divided into different levels of stringency, depending on how much of the individual materials are included. Generally speaking, most of the materials are subject to some obligatory requirement, and the levels in the requirements change if the materials account for more than 5.0 or 10.0% per weight. The background to this is that different hygiene products have very different compositions, and may comprise a single material, as with wash cloths, or many different materials, as with diapers. It was decided to introduce these levels, to reduce the burden of documentation when the sanitary product is composed of many different materials.

Table 4 below provides a guiding overview of which requirements the different material types have to fulfil. The list is a guide and if there is any discrepancy with the texts in the requirements, it is the O-requirements that apply. The environmental requirements are described in more detail in the sections on chemical requirements, material requirements and performance requirements for the products (sections 7.4, 7.5 and 7.6). The table also describes what requirement applies and who will document the requirement.

Table 3: Overview of the limits for the different level of requirements, depending on the percentage of the specific materials included. The weight % for specific materials is related to the total weight of the materials in the sanitary products and in the additional components in a pack (S+A).

Material	>1.0 weight %	>5.0 weight %	>10.0 weight %	>20 weight %
Cellulose based pulp/fluff/air-laid	X		X	
Paper/carton/paperboard	X		X	
Wood materials	X			
Cotton	X	X		
Regenerated cellulose	X		X	
Plastic/polymers	X	X		
Superabsorbent	X		X	X

Table 4: Guiding overview of the requirements.

Material	Requirement domain/level	Req. no	Comments	Who shall document?	Form
	Description of the product	O1		The producer of the sanitary product	Form 1
	Material composition	O2		The producer of the sanitary product	Form 1
Chemicals	General chemical requirements	O3-O5	Requirements to classification of chemical products, CMR- substances and other excluded substances	The producer of the chemical product	Form 2a
Silicone	Specific chemical requirement	O6	Applies to silicone added to other materials or silicone for coating	The producer of the product for silicone treatment	Form 3
Adhesives/ Binders	Specific chemical requirement	O7		The producer of the adhesive/binder	Form 2b
Fragrances and skin care preparations	Specific chemical requirement	O8	Prohibited	The producer of the sanitary product	Form 4
Odour control substances	Specific chemical requirement	O9	Odour control substances are permitted only in incontinence care products, and must fulfil O3 - O5	The producer of the sanitary product and the chemical products	Form 4, form 2a form O3-O5
Medicaments and antibacterial agents	Specific chemical requirement	O10	Prohibited with exemption of lactic acid bacteria in tampons	The producer of the sanitary product	Form 4

Material	Requirement domain/level	Req. no	Comments	Who shall document?	Form
Dying and printing	Specific chemical requirement	O11 - O12	Applies to dying and printing on the sanitary product	Producer of the dyes and inks	Form 2c
Recycled material	Mandatory	O13			
Cellulose-based pulp/fluff/air-laid	Applies when ≥ 1.0 weight-% or more	O14		The pulp/fluff/air-laid producer	Form 5
	Additional requirement when 10.0 weight-% or more	O15-O16		The pulp/fluff/air-laid producer	Form 6 for fiber raw materials and forbidden tree species
Paper/carton/paperboard	Applies when ≥ 1.0 weight-% or more	O17	Applies for tissue, printing and silicone paper, carton, cardboard and other paper.	The paper/carton/paper board producer	Form 7
	Additional requirement when 10.0 weight-% or more	O18-O19		The paper/carton/paper board producer	
Wood material	Mandatory	O20	Applies to solid wood, like stick in cotton buds	The supplier of the wood material	Form 8
Cotton	Applies when ≥ 1.0 weight-% or more	O21	Bleaching with Cl ₂ prohibited	The supplier of the cotton	Form 9
	Additional requirement when 5.0 weight-% or more	O22-O23	Ecological cotton and requirements to additives	The supplier of the cotton	
Regenerated cellulose	Applies when ≥ 1.0 weight-% or more	O24	Bleaching with Cl ₂ prohibited and AOX/OCI limitation	The producer of regenerated cellulose	Form 10
	Additional requirement when 10.0 % weight-% or more	O25		Additional requirement when 10 % by weight or more	Form 10
Plastic/polymer	Mandatory	O26	PVC (halogenated polymers) prohibited in product and packaging	The producer of the sanitary/plastic product	Form 4

Material	Requirement domain/level	Req. no	Comments	Who shall document?	Form
Plastic/polymer	Part A) Applies when plastic contained in components make up ≥ 1.0 weight-% or more Part B) Applies when components of plastic included in (S+A) by 5% weight-% or more	O27	Part A: Requirements to chemical substances in PE, PP, PS, PET, PA, PUR (included elastan) Part B: Requirements for added chemicals	Part A) The plastic manufacturer or test done in the supply chain Part B) The plastic manufacturer	Form 11
Polyurethane/elastane	Applies when 5.0 weight-% or more	O28	Production requirements	The producer of the plastic/polymer product	Form 12
Polyamide	Applies when 5.0 weight-% or more	O29	Production requirements	The producer of the plastic/polymer product	Form 13
Bio-based polymer	Applies when 20.0 weight-% or more		Requirement for certification of raw materials for bio-based polymers	The polymer producer	
Recycled plastic		O31	Requirements for recycled plastic in sanitary product, additional component and packaging	The producer of the recycled plastic	Form 14
SAP	Applies when 1.0 % weight-% or more	O32	Requirements to acrylamide, rest monomers and water soluble extracts	The SAP producer	Form 15
	Applies when 10.0 weight-% or more	O33	Requirement to additives	The SAP producer	Form 15
Nonwoven		O34 - O35	Refers to the relevant material and chemical requirements	See relevant requirement	Form 16
Material composition - share of recycled and renewable materials		O36	Applies to product and primary packaging	The producer of the sanitary product	
Other components		O37	Like cotton sticks material, tape, elastic/rubber band etc. Refers to relevant requirements	See relevant requirement	
Primary packaging		O26 and O38	Refers to relevant requirements	The producer of the sanitary product, see also relevant requirement	
	Function	O39		The producer of the sanitary product	
	Tampons	O40	Requirement to the content of aerobic microorganisms	The producer of the sanitary product	

Material	Requirement domain/level	Req. no	Comments	Who shall document?	Form
	Information on packaging	O41	Applies to size designations and that relevant products must not be discarded in the toilet	The producer of the sanitary product	
	Mandatory	O42 - O49	Quality and regulatory requirements	The producer of the sanitary product	

7.3 Description of the product

Requirements O1 and O2 are intended to provide a description of the product and the packaging, plus a statement of the percentage composition.

O1 Description of the product

The applicant must provide a description of the product, a description of the manufacturing processes, as well as information about packet sizes.

The following information must be provided for all components of the sanitary product, any additional components, product information sheets and primary packaging must be provided:

- Function (as outer layer, foil around each product, absorbing part, elastic around the legs, information sheet, primary packaging etc.)
- Weight of component
- Constituent materials (e.g. fluff, PP, PET)
- Chemical products that are added to the sanitary product (e.g. adhesives)
- Supplier/producer (with the components they deliver, business name, country of production and contact person)

The production chain with suppliers for the sanitary product and additional components must be illustrated by i.e. a flowchart.

☒ Description in accordance with the requirement. See appendix 1, form 1, table S1.

O2 Material composition

Composition

The different material types* in the sanitary product and additional components must be stated in terms of amount and percentage by weight of (S+A).

The material types in the primary packaging must be stated in terms of amount and percentage by weight of (S+A). The weight of the material types in the primary packaging shall not be included in the (S+A).

* The same material type included in more than one component shall be summed up.

Nominal limit

Specific material types present in quantities of maximum 1.0 weight-% of (S+A) is exempted from the material requirements, even if there is a requirement for the particular material type in the document.

Materials for which no requirements are imposed in the document, and which are not explicitly prohibited, may each make up a maximum of 2.0 weight-% of (S+A), but not exceed 5.0 % weight-% totally.

The amount of requirements that must be fulfilled is determined by weight-% of the specific material related to the total weight of the sanitary product + additional component (S+A).

- ☒ Description in accordance with the requirement. Appendix 1, form 1, table S2 can be used to document parts of the requirement.

Background to the requirements O1-O2

The requirements O1 and O2 have been set to provide an overview of the product and the packaging for which a licence is being sought. This will make it easier to determine which requirements have to be fulfilled for the raw materials.

For a Nordic Swan Ecolabelled sanitary product, 100% of the contents must be stated, and 95 % by weight of the materials, components and constituent substances in the sanitary product and the additional components must meet the requirements set in the criteria document. This means that 5.0% may consist of materials with no requirements, with a maximum of 2.0% by weight of each material type. This may be materials such as silk, rubber, latex and so on. Similarly, the composition of primary packaging must be specified so it later in the document becomes clear which requirements apply for the various materials. As a basis for calculating the weight %, is chosen the sum of the materials in the sanitary product and additional components belonging to each product. That is, what it takes for the product to be used. This sum is termed (S+A). The weight of the materials in the primary packaging shall not be included in (S+A). It is equivalent if it is calculated for all the products in the package or calculated per unit in the package.

Small parts of the sanitary product or additional components can be made of material types which requirements are imposed on in the document. One example is sewing thread that may be made from cotton or polyester, where there may be several stages back in manufacturing chain, making it difficult to find sufficient documentation for such a small component. Therefore, a nominal limit is introduced for every material of 1.0% by weight.

7.4 Requirements for chemical products and chemical substances

The chemical requirements are split into two sections: general chemical requirements and function-specific requirements.

The general chemical requirements O3, O4 and O5 apply for all chemical products added during the manufacture/composition of the sanitary products and additional components. The requirements apply to adhesives, odour control substances (only for incontinence care products), dyes and so on. These requirements are also to be consulted for chemical products and additives used in materials/fibre/components used in the sanitary products. The reference to these requirements for such products appears in the material requirements later in the document.

The section on other chemicals (O6 to O12) sets requirements concerning silicone treatment and adhesives, prohibits the addition of fragrances, skincare substances and medication, limit the use of odour control substances, and set requirement to chemicals for printing and dyeing.

What counts as a constituent substance?

In the requirements the term “constituent substances/ingoin substances” is used. The following definitions are given:

- **Ingoing substances:** All substances in the chemical product, including additives (e.g. preservatives and stabilisers) in the raw materials. Substances known to be released from ingoin substances (e.g. formaldehyde and arylamine) are also regarded as ingoin substances.
- **Impurities:** Residuals, pollutants, contaminants etc. from production, incl. production of raw materials that remain in the chemical product in concentrations less than 100 ppm (0,0100 w-%, 100 mg/kg). Examples of impurities are residues of the following: residues or reagents incl. residues of monomers, catalysts, by-products and detergents for production equipment and carry-over from other or previous production lines.

Some materials are subject to requirements concerning residues that have not been actively added. These may, for example, be residues of monomers or catalysts in polymerisation such as D4 and D5 in silicone, antimony in polyester or residues of crosslinkers or monomers in SAP. The limitations on these substances are explained in the requirements for the relevant materials.

7.4.1 General chemical requirements

03 Chemical products, classification

Chemical products used in the production/composition of sanitary products and additional components must not be subject to a classification requirement specified in Table 2.

The requirement also applies to additives to material/components where it later in the document is referred to this requirement.

Table 2: Classification of chemical products

Classification under CLP Regulation (EC) No 1272/2008*	
Hazard class and category	H phrases (Code)
<u>Toxic to aquatic organisms</u>	
Aquatic Acute 1	H400
Aquatic chronic 1-4	H410, H411, H412, H413
<u>Acute toxicity</u>	
Acute Tox 1, 2	H330, H310, H300
Acute Tox 3	H331, H301, H311
Acute Tox 4	H332, H312, H302
<u>Specific target organ toxicity</u>	
STOT SE 1	H370
STOT SE 2	H371
STOT RE 1	H372
STOT RE 2	H373
<u>Aspiration hazard</u>	
Asp. Tox 1	H304
<u>Skin corrosion/irritation</u>	
Skin Corr 1A/B/C	H314

<u>Allergenic</u> Resp. sens 1 or Skin sens 1	H334 H317
<u>Carcinogenic</u> Carc 1A/1B Carc. 2**	H350 H351
<u>Mutagenic</u> Muta. 1A/B Muta. 2	H340 H341
<u>Toxic for reproduction</u> Repr 1A/1B Repr 2	H360, H361 H362

* Classification in line with the Regulation on classification, labelling and packaging of substances and mixtures (Regulation (EC) no 1272/2008).

** An exemption is made for titanium dioxide (CAS no. 13463-67-7).

The producers of the chemical products are responsible for the classification.



Material safety data sheets for all chemical products in accordance with current European legislation.

Duly completed and signed Appendix 1, form 2a, Declaration of chemical products, in the criteria document. To be completed by the producer of the chemical product.

04 Chemical substances, CMR

This requirement applies to chemical products used in the production/composition of sanitary products and additional components.

The requirement also applies to additives to materials/components where it later in the document is referred to this requirement.

The chemical products must not contain substances that are or may degrade into substances that are classified as carcinogenic (Carc), mutagenic (Mut) and/or toxic for reproduction (Rep) according to CLP Regulation (EC) No 1272/2008 (see Table 3).

Table 3: Classification of CMR substances

Classification in line with CLP Regulation (EC) No 1272/2008	
Hazard class and category	H phrases (Code)
<u>Carcinogenic</u> Carc. 1A/1B Carc. 2*	H350 H351
<u>Mutagenic</u> Muta. 1A/B Muta. 2	H340 H341
<u>Toxic for reproduction</u> Repr. 1A/1B Repr. 2	H360, H361 H362

* An exemption is made for titanium dioxide (CAS no. 13463-67-7).



Duly completed and signed Appendix 1, form 2a, Declaration of chemical products, in the criteria document. To be completed by the producer of the chemical product.

05 Other excluded substances

Chemical products used in the production/composition of sanitary products and additional components must not contain substances from the lists below.

The requirement also applies to additives to material/components where it later in the document is referred to this requirement.

There may be overlap between the substances on the two lists.

List of forbidden substances

- Substances on the Candidate List*

D4, D5 and D6 in silicone polymer have an own requirement, see O6

- Organotin compounds
- Phthalates
- APEO – alkylphenol ethoxylates and alkylphenol derivatives (substances that release alkylphenols on degradation). An exception is made for:
 - sterically hindered phenolic antioxidants with molecular weight (MW) >600 g/mole.
- Halogenated organic compounds. An exception is made for:
 - halogenated organic pigments that meet the European Council's "Resolution AP (89) 1 on the use of colourants in plastic materials coming into contact with food", point 2.5
 - the preservative CMIT (CAS no. 26172-55-4)
- Flame retardants

List of substances with specific characteristics not allowed

- Substances that have been judged in the EU to be PBT (Persistent, Bioaccumulative and Toxic) or vPvB (very Persistent and very Bioaccumulative)**
- Substances considered to be potential endocrine disruptors in category 1 or 2 on the EU's priority list of substances that are to be investigated further for endocrine disruptive effects***
- Preservatives that are bioaccumulative in accordance with Appendix 2 (BCF >500 / logKow >4).
- Antibacterial agents (e.g. nanosilver and triclosan)****

*The Candidate List can be found on the ECHA website: <http://echa.europa.eu/candidate-list-table>

** PBT and vPvB in accordance with the criteria in Annex XIII of REACH

*** Substances considered to be potential endocrine disruptors in category 1 or 2, see following link: http://ec.europa.eu/environment/chemicals/endocrine/strategy/being_en.htm

**** An antibacterial agent is a chemical/product that inhibits or stops growth of microorganisms such as bacteria, fungi or protozoa (single-celled organisms). The requirement does not apply to preservatives used to preserve the chemical product, so-called in-can preservatives.

- ☒ Duly completed and signed Appendix 1, form 2a, Declaration of chemical products. To be completed by the producer of the chemical product.

Background to the requirements O3-O5

The general chemical requirements are divided into three specific requirements. The first concerns classification of the chemical products used, while the next two apply to chemical substances that must not be included in these chemical products. The latter two requirements place special emphasis on substances that are considered to be SVHC (Substances of Very High Concern). Certain specific chemical groups such as phthalates, organotin compounds and flame retardants are also covered. In this revision, the requirement has been expanded from only having a classification requirement for chemical products, to also having two requirements concerning constituent substances in the chemical products used in the manufacture of the sanitary products.

The requirements apply to chemical products and chemical substances used in production/composition of hygiene products and their additional components. Later in the document, under requirements to the different materials such as nonwoven, fluff/pulp, regenerated cellulose, cotton, superabsorbent polymers and plastics/polymers there can be referred to that O3-O5 must be fulfilled. In these cases the chemical products/substances that are added to the materials/components must not be classified according to O3 or be forbidden/have certain properties according to O4 and O5. It is given in the specific requirement who shall document the requirements, and it will not always be a requirement that the producer of the chemicals shall be the one that declare the fulfilment of the requirement in these cases.

On September 15 2020 an exemption was adopted for titanium dioxide (TiO₂) classified Carc.2 (H351). TiO₂ has recently been classified as H351 if it is in the form of dust. As TiO₂ is widely used in many different chemical products and there is no replacements for this at the moment, an exemption is granted. TiO₂ will not be in classified form in the sanitary products as it will be dispersed in the chemical product used or bound to the material.

Substances of Very High Concern and the Candidate List

Substances of Very High Concern (SVHC): As the name suggests, SVHC covers substances that give grounds for caution due to their inherent properties.

They meet the criteria in article 57 of the REACH Regulation, which defines SVHC as: substances that are CMR (category 1 and 2 under the Dangerous Substances Directive 67/548/EEC or category 1A and 1B under the CLP Regulation), PBT substances, vPvB substances (see section below) and substances that have endocrine disruptive properties or are environmentally harmful without meeting the criteria for PBT or vPvB. SVHCs may be included on the Candidate List with a view to them being inscribed on the Authorisation List, which means that the substance becomes regulated (ban, phasing out or other form of restriction).

Since these substances face being phased out or banned, it is only logical for Nordic Ecolabelling not to permit this type of substance in ecolabelled products.

A substance may meet the criteria for SVHC without being included on the Candidate List, so there is no direct equivalence between SVHC and the Candidate List.

To avoid cross-references between PBT, vPvB, CMR and endocrine disruptors, instead of excluding SVHC (which does cover some CMR, PBT, vPvB, etc.) Nordic Ecolabelling chooses to exclude from use the substances on the Candidate List and to separately exclude PBT, vPvB and endocrine disruptors. This should still cover all SVHC substances.

“Persistent, bioaccumulative and toxic (PBT) organic substances” and “very persistent and very bioaccumulative (vPvB) organic substances” are substances whose inherent properties are not desirable in Nordic Swan Ecolabelled products. PBT and vPvB substances are defined in Annex XIII of REACH (Regulation (EC) No 1907/2006).

Potential endocrine disruptors are substances that may affect the hormone balance in humans and animals. Hormones control a number of vital processes in the body and are particularly important for development and growth in humans, animals and plants. Changes in the hormone balance can have unwanted effects and here there is an extra

focus on hormones that affect sexual development and reproduction. Several studies have shown effects on animals that have been traced to changes in hormone balance. Emissions to the aquatic environment are one of the greatest sources for the spread of endocrine disruptors⁴³. Nordic Ecolabelling bans the use of substances that are considered to be potential endocrine disruptors, category 1 (there is evidence of a change in endocrine activity in at least one animal species) or category 2 (there is evidence of biological activity related to changes in hormone balance), in line with the EU's original report on "Endocrine disruptors" or later studies⁴⁴.

This entails a ban on substances such as bisphenol A, several phthalates and certain alkylphenols. Phthalates are included as a separate point on the exclusion list to make it absolutely clear that no phthalates are permitted.

Organotin compounds

Organotin compounds are regulated in Annex XVII, point 20 of REACH. Subsection 6a states that dioctyltin (DOT) must not appear at more than 0.1% by weight of tin in feminine hygiene products, for example. A report from 2005 written by Risk & Policy Analysts Limited (RPA), on behalf of the European Commission,⁴⁵ states that organotin compounds have been reported in products that include diapers and feminine hygiene products. According to the report, organotin has historically been used as a catalyst in polymer production, as a stabiliser in polymers and as a biocide in various products.

For more in-depth information on organotin compounds, please see the background document on the Nordic Ecolabelling criteria for chemical building products⁴⁶. The same reference also contains concerns about many of the other substances on the exclusion list: **phthalates**, **APEO** (alkylphenol ethoxylates and alkylphenol derivatives) and **halogenated organic compounds**. On 17 October 2018 Nordic Ecolabelling decided exceptions for some APEOs in O5. The exception applies to antioxidants that are sterically hindered with a molecular weight > 600g/mole. APEOs and its derivatives are a large group of different substances commonly used in products containing polymers, e.g. adhesives. There are adhesives on the market that contain antioxidants that can be defined as APEOs and alkylphenol derivatives. Antioxidants are essential for the quality of the glue. It has also been found that less PAH is formed in this adhesive compared to corresponding adhesives. The exception is limited to antioxidants which are used in small amounts. The exception will not allow the use of substances known to be harmful for health and environment as nonylphenol ethoxylates.

Antibacterial agents and flame retardants

The article "The Regulation of Nano-particles under the European Biocidal Products Directive: Challenges for Effective Civil Society Participation" from 2011⁴⁷ mentions diapers as an example of a product that may contain silver nanoparticles. A search on

⁴³ Miljøstatus i Norge, 2008

⁴⁴ http://ec.europa.eu/environment/endocrine/documents/final_report_2007.pdf
http://ec.europa.eu/environment/endocrine/documents/bkh_report.pdf#page=1
http://ec.europa.eu/environment/endocrine/documents/wrc_report.pdf
http://ec.europa.eu/environment/docum/pdf/bkh_main.pdf

⁴⁵ Risk assessment studies on targeted consumer applications of certain organotin compounds, Final Report - September 2005 prepared for the European Commission by Risk & Policy Analysts Limited (RPA)

⁴⁶ Nordisk Miljömerking. Bakgrund till miljömärkning av Kemiska byggprodukter. 19 mars 2014, side 36-40.
<http://www.svanemarket.no/for-bedrifter/sok-om-svanemarket/svanens-krav/byggevarer-og-hus/utendørsmaaling-lim-fugemasse-sparkel/> (hentet 19. mai 2015)

⁴⁷ Reinsborough, M. T., Sullivan, G., The Regulation of Nano-particles under the European Biocidal Products Directive: Challenges for Effective Civil Society Participation, European Journal of Law and Technology, Vol. 2, No.3, 2011

products containing nanosilver generates several hits for both diapers and sanitary towels⁴⁸. A product search on diapers and triclosan does not receive as many hits, but several websites mention triclosan in diapers and in other sanitary products⁴⁹.

Antibacterial substances are not desirable in ecolabelled products, and particularly not in products that come into direct contact with the body. There has been an increase in products with added antibacterial agents. Nanosilver, for example, is found in everything from socks and toothbrushes to refrigerators. There is particular concern that extensive and unnecessary use of nanosilver and other antibacterial agents may eliminate desirable bacteria and cause resistance in bacteria, such that in contexts where they are needed such agents will no longer have the desired effect. It is stated in the requirement that this does not include so-called in-can preservatives used to preserve the chemical product, but it is not permitted to add chemicals deliberately which have an antibacterial effect on the sanitary product, see also O10.

Nordic Ecolabelling is not aware of any use of flame retardants in sanitary products. It has, however, been noted that products have added flame retardants where the products are flammable and they will be stored in a place where the consequences of a fire would be enormous.

The requirement concerning additives based on lead, cadmium, chromium VI and mercury, and their compounds, is of most relevance to additives in polymers, and is described in more detail in section 7.2.8 Polymers. This requirement was removed after the hearing as there is a specific requirement to this under the requirements to polymer.

A test from May 2015 conducted by the Danish Consumer Council found polycyclic aromatic hydrocarbons (PAH) in three out of nine diaper brands⁵⁰. PAH is typically a pollutant from exhausts, tyre dust and oil, and not something added to diapers. The PAH found in the diapers may originate from the production machinery, and not from the actual manufacture of the product. It would therefore not be relevant to introduce a ban on PAH in diapers.

7.4.2 Other chemical requirements

This section contains specific requirements for chemical products and chemical substances that may be used in the manufacture of sanitary products or added to the constituent components. The definition of constituent substances and impurities is the same as in the previous section. There is no longer a separate requirement for nanomaterials or flame retardants. The judgment has been made that a general ban on nanomaterials is too strict and nanosilver has now been removed as a type of antibacterial additive in O10. Flame retardants have been introduced as a separate point in the exclusion list.

⁴⁸ Produktsøk på bind: http://www.vmosa.com/product02_en.htm (20/5-15), produktsøk på bleier: <http://australia.tradekey.com/disposable-nappies.htm> (20/5-15)

⁴⁹ Produktsøk på bleier og triklosan: <http://www.abc.net.au/worldtoday/content/2010/s2873698.htm> (20/5-15) og <http://www.certifiedorganicskincare.com.au/dangers-of-triclosan/> (20/5-15) og <http://www.huggies.com.au/nappies/huggies-nappies/questions> (20/5-15)

⁵⁰ Artikkel i Politiken, "Dyreste ble taber test: Hver tredje ble har spor af kræftfremkaldende stoffer", 5. Mai 2015 <http://politiken.dk/forbrugogliv/forbrug/forbrugersikkerhed/ECE2653707/dyreste-ble-taber-test-hver-tredje-ble-har-spor-af-kræftfremkaldende-stoffer/> (besøkt 30/6-15)

Silicone

Silicone is used primarily to achieve a grease- or water-repellent effect as a coating on materials or as an additive in materials. The following requirement applies where silicone is used, for example on silicone coated paper.

06 Silicone

The following requirements must be fulfilled in the event of silicone treatment of the whole or parts (components and additional components) of the sanitary product:

- Solvent-based silicone coatings must not be used.
- Octamethylcyclotetrasiloxane, D4, (CAS no. 556-67-2), decamethyl cyclopentasiloxane, D5, (CAS no. 541-02-6) and dodecamethyl cyclohexasiloxane, D6, (CAS no. 540-97-6) must not form part of the product. The requirement does not apply to D4, D5 and D6 contained as impurities*.
- Organotin catalysts must not be used in the production of the silicone polymer.

**Impurities of D4, D5 and D6 are defined as residual products from the raw material production in the silicone mixture (like the silicone emulsion's coating bath) or in the finished cured silicone in concentrations below 800 ppm (0.08% by weight, 800 mg/kg).*

Nordic Swan Ecolabelled grease-proof paper meets the requirement.

- ☒ Material safety data sheet for the product. Duly completed and signed Appendix 1, form 3, Silicones for coating. To be completed by the producers of the silicone products. If the paper is Nordic Swan Ecolabelled, the certification number must be submitted.

Background to the requirement 06

The requirement has been changed in that solvent-based coatings may not be used.

This method is being phased out since the use of solvents is undesirable. The requirement concerning D4 and D5 was originally harmonised with the requirements in the criteria for grease-proof paper from 2014. On October 24, 2018, Nordic Ecolabelling agreed to remove the requirement that silicones should fulfill O3-O5 and at the same time D6 is banned together with D4 and D5. This is because D6 is now on the Candidate List and to ensure requirements for D6, it is introduced specifically as it previously was handled in O5. That chemicals used for silicone treatment should fulfill O3-O5 were new in this generation of the criteria and were based mainly on knowledge from the grease-proof paper criteria. However, it has been found that other methods of silicone treatment are applied to plastics than paper that requires other types of chemicals. The requirements were therefore set on an inadequate basis. Therefore, changes have also been made to the formulation of the contamination limit to make it more independent on method. Residues of D4, D5 and D6 can be measured in the silicone mixture itself, such as the silicone emulsion coating bath or in the finished cured silicone. This makes the requirement more flexible and can be defended as the amount of cyclic residual polymers will not change significantly in the process of curing. The limit for impurities from 100 to 800 ppm based on experience of what the industry is currently able to achieve. The limit will be reassessed in the next revision. For more information on the requirement concerning silicone, see the background document about the criteria for grease-proof paper⁵¹.

⁵¹ Nordisk Miljömerking. Om Svanenmärkta Fetttäta papper, tilläggsmodul, version 4. 18 november 2014.
<http://www.svanemerket.no/for-bedrifter/sok-om-svanemerket/svanens-krav/papirprodukter/mat-og-bakepapir/>
(hentet 7. juni 2015)

Sanitary products such as diapers very often have a silicone strip, usually of paper, but not always. The strip either provides protection for Velcro or it protects a self-adhesive strip. In the first case, the silicone treated surface (paper) is constantly held in place in the diaper. The diaper's silicone surface does not come into direct contact with the baby's skin. A typical pull-up diaper (for a two-year-old child) contains around 2 mg of silicone. In the second case, the silicone barrier (usually paper) is fully removed from the sanitary towel or sanitary protection in order to reveal the self-adhesive surface. The typical amount of silicone is 1 g/m² of paper. There has been no investigation into the amount of silicone used in other sanitary products.

Adhesives and binders

07 Adhesives/Binders

The requirement applies to adhesives/binders used in the composition of the sanitary product and additional components. The requirement also applies to eg. adhesive on tape release paper and binders in nonwoven.

Adhesives/binders must not contain phthalates or colophony rosin. Modified colophony derivatives that are not classified as sensitizing are allowed.

Formaldehyde generated during the production process may amount to no more than 250 ppm (0.025%) measured in newly produced polymer dispersion.

The content of free formaldehyde in hardened adhesive must not exceed 10 ppm (0.001%).

The adhesive/binder must fulfil the general chemical requirements O3-O5.

Hotmelt adhesives are exempted from the formaldehyde requirement.

Information on sampling, methods of analysis and analysis laboratories is provided in Appendix 2.

- ☒ Declaration from the producer of adhesive/binder that the adhesive/binder does not contain phthalates or colophony rosin. Results of analysis of the formaldehyde content of the adhesive/binder. Duly completed and signed appendix 1, form 2b may be used.

Background to the requirement O7

The requirement has not been changed in this version of the criteria. The background to the ban on phthalates is that many of these are classified as harmful to health and the environment⁵². They are used mainly in PVC, but may also be used as an additive in other materials or chemical products. Rosin is prohibited because it can cause contact allergies. Rosin is derived from the resin of pine trees. The mixture contains several allergens and can cause a rash after prolonged skin contact. According to the website of Astma-Allergi Danmark⁵³, it can be found in plasters, sanitary towels and diapers, tape and adhesive, and may also go by the following names: colophony, abietin, abietic acid, methyl abietate or abiethyl alcohol. It is allowed with adhesives based on derivatives of colophony if they are not classified as sensitizing.

The requirement that the content of formaldehyde must not exceed 250 ppm in newly produced polymer dispersion and the restriction to 10 ppm in hardened adhesive have been set because formaldehyde is carcinogenic and may cause allergic reactions. Hotmelts

⁵² Miljødirektoratet i Norge. Miljøstatus.no. Ftalater. Publisert 30.06.2014, 15:41.

<http://www.miljostatus.no/Tema/Kjemikalier/Noen-farlige-kjemikalier/Ftalater/> (hentet 7. juni 2015)

⁵³ Astma-Allergi Danmark. Kolofonium. [http://eksem.astma-](http://eksem.astma-allergi.dk/kontakttekst/allergiskkontaktallergi/konserveringsmidler/andrekonserveringsmidler/kolofonium)

[allergi.dk/kontakttekst/allergiskkontaktallergi/konserveringsmidler/andrekonserveringsmidler/kolofonium](http://eksem.astma-allergi.dk/kontakttekst/allergiskkontaktallergi/konserveringsmidler/andrekonserveringsmidler/kolofonium) (hentet 7. juni 2015)

are, however, exempted from this requirement, since formaldehyde is not relevant for hotmelt adhesives.

Fragrance, lotion and other additives

O8 Fragrances and skin care preparations

Fragrance or other scents (e.g. essential oils and plant extracts), lotion, skin care and/or moisturising preparations must not be added to the sanitary product, additional components or to the constituent materials/components.

- ☒ Duly completed and signed declaration from the producer of the sanitary product. Appendix 1, form 4 may be used.

Background to the requirement O8

The requirement concerning fragrance or other scents remains unchanged in this revision, but the ban on flavorings has been deleted since toothpicks are no longer included in the product group. Fragrance and other scents in the form of essential oils, plant oils and plant extracts, for example, must not be included in sanitary products. Fragrance, essential oils and plant oils and extracts often contain a number of allergens or carcinogens. To avoid unnecessary effects on health from these types of substances, the use of fragrance and scents is entirely prohibited. Fragrance and scents also have no function in relation to sanitary products and are considered unnecessary.

The requirement concerning lotion and skin care preparations has not been changed in this version of the criteria. To achieve a moisturising effect on the surface of the sanitary product, ready-mixed lotion is sometimes added to the sanitary product, or ingredients with moisturising and skin care effects might be added individually to the product. Moisturising and skin care preparations might include aloe vera, chamomilla recutita, glyceryl stearate and protolatum (Vaseline). Allergens and carcinogens can occur in lotion preparations.

Since lotion and skin care or moisturising preparations are not necessary for the function of the sanitary products, this type of additive is excluded from use on health grounds. It is considered that the requirement can be documented by a declaration from the producer of the sanitary product even if potential additives to materials can be done earlier in the supply chain. It is however considered that these kinds of substances are not added without informing about it and the producer of the sanitary product must know whether such substances are added or not.

Odour control substances

O9 Odour control substances

Odour control substances are permitted only in incontinence care products.

If used, the substances must fulfil the general chemical requirements O3-O5.

Odour control substances with the classifications H332, H373, H400 and H410 are permitted under the following conditions:

- The incontinence care product must not be a so-called heavy incontinence product, that is designed for more severe incontinence.
- The odour control substance shall be encased/encapsulated in, or bound by/attached to the superabsorbent so that there is not a risk of migration during normal use.
- The total content of odour control substance(s) shall be maximum 1,5 weight-% of the superabsorbent material.

- ☒ In the case of sanitary products that are not incontinence care products, the producer of the sanitary product must declare that the requirement is fulfilled. Appendix 2, form 4 may be used.
- ☒ If odour control substances are used, documentation from the producer of the chemical product showing that O3-O5 are fulfilled. Duly completed and signed appendix 1, form 2a can be used.
- ☒ If the odour control substance(s) are classified with H332, H373, H400 and/or H410:
 - description from the producer of the incontinence product of the type of incontinence product the classified odour control substance(s) are used in.
 - declaration from the producer of the superabsorbent material that the odour control substance(s) are encased/encapsulated in, or bound by/attached to the superabsorbent and do not risk migrating under normal use.
 - declaration from the producer of the superabsorbent material that the total content of the odour control substance(s) are maximum 1,5% by weight in the superabsorbent material.

Background to the requirement O9

As in the previous version, odour control substances are prohibited in sanitary products, with the exception of incontinence care products. The criteria specify that any odour control substances must fulfil the general chemical requirements O3-O5. On November 1, 2019, Nordic Ecolabelling approved an adjustment in the requirement permitting odour control substances classified H332, H373, H400 and/or H410. These classifications are only allowed for products designed for lighter incontinence such as pads and panty liners. The delimitation is made as odour inhibitors are an important part of the function of such products for people who have an active everyday life. To minimize odours in the best possible way, odour inhibitors classified with some of the hazard statements in O3 are allowed.

Medicaments and antibacterial agents

O10 Medicaments and antibacterial agents

Sanitary products containing chemical substances designed to prevent bacterial growth, alleviate or cure illness, sickness symptoms and pain or to alter bodily functions cannot be ecolabelled.

Lactic acid bacteria added to tampons are exempted from the requirement.

- ☒ The manufacturer must declare that the requirement is fulfilled. Duly completed and signed Appendix 1, form 4 may be used.

Background to the requirement

To avoid any doubt about the extent to which a product with added medication or disinfecting substances is effective and meets the health requirements set for the product in question, Nordic Ecolabelling has chosen to entirely prohibit medicaments in ecolabelled sanitary products. In this context, medicaments means chemical substances/products designed to prevent, alleviate or cure illness, sickness symptoms, pain and bacterial growth or to alter bodily functions (cf. definition in Section 2 of the Cosmetics Directive). This definition also extends to chemical substances such as silver compounds (healing) and triclosan (antibacterial and disinfecting). Antibacterial agents are now also named in the title of the requirement, to make it absolutely clear that the addition of antibacterial agents to the sanitary product is not permitted. Antibacterial agents could also reduce any composting of the products.

Nordic Ecolabelling thinks it is impossible to forbid all unwanted chemical products that might be used as process chemicals when the components are produced. But it is essential to make sure that the components and the sanitary product itself are not added medicaments and antibacterial agents that stay in the component/sanitary product and give an antibacterial or pharmacological effect. There is an exemption for lactic acid bacteria in tampons. These are currently added in one type of tampon to maintain the pH balance in the vagina. Lactic acid bacteria occur naturally in the body and are therefore not considered a medicament.

7.4.3 Dyes and printing inks

The requirements concerning printing and dyeing apply for the sanitary product and the components in the sanitary product, but not additional components, information sheet or primary packaging.

O11 Dyeing

The requirement applies to the sanitary product and the materials/components in the sanitary product.

Materials in sanitary products must not be dyed. The following exemptions apply:

1. Tampon strings can be dyed.
2. Titanium dioxide in polymers and fibres of regenerated cellulose are allowed in all sanitary products, independent if the material is in contact with the skin or not.
3. Materials/components considered to have a special function* may be dyed if the material is not in contact with the skin. The colourant must fulfil the following requirements:
 - Requirements O3-O5 in this criteria document and
 - R9-R12 in the Nordic Swan Ecolabelling of Paper Products – Chemical Module, Version 2 or O9-O10 in Nordic Swan Ecolabelling of Paper Products – Chemical Module, Version 3 must be fulfilled for the colourant.
 - The requirements in the chemical modules are given in appendix 5 in this criteria document.
4. Exceptions may also be granted in the case of certain specialist products for use in hospitals and nursing homes** independent if the material is in contact with the skin or not. This is subjected to agreement with Nordic Ecolabel. The colourant must fulfil the following requirements:
 - Requirements O3-O5 in this criteria document and
 - R9-R12 in the Nordic Swan Ecolabelling of Paper Products – Chemical Module, Version 2 or O9-O10 in Nordic Swan Ecolabelling of Paper Products – Chemical Module, Version 3

The requirements in the chemical modules are given in appendix 5 in the criteria document for Sanitary products.

5. Material in incontinence products for adults and children over 5 years may be dyed, independent if the material is in contact with the skin or not. The colourant must fulfil the following requirements:
 - O3-O5 in this criteria document and
 - R9-R12 in the Nordic Swan Ecolabelling of Paper Products – Chemical Module, Version 2 or O9-O10 in the Nordic Swan Ecolabelling of Paper Products - Chemical Module version 3. The

requirements in the chemical modules are given in appendix 5 in the criteria document for Sanitary products

- Meet the European Council's "Resolution AP (89) 1 on the use of colourants in plastic materials coming into contact with food".
- Colourants for polymer materials must also meet BfR's (Federal Institute for Risk Assessment) recommendations: "IX. Colorants for Plastics and other Polymers Used in Commodities" or Swiss Ordinance 817.023.21 Annex 2 and 10.
- Colourants used for cellulose materials must meet the following requirement: BfR's recommendation XXXVI. Paper and board for food contact, from July 2015 or later versions.

** An example of a special function can be dyeing of breast pads to reduce the visibility of the product through white or light-coloured clothing and plasters.*

*** e.g. as a guidance to the personnel to differ on sizes or to use the product in the correct way. This is always a subject to an agreement with Nordic Ecolabelling.*

- ☒ Declaration from the producer of the sanitary product that neither the product nor the materials/components have been dyed. Appendix 1, form 4 may be used.
- ☒ In the case of exemptions for specialist products for hospitals/nursing homes or where the dyeing has a special function: the function must be described. The producer/supplier of the colourant must declare that the requirements are fulfilled. Duly completed and signed Appendix 1, form 2c can be used. Material safety data sheet for the colourant must be submitted.
- ☒ For the exemption for incontinence products for adults and children over 5 years: description of the type of product that is dyed. The producer/supplier of the colourant must declare that the requirements are fulfilled. Duly completed and signed Appendix 1, form 2d can be used. Material safety data sheet for the colourant must be submitted.

012 **Printing inks**

The inks/pigments for printing on the sanitary products or part of this must fulfil O3-O5 in this criteria document and R9-R12 in the Chemical Module (Nordic Swan Ecolabelling of Paper Products – Chemical Module, Version 2 or later). The requirement does not apply to printing on additional components, information sheets and primary packaging.

- ☒ The producer/supplier of the printing ink/pigments must declare that the requirement is fulfilled by means of material safety data sheets and duly completed and signed Appendix 1, form 2c.

Background to the requirements O11 and O12

The ban on dyeing sanitary products has been set to minimise the content of harmful dyes in products that are in close contact with the skin, and unnecessary dyeing of the products. Exceptions may, however, be made for specialist products for use in hospitals and nursing homes, if there are particular reasons why the products must be dyed. It may be that staff need to see the difference between different sizes, for example.

Materials that are not directly in contact with the skin may be exempted from the requirement if the dye has a special function. This could include dyeing the outer side of breast pads, so they are not visible through white clothing, for example. Tampon strings are exempted from the requirement, since dyeing the string has an important function, namely that the user can separate the string from the tampon without damaging the product.

On March 10, 2020, an adjustment was adopted that allows dyeing of incontinence products for adults and children over 5 years. It is only allowed for incontinence products intended for light incontinence and not for heavy incontinence or women's hygiene products such as panty liners. Being incontinent is still taboo. To reduce the feeling of using an "aid", there are colored products that are more similar to regular underwear (colored in colors other than white). For children, urinary incontinence can be very embarrassing and have a negative effect on the child's self-esteem. Therefore, it opens up to allow dyeing of incontinence products. As these will be products that are close to the skin, additional requirements are set for the dyes/pigments used. They must be approved for use in all cosmetic products - e.g. no restrictions should be stated in column g of Annex IV of the Cosmetics Directive (Regulation (EC) No 1223/2009 on cosmetic products), and they must fulfill any conditions specified therein. Some dyes, for example, must meet the purity requirements set out in the regulations for food additives. Organic colors should not be bioaccumulative ($BCF < 500$ / $\log K_{ow} < 4$). Alternatively, the color may be approved as a food additive (meet the requirements of Regulation (EU) No 231/2012 of 9 March 2012 laying down specifications for food additives listed in Annexes II and III to Regulation (EC) No 1333/2008).

If the sanitary products or materials/components are dyed, the dyes must fulfil the requirements set out in O3-O5 and in R9-R12 in the Chemical Module (Nordic Swan Ecolabelling of Paper Products – Chemical Module, Version 2 or later). On December 12, 2018, Nordic Ecolabelling approved that inks/pigments were exempted from classification H318 in O3. This is not the most serious environmental or health classification and is a classification that Nordic Ecolabelling seldom include in the requirements. Print is added to certain sanitary products, such as diapers, on the back of the release paper under panty-liners and incontinence care products, and so on. Flexography is the main printing method used for this. Other techniques such as inkjet are also used for printing on sanitary products or their packaging. For printing inks, see the requirements in the Chemical Module. A more detailed description of the background to the requirements set in the Chemical Module can be found in the document: "Background memo. Modules for Nordic Swan Ecolabelled paper products – The Module system – Background for the Basic Module and the Chemical Module, February 2003". The requirement to dyeing and printing applies for printing on the sanitary product or the materials/components. The requirement do not apply for additional components, information sheet or primary packaging as these are part of the product that are not in contact with the body. This would also lead to a high documentation burden.

Dyeing with TiO_2 is commonly used in polymers and regenerated cellulose to stop them looking grey. TiO_2 affords good coverage and is permitted in foodstuffs such as sweets, toothpaste, biscuits, bakery goods, ice cream, tablets, cheese etc.

7.5 Requirements concerning materials in the product and packaging

7.5.1 Ecolabelled materials

Materials/components in the sanitary product or additional components that are Nordic Swan Ecolabelled or EU Ecolabelled do not have to fulfil additional material requirements. This can apply to regenerated cellulose or other textile fibres, different types of paper and so on. Inspected paper do not have to fulfil additional material

requirements. Inspected paper is paper that fulfil the requirements that are set for paper used in a Nordic Swan Ecolabelled printing house. The requirements to inspected paper are given in appendix 3 in the criteria document. If inspected paper is used, the name of the paper must be stated. It is possible to apply for getting the paper inspected and by that approved for use in a Nordic Swan Ecolabelled sanitary product. The process for this is described in more detail in appendix 3 in the criteria document.

For cellulosebased pulp/fluff/air-laid the following applies: Cellulose pulp that have been evaluated by Nordic Ecolabelling according to the "Basic module for paper products", version 2 or later, fulfils some of the requirements to cellulose pulp/fluff in these criteria. In addition, O14 in this criteria document must be documented as this requirement is not covered by the "Basic-and Chemical module", but is a specific requirement in this criteria document. For other cellulosebased pulp/fluff/air-laid that comprise 10.0 weight-% or more, the pulp/fluff must be evaluated (inspected) after the the requirements in the criteria for sanitary products.

7.5.2 Recycled material

Nordic Ecolabelling limit the use of recycled material in the sanitary product itself as recycled material might contain unknown substances that can be harmful for the environment or health. As the product most often are in direct contact with the body such substances are not wanted in the sanitary product. However, it is allowed with recycled plastic in the sanitary product if the plastic fulfils the requirement set to recycled plastic for food contact in EU regulation nr. 282/2008 on recycled plastic materials and articles intended to come into contact with food, see O31 for requirements. Recycled plastic in contact with food have a more strict regulation than e.g. recycled paper and carton. It is allowed with recycled material in additional components, like in release paper that are removed before use. It is also allowed in the primary packaging.

O13 Recycled material

Recycled material is not allowed in the sanitary product (e.g. in cotton, paper and fluff) with the exception of recycled plastic.

Recycled material is allowed in additional components, e.g. in tape or release paper that shall be removed before use and in primary packaging.

For requirement to recycled plastic in the sanitary product, additional component and primary packaging, see O31.

- ☒ Specify whether recycled material is used, what kind of material it is and where it is used (in the sanitary product, additional component or primary packaging)

7.5.3 Cellulose-based pulp/fluff/ air-laid

The requirements concerning cellulose-based pulp/fluff/air-laid are split into different levels, depending on the quantity in the product (weight-% in relation to total weight of S+A):

- All cellulose-based pulp/fluff/air-laid (1.0 weight-%) must fulfil requirement O14.
- If there is 10.0 weight-% or more of cellulose-based pulp/fluff/ air-laid in relation to the sum of the sanitary product and additional component (S+A), requirement O15-O16 must also be fulfilled.

If the cellulose-based pulp/fluff/air-laid in the sanitary product already have been evaluated by Nordic Ecolabelling after the requirements in the criteria document (inspected fluff), O14-O16 is already fulfilled. State the name of the pulp.

Requirements concerning more than 10.0 % by weight of cellulose-based pulp/fluff/air-laid are based on the criteria for the Nordic Swan Ecolabelling of paper products via the Basic Module and the Chemical Module for paper products, as well as a separate requirement for fibre raw material. This is because the similar requirement to fibre raw material in the Basic Module is related to the finished paper and not the pulp. The calculations for fulfilling the requirements concerning pulp are detailed in the Basic Module, version 2 or later. The calculations are made according to the calculation structure in the Basic Module, which also defines the calculation parameters and abbreviations. The points are calculated with the help of a technical description of the production processes, where energy consumption and emissions are related to reference values for the production. The reference values for different pulps can be found in the Basic Module, version 2 or later. The criteria for sanitary products contains limit values for the total electricity and fuel points, limit values for the emission requirements and a limit value for total CO₂ emissions, as well as reference values for electricity and fuel for pulp/fluff and air-laid. A calculation form developed by Nordic Ecolabelling is to be used for the calculation.

The requirements concerning fluff production are to be documented by the fluff manufacturer. The fluffing of the pulp is often conducted at the pulp mill, but may also be conducted at an external production site. It is given its own reference values, relative to the mechanical fluffing process. If chemicals are used after the production of the cellulose pulp, i.e. in connection with the production of the fluff pulp, these chemicals must meet the general chemical requirements described in O14.

O14 Cellulose-based pulp/ fluff/air-laid, general requirements (≥1.0 weight-%)

State the name and quality of the pulp/air-laid. The following requirements must be met:

- The cellulose-based pulp/fluff/air-laid must not be bleached with chlorine gas (Cl₂)
- Optical brightener or fluorinated chemicals must not be added to the cellulose-based pulp/fluff/air-laid.
- The cellulose-based pulp/fluff/air-laid must not have a growth inhibiting effect on microorganisms, under test method EN 1104.
- Chemicals added to the finished cellulose-based pulp/fluff/air-laid to provide specific properties* must fulfil the chemical requirements O3-O5**.
- The producer of cellulose-based pulp/fluff/air-laid must be Chain of Custody (CoC) certified by the FSC/PEFC schemes.

** Softeners that contain quaternary imidazoline (CAS no. 72749-55-4) are exempt from the classifications H400, H410 og H411 in O3.*

*** Production chemicals used during the production of the cellulose pulp are not included in the requirement.*

- ☒ Duly completed and signed Appendix 1, form 5, Cellulose-based pulp/fluff/air-laid, general requirements. To be completed by the producer of the cellulose-based pulp/fluff/air-laid.
- ☒ Copy of valid CoC-certificate or certificate number.

- ☒ Documentation as specified in requirements O3-O5 if chemicals are used. List of added chemicals and material safety data sheets for each chemical product. Duly completed and signed Appendix 1, form 2a from the producer of the chemical product can be used.

O15 Cellulose-based pulp/fluff/air-laid, wood raw material (≥10.0 weight-%)

6. Tree species listed on Nordic Ecolabelling's list of prohibited tree species* are not permitted to be used

* The list of prohibited tree species is located on the website: www.nordic-ecolabel.org/wood/

7. The producer of cellulose-based pulp/fluff/air-laid must state the name (species name) of the wood raw material used in the production.
8. A minimum of 30weight-% of all wood raw material used in the cellulose-based pulp/fluff/air-laid, must origin from forestry certified under the FSC or PEFC schemes. The remaining proportion of wood raw material must be covered by the FSC/PEFC control schemes (FSC controlled wood/PEFC controlled sources)
- or
- 75% of the wood raw material in the pulp must be must be woodshavings or sawdust
- or
- a combination of certified and woodshavings/sawdust.

If the fibre raw material in the pulp consists of less than 75% by-products such as wood shavings or sawdust, the proportion of fibre raw material based on certified wood must be calculated using the following formula:

Requirement applicable to the proportion of fibre raw material from certified forestry operation present in the pulp (Y):

$$Y (\%) \geq 30 - 0.267x$$

where x = the proportion of wood shavings or sawdust.

The requirement shall be documented as purchased wood on an annual basis (volume or weight) by the producer of cellulose-based pulp/fluff/air-laid.

If several pulps are mixed, the certification percentage must be fulfilled for the finished pulp/fluff in the product.

The application tool My Swan Account must be used. Contact the ecolabelling organization for a password.

- ☒ Declaration from the producer of cellulose-based pulp/fluff/air-laid that the requirement to tree species not permitted to be used are met. Appendix 1, form 6 may be used.
- ☒ Name (species name) on the wood raw material used in the cellulose-based pulp/fluff/air-laid. Appendix 1, form 6 may be used.
- ☒ Documentation from the producer of the sanitary product showing amount of certified fibre in the pulp/fluff/air-laid purchased, e.g.in an excel file with information on deliveries of certified fibre. The purchased amounts must be supported by an invoice or delivery note (paper or E-billing), showing the quantity of certified wood raw material that is purchased from the producer of the pulp/fluff/air-laid to the producer of the sanitary product.

O16 **Cellulose-based pulp/fluff/air-laid, production requirements (≥10.0 weight-%)**

The cellulose-based pulp/fluff/air-laid must fulfil the requirements R1-R6, R8-R10 and R12-R18 in the Basic Module for paper products, version 2 and all the requirements in the Chemical Module, version 2, or corresponding requirements in later versions. For the requirements concerning energy consumption and emissions, the following limits and reference values apply:

Energy:

- $P_{\text{electricity}(\text{total})} < 1.25$
- $P_{\text{fuel}(\text{total})} < 1.25$
- The reference values for cellulose pulp are found in the Basic Module.
- The reference values for fluff pulp are $E_{\text{reference}} = 900 \text{ kWh/ADT}$ and $\text{Fuel}_{\text{reference}} = 6000 \text{ kWh/ADT}$. For mechanical fluff pulp (CTMP) the reference values are $E_{\text{reference}} = 2000 \text{ kWh/ADT}$ and $\text{Fuel}_{\text{reference}} = 1000 \text{ kWh/ADT}$.
- Addition in the reference values for air-laid process: $E_{\text{reference}} = 4000 \text{ kWh/ADT}$ and $\text{Fuel}_{\text{reference}} = 4000 \text{ kWh/ADT}$.

CO₂:

- For production of fluff/cellulose pulp and air-laid, the limit value for emissions of CO₂ is 450 kg CO₂/ADT. For mechanical fluff pulp (CTMP) the limit value for emissions of CO₂ is 900 kg CO₂/ADT.

Emissions:

Emissions of AOX from production of fluff/cellulose pulp and pulp for air-laid must on average be ≤ 0.15 kg/tonne per pulp mixture. Emissions of AOX from the individual pulp must be ≤ 0.17kg/tonne.

Total emission points must be ≤ 4.0, and individual emission points must be ≤ 1.5. The reference values in the Basic Module shall be used*.

- $P_{\text{emissions}(\text{total})} = P_{\text{COD}} + P_{\text{P}} + P_{\text{S}} + P_{\text{NOx}} \leq 4$

** For unbleached chemical pulp used in manufacturing of fluff pulp, the reference value of phosphorus is 0.03 kg/ADT.*

The application tool My Swan Account must be used. Contact the ecolabelling organisation for a password.



Documentation from the producer of the pulp/fluff/ pulp for air-laid showing that the requirements are fulfilled. If the pulp/fluff has previously been approved by Nordic Ecolabelling, state the name of the pulp.

Background to the requirements O14, O15 and O16

The requirements that apply to all pulps, irrespective of the quantity, are associated with the use of chemicals. The pulp must not be bleached with chlorine gas (Cl₂) and optical brightener or fluorinated chemicals must not be added to the pulp. Bleaching with chlorine gas is no longer used in Europe, but the requirement remains in place to cover imported pulps. It is less common for fluorinated chemicals to be added to the pulp, as is the case for disposable products such as paper plates. Nordic Ecolabelling is, however, particularly concerned about the unnecessary use of fluorinated chemicals. The pulp must also not have a growth inhibiting effect on microorganisms, under test method EN 1104. The use of chemicals intended to have an antibacterial effect is unnecessary in

sanitary products, and residues of process chemicals are also undesirable. Chemicals added to the pulp to provide specific properties must fulfil the general chemical requirements O3, O4 and O5. This requirement therefore only applies to chemicals added after normal production of the cellulose pulp (unless added to provide specific properties associated with sanitary products), and during the fluffing of the pulp, or those added to the pulp during composition of the sanitary product. This may relate to debonding agents and softeners. On 24 May 2017 there was introduced an exception for the classifications H400, H410 and H411 in O3 for softeners that contain quaternary imidazoline (CAS no. 72749-55-4). This is added as a debonder/softener to fluff especially used in air-laid, and there are no good alternatives to this chemical today. It is difficult to make fluff with the right quality for use in sanitary products if this is not allowed. The same exception is given in the criteria for tissue paper. Fluff or other cellulose-based pulp based on recycled fibers is not allowed due to a risk for unwanted chemicals as environmental pollutants.

If there is 10.0 weight-% or more cellulose-based pulp/fluff/air-laid additional requirements must be met. This limit is set so the documentation burden will not be too great for products which include many materials in smaller quantities.

The requirements have been tightened in this revision and follow the new requirements in the Basic Module and the Chemical Module for Nordic Ecolabelling paper, version 2, as revised in 2011. The background to the changes in version 2 of the Basic Module and the Chemical Module is described in "Background memo. Modules for Nordic Swan Ecolabelled paper products"⁵⁴.

The requirement to fiber raw material is also tightened. Nordic Ecolabelling wants to contribute to sustainable forestry (ecologically, economically and socially). From a life cycle perspective, forestry is a key part of a wood product's environmental impact. The forest requirements focus on sustainable forestry and traceability of the wood raw material. Sustainably managed forests deliver a wealth of benefits for society, beyond the wood for materials and energy. The forests slow global warming by capturing and storing CO₂, they provide daily necessities for local communities and indigenous peoples, ensure biodiversity (wild animals and plants), protect water and soil from pollution and erosion, and so on. By setting requirements to certified wood raw material the Nordic Ecolabelling supports the development towards more sustainable forestry. It is also forbidden to use tree species on a given list: www.nordic-ecolabelling.org/wood/. Criteria for tree species found in the list are:

- IUCN red list, (categorized as critically endangered (CR), endangered (EN), vulnerable (VU) and relevant species as Near Threatened (NT)).
- Tree species list CITES Appendices I, II and III.
- Non-sustainable forestry, such as tree from HCVF, IFL -areas in countries/regions with high corruption.

There is also a requirement that the pulp/fluff producer is CoC-certified by the FSC/PEFCs schemes. The requirement for Chain of Custody certification contributes to traceability in the supply chain within the FSC and PEFCs guidance and control systems for traceability. The company's Chain of Custody certification proves how certified wood is kept separate from not certified wood in the production, administration and

⁵⁴ Nordisk Miljømerking. Baggrundsnotat. Moduler for Svanemærkede papirprodukter. 22. juni 2015. http://www.svanemarket.no/Documents/Kriterier%20mm/kopipapir_bkg.pdf (hentet 19. mai 2015)

warehousing and is checked annually by independent certification bodies. The remaining share of the wood shall comply with a number of minimum requirements to ensure that it can be considered as "legal timber".

The certification percentage is increased from 20% in generation 5 to 30% in generation 6 of the criteria. The remaining part must be FSC Controlled Wood or PEFC Controlled Sources. Certification schemes approved by PEFC, like the American certification scheme SFI, are approved. Nordic Ecolabelling wants to have as high a certification percentage as possible, but consider an increase of 10% in the new generation is enough for these kind of products. This is based on our own experience from licensing and the availability of certified material on the market. Much of the pulp/fluff used in sanitary products are produced in the United States where approximately 24% of the forest is certified⁵⁵. The requirement in the EU Ecolabel criteria for absorbent hygiene products have also been looked at. In the EU Ecolabel the requirement is 25% certified material. The rationale in the EU Ecolabel for the requirement of 25% is the availability on the market⁵⁴.

Requirements concerning energy and CO₂ emissions as related to fluff pulp include the cellulose pulp used. Energy and emissions data from the production of the cellulose pulp must be used in order to calculate the final values. Nordic Ecolabelling has drawn up a new calculation form to facilitate the required calculations. The requirements concerning energy and CO₂ emissions with regard to fluff pulp have undergone the following changes in this revision:

- New reference values have been drawn up for both electricity and fuel for fluff pulp and air-laid.
- The values for the electricity and fuel points have been amended. The electricity points have been tightened.
- New requirements for CO₂ emissions from energy consumption are calculated based on purchased electricity and fuel used for heating and electricity generation (pulp and fluff process).

The underlying data for calculating the energy points and guidance on how the calculations work can be found in the Basic Module, version 2 or later. Further information is available in the aforementioned background document for the Basic Module.

The reference values and point values include both the manufacture of the pulp and the fluffing process. The new reference values are based on the licence data available to Nordic Ecolabelling. The values have also been compared with the reference values proposed for the EU Ecolabel's criteria for absorbent hygiene products. Since the EU Ecolabel chose to drop the energy requirement in its last revision of the criteria, Nordic Ecolabelling's requirements may be seen as comparatively stricter.

The reference values have been assessed and revised in relation to the actual processes involved in the production of fluff pulp. The vast majority of the licence data available to Nordic Ecolabelling relates to fluff pulp made from ECF/TCF pulps, which have to be dried to 95% dry matter content. This process is more energy intensive and these additional energy needs have been accounted for in drawing up the reference values for

⁵⁵ Technical report, draft v.4, Development of EU Ecolabel Criteria for Absorbent Hygiene Products, oktober 2013, European Commission JRC – IPTS

electricity and fuel. CTMP pulp has not been accounted for in the requirements. However, since it in the licensing process has been shown that mechanical fluff (CTMPs) can also be used, it was decided to also have reference values for mechanical fluff in the criteria on 19. June 2017. The production methods for mechanical and chemical pulp are different and mechanical pulp uses more electricity, but less fuel compared to chemical pulp. Nordic Ecolabelling do not wish to discriminate the two methods and to make it possible to use also mechanical pulp in the sanitary products, there are now separate reference values for mechanical pulp (2000 for el and 1000 for fuel), and a separate limit value for CO₂ on 900 kg CO₂/ADT.

Version 5 of the criteria for sanitary products contained energy points for electricity and for total energy consumption (electricity plus fuel), while the new criteria have separate requirements for electricity and fuel. Analysed licence data indicates that the point score value for electricity can now be tightened. Air-laid has been given its own reference values. This is the first time that Nordic Ecolabelling has requirement for energy use for air-laid production. A machine manufacturer reports that an air-laid-process uses in average 1150 - 1230 kWh el/tonne product and 1000 - 1200 kWh gas/tonne product (included air conditioning)⁵⁶. During the consultation period work was done to get comments on the suggested reference values for air-laid without succeeding. In the licensing process it has been shown that the suggested values are too strict. It was therefore decided on 19 June 2017 to increase the reference values from 1000 kWh for el and fuel to 4000 for el and fuel (separately). More information on air-laid is described in the chapter on nonwoven, 7.5.10.

The requirement for CO₂ emissions has been set at 450 kg/ADT. This value includes the fluffing process, where the pulp is dried to a dry matter content of 95%. The drying process requires more energy and thus causes higher CO₂ emissions. This is the first time that a value for CO₂ emissions has been set for the production of the fluff pulp. A requirement on CO₂ is important, since it is an indirect measure of energy consumption from electricity and fossil fuels. The EU Ecolabel has set up the same limit value (450 kg/ADT) in its criteria for absorbent hygiene products. In order to calculate the CO₂ emissions in relation to purchased electricity, Nordic Ecolabelling uses a factor of 385 g CO₂/kWh. Nordic Ecolabelling's requirements in this respect can thus also be considered stricter than those of the EU Ecolabel.

The requirement concerning emissions from cellulose production has been harmonised with version 2 of the Basic Module.

The background to the emissions requirement and guidance on how the calculations of the emissions (from the cellulose pulp production) work are set out in the Basic Module, version 2 or later. Further information is available in the background document for the Basic Module⁵⁷. The Basic Module allows the use of a mix of pulps, with the limit value for AOX for each individual pulp set at 0.25 kg/tonne of pulp. The limit value for the mixed pulps is, however, set at 0.15 kg/tonne of fluff pulp. The requirement for AOX of 0.15 kg/tonne of pulp has thus been retained from version 5 of the criteria, but it has been clarified that is for the mix of pulps. There is however also a requirement for emission of AOX from each individual pulp on 0.17 kg/tonne pulp. This was changed after the hearing when the requirement was 0.15 kg/tonne for each individual pulp. The

⁵⁶ Samtal och mailkorrespondans med Ingo Mählmann på Oerlikon Neumag (3/7-15)

⁵⁷ Nordisk Miljömerking. Baggrundsnotat. Moduler for Svanemærkede papirprodukter. 22. juni 2015. http://www.svanemarket.no/Documents/Kriterier%20mm/kopipapir_bkg.pdf (hentet 19. mai 2015)

rational before the hearing was that mixing of pulp/fluff was not common for sanitary products, but as mixing is done in some cases, the requirement was changed.

The fluffing process entails no significant emissions to water. The reason for this is that steam is formed as part of the drying process. No limit value has thus been set with regard to emissions to water from the fluff production, but any emissions from the fluffing process must also be included in the calculation of total emissions. Overall, this requirement on emissions to air and water can be considered to be harmonised with the Basic Module, with the difference that the Basic Module includes emissions for both pulp and paper production.

On December 13 2022 Nordic Ecolabelling adopted an adjustment in the requirement O16 regarding reference value of phosphorus for unbleached chemical pulp. Sanitary products have traditionally been made from bleached chemical pulp which have good absorbency and a high level of purity. Recent trends and especially the latest ANSES studies⁵⁸ have, however, aroused more and more interest in the use of unbleached pulp in hygiene products. However, there are only a few suitable unbleached pulps which can be used for high quality products such as baby diapers. Therefore, the reference value of phosphorus has been adjusted (from 0.02 to 0.03 kg/ADt). Unbleached pulp which is further processed into unbleached fluff pulp, has higher P- emissions of phosphorus levels compared to reference value in the Basic Module. This is due to several process steps required to obtain desired functional requirements of the sanitary products such as good absorbency and high degree of purity.

In connection with the revision of the paper requirements, Nordic Ecolabelling has developed an electronic application guide, My Swan Account, which give information about the cellulose pulp. My Swan Account must be used in the application process for approving the pulp/fluff/air-laid for use in sanitary products..

Pulps may have been checked previously by Nordic Ecolabelling via the My Swan Account database. Checks of the cellulose pulp mean that Nordic Ecolabelling has examined the information about the pulp. Contact one of the secretariats if this is the case.

7.5.4 Paper (tissue paper, release paper, paperboard and other paper)

The paper requirements apply for different types of tissue paper, paper in tape or release paper (silicone paper), other paper, carton and paperboard. The requirements for paper are separated into different levels, depending on the quantity of paper involved, so the documentation burden will not be too great for products which include many materials in smaller quantities. The use of recycled paper is not permitted in the products, unless the components are removed from the product before use, as with some types of tape and release paper. Recycled paper is permitted in the packaging and in any accompanying information. Whatever the type of paper or paperboard, it is not permitted to coat the paper or paper pulp with fluorinated compounds or add them to the pulp.

All paper/carton/cardboard (≥ 1.0 weight-%) used in sanitary products and additional components must fulfil O17. In addition paper/carton types that account for

⁵⁸ https://www.anses.fr/en/search?search_api_views_fulltext=baby%20diapers

10.0 weight-% or more of (S+A) must fulfil requirement O18 and O19 with the following exceptions:

- a) For paper/carton/paperboard that account for 10.0 weight-% or more in cotton buds, only O18 shall be fulfilled, see also O37.
- b) For release paper that account for 10.0 weight-% or more only O18 shall be fulfilled. Please note that any silicone treatment of the release paper must meet O6.

The exceptions for paper/paperboard/carton in cotton buds and release paper were adopted on September 26, 2018. The documentation needed to document and fulfill O19 is extensive. The paper will still fulfill the basic requirements set in O17, including banning chlorine bleaching and the use of fluorinated organic chemicals in production. In addition, there is a requirement for CoC certification and forest certification in O18. For release paper there will also be requirements for silicone treatment (O6) and much of the environmental impact associated with release paper is related to silicone and the chemicals used here.

Each papertype (e.g. tissue paper, releasepaper, paper in tape and air-laid) shall be summarized separately and only if the individual paper type reaches 10.0 weight-% or more the requirement must be fulfilled. Air-laid are considered as an individual paper type even though this is actually a production method. There might be many different paper types in small amounts in the product, and paper in air-laid may also be different types, like tissue paper, it is chosen to have air-laid as an individual paper type.

The requirements refer to the Basic module for paper products, version 2 and different criteria for the Nordic Swan Ecolabelling of paper:

- Nordic Swan Ecolabelling of copy and printing paper, version 4. These include requirements concerning wood-containing and wood-free non-converted printing paper made from chemical and/or mechanical pulp and/or recycled fibre, and the following paperboard types: Solid Bleached Board (SBB), Solid Bleached Sulphate (SBS), Solid Unbleached Board (SUB), Folding Boxboard (FBB) and recycled fibre-based White Lined Chipboard (WLC).
- Nordic Swan Ecolabelling of tissue paper, version 5. Cellulose-based tissue paper made from virgin and/or recycled fibre.
- Nordic Swan Ecolabelling of grease-proof paper, version 4. This includes cellulose-based paper, which may be coated in different ways as parchment paper/grease-proof paper and various types of release paper.

O17 Paper/paperboard, general requirements (≥1.0 weight-%)

State the name, grade, grammage and producer of the paper. The following requirements must be met:

- a) The paper/carton/paperboard must not be bleached with chlorine gas (Cl₂).
- b) The paper/carton/paperboard must not be coated or treated with fluorinated chemicals. The requirement also applies to fluorinated additives in the paper pulp.
- c) The paper/carton/paperboard must not have a growth inhibiting effect on microorganisms, under test method EN 1104.

d) The producer of the paper/carton/paperboard must be Chain of Custody (CoC) certified by the FSC/PEFC schemes.

e) If the paper/carton/paperboard is coated with silicone, requirement O6 must be fulfilled*

**Nordic Swan Ecolabelled grease-proof paper fulfils the requirement.*

Information on analysis laboratories is given in Appendix 2.

☒ Documentation from the producer of paper/carton/paperboard showing that the requirements are fulfilled. Duly completed and signed appendix 1, form 7 may be used for the declaration.

☒ Copy of valid CoC certificate or certificate number.

O18 Paper/carton/paperboard, wood raw materials, (≥10.0 weight-%)

1. Tree species listed on Nordic Ecolabelling's list of prohibited tree species* are not permitted to be used.

**The list of prohibited tree species is located on the website: www.nordic-ecolabel.org/wood/*

2. The producer of paper/carton/cardboard must state the name (species name) of the wood raw material used in the production.

3. A minimum of 50% of all wood raw material used in the paper/carton/cardboard must originate from forestry certified under the FSC or PEFC schemes.

The remaining proportion of wood raw material must be covered by the FSC/PEFC control schemes (FSC controlled wood/PEFC controlled sources).

The requirement shall be documented as purchased wood on an annual basis (volume or weight) by the producer of paper/carton/cardboard.

☒ Declaration from the producer of paper/carton/cardboard that the requirement to tree species not permitted to be used are met. Appendix 1, form 6 may be used.

☒ Name (species name) on the tree species used in the paper/carton/paperboard. Appendix 1, form 6 may be used.

☒ Documentation from the producer of the sanitary product showing amount of certified fibre in the paper/carton/cardboard purchased. The purchased amounts shall be supported by an invoice or delivery note (paper or E-billing), showing the quantity of certified wood raw material that is purchased from the producer of the paper/carton/paperboard to the producer of the sanitary product.

O19 Paper/paperboard, production requirements (≥10.0 weight-%)

Paper/carton/paperboard must fulfil:

- Requirements in the criteria for Nordic Swan Ecolabelling of copy and printing paper (version 4 or later) with the exception of requirement to wood raw material and transportation (R7 and R11 in the Basic module for paper products, version 2), or comply with the Nordic Ecolabelling requirements for inspected paper. The requirements for inspected paper are given in Appendix 3.

or

- Requirements in the criteria for Nordic Swan Ecolabelling of tissue paper (version 5 or later) with the exception of requirement to wood raw material and transportation (R7 and R11 in the Basic module for paper products, version 2)

or

- Requirements in the criteria for Nordic Swan Ecolabelling of grease-proof paper (version 4 or later) with the exception of requirement to wood raw material and transportation (R7 and R11 in the Basic module for paper products, version 2).

For paper/carton/paperboard-types where there are now reference values for energy in the Basic module or additional modules (copy and graphic paper, tissue paper, grease-proof paper), the following reference values for energy must be used:

	Reference value fuel kWh/t	Reference value electricity kWh/t
Paper/carton/paperboard	1700	800

All the requirements (like energy and emissions) in the basic module, with the exception of requirement to wood raw material and transport, must be fulfilled.

If the paper is treated with silicone, O6 silicone must be fulfilled as well. Nordic Swan Ecolabelled grease-proof paper fulfils O6.

The application tool My Swan Account must be used.

- ☒ Documentation from the producer of paper/carton/paperboard showing that the requirements are fulfilled. If the paper material is already Nordic Swan Ecolabelled, the certification number must be submitted.

Background to the requirements for paper O17, O18 and O19

The requirements for paper are separated into different levels, dependent on the amount of paper in the product.

All types of paper above the limit of 1.0 weight-% must fulfil O17 which have several points. One of them is that the paper must not be coated with fluorine compounds or have fluorine added to the cellulose pulp. The use of fluorine additives appears to have increased and these are problematic from both a health and an environmental perspective. More information on the background to this requirement can be found in the background to the criteria for the Nordic Swan Ecolabelling of grease-proof paper⁵⁹.

The requirements concerning microbial activity and wet strength remain unchanged in this revision, and are the same as those set in the criteria for tissue paper. The paper's microbial activity gives an indication of whether the paper contains antimicrobial agents. The ban on high wet strength has been removed. But there is a requirement for information on the product that relevant products shall not be discarded in the toilet, see O41. Although wet strength agents may contain chlorinated organic compounds that are not beneficial to the environment, it is believed that these will not be added unnecessarily.

There is also a requirement to CoC-certification within the FSC or PEFC systems of the producer of paper/carton/paperboard. This certification contributes to traceability in the supply chain and the company can separate certified wood from not certified wood in the production, administration and warehousing. The remaining share of the wood complies with a number of minimum requirements to ensure that it can be considered as "legal timber".

⁵⁹ Nordisk Miljömärkning. Om Svanenmärkta Fettåta papper, tilläggsmodul Version 4.0.18 november 2014.
<http://www.svanemarket.no/for-bedrifter/sok-om-svanemarket/svanens-krav/papirprodukter/mat-og-bakepapir/>

If the product contains 10.0% by weight of paper or more, the requirements for the Nordic Swan Ecolabelling of paper must be fulfilled with the exception of requirement to wood raw material and transport. Nordic Ecolabelling chooses not to include transport requirement as this is comprehensive to document.

As the paper is not ecolabelled as such, but only an ingoing material in a sanitary product, requirement to transport is considered too comprehensive. There is also a requirement to certified wood raw materials in the paper. The certification limit is set to 50% certified wood raw material. The limit is based on Nordic Ecolabelling's experience and contact with the industry and comments received during the hearing for sanitary product and the hearing for new forestry requirements in 2015.

The requirements to Nordic Swan Ecolabelling of paper means that requirements are set for the fiber raw material (that it comes from sustainably managed forests), for chemicals used in the production, for energy consumption and for emissions of AOX, CO₂ (which are also restricted by the energy requirement) and other emissions such as oxygen-demanding organic compounds (COD), sulphur, nitrogen oxides (NO_x) and phosphorus. More information on the requirements for the Nordic Swan Ecolabelling of paper products can be found in the "Background document for the Basic and Chemical Modules, version 2"⁶⁰. See also chapter 7.5.3 for more general background information to the forestry requirements.

For some type of components in a sanitary product, like release paper, it can be used paper types that do not have reference values for energy in the Basic module for paper products, version 2. To make it possible for these kind of paper types to be used in a Nordic Swan Ecolabelled sanitary product, there are individual reference values that can be used when calculating the energy requirement. The reference values are the least stringent reference values in the Basic module today (reference value for fuel is 1700kWh/t and for electricity 800 kWh/t). It is only for the energy calculation separate reference values are set. All the requirements in the Basic module must be fulfilled and it is the requirement limits to e.g. energy and emissions in the Basic module that applies.

7.5.5 Wood materials

The requirements apply to components made from solid wood, such as the stick of a cotton bud.

020 **Origin, legality and traceability**

1. Tree species listed on Nordic Ecolabelling's list of prohibited tree species* are not permitted to be used.

* The list of prohibited tree species is located on the website: www.nordic-ecolabel.org/wood/

2. The producer/supplier of the wood raw material must state the name of the tree species (species name).
3. The supplier of the wood material to the sanitary producer must be Chain of Custody (CoC) certified according to FSC or PEF certification schemes.
4. A minimum of 70% by weight of all wood raw materials must come from certified forestry according to FSC or PEF certification schemes.

⁶⁰ Nordisk Miljömärkning. Bakgrundsdokument för bas- och kemikaliemodulerna, version 2. 22 juni 2011. <http://www.svanen.se/Foretag/Kriterier/kriterie/Pappersmoduler/>

The remaining proportion of wood raw material must be covered by the FSC/PEFC control schemes (FSC controlled wood/PEFC controlled sources).

The requirement may be documented as volume of wood purchased on an annual basis.

- ☒ Declaration from the producer /supplier that the requirement to tree species not permitted to be used are met. Appendix 1, form 8 may be used.
- ☒ Name (species name) on the tree species used in the sanitary product. Appendix 1, form 8 may be used.
- ☒ Copy of valid CoC-certificate or certificate number from all the suppliers which covers all the wood raw material used in the Nordic Swan Ecolabelled sanitary product.
- ☒ Documentation from the producer of the sanitary product showing amount of certified wood purchased. The purchased amounts shall be supported by an invoice or delivery note (paper or E-billing), showing the quantity of certified wood raw material that is purchased from the supplier of wood to the producer of the sanitary product.

Background to the requirement O20

It is not many parts of a sanitary product that are made of solid wood, but it can be used in for instance the stick of cotton buds and similar products. As the requirements now are based on the new forestry requirement in the Nordic Ecolabelling, the requirement is changed, but the certification limit is the same as before, 70%. For more background information on forestry requirements, see chapter 7.5.3.

7.5.6 Cotton

The requirements for cotton depend on the quantities involved (weight-% in relation to total weight of S+A). All cotton must fulfil O21. If cotton makes up 5.0 weight-% or more of (S+A), the requirements O22 and O23 must also be fulfilled.

O21 Cotton, bleaching with chlorine gas(≥1.0 weight-%)

The cotton must not be bleached with the aid of chlorine gas (Cl₂).

- ☒ Declaration from the cotton producer/supplier showing that the requirement is fulfilled. Duly completed and signed Appendix 1, form 9 may be used for the declaration.

O22 Cotton, raw fibre (≥5.0 weight-%)

The cotton must be organically cultivated or cultivated in the transitional phase to organic production.

The string on tampons is exempted from the requirement.

Organic means cotton grown in line with Council Regulation (EC) No 834/2007 of 28 June 2007 on organic production and labelling of organic products, or products produced in the same way and under similar control schemes. Examples include: KRAV, IFOAM, KBA, OCLA, TDA, DEMETER.

- ☒ Duly completed and signed Appendix 1, form 9 and attached certificate or transition certificate from a competent body for the certification of organic cultivation. Valid GOTS-certificate according to version 4 or later can be used to document that the cotton is organically cultivated. If in the case of cultivation in a transitional process no certificate is available, the ecolabelling organisation must be supplied with information on the supplier and method of cultivation and sufficient documentation showing that the cultivation is in the process of transition to organic production.
- ☒ Documentation showing that the producer of the sanitary product has purchased organically cultivated cotton.

O23 Cotton, additives (≥5.0 weight-%)

Substances added to cotton must fulfil the chemical requirements O3-O5.

- ☒ Duly completed and signed Appendix 1, form 9 from the supplier of cotton.

If chemicals are added, a list on the added chemicals and material safety data sheets must be submitted. Duly completed and signed Appendix 1, form 2a) can be used to document O3-O5.

Background to the requirements for cotton O21, O22 and O23

Our cotton requirement is strict but steerable for the manufacturer. We require all cotton used in 5.0 % by weight sanitary products and in the additional components to be organically cultivated. This brings major environmental gains compared with conventionally grown cotton, since chemical pesticides, defoliants and artificial fertilisers are not used. Cotton cultivation sometimes requires irrigation of large areas, which has an impact on the hydrology of the surrounding water resources and on biodiversity. It has been estimated that cotton cultivation accounts for 1-6% of the decline in global freshwater resources. It should, however, be stressed that irrigation and excessive use of water are not associated exclusively with cotton production. Water shortages are a general problem in agricultural areas. Cotton is grown in areas that use irrigation and in areas that only make use of rainwater. The amount of water used in production depends on the country/area and the irrigation method. It is thus not an environmental problem that can be resolved simply by means of organic production. The cotton requirement has not been changed in this version.

7.5.7 Regenerated cellulose

The requirements for regenerated cellulose depend on the quantities involved. All regenerated cellulose must fulfil O24. If regenerated cellulose makes up 10.0% by weight or more of (S+A), requirement O25 must be fulfilled.

O24 Regenerated cellulose, bleaching (≥1.0 weight-%)

Chlorine gas (Cl₂) must not be used to bleach cellulose pulp or cellulose fibre.

The resulting total amount of adsorbable organic halogens (AOX) and organically bound chlorine (OCl) must not exceed:

- 0.15 kg/ADt of fibre pulp in wastewater from the fibre pulp production (AOX) and
- 150 ppm in the finished fibre (OCl)

Information on sampling, methods of analyses and analysis laboratories is provided in Appendix 2 in the criteria document.

- ☒ Declaration from the manufacturers of the cellulose pulp and regenerated cellulose that the requirement is fulfilled including a test report. Appendix 1, form 10 can be used.

O25 Regenerated cellulose, production requirements (≥10.0 weight-%)

COD emissions from the production of cellulose pulp and regenerated cellulose must not exceed a combined total of 45 kg/ADt of regenerated cellulose.

Sulphur emissions to air from dissolving of the pulp and fibre production must not exceed more than 20 g/kg of regenerated cellulose fibre expressed as an annual average.

Zinc emissions to water from dissolving of the pulp and production of fibre must not exceed 0.2 kg Zn/kg of regenerated cellulose fibre, expressed as an annual average.

The quantity of oxygen depleting substances may also be stated as the equivalent quantity of TOC.

Information on sampling, methods of analysis and analysis laboratories is provided in Appendix 2.

- ☒ Duly completed and signed Appendix 1, form 10 from the producer of cellulose pulp and producer of regenerated cellulose. Test report from the production of cellulose pulp and regenerated cellulose showing that the requirement is fulfilled. The methods of analysis must be described and the laboratories use must be stated. The sanitary producer must inform the producer of regenerated cellulose on which paragraphs on the form to fill in.

Background to the requirements O24 and O25

Regenerated cellulose fibre is a type of regenerated cellulose fibre made from raw materials such as wood, bamboo and cotton (cotton linters). Regenerated cellulose may comprise filament fibre or staple fibre. Filament fibre is long, continuous fibre and is used in products as a replacement for silk. For staple fibre, the fibre is cut up before being spun. The product is then more like natural fibre, which is mainly staple fibre, e.g. wool and cotton. According to the Global and China Regenerated cellulose Fiber Industry Report from 2013⁶¹, regenerated cellulose staple fibre production accounts for around 90% of total produced regenerated cellulose. Rayon is a general term for regenerated cellulose fibre⁶², but in everyday speech rayon and regenerated cellulose are often interchangeable. Modal and lyocell are other regenerated cellulose fibre. Modal fibre is a second-generation regenerated cellulose fibre developed by Lenzing. Modal is manufactured using a modified regenerated cellulose process that gives fibre with higher dry and wet strength, improved dimensional stability, and greater durability⁶³. Lyocell is a relatively new cellulose fibre that is similar to regenerated cellulose, but more durable. Lyocell is also known by the trade name Tencel, which Lenzing has patented.

The following market data is taken from the Global and China Regenerated cellulose Fiber Industry Report from 2013, as referred to above. The majority of regenerated cellulose production is based in Asia (approx. 80%) with China as the dominant country (approx. 62%). China largely produces first-generation regenerated cellulose. In 2012, the Aditya Birla Group was the world's largest manufacturer of regenerated cellulose, with a capacity of around 800,000 tonnes, with factories in countries such as India, Thailand, Indonesia and China. Austria's Lenzing was ranked second with a regenerated cellulose capacity of 770,000 tonnes (2011) and factories in Austria, Indonesia, China, the UK and the USA, and it also has a monopolistic position in lyocell fibre and modal fibre production. Other major regenerated cellulose fibre manufacturers are located mainly in China.

Production process

For a detailed description of the regenerated cellulose and lyocell process, see the report Reference Document on Best Available Techniques (BREF) in the Production of Polymers, August 2007⁶⁴. A brief summary appears below.

Regenerated cellulose fibre is based on cellulose fibre. Cellulose pulp is used and it is desirable to have more than 89% pure alpha-cellulose, i.e. most of the lignin and hemicellulose is removed from the wood fibre. After refining and bleaching with NaOH

⁶¹ Research in China; Global and China Viscose Fiber Industry Report, 2012-2015, 2013. Sammendrag og presentasjon av rapporten finnes på Research in China sine hjemmesider:

<http://www.researchinchina.com/htmls/report/2013/6635.html> (10/10-14)

⁶² Wikipedia.com «Rayon»: <http://en.wikipedia.org/wiki/Rayon>

⁶³ Om Modal på hjemmesiden til European Man-made Fibres Association:

<http://www.cirfs.org/manmadefibres/fibrerange/Modal.aspx> (13/10-14)

⁶⁴ Reference Document on Best Available Techniques in the Production of Polymers, August 2007

(alkalisation), the pulp swells and is further treated with CS₂ to form cellulose xanthogenate. (The suspension has high viscosity, hence the name regenerated cellulose). This coagulates in an acid bath containing H₂SO₄, NaSO₄ and ZnSO₄. After further ripening, filtering and degassing, the regenerated cellulose is spun. Since regenerated cellulose is normally based on chemical pulp, there may be major emissions of COD from the production. The manufacture of regenerated cellulose also generates emissions of sulphur and zinc. Lyocell fibre has been manufactured since 1998, in a slightly different process where the pulp is dissolved in an organic solvent (NMMO = N-methylmorpholine-N-oxide) instead of CS₂/NaOH. The solvent is fully biodegradable and can dissolve the cellulose without chemical processing.

For more information on the environmental problems associated with the production of cellulose pulp, see also Nordic Ecolabelling's background document for the Basic Module for cellulose pulp production.

Background to the requirements

The production of regenerated cellulose is covered by the EU's Reference Document on Best Available Techniques (BREF) for polymers and for pulp, paper and board. All the EU BREF documents are available on the European Commission's Joint Research Centre website⁶⁵. Table B1 in Appendix 1 gives an overview of BAT values from the two BREF reports. Also included are the requirements set for regenerated cellulose in the EU Ecolabel's criteria for textiles from 2014 and AHP (absorbent hygiene products). The table additionally features Nordic Ecolabelling's requirements for regenerated cellulose in version 5 of the sanitary product criteria and in version 4 of the textile criteria.

Raw material extraction:

The raw material for regenerated cellulose fibre, e.g. regenerated cellulose, is primarily wood pulp and cotton (cotton linters), but it may also be bamboo. A requirement was recently added to the criteria for textiles (version 4) stating that the raw materials must come from sustainable and legal sources. There is currently little experience of these requirements, and requirements have therefore not been introduced so far back in the chain in this revision of the criteria for sanitary products.

Chlorine gas and AOX:

The requirement states that the cellulose pulp must not be bleached with chlorine gas. Chlorine gas is no longer used in Europe, but its use has not ended everywhere in the world. Chlorine gas is an effective bleaching agent, but it causes considerable emissions of organochlorine substances. There are now good alternative bleaching methods for cellulose pulp. According to Lenzing⁶⁶ bleaching with ClO₂ is the industry standard for dissolving pulp. The industry standard for regenerated cellulose and lyocell fibre is NaClO bleaching. This is referred to as ECF (elemental chlorine free) bleaching. Some manufacturers also use the TCF (total chlorine free) bleaching method. Version 6 of the criteria introduces a limit value for emissions of AOX in cellulose pulp production, which corresponds with the requirement for the production of fluff/cellulose pulp. In addition, there is now a limit value for organically bound chlorine in the actual fibre, in line with the EU Ecolabel's requirements for absorbent hygiene products.

⁶⁵ EU Kommissionens BREF-dokumenter er tilgjengelige på siden: <http://eippcb.jrc.ec.europa.eu/reference/>

⁶⁶ Høringssvar fra Lenzing til versjon 5 av kriteriene (2007)

COD:

The requirement set for COD emissions applies to both the manufacture of the pulp and the further production of the regenerated cellulose.

Instead of measuring COD, TOC may be measured, if there is a correlation between the two values for the production process. Routine analysis of COD applying the ampoule method makes use of environmentally harmful mercury (Hg), and so several companies now use TOC as the parameter. The BAT-associated emission level for COD is set to (3-8 kg/ADt) for regenerated cellulose and (10-30 kg/ADt) for dissolving pulp in EU BAT-report 2015⁶⁷. However, it is clearly stated in report (table 8.12) that these BAT-associated emission levels are not applicable to dissolving pulp mills and to the manufacturing of speciality pulp for chemical applications. The process of making sulphite pulp to paper or dissolving pulp is nearly to the same. The big difference is the exchange of paper/dissolving pulp. To make viscose, a pure cellulose is required, which means that the yield is only 35-38%. This means that more hemicellulose has to be removed from the pulp. The reason for that several dissolving sulphite pulp mills have a slightly higher COD value relative to BAT are due to lack of effective purification process. Based on both the recommended BAT values and COD emission data from license holders and other producers of dissolving pulp the requirement has been tightened from 55 to 45 kg/ADt regenerated cellulose in generation 6.

Sulphur, Zinc and Copper:

The requirement concerning emissions of sulphur to air has been kept at the same level as before, and has proven to be achievable for licensees. During the revision of the EU Ecolabel's criteria for textiles, it was suggested that the sulphur emission requirement should be tightened to 12.5 g S/kg for staple fibre. Stakeholders⁶⁸ commented that this is not achievable and that the limit of 30 g S/kg already requires a combination of different recycling technologies. There is no differentiation between staple and filament fibre in the requirement, since staple fibre is the relevant fibre for the product group. The level of 20 g S/kg in version 5 of the criteria has proven achievable for licensees and the requirement level has therefore been kept as it is.

A requirement was proposed for emissions of zinc and copper in the EU Ecolabel's criteria for textiles and absorbent hygiene products, but these requirements were deleted from the final criteria. A copper requirement is relevant for cupro fibre, which is made from the hairs on a cotton plant (cotton linters) with a blend of copper and ammonia as a solvent ($\text{Cu}(\text{NH}_3)_4(\text{OH})_2$). This may still be produced outside the EU⁶⁹. The fibre is produced as filament fibre, and is therefore mainly of interest as a replacement for silk, for example as liner in suits. Cupro fibre is not considered relevant for the product group sanitary products, and the requirement concerning cupro fibre has therefore been removed from this version of the criteria. The limit value for emissions of zinc in version 5 of the criteria has been retained in version 6, since the value has proven to be at a relevant level.

Energy

In generation 6 there is also a requirement to the energy use in the pulp production (dissolving pulp) that are used in the production of regenerated cellulose. It refers to the

⁶⁷ http://eippcb.jrc.ec.europa.eu/reference/BREF/PP_revised_BREF_2015.pdf (visited 07-02-18)

⁶⁸ Rapporten «Stakeholder table of comments/responses», oktober 2013 på EU Ecolabels kriterieutviklingsnettside for tekstiler: <http://susproc.jrc.ec.europa.eu/textiles/stakeholders.html> (15/10-14)

⁶⁹ Rapporten «Technical background report», oktober 2013 på EU Ecolabels kriterieutviklingsnettside for tekstiler: <http://susproc.jrc.ec.europa.eu/textiles/stakeholders.html> (15/10-14)

energy requirement in O16 which again refers to the Basic Module. In retrospect, it has proved to be problematic to refer to the Basic Module as there are now specific values for production of dissolving pulp there. This production is different from the production of cellulose pulp to be used in production of paper.

Nordic Ecolabelling has not had requirements for energy use for dissolving pulps earlier and do not have requirements for this in the criteria for textiles. Nordic Ecolabelling therefore do not have any specific information about the energy use in the production of dissolving pulp. The overall assessment was therefore to delete the energy requirement from the sanitary criteria while at the same time attempting to collect information about energy consumption in the revision for textiles. This was decided on 24 May 2017.

The regenerated cellulose requirements in version 6 of the criteria for sanitary products do not entirely match the Nordic Swan Ecolabelling and EU Ecolabel requirements for textiles. Regenerated cellulose that is labelled with either the Nordic Swan Ecolabel or the EU Ecolabel does, however, automatically meet the regenerated cellulose requirements in version 6 of the criteria for sanitary products.

As for pulp and paper, the requirements are set only when the materials are included with 10.0% by weight or more.

7.5.8 Plastic

Polymers/plastic materials that are subject to requirements when used in sanitary products, additional components and primary packaging are: polyethylene (PE), polypropylene (PP), polyester (PET), polystyrene (PS), polyamide (PA), ethylene vinyl acetate (EVA) and polyether/polyurethane (e.g. elastane, spandex, foam) and bio-based polymers.

Superabsorbent (e.g. SAP and bio-based SAP), regenerated cellulose and cotton are covered in this section. Other polymers may be included together with other materials for which no requirements have been set, up to a maximum of 5.0% by weight, with maximum 2.0% by weight for each material type, see O2. This means, for example, that silicone materials may be used in small quantities, even though no silicone polymer requirement has been set. However, if silicone is used as an additive in other materials or as a coating, requirement O6 must be fulfilled.

For polymers/plastic materials (such as foil or other components), there are general requirements concerning additives to or constituent substances of the polymer. For bio-based polymers there is an additional requirement concerning the renewable raw material if it is palm oil, soy or sugar cane.

The requirements to plastic (fossil based or bio-based) are divided into separate levels dependent of the amount of the polymer in the product, and there is a mandatory requirement that forbid the use of halogen-based plastic materials.

The component and polymer requirements are divided into two different levels, depending on the quantities involved in relation to (S+A).

026 Halogen-based plastic

Sanitary products, additional components and their packaging must not be halogen-based, e.g. PVC.

- ☒ Declaration from the producer of the sanitary product (Appendix 1, form 4) showing that the requirement is fulfilled.

027 **Plastic included in components**

Part A:

The requirement includes plastic contained in components which make up more than 1.0% by weight of the sanitary product and the additional components (S + A), (eg film, foil or foam).

The following substances must not be present in the polymer apart from impurities*:

- a) halogenated organic compounds
- b) phthalates
- c) organotin compounds
- d) compounds based on lead, cadmium, chromium^{VI} and mercury

Polyester: The amount of antimony in polyester, measured as an average value on an annual basis, must not exceed 260 ppm (the requirement does not, however, apply to recycled polyester).

Antimony shall be tested using the following method: Direct determination by atomic absorption spectrometry. The test shall be executed on raw fibre.

**For definition of impurities, see chapter 2.1 Requirements to chemical products or Terms and definitions.*

The requirement shall be documented by a declaration from the component manufacturer based on knowledge gathered from and requirements made to its suppliers, or by use of a test. See explanation below:

- If test is used, the test can be performed by the producer of polymer/plastic or a part in the supply chain, e.g. a nonwoven supplier. If the test is performed by someone other than the polymer/plastic producer, the test must be done on the virgin plastic raw materials before the supplier receiving it has done any modifications, like adhesives or other additives. See Appendix 2 for information on test methods and laboratory for analysis.

Part B:

The requirements includes components of plastic included in the sanitary product and the additional components (S + A) by 5.0% by weight or more.

If the component manufacture add chemical product to the component of plastic, they must comply with the chemical requirements O3-O5. O3-O5 can be documented with a declaration from the producer of component manufacturer.

- ☒ For part A) Declaration from the component manufacture that the requirement is fulfilled. Appendix 1, form 11 can be used.

Alternatively

- ☒ For part A) Test report showing that the requirement is met. Information about test methods and analysis laboratories is provided in Appendix 2.
- ☒ For part B) Declaration from the component manufacture that the requirement is fulfilled. Appendix 1, form 11 can be used.

028 **Polyurethane/Elastane (≥5.0 weight-%)**

The requirement includes elastane / polyurethane which accounts for 5.0 wt % or more relative to the total weight of the sanitary hygiene product and the additional components (S + A).

- a) A closed process must be used when using isocyanate in the production.
- b) Organotin compounds shall not be used.
- c) Fibre (as elastan and spandex)

Emissions to air of aromatic diisocyanates during polymerisation and, if applicable, spinning must be less than 5 mg/kg of produced fibre, expressed as

an annual average.

N,N-Dimethylacetamide (DMAc, CAS no. 127-19-5) must not be used in the production of elastane.

- d) PUR foam and thermoplastic PUR must fulfil "criterion 2 Polyurethane (PUR) foam" in EU Ecoabels criteria for "Bed mattresses"*. See appendix 6 for the requirements.

** EU Ecolabel for bed mattresses (2014/391/EU).*

- ☒ Declaration from the polymer producer that the requirement is fulfilled. Duly completed and signed Appendix 1, Form 12 may be used in addition to test reports from the polymer producer.
- ☒ For d), documentation according to EU Ecolabels criteria for Bed mattresses (2014/391/EU).

029 **Polyamide (≥5.0 weight-%)**

The requirement includes polyamide which accounts for 5.0 wt.% or more relative to the total weight of the sanitary hygiene product and the additional components (S + A).

Emissions of nitrogen dioxide (N₂O) to the air from the production of monomers must not exceed 9 g/kg caprolactam (for PA 6) or adipinsyre (for PA 6.6), expressed as an annual average.

- ☒ Detailed information and/or a test report from the polyamide producer showing that the requirement is fulfilled. Duly completed and signed Appendix 1, form 13 may be used.

030 **Palm oil, soybean oil and sugar cane as feedstock for bio-based polymer (≥20.0 weight-%)**

The following requirements apply if a polymer based on the raw materials palm oil, soy and sugar cane constitutes 20.0 weight-% or more of (S+A):

- Palm oil must be RSPO certified
- Soy oil must be RTRS certified
- Sugar cane must be Bonsucro certified

The supplier of certified raw material must be chain of custody certified (CoC) in accordance with the certification scheme and the traceability must be secured via mass balance. Book and claim-system will not be accepted.

The producer of the bio-based polymer must document that certified raw material is purchased.

** Nordic Ecolabelling can evaluate other certification schemes for the raw materials mentioned above if applicable. The certification scheme will be evaluated according to the Nordic Ecolabelling's requirements set for standard and certification scheme given in Appendix 4.*

- ☒ Copy of valid chain of custody certificate or certificate number.
- ☒ Documentation like invoice or delivery note showing that certified raw material has been purchased.

031 **Recycled plastic**

Requirement a) applies to recycled plastic in additional components and primary packaging if the recycled plastic constitutes ≥1.0 weight-% in the additional component or primary packaging.

Requirement b) and c) applies to recycled plastic in the sanitary product. Requirement b) applies if the recycled plastic constitutes ≥1.0 weight-% in the sanitary product.

Requirement c) applies if the recycled plastic constitutes ≥ 20.0 weight-% in the sanitary product.

Recycled plastic must comprise pre- and/or post-consumer* recycled material.

Additional components and primary packaging

- a) Recycled plastic must not contain polybrominated biphenyls or diphenyl ethers, phthalates, organotin compounds, lead, cadmium, mercury or chromium VI. Impurities up to 100 ppm are, however, permitted.

Sanitary product

- b) ≥ 1.0 weight-% in the sanitary product: Recycled plastic must meet the requirements for recycled plastic materials and articles intended to come into contact with foods** and fulfil O26.
- c) ≥ 20.0 weight-% in the sanitary product: chemicals added to the recycled plastic must fulfil the requirements O3- O5.

** Pre- and/or post-consumer recycled material is defined in the standard ISO 14 021. Recycled materials can be post-consumed material like discarded plastic products and packaging from the end-user as households or commercial, industrial or institutional facilities or be pre-consumed material like reprocessed production scrap. Rework, regrind or scrap generated in a process and capable of being reclaimed within the same process that generated it is not considered as recycled material.*

*** EU commission regulation (EC) No 282/2008 on recycled plastic materials and articles intended to come into contact with foods. If it can be documented that the recycled material originates from a closed system, like recycling of PET-bottles (e.g. if PET-granulate are used from this process or from bottles that no longer can be reused), it is not necessary to document that the requirement for recycled plastic in contact with food is fulfilled.*

- ☒ Part a): Test report for the content of the substances in part a) of the recycled plastic. If it can be documented that the material comes from known sources (with traceability from the recycled product to the finished recycled plastic material) where it has been established that this type of content is unlikely to occur, it is sufficient to demonstrate traceability to the source and describe why a test is not necessary. Duly completed and signed Appendix 1, form 14 can be used.
- ☒ Part b) Documentation showing that the recycled plastic material fulfils the requirements to recycled plastic in contact with food. Duly completed and signed Appendix 1, form 14 can be used.
- ☒ Part c) Declaration from the supplier of plastic that the requirements O3-O5 are fulfilled.

Background to the requirements

PVC

The requirement prohibiting halogenated polymers remains unchanged from the previous version of the criteria. It is a requirement that Nordic Ecolabelling includes in many criteria where the plastic materials have a short lifetime, and is primarily a requirement that excludes the use of PVC. PVC is probably not relevant in the actual sanitary products. The requirement ensures that PVC is also not used in the packaging.

The key problem areas for PVC are described in Nordic Ecolabelling's background report on floor coverings⁷⁰. Below is a brief summary of the environmental challenges associated with the use of PVC.

The environmental impact of PVC is associated primarily with waste management, the use of additives and dioxin emissions, for example in the production of PVC, plus the use of mercury in the production of the chlorine. According to the report "Hazardous substances in plastic materials"⁷¹ published by the Norwegian Environment Agency in 2013, PVC may have over 50% plasticiser added, of which phthalates remain the most popular since they are cheap and have solubility parameters that are very similar to the PVC polymer. PVC requires stabilisers to tolerate the temperatures needed to manufacture a PVC product (extrusion, injection moulding, etc). These stabilisers may be based on lead, metal mixtures (such as barium-zinc and calcium-zinc), tin or cadmium.

Overall, the environmental impact associated with the production, use and disposal of PVC is steadily reducing, in part due to new knowledge and technical advances. However, there is every suggestion that problems associated with PVC remain. There are also not good enough controls over PVC imported into the EU and the Nordic region from other parts of the world, which is not subject to the same European restrictions. For Nordic Swan Ecolabelled sanitary products, which are disposable, there is therefore a ban on the use of PVC in the products and their packaging.

Additives to plastics and polymers

The report "Hazardous substances in plastic materials"⁷² was published by the Norwegian Environment Agency in 2013. It was prepared by COWI in cooperation with the Danish Technological Institute. According to the report, the following "hazardous substances" are relevant for different types of polymer (PVC is not included because PVC is excluded from use in sanitary products):

LDPE and HDPE: colourants/pigments, flame retardants (cables, electronics).
Chromium oxide might be used as a catalyst (the Phillips method).

PP: antioxidants, colourants/pigments, flame retardants (cables, electronics).

PET: colourants/pigments. Antimony is not mentioned.

PU: flame retardants (relevant in UK) and biocides (methyl fumarate is named as an example). Mercury may occur as an impurity, as it is used as a catalyst in the production of PU polymers.

The report also goes through specific prioritised substances in plastics. The following additives may be relevant for the plastic types used in sanitary products:

- Arsenic and its compounds: used in antimicrobial additives such as 10,10'-oxybisphenoxarsine (OBPA). OBPA accounts for 70% of the demand for antimicrobials in plastics. Relevant for soft PVC, PUR, LDPE and polyester.

⁷⁰ Nordisk Miljömärkning. Om Svanenmärkta Golv, Version 6.0. Bakgrund för miljömärkning 18. November 2014. <http://www.svanemerket.no/for-bedrifter/sok-om-svanemerket/svanens-krav/byggevarer-og-hus/gulv/> (hentet 8. juni 2015)

⁷¹ Klima- og forurensningsdirektoratet, Hazardous substances in plastic materials, Cowi, januar 2013.

⁷² Klima- og forurensningsdirektoratet, Hazardous substances in plastic materials, Cowi, januar 2013.

- Triclosan (CAS no. 3380-34-5): PE, PP, PET, PA, PVC
- Organotin compounds: here only polyurethane foam and PVC are named as relevant, as a catalyst and a stabiliser respectively. For dibutyltin used as a catalyst, the normal residue concentration in polyurethanes is 0.05-0.3% (i.e. from 500 ppm).
- 2,2'-dichloro-4,4'-methylenedianiline (MOCA): most relevant for PU (crosslinker), but also polystyrene (curing agent)
- Diisobutyl phthalate (DIBP): polystyrene
- Pigments based on lead, chromium, cobalt: relevant for dyed polymers.

The requirements set for additives in polymers prohibit the use of antibacterial additives. It is therefore not possible to use triclosan or other antibacterial additives. Flame retardants, organotin compounds, phthalates and additives based on lead, chromium and cadmium that are listed as hazardous are also prohibited in chemical requirement O5. The report from COWI also mentions pigments based on cobalt, but these are not prohibited in this version of the criteria. The crosslinker 2,2'-dichloro-4,4'-methylenedianiline (MOCA) is on the ECHA's Candidate List and thus cannot be used for that reason. The ban on organotin compounds may make it difficult to find polyurethane foam that meets the requirements, since it is common to use organotin compounds as a catalyst in production. Requirement O5 sets a limit of 100 ppm for impurities from the raw material production.

Halogenated organic pigments are also prohibited via the requirement concerning "Other excluded substances" (O5), but there is an exception if the pigments comply with European Council resolution AP (89) 1 on the use of colourants in plastic materials coming into contact with food.

Antimony/Polyester

Antimony trioxide (CAS no. 1309-64-4) is not named in the report from the Norwegian Environment Agency, but it is mentioned in the 2014 report "Everything you (don't) want to know about plastic" by the Swedish Society for Nature Conservation⁷³ as carcinogenic and as the key catalyst in PET production. EU Regulation No. 10/2011 "Plastic materials and articles intended to come into contact with food" sets a limit for antimony of 0.04 mg antimony per kg of food, expressed as migrated antimony. This limit value says nothing about the content of antimony in the actual polyester material.

Of the world's PET production of around 60 million tonnes per year, approximately 65% is used for textile fibre and about 30% for packaging/bottles⁷⁴. The production process for PET fibre often uses the catalyst diantimony trioxide (Sb₂O₃). This substance is used primarily as a flame retardant in plastic materials and textiles, and as a catalyst in PET production and in pigment. Version 5 of the criteria has a requirement concerning residues of the antimony catalyst in polyester, since antimony is harmful to health, with the classification Carc 2 (formerly cat 3) and has been risk-assessed as an existing

⁷³ Klar, M., Gunnarsson, D., Prevodnik, A., Hedfors, C. og Dahl, U., Allt du (inte) vill veta om plast, Naturskyddsföreningen, 2014

⁷⁴ Om PET på Wikipeda.com (august 2012)

substance in EU 2008 (SE)⁷⁵. The risk assessment concluded that the classification of the substance should remain (without environmental hazard classification).

The report states that the risk areas that should be further investigated were human and environmental exposure to pure diantimony trioxide, including in the PET industry. Polyester usually contains antimony in concentrations of 150-350 ppm (mg/kg)⁷⁶. As part of the EU Ecolabel's work on criteria for textiles in 2001-2002, information on "best available technology" (BAT) and submissions from the PET fibre industry led to a decision that 260 ppm was a suitable base level for the EU Ecolabel, with a best level of "antimony free". In the EU Ecolabel's criteria for textiles from 2014, the level remains at 260 ppm. The EU Ecolabel's criteria for absorbent hygiene products does not have a separate requirement for antimony, but antimony trioxide is limited to a maximum of 1000 ppm through the requirement limiting classified compounds, as mentioned above.

Work on developing alternative catalysts is underway, but Nordic Ecolabelling has no information on any major successes so far, and the situation will be monitored until the next revision. According to a player in the textile market, there is greater pressure to phase out antimony in the production of PET bottles than there is on textiles, since PET bottles are used in the food industry. In order to minimise anthropogenic production and accumulation of and exposure to harmful substances in the ecocycle, Nordic Ecolabelling should continue to set a limiting requirement concerning residues of such substances, even if the requirement serves primarily as a signal to the industry to maintain a good technical level in the production of PET. Since the content of diantimony trioxide (Sb_2O_3) in finished PET fibre can vary somewhat, the limit value is set as an average over a period of one year. In version 6 of the criteria, the limit value is set at 260 ppm, because experience shows that it is a challenge to find polyester producers that come in below this value.

Requirements for the documentation of requirement O27 (plastic included in components), Part A, shall be declared by the component manufacturer or by the use of a test. When using a test, this can be carried out by a manufacturer of the plastic material or a later link in the supply chain, for example nonwoven supplier. If the testing is done by a later point in the supply chain, it must be tested on the pure plastic material, that is, the material that the supplier receives without further compilation with, for example, glue or other additives.

Declaration by the component manufacturer must be based on knowledge gathered and requirements made to its suppliers. That is, the responsibility for fulfilling the requirement throughout the supply chain is placed on the component manufacturer. Nordic Ecolabelling is aware that it is generally difficult to obtain information from the polymer producers and the plastics industry. The long supply chain makes it extra challenging. However, the requirement saying that the declaration from the component manufacturer must base on an ongoing dialogue with its suppliers ensures that this potentially captures any replacements of suppliers. Nordic Ecolabelling does not require documentation for the component manufacturer's dialogue with its suppliers during licensing, but may request this on audits.

Requirement O27 part B includes components of plastic included in the sanitary hygiene product and additional components (S + A) with 5% by weight or more. If the

⁷⁵ European Union, Risk Assessment Report DIANTIMONY TRIOXIDE, Swedish Chemicals Inspectorate, DRAFT 2008

⁷⁶ Miljøstyrelsen, Miljøprojekt nr. 892, 2004, Antimon - forbrug, spredning og risiko

component manufacturer add chemical products to the component of plastic, they must comply with the chemical requirements O3-O5.

Experience from licensing shows that applicants indicate the percentage composition of a product, stating the name and quantity of the different components. With requirement O27 part b we ensure that all essential components are covered by the requirements.

Polystyrene

Polystyrene was introduced as one of the polymers which have specific requirements in version 5.2 of the criteria. Polystyrene is a thermoplastic with uses that include food packaging⁷⁷. Polystyrene is produced through the polymerisation of styrene. Styrene is classified as harmful to health and as an irritant (Xn; R20, Xi; R36/38) and is furthermore placed on the Danish Working Environment Authority's list of carcinogenic substances, with a limit of 25 ppm in the working environment. An EU Risk Assessment Report (EU RAR) was drawn up for styrene in 2008 and this report has subsequently been evaluated by the Scientific Committee on Health and Environmental Risks (SCHER). SCHER disagrees with the conclusion in the EU RAR, which indicates that there is no need for concern in relation to human carcinogenicity, but apart from that SCHER generally agrees with the exposure and effect assessments made. SCHER concludes that – apart from specific exposure scenarios (boat building, working with styrene containing liquids or styrene based pastes) – there is no need for further information or risk reduction measures beyond those already being applied for consumers⁷⁸. The EU Directive relating to plastic materials and articles intended to come into contact with foodstuffs (2002/72/EC) sets no limitations on the content of styrene monomers. Based on the above, it is thus not considered relevant to establish limit values for the content of styrene in sanitary products in the criteria for the Nordic Swan Ecolabelling of sanitary products.

Polyamide

In version 6 of the criteria document for sanitary products are introduced specific requirements for the manufacture of polyamide (PA) and polyurethane (PUR). Both polyamide and polyurethane used partly as a carrier material in plaster⁷⁹. Energy Requirements for PA6 and PA6.6 are taken from Plastics Europe's Ecoprofiles^{80,81}, see Table 4 for values. In these reports, overviews of the manufacturing processes for the two polymers are given. For PA6 and PA6.6 there is in addition set a requirement regarding emission of nitrogen dioxide to the air from the preparation of the monomers caprolactam (PA 6) and adipic acid (PA 6.6). This value is taken from the EU Ecolabel requirements for textiles from 2014⁸².

Elastane/Polyurethane

Elastane is a polyurethane elastomer. It is not used alone as a textile fibre, but is

⁷⁷ Informasjon om polystyren på Wikipedia, <http://en.wikipedia.org/wiki/Polystyrene>

⁷⁸ SCHER 2008: Risk Assessment Report on Styrene Human Health Part, May 2008. http://ec.europa.eu/health/ph_risk/committees/04_scher/docs/scher_o_095.pdf

⁷⁹ Epost korrespondanse med Beiersdorf 7/11-13

⁸⁰ Eco-profiles and Environmental Product Declarations for the European Plastics Manufacturers Polyamide 6.6 (PA6.6), Plastics Europe February 2014.

⁸¹ Eco-profiles and Environmental Product Declarations for the European Plastics Manufacturers Polyamide 6 (PA6), Plastics Europe February 2014.

⁸² COMMISSION DECISION of 5 June 2014 establishing the ecological criteria for the award of the EU Ecolabel for textile products (2014/350/EU)

incorporated into other materials to make them elastic. The catalyst in the polymerisation may be either special amines or organotin compounds⁸³.

Organotin compounds are highly toxic to both people and animals⁸⁴, and there is a requirement that polymers must not include organotin compounds.

Elastane can be produced in four different ways: through extrusion, reaction spinning, solution dry spinning or solution wet spinning⁸⁵. Solution dry spinning is used to produce 94.5% of the world's elastane. This method uses dimethylacetamide (DMAc) as a solvent⁸⁶. Many other solutions may also be used, including dimethylformamide (DMF) and nitric acid (HNO₃). DMAc was entered onto the Candidate List for REACH in 2012. According to BREF Polymer⁸⁷, residues of DMAc may be found in the fibre (<1% of the fibres' weight) and also in the wastewater from pre-treatment. To ensure the plasticity of the fibre during processing, auxiliary chemicals are added to the fibre. These auxiliary chemicals contain 95% silicone-based oils and 5% surfactants. High levels of silicone oil have an environmental impact during the pre-treatment of textiles, when these chemicals are removed. Established manufacturers of elastane fibre are Invista, Hyosung, Asahi Kasei and RadiciSpandex⁸⁸.

The report "Hazardous substances in plastic materials"⁸⁹ points out that mercury may be used as a catalyst in the production of PU polymers, but it is unclear whether these polymer types are relevant to sanitary products. The report states that mercury was formerly used as an antibacterial agent in plastic, but it is not thought to be used any longer. It may, however, occur as a catalyst, and mercury is therefore prohibited in polymers that form part of Nordic Swan Ecolabelled sanitary products. The report states that new products will typically contain 0.1-0.3% mercury.

In version 6 criteria of the criteria for sanitary products, additional requirements for PUR foams and thermoplastic PUR are introduced in addition to the requirements to elastane. PUR foam is used in wash cloths and thermoplastic polyurethane used in adhesive plaster. In these product types, a significant amount of PUR can be included. It's introduced a requirement that the manufacture of PUR shall meet "criterion 2" in EU Ecoabels criteria for Bed mattresses⁹⁰. This including requirements for biocides, plasticisers, heavy metals, monomers, organotin compounds, VOC emissions, total chlorine content and blowing agents.

Background - no energy requirement

As mentioned under the RPS, the production of the constituent materials accounts for the greatest environmental impact from a sanitary product. It is therefore desirable to promote the materials that require least energy to produce and have the lowest GWP value over their lifetime, in addition to reducing use of environmentally problematic chemicals during production. Therefore, Nordic Ecolabelling did have a requirement to production energy for fossil based and bio-based polymers in the hearing version to

⁸³ EU Ecolabels bakgrunnsrapport; "Establishment of ecological criteria for textile products", final report April 1998

⁸⁴ <http://www.miljostatus.no/tema/Kjemikalier/Noen-farlige-kjemikalier/TBT/> (tilgjengelig 18.11.2011)

⁸⁵ Wikipedia.com: <http://en.wikipedia.org/wiki/Elastane> (sept 2012)

⁸⁶ <http://www.kpatents.com/pdf/applications/apn-4-05-03.pdf> (sept 2012)

⁸⁷ BREF-dokument for polymerer, 2007, er tilgjengelig på følgende nettsted:

http://eippcb.jrc.ec.europa.eu/reference/BREF/pol_bref_0807.pdf

⁸⁸ <http://www.textilesintelligence.com/til/press.cfm?prid=440>

⁸⁹ Klima- og forurensningsdirektoratet, Hazardous substances in plastic materials, Cowi, januar 2013.

⁹⁰ COMMISSION DECISION of 23 June 2014 establishing the ecological criteria for the award of the EU Ecolabel for bed mattresses (notified under document C(2014) 4083) (2014/391/EU)

generation 6 of the criteria. After the hearing the requirement has been removed as the steerability for such a requirement is very low, especially for the fossil based polymers. This is basically due to the fact that it is very difficult to obtain factory-specific data about the energy consumption and not that such a requirement is irrelevant.

The fossil polymer industry is based on Nordic Ecolabelling's experience, more negative to give information, while the bio-based polymer industry is more open. The requirement is however also removed for bio-based polymers, as Nordic Ecolabelling does not want to have stricter requirements to bio-based than fossil based polymers. As the criteria wants to stimulate the use of bio-based materials, it is important that the requirement burden not is bigger for bio-based than for fossil based polymers.

About bio-based plastics/bio-based polymers

The market for bio-based polymers has previously been dominated by plastic materials made for composting. In recent years, there has been a major increase in bio-based plastics which have the same properties as fossil plastics, are not compostable, are included in recycling systems and are able to directly replace fossil plastics. See the overview of different bio-based plastic types on the website of European Bioplastics⁹¹. There are around 115 producers in the market who play a significant role in bio-based plastic production capacity⁹². In 2013, Asia accounted for the most bio-based plastic production⁹³. The same trend can be seen in bio-based polymers generally; that there is a greater focus on producing "traditional" polymers, but replacing the fossil raw material with renewables. For some material types, one way forward is to apply a mass balance approach.

The overall environmental gain from bio-based polymers will depend on the production method and inputs (renewables or fossil in production), transport and the refining process. The figures will change with increased volumes of biopolymers and a greater environmental focus in production. According to a 2014 report by the Norwegian environmental foundation ZERO on bioplastics⁹⁴ various life cycle analyses (LCA) of emissions from different bioplastic products have been conducted. ZERO states that it primarily found studies on the biodegradable bio-based plastic variants, and not the newer non-degradable bio-based plastic variants such as bioPET. The report quotes PlasticsEurope in stating that sugar cane-based ethene has the greatest potential for the reduction of greenhouse gas emissions. Globally, the largest volumes of bioethanol are currently produced from sugar cane in Brazil, and this can in turn be used as a raw material for products such as bioPE and bioPET. In 2014, PE International launched a new LCA database for bio-based plastics⁹⁵.

Use of bio-based plastics and biopolymers today:

The report "Market study on Bio-based Polymers in the World"⁹⁶ estimates that the production capacity for bio-based polymers will rise from 3.5 million tonnes in 2011 to

⁹¹ European Bioplastics hjemmeside: <http://en.european-bioplastics.org/technologymaterials/materials/> (9/2-15)

⁹² European Bioplastics hjemmeside, Liste over «bioplast bedrifter» <http://en.european-bioplastics.org/market/market-development/market-data-methodology/> (9/2-15)

⁹³ European Bioplastics hjemmeside <http://en.european-bioplastics.org/market/europebeyond/>

⁹⁴ Stiftelsen Zero i Norge: Gjerset, M., Arnøy S., Hojem, J. F., Klimaløsning: Bioplast! –Status, barrierer og virkemidler for fornybar plast, Zero, januar 2014

⁹⁵ PE Internationals hjemmeside: http://www.pe-international.com/fileadmin/Marketing_Material_GaBi/PE_INTERNATIONAL_-_Bioplastics_Database_v1.pdf (10/4-15)

⁹⁶ Market study on Bio-based Polymers in the World, Capacities, Production and Applications: Status Quo and Trends towards 2020, Nova Institute, Version 2013-07.

12 million tonnes in 2020. It is bio-based PET, PE/PP polymers and the new polymers PLA and PHA that are showing the strongest market growth. The greatest investment is expected in Asia and South America. The most dynamic development is expected in the area of “drop-in” polymers, which are chemically similar to their petrochemical counterparts, such as PET, PE and PP.

Examples of the use of bio-based plastics and biopolymers today:

- Ecover (British manufacturer of cleaning products) uses renewable PE combined with recycled plastic in its packaging⁹⁷.
- Serla uses “Green PE” from Trioplast⁹⁸ as packaging for most of its product groups⁹⁹. Trioplast purchases the plastic from Braskem, which produces Green PE from sugar cane.
- Coca Cola Norway uses only PlantBottle™ bottles. PlantBottle is a mineral water bottle made from PET plastic, with up to 22.5% of the material extracted from plants and up to 50% recycled plastic. The PET bottle is manufactured in a chemical reaction between oil-based terephthalic acid (70%) and plant-based ethylene glycol (30%), which is currently produced from sugar cane and molasses¹⁰⁰. Coca Cola is working with such companies as Procter & Gamble and Heinz to produce 100% plant-based PET bottles^{101,102}.
- PEF (ethylene glycol + furan dicarboxylic acid (FDCA)) may become the new 100% renewable alternative to PET (ethylene glycol + terephthalic acid (TPA))¹⁰³. Avantium (Netherlands), in partnership with a consortium comprising Swire Pacific, The Coca-Cola Company, DANONE and ALPLA, has entered into an agreement worth USD 50 million to conduct an industrial validation of PEF and finalise the planning and design of the first commercial scale plant. They will also be looking to validate the use of second-generation raw materials in the production process.
- Elopak has launched new cartons using bioPE¹⁰⁴.
- Tetrapak has launched 100% renewable packaging with LDPE in the barrier and HDPE in the cap¹⁰⁵.
- SABIC (a petrochemicals company) recently announced that it is beginning production of renewable PE and PP at its factory in the Netherlands^{106,107}. The

⁹⁷ Nettsiden til Ecover: <http://www.the-splash.co.uk/articles/plant-plastic>

⁹⁸ <http://www.triogreen.se/>

⁹⁹ Eksempler på produkter på Serlas hjemmesider: http://www.serla.no/products?product_category=All

¹⁰⁰ Nettsiden til Coca Cola Norge: http://www.coca-cola.no/nordic-corp/cc/no_NO/pages/sustainability/om_plantbottle.html

¹⁰¹ Procter & Gamble Sustainability report, 2012:

http://www.pg.com/en_US/downloads/sustainability/reports/PG_2012_Sustainability_Report.pdf

¹⁰² Nyheter fra nettsiden Packnews:

<http://www.packnews.no/article/20120607/NYHETER/120609986/0/S%C3%98K/1014&ExpNodes=1005>

¹⁰³ <http://avantium.com/news/2014-2/Avantium-Raises-36M-Investment-from-Swire-The-Coca-Cola-Company-Danone-and-ALPLA>

¹⁰⁴ <http://www.foodproductiondaily.com/Packaging/Elopak-renewable-polyethylene-PE-carton>

¹⁰⁵ <http://www.tetrapak.com/about-tetra-pak/press-room/news/first-package-made-from-plant-based-renewable-packaging-materials>

¹⁰⁶ Nettsidene til SABIC: <http://www.sabic.com/europe/en/news-and-media/news/2014/20140423--SABIC-launches-new-renewable-polyolefins-portfolio>

¹⁰⁷ <http://www.bioplasticsmagazine.com/en/news/meldungen/Sabic-launches-renewable-polyolefins.php>

company will use the mass balance system to include various types of bio-raw material in their existing fossil production chain in the naphtha cracker plant. According to contact with SABIC¹⁰⁸ the bio-raw material is waste fats and oils. SABIC uses ISCC Plus certification.

- Braskem¹⁰⁹ lists the following packaging producers as users of Green PE: Trioplast, Amcor Flexibles, Coveris, Barbier and RKW. According to Braskem, no production adaptations are needed in order to convert with Green PE. In some cases, the producer will add special grade material in order to achieve better properties, while at the same time achieving more than 50 percent renewable materials. On request, the ethanol can be Bonsucro certified and the polymer can have ISCC+ certification. See more details about the certification schemes below.
- Cargill produces bio-based polyols (BiOH®)¹¹⁰ that can be used to produce polyurethane, for example as a foam.

There are many projects focusing on increased use of renewable raw materials in manufacturing (both first and second-generation raw materials). Here are some examples:

- Närodlat plast¹¹¹ (2014-): A joint venture in Sweden looking at the potential for bio-based plastics from the forest. Borealis, Trioplast and Tetra Pak are involved.
- Skog22¹¹² (2015-): Norwegian strategy process to increase research, development, innovation and knowledge dissemination within the forest-based value chains. Launched in 2015.
- Hållbar Kemi 2030¹¹³: The vision is to encourage manufacturers in Stenungsund to switch to the use of renewable raw materials and increase recycling.
- The Bioplastic Feedstock Alliance (BFA)¹¹⁴: Formed in November 2013 to increase awareness of the environmental and social benefits of potential raw materials for bio-based plastics. Members include Coca Cola, Heinz, Nestle, Nike, P&G, Unilever and WWF. Supports the sustainable use of raw materials.
- Forum for renewable plastics initiated by the ZERO Foundation in Norway (2014-)¹¹⁵: Development of skills and information, establishment of collaborations, development projects.

Biomass resources are limited and a switch from fossil raw materials to renewable raw materials based on biomass could have major negative consequences for the environment, for example in the form of loss of biodiversity due to direct and/or indirect changes in land use. Greater demand for biomass could thus lead to deforestation, which in turn contributes to global warming. This would most likely be associated with plantation production primarily in South America, Asia and Africa. There is a strong focus on developing second-generation biopolymers, whose raw materials do

¹⁰⁸ Epostkorrespondanse med Sabic 10/2-15.

¹⁰⁹ Epostkorrespondanse med Martin Clemensha, Braskem

¹¹⁰ <http://www.cargill.com/products/industrial/foam/>

¹¹¹ www.processum.se/sv/spprocessum/media/nyhetsarkivet/1213-naerodlat-plast-aer-det-moejligt

¹¹² <http://www.innovasjon Norge.no/skog22/> (10/2-15)

¹¹³ <http://www.kemiforetagenistenungsund.se/index.php>

¹¹⁴ <http://www.bioplasticfeedstockalliance.org/>

¹¹⁵ <http://blogg.zero.no/2014/06/bli-med-i-forum-for-fornybar-bioplast/>

not compete with food production, for example making use of waste products from sugar production (bagasse) or using wood instead.

There are, however, also arguments in favour of first-generation bioplastics over second-generation bio-based plastics. The industry organisation European Bioplastics points out that of the 13.4 billion hectares of land globally, 37% is used for agriculture¹¹⁶. Of this 70% is pasture and 30% is arable land. This 30% arable land is used mainly for food and animal feed (27%) and for materials (2%, including bio-based plastics) and energy crops (1%). Only 0.006% of global agricultural land is used to grow raw materials for bio-based plastics, compared with the 98% that is used for food, feed and pasture. There is still plenty of farmland available for production, even in the EU. If the whole world's plastic production were to be replaced with bio-based plastics, this would account for 7% of the world's agricultural land. It is also thought-provoking that around a third of the food produced is lost or discarded. Independent third-party certification systems can ensure socially, environmentally and economically sustainable production of bio-based plastics.

In an article in Bioplastics Magazine¹¹⁷ from 2011, the nova-Institute discusses the pros and cons of using first and second-generation bio-based plastics. The main point is that the technical solutions for first-generation bio-based plastics are more developed. Within the EU there is still vacant farmland and this is best used for crops that have been developed for maximum yield over many years, plus the infrastructure is already in place. Crops for industry can also serve as an emergency reserve for supply of food and feed. The article also points out that there is enormous potential to free up farmland through more sustainable use of biomass, for example by reducing meat in the diet and cutting food waste.

Certification of sustainable use of renewable raw materials

The European CEN Technical Committee CEN/TC 411¹¹⁸ is working on standards for bio-based products. The following five working groups have been set up:

- WG1: Terminology
- WG2: Bio-solvents
- WG3: Bio-based content
- WG4: Sustainability criteria, life cycle analysis and related issues
- WG5: Certification and declaration tools.

There are currently no published standards under WG4 and WG5. WG5 is developing standards for the sustainable use of renewable raw materials. There are, however, good, established systems that could be used in this area, according to the nova-Institute. These include ISCC, RSB, RSPO, PEFC, FSC and Bonsucro, all of which are described in brief below.

Certification schemes for products:

ISCC

¹¹⁶ Hjemmesiden til European Bioplastics, FAQ Aug 2013: <http://en.european-bioplastics.org/press/faq-bioplastics/#competition>

¹¹⁷ Carus, M. and Raschka, A., Agricultural Resources for Bioplastics, Feedstock for bio-based plastics today and tomorrow, 1st and 2nd generation crops: Pros and cons, bioplastics Magazine [06/11], vol 6

¹¹⁸ Hjemmesidene til CEN:

http://standards.cen.eu/dyn/www/?p=204:29:0:::FSP_ORG_ID,FSP_LANG_ID:874780,25&cs=1D63BAA7EABE56EB230DDAA05D6F2CE70#1

ISCC stands for “International Sustainability & Carbon Certification System for Biomass and Bioenergy”.

The standard was developed by private players with support from the authorities and is approved as the basis for fulfilling the sustainability criteria in the Renewables Directive.

ISCC PLUS is a certification system for food and feed which also covers technical and chemical applications, such as bio-based plastics, and was introduced in 2012¹¹⁹. ISCC Plus 202 deals with sustainable production areas, ISCC Plus 203 covers traceability and ISCC Plus 204-01 relates to mass balance.

RSB (Roundtable on Sustainable Biofuels)¹²⁰ is a multi-stakeholder initiative set up by the Ecole Polytechnique Federale de Lausanne (EPFL) in 2007 to develop standards for the sustainability of biofuels. The goal is to achieve global consensus on the principles and criteria for sustainable production of biofuels. RSB aims to create a tool that consumers, political decision-makers, businesses, banks and other players can use to ensure that biofuels live up to the promise of sustainability. The first version of the criteria was approved and published on 12 November 2009, and is based on 12 consolidated principles for sustainable production.

Certification schemes for renewable raw materials:

RSPO (Roundtable on Sustainable Palm Oil)¹²¹ was set up by organisations involved in the whole supply chain for palm oil. The standard comprises eight principles and 39 criteria for sustainable palm oil production. The criteria cover social, economic, ecological and general aspects. There is considerable interest in the scheme and several businesses have been granted certificates.

RTRS (Roundtable on Responsible Soy)¹²² is an initiative established by players from the whole production and distribution chain for soya oil. Consumer interests are also represented. The aim of the standard that has been developed is to promote soya produced in an economically viable way, but also on a socially just and environmentally sustainable basis. The first version of the criteria was approved and published on 10 June 2010. The criteria are based on five general requirements concerning the sustainable production of soya. The majority of RTRS certified soya comes from Brazil (60% by weight of a total 1.3 million tonnes in 2014) and Argentina (32% by weight), according to information on the organisation’s website (as at 28 July 2015). Other producer countries are Canada, China, Paraguay and India. RTRS permits the use of genetically modified soya.

Bonsucro¹²³ (formerly the Better Sugar Cane Initiative, BSI) is a collaboration between a number of stakeholders, including sugar cane producers, investors, dealers and NGOs. The aim is to develop international guidelines that define the sustainable production and processing of sugar cane. The initiative includes principles and criteria on environmental, economic and social issues. The first version of the criteria was approved and published on 27 June 2010. The criteria are based on five general principles for the sustainable production of sugar cane and products based on sugar cane. BSI has also developed a

¹¹⁹ ISCCs hjemmeside: <http://www.iscc-system.org/en/iscc-system/iscc-plus> (10/4-15)

¹²⁰ Round Table on Sustainable Biofuels, URL:

http://www.bioenergywiki.net/index.php/Roundtable_on_Sustainable_Biofuels

¹²¹ Roundtable on Sustainable Palm Oil, URL: <http://www.rspo.org>

¹²² Roundtable on Responsible Soy Association, URL: <http://www.rsoa.org>

¹²³ Bonsucro: URL: <http://www.bonsucro.com/>

Chain of Custody standard that is intended to ensure full traceability along the whole supply chain from raw material delivery to the mill onwards.

According to the website, around 4% of the world's sugar cane production is certified (information on website 28 July 2015). The website gives no information on whether genetically modified sugar cane is approved for use.

FSC¹²⁴ and PEFC¹²⁵ are the two increasingly dominant certification schemes for sustainable forestry. Although there are a number of differences between the schemes, both are considered by Nordic Ecolabelling to be at the forefront in setting standards and steering towards more sustainable forestry. Neither of the schemes permit the use of genetically modified trees.

Background to the requirements for bio-based polymers

To ensure sustainable use of bio-based polymers requirements have been set for the sustainable production of the raw material with focus on palm oil, soy oil and sugar cane. The desire is that the cultivation of the raw material must be certified to the requirements Nordic Ecolabelling's sets of standards, certification systems and certification bodies, see Appendix 3.

Nordic Ecolabelling's raw materials group has assessed the standards for RSPO, RTRS and Bonsucro and see that they in today's versions do not fully meet Nordic Ecolabelling's requirements concerning sustainability labels.

It is, among other things, unclear whether the standards go beyond legislation, particularly in relation to international conventions. Both schemes have absolute requirements, but there are possibilities of exceptions to these. In addition, for RTRS it is not found claims that safeguard protected areas and RSOP allows the creation of plantations on peatlands which are an important as carbon sink.

Since the production of these plant raw materials currently has major environmental consequences, Nordic Ecolabelling takes a strict line when it comes to these two raw materials and wants to set requirements that are as stringent as possible within the framework of the respective product groups. In the product groups where there are alternative raw materials and there is good steerability to exclude these without experiencing any "Burden Shift" Nordic Ecolabelling wishes to exclude palm oil and soy oil from use in those products. This is reason why neither palm oil nor soy oil can be used in Swanlabelled Candles. In product groups where there are more difficult to find good alternatives and/or no steerability to avoiding these raw materials, Nordic Ecolabelling wishes to set requirements that are as stringent as possible. This is to ensure that the most eco-friendly alternative is used in Nordic Swan Ecolabelled products. In the criteria for sanitary products Nordic Ecolabelling wants to promote the use of bio-based materials, and too strict requirements to the raw materials can make this challenging. The market for bio-based polymers are in development and the use of these raw materials cannot not be excluded. In these criteria, Nordic Ecolabelling has therefore decided to set a requirement for certification of these raw materials, and not prohibit them. In this case, Nordic Ecolabelling assess that RSPO, RTRS and Bonsucro, plus their associated traceability systems, are the best tools available and will therefore be setting requirements that the raw materials are certified after these schemes. Mass balance

¹²⁴ Forest Stewardship Council, URL: <http://www.fsc.org>

¹²⁵ Programme for the Endorsement of Forest Certification, URL: <http://www.pefc.org/>

can be used to document the certified amount. Basically, Nordic Ecolabelling wanted the requirement to be full traceability (physical traceability), but due to received comments in the hearing, the requirement has been set to the level of mass balance.

In addition the supplier of the certified raw materials must be CoC-certified. Both RSPO and RTRS are certification schemes that are in a positive development, and Nordic Ecolabelling will monitor their development. Bonsucro has just been revised (2015), but Nordic Ecolabelling will also monitor the development in this scheme. Nordic Ecolabelling can evaluate other certification systems for the raw materials if relevant in an application process. The certification scheme will be evaluated according to Nordic Ecolabelling's requirements to standard and certification scheme described in appendix 4 in the criteria document.

The background to the setting of these requirements for bio-based polymers is described in more detail in the Nordic Ecolabelling criteria for disposables for food¹²⁶. In the criteria for disposables for food, there is also a requirement that prohibit the use of genetically modified organisms (GMO) in the cultivation of the raw materials. Nordic Ecolabelling is critical about the use of many types of GMO, including those that are pesticide tolerant. A requirement to use non-GMO-based raw materials would, however, be too strict for the producers of the polymers. The availability of GMO raw materials depends on which plant is being cultivated. Braskem reports that it does not use genetically modified sugar cane, since it is not available in Brazil, but most of the maize produced in Canada for PLA is genetically modified. The judgment has so far been made that in these criteria it is more important to promote the use of renewable raw materials in sanitary products, and there is therefore no requirement concerning genetic modification. Nordic Ecolabelling would like feedback on whether these requirements are too strict in this version of the criteria, and whether this inhibits the use of bio-based polymers.

Recycled plastics

Recycled plastic that are used in additional components and the primary packaging must not contain polybrominated biphenyls or diphenyl ethers, phthalates, organotin compounds, lead, cadmium, mercury or chromium^{VI}. Impurities up to 100 ppm are, however, permitted. The requirement applies if the recycled plastic constitute ≥ 1.0 weight-% in the additional component and primary packaging. The requirement shall be documented by a test report, or a description and traceability to the source that substantiate that the given substances do not occur in the plastic.

According to a Danish plastics recycling company¹²⁷, their recycled plastic can be tested in accordance with the RoHS Directive for cadmium, lead, mercury, chromium VI, polybrominated biphenyls and polybrominated diphenyl ethers. They can detect quantities down to 100 ppm. The test is not conducted on a routine basis, but only in conjunction with specific deliveries. The company stresses that the equipment is extremely expensive and they do not know of any other plastics recyclers that can test the material in this way. According to the company, it is possible to pack diapers, for example, in recycled PE foil. It can be a challenge to procure enough PE of foil quality, if it needs to be a natural colour, which would be the case if the foil had to be printed on. According to the producer, it is possible to use 100% recycled plastic for foil. The

¹²⁶ Nordisk Miljømærking, Om svanemerkede Engangsartikler til fødevarer, Baggrund for miljømærkning version 1, Version 1 21.mars 2012

¹²⁷ Epostkorrespondance med bedriften Aage Vestergaard Larsen A/S, Danmark, 25/4-14

company uses only industrial waste (not post-consumer) and it rarely finds traces of the impurities mentioned above. If anything does appear, it tends to be brominated flame retardants.

Version 6 of the criteria nevertheless contain a requirement concerning content of cadmium, lead, mercury and chromium^{VI}, phthalates, organotin compounds plus flame retardants, since these may occur in post-consumer plastics. The limit value for several of the substances is 1,000 ppm in RoHS Directive (Restrictions of Hazardous Substances) which applies to electrical and electronic products, except for cadmium where the limit is 100 ppm.

For recycled plastic in the sanitary product there is a requirement that the plastic must be approved according to the EU commission regulation (EC) No 282/2008 on recycled plastic materials and articles intended to come into contact with foods. There are strict requirements to traceability if the recycled plastic should be used in food contact and therefore a better system for controlling what kind of substances the plastic contain. For materials of recycled plastic this means that the recycling process must be preapproved. Basically, there are processes for recycling of PET that are approved today. If it can be documented that the recycled plastic originates from a closed-loop system, like recycling of PET-bottles, no further documentation that the plastic is approved for food contact is necessary.

If the recycled plastic constitute ≥ 20.0 weight-% or more in the sanitary product, any chemicals added must fulfil O3-O5.

7.5.9 Superabsorbent polymers

All superabsorbent polymers (SAP) must meet O32 (≥ 1.0 weight-%). If superabsorbent polymers accounts for 10.0 weight-% or more of (S+A) requirement O33 must also be fulfilled.

O32 **Superabsorbent polymers (SAP), residual monomers and extracts (≥ 1.0 weight-%)**

Acrylamide (CAS no. 79-06-1) must not be used as a monomer.

Superabsorbents polymers (SAP) may contain a maximum of 1000 ppm residual monomers (the total of unreacted acrylic acid and crosslinkers) that are subject to a classification requirement and have been allotted the risk or hazard phrases specified in requirement O3, Table 2.

SAP may as a maximum contain 10.0 weight -% of water-soluble extracts.

Water-soluble extracts in SAP: monomers and oligomers of acrylic acid with lower molecular weight than SAP, and salts.

Information on sampling, methods of analysis and analysis laboratories is provided in Appendix 2.

- ☒ The producer must document the composition of the superabsorbent polymer by means of a product safety data sheet which specifies the full name and CAS number and the residual monomers contained in the product classified in accordance with the above requirement and the quantities thereof. The manufacturer must specify the quantity of water-soluble extracts in the superabsorbent. The methods of analysis must be described and the laboratories responsible must be stated. Appendix 1, form 15 may be used. The sanitary manufacturer must inform the producer of the superabsorbent on which paragraphs to fill in.

033 **Superabsorbent polymers, additives (≥ 10.0 weight-%)**

Additives in superabsorbent materials must fulfil requirements O3-O5.

- ☒ Declaration from the producer of superabsorbent polymers that the requirement is fulfilled. Duly completed and signed Appendix 1, form 15 can be used.
- ☒ If additives are used, a list of the additives and material safety data sheets. Duly completed and signed Appendix 1, form 2a) can be used to document O3-O5.

Background to the requirements

A superabsorbent is a material that, according to EDANA's website,¹²⁸ can absorb up to 300 times its own weight in water, and retain that liquid thereafter, making it ideal for use in absorbent sanitary products. The superabsorbents currently used in absorbent sanitary products are mainly sodium polyacrylate, which is a superabsorbent polymer. This is under development in a host of variants, e.g. through modification of the chain or the addition of different side groups to give new properties. Superabsorbents from renewable raw materials are mentioned later in this section. According to EDANA¹²⁹, superabsorbents based on substances including polyacrylamide copolymers, ethylene-maleic anhydride copolymers and polyvinyl alcohol copolymers¹³⁰ are not used in sanitary products. The use of acrylamide as a monomer has, however, been specifically prohibited in these criteria. The fact that it is not permitted as any other additive to superabsorbents is covered in the additives requirement, with reference to the chemical requirements.

The world's largest manufacturers of SAP are Nippon Shokubai, BASF, Evonik, Sumitomo Seika, San-Dia Polymers, LG Chemical and Taiwan Plastics¹³¹. Of these, BASF, Nippon Shokubai, Evonik Industries and Sumitomo Seika Europe are members of EDANA's association for SAP manufacturers¹³². These all manufacture SAP in Europe for sanitary products.

Below is a description of the production process for sodium polyacrylate-based SAP.

Production of SAP

A general overview of how sodium polyacrylate is made can be found on EDANA's website (see reference above). The polymerisation includes the addition of a copolymer which has more functional units than the acrylic acid, so that it can bond to more molecules and help to form a three-dimensional structure. The free-radical polymerisation is exothermic.

According to information from BASF¹³³, the polymer in the surface of the particles can be further crosslinked to give the material specific absorption properties such as retention under higher pressure. (Tetraallylethoxy) ethane and 1,1,1-Trimethylolpropane-tricrylate (TMPTA) are customarily used for crosslinking. The background document to version 5 of the criteria also mentioned other examples of monomers that can contribute

¹²⁸ Nettsidene til EDANA, beskrivelse av SAP-produksjon: <http://www.edana.org/discover-nonwovens/how-they%27re-made/superabsorbents> (6/5 2015)

¹²⁹ Epostkorrespondanse med Pierre Conrath 21/4-15

¹³⁰ Nettsiden til Transparency Market research:

<http://www.transparencymarketresearch.com/pressrelease/superabsorbent-polymers-market.htm> (7/5-15)

¹³¹ NONWOVENS INDUSTRY monthly trade magazine: http://www.nonwovens-industry.com/issues/2013-11-01/view_far-east-report/a-look-at-the-top-superabsorbent-polymer-makers-in-the-world/

¹³² Fra EDANAs hjemmesider: «SAP Producers Committee, Info Sheet (March 2014)». Tilgjengelig på siden: <http://www.edana.org/docs/default-source/default-document-library/info-sheet---sap-producers-committee.pdf> (23/3-15)

¹³³ Foredraget "Superabsorbent Polymers" av Mark Elliott, Product Development Scientist for SAP, BASF Aktiengesellschaft, tidligere publisert på nettsidene til BASF. Nå kan den blant annet finnes på denne nettsiden: http://chimianet.zefat.ac.il/download/super-absorbant_polymers.pdf (6/5-15)

to crosslinking: glycerol propoxy triacrylate, triallylamine, divinyl toluene, polyethylene glycol monoallyl ether, ethylene glycol, di- or polyglycidyl ether. The manufacturers reveal very little about the crosslinkers they use and it seems that virtually anything that can react with carboxylic acid has been tried.

Very small quantities are used and analysis is therefore difficult according to Fredric L. Buchholz, former research leader at Dow Chemicals, writing in an article in Chemistry in spring 2005¹³⁴.

According to information from BASF (see earlier reference) polymer additives include surfactants which help the gel to break down into smaller units. They may also increase “wetting” of the surface in order to improve swelling speed. Antioxidants are added to retain the whiteness of the SAP and reduce aging. Thermal or redox initiators reduce residual monomer levels, which is important in sanitary products that come into contact with skin. Fumed silica may be added as an anti-caking agent¹³⁵.

Extractives from SAP are low-molecular compounds that can be extracted from the polymer in the event of a fluid surplus. Residual monomers from SAP are also measured and these might for example be crosslinkers that were not taken up in the polymer network during polymerisation. The major manufacturers have no information on residual monomer content or extractives on their websites. The requirements for these have been retained at the same level as before.

Risk assessment of acrylic acid residues

EDANA's report “Risk assessment of acrylic acid in absorbent hygiene products” from 2008¹³⁶ states that SAP contains a small amount of unreacted acrylic acid and its neutralised form sodium acrylate as residual monomers. The report shows that in a typical diaper with a pH of 6.5, around 99% of the residual acrylic acid will be in the form of the salt sodium acrylate. The proportion of sodium acrylate rises from 84.6% to 99.8% from pH 5 to pH 7. The report gives examples of acrylic acid/sodium acrylate residues, with 730 ppm as the highest value.

Acrylic acid has the CAS no. 79-10-7 and has a harmonised classification in ECHA of: R10, Xn with R20/21/22, C: R35 and N with R50 (to date). Classification is not necessary at concentrations of <1%. EDANA's report (referenced above) refers to a 2002 risk assessment of SAP by the EU, which showed that long-term exposure to acrylic acid at 1% (10,000 ppm) does not result in treatment-related signs of irritation. Acrylic acid is not considered to be sensitising.

Sodium acrylate has the CAS no. 7446-81-3 and does not have a harmonised classification in the ECHA database (to date). Over 400 registrants have registered sodium acrylate as H400, 82 have registered no classification and a small number have classified it as H315 and H319 (causes skin and eye irritation).

EDANA's risk assessment is based on an unpublished study from 2006 by H. Schmidt (Evonik Stockhausen GmbH), which looks at skin exposure when using diapers. The study shows low transference of acrylic acid from the SAP to the skin (0.25 to 2.5%). In the worst case scenario, no more than 1.1% of the total acrylic acid in the SAP is

¹³⁴ artikkel i Chemistry, våren 2005, http://www.lysac.com/lysac/Chemistry_spring_2005.pdf, (01.01.2007)

¹³⁵ Kontakt med EDANA, 2010.

¹³⁶ Schmidt, H., Diener, B., Mezaiti, H., Kosemund, K., Risk assessment of acrylic acid in absorbent hygiene products», EDANA, 2008

released. This reinforces the view that very little may come into contact with the skin. EDANA's risk assessment assumed a residual monomer content of 1000 ppm in order to harmonise with REACH. It was also assumed that these 1000 ppm were pure acrylic acid (and not sodium acrylate).

The conclusion from EDANA's risk assessment is that residual quantities of acrylic acid in SAP pose no risk to consumers, and that a residual monomer content of 1000 mg/kg in absorbent sanitary products is safe. Nordic Ecolabelling therefore has changed the requirement and now allow 1000 ppm rest monomers with the given classification.

EDANA has developed a number of tests for polyacrylate superabsorbents, which are listed in the report "Harmonized test methods, Nonwoven and related industries"¹³⁷. These include "pH of Polyacrylate (PA) Powders", "Residual monomers", "Particle size distribution", "Free swell capacity in saline", "Fluid retention capacity in saline", "Absorption under pressure", "Flow-rate and density" and "Extractables".

Polyacrylic acid is currently fossil-based and not readily biodegradable. Below are examples of bio-based SAP, both biodegradable and non-biodegradable.

Bio-based superabsorbents

ADM (formerly Lysorb®) manufactures BioSAP™¹³⁸. It is made from renewable raw materials, it is biodegradable and it is not considered allergenic. The manufacturer says that the product is "hypoallergenic", a term used for something that does not normally cause allergic reactions, but this term is not medically defined. ADM makes the product from natural or modified starch from grain products such as maize and wheat, and also from guar gum. The material biodegrades 91.8% in 28 days, and has no residual monomers, according to the website.

To date, bioSAP has had a larger particle size than SAP based on sodium polyacrylate, and has been used in mixes with the latter. Several manufacturers also mention that bioSAP has a poorer absorption capacity than sodium polyacrylate-based bioSAP. It has not been possible to make contact with ADM to check on the development of their bioSAP in the revision for version 6 of the criteria.

2014 saw BASF launch a bio-based SAP of sodium polyacrylate, HySorb B7015 MB, which counts as renewable based on the mass balance system¹³⁹. According to an article by BASF from January 2015 on the subject of mass balance¹⁴⁰, the renewable raw material is currently agricultural waste, food waste and certified bio-naphtha. Bio-naphtha comes from oils and organic waste. According to the article, in terms of certification systems, bio-naphtha is approved under the Renewables Directive, and by the ISCC (see above), RSPO (Roundtable on sustainable palm oil) or equivalent. To verify the renewable proportion of the actual product, a certification system was developed in partnership with TÜV SÜD. The certification includes all stages in the production of the

¹³⁷ Harmonized test methods, Nonwoven and related industries, 2012: Finnes på EDANA's nettsider <http://www.edana.org/docs/default-source/default-document-library/harmonized-test-methods---2012-edition---1.pdf?sfvrsn=4> (6/5-15)

¹³⁸ ADMs nettsider (produsent av biobaserte piopolymerer): <http://www.adm.com/en-US/products/industrial/superabsorbents/Pages/default.aspx> (7/5-2015)

¹³⁹ Artikel i Allgemeiner Vliesstoff-Report Nonwovens & Technical Textiles 24. Juni 2014 "HySorb B7015MB – superabsorbent polymer based on renewable feedstock" Finens på nettsiden <http://verpackungsrundschau.de/hysorb+b7015mb+superabsorbent+polymer+based+on+renewable+feedstock+.118330.htm> (besøkt 30/6-15)

¹⁴⁰ Klein, D. And Frietsch, S., Identical Product Properties - Chemical Products Based on Renewable Resources through Use of the Mass Balance Approach, European Polyurethane Journal, January 2015.

product, plus an examination of the amount of renewable raw material used on an annual basis. This means that all the constituent substances, including those not present in the end product (e.g. solvents) are counted over the whole production period.

According to contact with BASF¹⁴¹, they offer HySorb with a renewable proportion from 20% up to 100%, according to the customer's wishes. BASF reports that supply of renewable raw material currently exceeds demand.

Research is also underway into the production of sodium polyacrylate-based SAP from renewable acrylic acid¹⁴². SAP manufacturers Dow Chemical, BASF, OPX Biotechnologies, Myriant and Metabolix¹⁴³ all have current projects with this focus. According to BASF¹⁴⁴, commercialisation probably lies several years in the future, if success is achieved at all.

The limits for the requirements

The limit value for the content of classified residual monomers has been changed from generation 5 to generation 6 from 400 ppm to 1000 ppm. This is based on received hearing comments. The requirement is the same as in EU Ecolabels requirements for absorbent hygiene products.

The requirement to water-soluble extracts is also less strict than in generation 5. In the hearing version to generation 6 the requirement was on the same level as in generation 5. The received hearing comments and information from the EU Ecolabels criteria development for absorbent hygiene products has led to a requirement of 10 weight-% water-soluble extracts and is on the same level as in the EU Ecolabel criteria for absorbent hygiene products (2014/763/EU).

At the production of SAP chemicals can be added and it is therefore a requirement that possible additives to SAP must fulfil O3-O5. This is a new requirement in generation 6.

At the EU Ecolabel's 2nd ad hoc working group meeting for the EU Ecolabel's AHP criteria, the industry commented that there may be traces of acrylamide in SAP. Acrylamide (CAS no. 79-06-1) is classified as mutagenic and carcinogenic, amongst other things¹⁴⁵. It was agreed that only intentionally added acrylamide should be prohibited, and this was introduced into the criteria. Whether added intentionally or unintentionally, acrylamide is not desirable in SAP for Nordic Swan Ecolabelled products. It is therefore prohibited to use acrylamide as monomer.

Nordic Ecolabelling sets no requirements to renewable raw materials used in bio-based SAP in this generation of the criteria. Even if it can be a problem with sustainability of the renewable raw materials, Nordic Ecolabelling chooses not to set a requirement now, but this will be evaluated in later revisions of the criteria. The use of bio-based SAP is not widespread, and in general Nordic Ecolabelling wants to promote the use of renewable materials above fossil based.

¹⁴¹ Epostkorrespondanse med BASF 30/6-15

¹⁴² Nettsiden til SpecialChem: <http://coatings.specialchem.com/news/industry-news/basf-cargill-amp-novozyms-succeed-in-making-sap-s-from-bio-based-acrylic-acid> (7/5-15)

¹⁴³ Nettsiden til Chemical & Engineering news: <http://cen.acs.org/articles/91/i46/Hunting-Biobased-Acrylic-Acid.html?h=1016647717> (7/5-15)

¹⁴⁴ Epostkorrespondanse med BASF 2014

¹⁴⁵ ECHAs database: <http://echa.europa.eu/information-on-chemicals/cl-inventory-database/-/cl-inventory/view-notification-summary/104230>

7.5.10 Nonwoven

Nonwoven may be produced from a variety of materials. The requirements concerning nonwoven therefore regularly refer to other requirements in the document.

No specific nominal limit has been set for nonwoven. The choice of applicable requirement depends on how much of the different materials are contained in the sanitary product. The description of which requirements apply to the quantity of materials can be found under the chapters for the different materials.

034 Nonwoven, general requirement

The producer of the nonwoven used must specify the materials (raw materials and additives) used in the production and state the names of the raw material suppliers. The materials must fulfil the following requirements:

- Fluff/cellulose pulp must fulfil the requirements in chapter 2.2.2
- Cotton must fulfil the requirements in chapter 2.2.5.
- Regenerated cellulose must fulfil the requirements in chapter 2.2.6.
- Polymers as fibre or binder must fulfil the requirements in chapter 2.2.7.
- Superabsorbents must fulfil the requirements in chapter 2.2.8.

If other materials are present and have requirements in these criteria, these must also be fulfilled.

- ☒ The producer of the nonwoven used must specify the materials used in production and state the names of the raw material suppliers. Documentation as in the referred requirements. Appendix 1, form 16 can be used.

035 Nonwoven, chemicals

All additives/chemical products used in the production of the nonwoven must fulfil the chemical requirements O3-O5.

Adhesives/binders must fulfil O7.

Other process- and auxiliary chemicals (e.g. spinning additives and machine oils) are exempt from the requirement.

Process water: A substance that is classified as sensitising with risk phrase H317 and/or H334 can only be used in the process water if the residue in the nonwoven is <0,10 ppm for each sensitising substance.

- ☒ Declaration from the producer of nonwoven that the requirement is fulfilled. Duly completed and signed appendix 1, form 16, and form 2a (O3-O5) and form 2b (O7) can be used.

Background to the requirements O34 and O35

Sanitary products often have one or more layers of nonwoven fabric. This is most commonly made from regenerated cellulose, polythene (PE), polyester (PET), polypropylene (PP) or fluff/cellulose pulp. Nonwoven is also a component of materials such as tape and elastic side panels, for example in diapers. According to industry organisation EDANA¹⁴⁶, the nonwoven in absorbent sanitary products is almost exclusively PP spunbond, where 40 years ago it was only regenerated cellulose that was used. According to nonwoven producer Fitesa¹⁴⁷, there is market interest in bio-based nonwoven. Fitesa has launched co-spun fibre nonwoven with PLA (NatureWorks, Ingeo) as the core and renewable PE from Braskem around the outside. Fitesa sells this

¹⁴⁶ Epostkorrespondanse med EDANA 22/1-15

¹⁴⁷ Epostkorrespondanse med Fitesa 26/11-15

primarily in North and Central America, but also in Europe and other territories. The material costs 50-150% more than today's 100% PP-based material. Fitesa also sells co-spun fibre nonwoven with PLA as the core and PP on the outside.

Nonwoven is defined in the standards ISO 9092 and CEN EN 29092. According to the international industry body for nonwoven, EDANA, these two documents give the only internationally recognised definitions of nonwoven¹⁴⁸. They were published in 1988, and work is now underway to update the standards to account for developments in the field and better reflect what is meant by nonwoven today.

Below is a brief overview of the various production processes for the manufacture of nonwoven. The descriptions are taken from EDANA's website¹⁴⁹.

General

Nonwoven manufacture starts with the arrangement of fibres in a sheet or web. The fibres can be staple fibres packed in bales (wetlaid, air-laid, carding), or filaments extruded from molten polymer granules (spunmelt). Three basic methods are used to form a web, and nonwovens are usually referred to by one of these methods.

Drylaid: There are two methods of drylaying: carding and airlaying. The fibres are first "opened" from the bale and placed on a conveyor. Then the clumps of fibres are carded to separate out the individual fibres. In airlaying, the fibres are fed into an air stream after carding to form a randomly oriented web. The fibre usually accounts for around 85% by weight of air-laid. The remaining 15% comprises various binders. Air-laid without binders is also available. It may also contain other materials such as superabsorbents, in addition to fluff pulp and binder. Air-laid is used in various types of sanitary product, including feminine hygiene products, sauna underlays, bibs, etc. Air-laid is a technique where the paper is manufactured using air instead of water. Air-laid typically comprises cellulose pulp and possibly a binder. The grounds for the requirement of energy consumption in the production of air-laid is described in section 7.5.1.

Spunmelt (also called spunbond when spunmelt is bonded via calendering¹⁵⁰): Spunmelt is a generic term describing the manufacturing of nonwoven webs directly from thermoplastic polymers. It encompasses two processes (spunmelt and meltblown) and the combination of both, with no use of binders.

Wetlaid: The principle of wetlaying is similar to paper manufacturing. The difference lies in the amount of synthetic fibres present in a wetlaid nonwoven. A dilute slurry of water and fibres is deposited on a moving wire screen and drained to form a web. The web is pressed between rollers and dried. Impregnation with binders is often included in a later stage of the process. Binding may occur through binders or the fibres themselves providing chemical binding (with the addition of various polymers), thermal binding or mechanical binding. Examples of disposable products using the wetlaid technique include paper handkerchiefs, serviettes, gowns, gloves, teabags and gauze.

Finishing

A variety of different chemical substances can be employed before or after binding.

¹⁴⁸ EDANA, the international association for the nonwovens. What are nonwovens? :

<http://www.edana.org/discover-nonwovens/what-are-nonwovens> (5/11-14)

¹⁴⁹ EDANA, the international association for the nonwovens. Formation (om produksjonsprosessen til nonwoven)

<http://www.edana.org/discover-nonwovens/how-they're-made/formation> (5/11-14)

¹⁵⁰ Wikipedia.org, søkeord non woven: http://en.wikipedia.org/wiki/Nonwoven_fabric (6/11-14)

There are also various mechanical processes that can be applied to the nonwoven after binding.

Nonwovens can be made conductive, flame retardant, water repellent, porous, antistatic, breathable, absorbent and so on. They can also be coated, printed, flocked or dyed, and can be combined with other materials to form complex laminates.

For absorbent sanitary products it is common to add surfactants to nonwoven to make it hydrophobic or hydrophilic, since it has to either drain or stop liquids. The requirements concerning nonwoven refer to the material requirements for the constituent materials and to the chemical requirements if chemicals have been used during the manufacture of the nonwoven material. Although the processes associated with the manufacture of nonwoven use energy and may generate emissions to water, no requirements concerning this have been included in this version of the criteria. There are also no requirements concerning process chemicals such as spinning additives, but with the exception of requirement to sensitising substances in the process water. Nordic Ecolabelling has after analyses of wet wipes of nonwoven, experienced that substances like MI (methylisothiazolinone), CMI (methylchloroisothiazolinone) and glutaraldehyde can be used in the process water in the production of nonwoven. These are allergenic substances, and as these products often are in close contact with the skin, such substances are undesirable in the products. If allergenic substances are used in the process water, it should be declared that the content in the finished nonwoven is <0.10 ppm for each sensitising substance.

7.5.11 Material composition

036 Material composition, renewable and recycled materials

One of the following requirements (a, b or c) must be fulfilled:

- a) Diapers and incontinence products must have ≥ 50 weight-% of renewable material in the product and additional component.
Other products must have ≥ 60 weight-% of renewable material in the product and additional component.
or
- b) The primary packaging contains ≥ 20 weight-% of renewable and/or recycled material in relation to the total weight of the primary packaging. The amount of renewable/recycled material can be documented on an annual basis.
or
- c) ≥ 7 weight-% of the polymers in relation to the total weight of polymers in the product and additional component (including SAP) must be bio-based and/or recycled.

For requirements to recycled plastic in the sanitary product and primary packaging, see O31.

Recycled material is defined in the standard ISO 14 021. Recycled materials can be post-consumed material like discarded plastic products and packaging from the end-user as households or commercial, industrial or institutional facilities or be pre-consumed material like reprocessed production scrap. Rework, regrind or scrap generated in a process and capable of being reclaimed within the same process that generated it, is not considered recycled material

- ☒ Part a) a calculation of the amount of renewable materials in the product and additional components.

- ☒ Part b) a calculation of the amount of renewable and/or recycled materials in the primary packaging.
- ☒ Part c) a list of the bio-based polymers and/or recycled plastic materials and the amount in the sanitary product.

Background to the requirement to material composition

The requirement is based on the requirement in generation 5, but with some adjustments. However, the objective of the requirement is still to stimulate the use of renewable and recycled materials in the product and packaging. The possibility to fulfil the requirement by using GWP-values is removed, as the experience show that this requirement has not led to a change in materials (fossil based to bio-based/recycled). Also, the documentation received could not ensure that the GWP-values actually showed differences between producers of the same material. For instance, values from LCA-studies and such is not considered as good enough documentation without doing a more thorough evaluation having accurate information about the energy consumption, conversion factors used etc. This information has not been easy to get, especially for polymers, and this is also the reason why the requirement to energy used in the production of polymers has been removed from the criteria. Therefore, it is not possible to fulfil the requirement by using GWP-values in generation 6 of the criteria as it do not lead in the right direction promoting a change from fossil based to renewable/recycled materials.

The requirement was changed after the hearing. Many commented that the requirement was too strict, based on the availability of bio-based plastic and recycled material on the market. The requirement is now based on the requirement as it was in generation 5 with some adjustments and with a new opportunity to fulfil it. In the hearing version there had to be a certain amount of renewable and recycled materials in the product, but fluff and paper should be considered as renewable in the calculations. This is changed so that fluff and paper now are counted as renewable. The limit related to an automatic fulfilment of the requirement is raised from 50 to 60% renewable materials in the product (included fluff/paper), but it is kept on 50% for diapers/incontinence products as these are complex products and are partly diverse from the other products that can be labelled (alternative a). Products with a lower content of renewable materials must either fulfil the requirement by using minimum 20% recycled/renewable materials in the packaging (alternative b) or have minimum 7 weight-% of bio-based polymers or recycled plastic in the product related to the ingoing polymers in the product and additional component (alternative c). Recycled material is defined according to ISO 14021 which contain definitions of "post-consumer" and "pre-consumer" materials. Recycled materials can be post-consumed material like discarded plastic products and packaging from the end-user as households or commercial, industrial or institutional facilities or be pre-consumed material like reprocessed production scrap. Rework, regrind or scrap generated in a process and capable of being reclaimed within the same process that generated it is not considered as recycled material. This means that reuse of plastic from the use of the plastic material, and that is sent back to the producer of the plastic is considered pre-consumed. Cuttings from the plastic production that are used again in the same process are not considered as pre-consumer.

The requirement to recycled material is only valid for plastic and not paper/carton/paperboard. These materials are renewable and are already a part of a functioning recycling system. Nordic Ecolabelling considers that we have limited possibilities to affect and increase the amount of recycled materials by having a requirement to these materials.

During the hearing process, Nordic Ecolabelling has received comments that also biodegradable materials should be an alternative.

However, Nordic Ecolabelling do not consider this is an alternative in these criteria. The property biodegradable cannot be equated with renewable/recycled material, and Nordic Ecolabelling consider it better that plastic packaging is recyclable. It is also possible to add chemicals to fossil based plastic to make it degradable. It is not unproblematic with degradable plastic, as it can cause problems in the handling facilities for recycling of plastics or be a source to micro plastic in the environment.

7.5.12 Materials in cotton buds

O37 Other materials

The stick, e.g. the stick of cotton buds must be made from renewable raw materials, such as wood or paper/paperboard/carton. The stick must not be made of plastic or a mixture of materials like plastic and paper. The material shall fulfil the relevant requirements if it comprises the weight-% that requires this.*

Other material parts as tape, elastic etc. shall fulfil relevant material requirements if comprises in percentage by weight that require this, see O2.

** For paper/paperboard/carton in a cotton bud O17 and O18 must be fulfilled if the materials comprises the weight-% that requires this. O19 shall not be met, see chapter 2.2.3.*

☒ Documentation showing that the requirement is fulfilled.

O38 Primary packaging, material requirements

The following material requirements must be met if the primary packaging makes up more than 1.0% of the weight of the sanitary products plus the additional components in a pack.

- If the packaging is made of cardboard/carton, the material must meet the requirement part a and part b in O17. If the packaging is made of plastic, the requirement O26 and O27 part A must be fulfilled.
- For recycled plastic, the requirement O31 part a) shall be fulfilled.

☒ Documentation from the producer of the sanitary product and documentation as in the referred requirements showing that the requirements are fulfilled.

Background to the requirements O37 and O38

The stick in cotton buds should not be made of plastic or a blend of plastic and paper. This is also specified in the product group definition, see chapter 2.1. as well as in chapter 7.1.2. The definition and requirement were changed on September 18, 2018, see chapter 7.1.2 for more information.

The requirement concerning labelling of plastic packaging is taken away, and the ban on PVC in packaging is in requirement O26. However, it is new to set material requirements for the primary packaging.

7.6 Product performance

O39 Performance

The performance/quality of the product must be satisfactory and must match that of equivalent products on the market.

In the case of products where an acknowledged test exists, this test must be used. The test may be a laboratory test, the applicant's internal quality test, a consumer test or a comparative test with an equivalent product.

In the case of diapers, sanitary products (sanitary towels and panty-liners), incontinence care products and breast pads, the performance test must as a minimum include absorption capacity and rewet under pressure (dryness on the outside).

In the case of tampons, the performance test must as a minimum encompass absorption capacity.

If a consumer test is performed, a minimum of 10 users must be included and the users must be satisfied with the product, see the conditions in Appendix 2.

- ☒ Documentation (test report or user report) of the performance of the product including, where applicable, tests of absorption capacity and rewet under pressure. The chosen test must be described and data attached.

Background to the requirement

The requirement remains unchanged. It is in the interest of both licensees and Nordic Ecolabelling that Nordic Swan Ecolabelled sanitary products should have satisfactory performance characteristics. The function requirement states that: "The performance/quality of the product must be satisfactory and must match that of equivalent products on the market. In the case of products where an acknowledged test exists, this test must be used. The test may be a laboratory test, the manufacturer/applicant's internal quality test, a consumer test or a comparative test with an equivalent product. In the case of diapers, sanitary products (sanitary towels and panty-liners), incontinence care products and breast pads, the performance test must as a minimum include absorption capacity and dryness on the outside (or: "rewet under pressure" or "wetback"). In the case of tampons, the performance test must as a minimum encompass absorption capacity. If a consumer test is performed, the participants must be satisfied with the product compared to the product they normally use.

Standard performance tests do not exist for most types of sanitary products. One exception is incontinence care products, where a standard does exist. Manufacturers may accordingly use their own modified tests for children's diapers, sanitary towels, breast pads and other sanitary products. In other words, there is a certain degree of freedom in relation to documentation. Different tests may be used, provided that the test used provides answers to relevant parameters, and comparisons must be made with equivalent products available on the market. The responsibility for finding equivalent products is left to the licence applicant, and considerable variations and degrees of detail exist for sanitary products.

Many manufacturers of sanitary products and producers of the raw materials used in sanitary products have expressed the wish that Nordic Ecolabelling should impose requirements as to the performance of specific tests and the measurement of various parameters such as absorption ability under pressure, swelling capacity, etc. However, variations exist in the composition of the products and the way the products function for the individual consumer. For example, some parents prefer a particular brand of diaper, while others are of the view that a different brand suits their child better. A range of tests has been performed by various consumer organisations/consumer magazines, and as long as these tests show that the products function "well enough", Nordic Ecolabelling does not wish to impose specific requirements in relation to the tests conducted. For example, some consumers may prefer the product to have a different fit, some prefer the

thinnest products, others in turn may prefer a slightly thicker product that allows more air to circulate and does not feel so enclosed.

In its criteria for absorbent hygiene products from 2014, the EU Ecolabel has similar requirements, but has specified which tests should be performed. These relate to absorption ability and protection against leakage for diapers and tampons, plus a dry skin test using the TEWL method for children's diapers.

040 Tampons

Tampons may as a maximum contain 1,000 aerobic microorganisms per gram of product.

- ☒ Description of the test for aerobic microorganisms and a statement on the test results from the sanitary product manufacturer.

Background to the requirement

The requirement has not been changed in the revision and has a limitation in relation to the content of aerobic microorganisms per gram of product. This requirement is set by hygienic considerations.

041 Information on the primary packaging

Copy of the information on the primary packaging (artwork) for all the relevant languages must be submitted.

The absorption ability must be specified on the packaging in the case of product types where this is relevant. For diapers, sanitary products (sanitary towels and panty-liners), tampons and incontinence care products, for example, this information can be provided by means of clear details of the size (e.g. the weight of the child in kilos or pictograms/values indicating the absorption capacity of the product).

In the case of relevant products, consumers must be urged not to discard them down the toilet. This information can be stated using a pictogram. Relevant products include diapers, sanitary towels, panty-liners, tampons, cotton buds, etc.

- ☒ Sample of the packaging information.

Background to the requirement

The requirement concerning the information text on the products remains unchanged from the previous version of the criteria.

The requirement concerning information that the products must not be discarded down the toilet applies to products such as cotton buds, diapers, sanitary towels, panty-liners and tampons. Cotton buds get caught in the mechanical filters of wastewater treatment plants, creating problems. Disposal of sanitary products down the toilet causes blockages and build-ups in sewage pipes in many municipalities which, in turn, can lead to basement flooding and the discharge of pollutants into nature. Such information is not relevant to other, larger, products such as bed linen.

The other requirements applicable to the information text, such as the disclosure of information on the absorption of the relevant products and the specification of the size of the product are unchanged. This information is important to consumers, because they want products that perform satisfactorily from first use. The parameters that are of interest to consumers are the purpose of the product, if applicable the age or size of the consumer (this applies in particular to children's diapers) and the time at which the product is to be used.

7.7 Quality and regulatory requirements

Requirements O42-O49 are standard requirements in criteria for Nordic Swan Ecolabelled products. The final sentence of requirement O49 states that the products must also meet relevant product-specific requirements imposed by the authorities.

8 Changes compared to previous version

The new criteria for sanitary products, generation 6, have been tightened on a number of points:

- The chemical requirements have been tightened as it also is a requirement to ingoing substances in the chemical products used in the production of the sanitary product. Earlier it was only a requirement to the classification of the chemical product.
- The general chemical requirements are also valid for additives to the ingoing materials/components, like polymers, nonwoven, superabsorbent polymers, regenerated cellulose etc.
- There are new requirements to polymers. This comprise specific requirements to polyurethane and polyamide and a requirement to certified raw materials if the bio-based polymers are based on raw materials from palm oil, soy oil or sugar cane.
- The limit for emission of COD from the production of regenerated cellulose is lowered from 55 to 45 kg/tonne regenerated cellulose, and there is a requirement to emission of AOX and OCl.
- For cellulose-based pulp/fluff/air-laid there is a new forest requirement with a certification percentage of 30% compared to 20% in the earlier version. There is also a requirement to CoC-certification. The energy and emission requirements are also tightened and the calculation based on the Basic module, version 2.
- For paper the requirements are also tightened by referring to the Basic module version 2 and the calculation of energy and emission in this module. There is also a forest requirement with a certification percentage of 50% compared to 30% in the Basic module. There are also separate reference values for energy for packaging paper based on the least stringent requirements in the paper modules as this kind of paper can be a part of the sanitary product, for instance as release paper, and this kind of paper are not a part of the paper modules today.
- There are now requirements to recycled plastic in the primary packaging and/or in the sanitary product.

In addition to the tightenings mentioned above there are also other changes in the criteria:

- The product group has included more product types like plaster, washing cloths, sauna underlays, patient gowns/patient covers, surgical masks and caps. It is also pointed out that the products should have an absorbent and/or a protective function for bodily fluids and faecal matter.

Toothpicks are removed from the criteria as these kind of products have a different function and there was no licenses for such products.

- The criteria are changed so that the amount of requirements that must be fulfilled are related to the amount of the material in the product. For all materials there is a nominal limit of 1 weight-%, while the other limits are on 5, 10 or 20 weight-%.
- The requirement to material composition is changed and the possibility to fulfil the requirement using GWP-values are removed. In addition the limit related to an automatic fulfilment of the requirement is raised from 50 to 60% renewable materials in the product (included fluff/paper), but it is kept on 50% for diapers/incontinence products as these are complex products and are a bit different from the other products that can be labelled. Products with a lower content of renewable materials must either fulfil the requirement by using minimum 20% recycled/renewable materials in the primary packaging or have minimum 7 weight-% of bio-based polymers or recycled plastic in the product related to the ingoing polymers in the product and additional component.

The previous requirement for waste is removed. It included a waste management plan and there was a limitation in relation to material waste. This is an area where there have been more stringent requirements in for example Europe, although there are still many countries where large amounts of waste going to landfill. Because it is in the manufacturer's interest to reduce the amount of in the factory, the requirement regarding waste is removed.

The requirement for labeling of plastic packaging is also taken away.

9 Terms and definitions

Term	Explanation or definition
Additional components	Additional components mean components belonging to the hygiene product that are removed before use of the product. Examples include release paper, a plastic film around a tampon or a sanitary towel or an applicator for tampons.
ADP	Abiotic depletion potential (Materials and fossil fuels)
ADt	Air Dry tonnes
AP	Acidification potential
Bio-based SAP	Term used for superabsorbent polymers made from renewable raw materials.
Chemical product	A chemical product is made of one substance or a mixture of substances.
Component	Components are formed out of one or several materials and chemical products that together fulfil a desirable function. For example: a layer of nonwoven, an outer barrier film or an absorbent core of fluff pulp and super absorbents.
EP	Eutrophication potential
GWP	Global warming potential
Information sheet	Printed information that is included in the primary package. They do not have to meet any requirements.
LCA	Life cycle assessment
Material	For example: fluff pulp, PP, PE, PET, SAP, paper, regenerated cellulose and cotton
OBPA	10,10'-oxybisphenoxarsine
PE	Polyethylene
Plastic	Plastic materials are polymers that has been added chemical products like dyes, stabilisers or other additives. Plastic materials may in addition be processed into foil, fiber or other components.
Polymer	A polymer is a substance consisting of molecules with high molecular mass with a repeating structural unit (monomers). In this document polymers includes various synthetic polymers such as polyethylene (PE), polypropylene (PP), polyester (PET), polystyrene (PS), polyamide (PA) and polyether/polyurethane (e.g. spandex,, spandex, thermoplastic polyurethane and polyurethane foam) and polymers based on renewable raw materials like PLA and bio-based PE. The document differs between the polymers and other materials such as pulp, superabsorbent polymers, regenerated cellulose fibers and cotton that have other requirements in this criteria document.
POP	Photochemical oxidation potential
POCP	Photochemical ozone creation potential
PP	Polypropylene
Primary packaging	Primary packaging means the packaging around the sanitary products and additional components as sold in retail outlets or directly to the customer. Primary packaging does not include transport packaging.
Renewable raw material	Renewable resources are defined as raw materials taken from biological materials that are continuously regenerated within a short space of years, such as corn and trees.
Recycled material	Recycled material is material that fulfils the definition in ISO 14021
Sanitary product	Sanitary product refers to the product used, i.e. excluding additional components, information sheets and primary packaging
SAP	Superabsorbent polymer
SBR	Styrene butadiene rubber
Transport packaging	Transport packaging contains and protects the packs of sanitary products during transport to stores and consumers.
TPU	Thermoplastic polyurethane

Appendix 1 Requirement for regenerated cellulose

Table B1 Summary of BAT values and requirements for regenerated cellulose

	S to air	Zn to water	Cu cupro	COD	FSC/PEFC /Organic	Bleaching	Other
BREF Polymers, August 2007 ¹⁵¹	Staple: 12-20 kg S/ton ("current emission for filament yarn": 40-60/ 170-210 kg S/tonne)	Staple: 0.01-0.05 g Zn/kg ("current emission for filament yarn": 0.1-0.3 g/0.5-3 g Zn/tonne)		Staple: 3-5 kg/tonne ("current emission for filament yarn": 5-6 kg/tonne)			
BREF Pulp, paper and board, final draft July 2013 ¹⁵²				10-30 kg/ADT (air dry pulp tonne) for sulphite pulp			
EU Ecolabel, October 2014 AHP (absorbent hygiene products)	Filament: 40/170 g S/kg Staple: 30g S/kg Only for regenerated cellulose/modal	Was proposed, but deleted. (Filament: 0.16g S/kg Staple: 0.3 g Zn/kg)	Was proposed, but deleted (0.1ppm Cu in wastewater)	No, but 50% recovering of spent process liquor (energy/chemical co-products)	Forest management and CoC. 25% certified (?) Organic cotton	Not chlorine gas AOX: 0.170 kg/ADT or OCI: 150 ppm	Visual (+fluorescent) whitening and colouring + not OK.
EU Ecolabel textiles 2014	Filament: 40/170 g S/kg Staple: 30 g S/kg	Was proposed, but deleted.	Was proposed, but deleted (0.1 ppm)		25% certified	Not chlorine gas AOX: 0.170 kg/ADT or OCI: 150 ppm	Recover value.
Nordic Ecolabelling sanitary, version 5	20 kg S/tonne Proposal: 30 kg S/tonne	0.2 kg/tonne	No requirement	55 kg/tonne (BREF pulp + polymer?)	Only for wood for toothpicks, etc.		
Nordic Ecolabelling sanitary, consultation prop. version 6							
Nordic Ecolabelling textiles, version 4	Harmonised with EU Ecolabel 2009: Filament: 120 g S/kg Staple: 30 g S/kg	0.3 g Zn/kg	0.1 ppm copper in wastewater		Traceability and 30% certified	Not chlorine gas	

¹⁵¹ BREF-dokument for polymerer, 2007, er tilgjengelig på følgende nettsted: http://eippcb.jrc.ec.europa.eu/reference/BREF/pol_bref_0807.pdf

¹⁵² BREF-dokument for polymerer, 2013, er tilgjengelig på følgende nettsted: http://eippcb.jrc.ec.europa.eu/reference/BREF/pol_bref_0807.pdf

Appendix 2 Guidelines for standard, renewable commodities

Nordic Ecolabelling sets requirements on the standards to which cultivated commodities is certified. These requirements are described below. Each individual national sustainability standard and each certification system is reviewed by Nordic Ecolabelling as to fulfilment of the requirements. When a standard is revised, it is re-reviewed.

Requirements on standards

- The standard must balance economic, ecological and social interests and comply with the Rio Declaration's principles, Agenda 21 and the Forest Principles, and respect relevant international conventions and agreements.
- The standard must contain absolute requirements and promote and contribute towards sustainable cultivation. Nordic Ecolabelling places special emphasis on the standard including effective requirements and that the requirements protect the biodiversity.
- The standard must be available to the general public. The standard must have been developed in an open process in which stakeholders with ecological, economic and social interests have been invited to participate.

The requirements related to the sustainable standards are formulated as process requirements. The basis is that if stakeholders agree on the economic, social and environmental aspects of the standard, this safeguards an acceptable requirement level.

If a sustainability standard is developed or approved by stakeholders with ecological, economic and social interests, the standard may maintain an acceptable standard. Accordingly, Nordic Ecolabelling requires that the standard balances these three interests and that representatives from all three areas are invited to participate in development of the sustainable standard.

The standard must set absolute requirements that must be fulfilled for the certification. This ensures that the agriculture management fulfils an acceptable level regards the environment. When Nordic Ecolabelling requires that the standard shall "promote and contribute towards sustainable cultivation, the standard must be assessed and revised regularly to initiate process improvement and successively reduce environmental impact.

Requirements on certification system

- The certification system must be open, have significant national or international credibility and be able to verify that the requirements in the sustainable standard are fulfilled.

Requirements on certification body

- The certification body must be independent, credible and capable of verifying that the requirements of the standard have been fulfilled. The certification body must also be able to communicate the results and to facilitate the effective implementation of the standard.

The certification system must be designed to verify that the requirements of the standard are fulfilled. The method used for certification must be repeatable and applicable so the requirements can be verified. Certification must be in respect to a specific sustainable standard. There must be inspection prior to certification.

Requirements on Chain of Custody (CoC) certification

- Chain of Custody certification must be issued by an accredited, competent third party.
- The system shall stipulate requirements regarding the chain of custody that assure traceability, documentation and controls throughout the production chain.

Documentation

Copy of cultivation standard, name, address and telephone number to the organisation who has worked out the standard and audit rapports.

References to persons who represents stakeholders with ecological, economic and social interests who have been invited to participate.

Nordic Ecolabelling may request further documents to examine whether the requirements of the standard and certification system in question can be approved.