About Nordic Ecolabelled

Textiles, hides/skins and leather



Version 4.13

Background to ecolabelling
12 January 2021

Nordic Ecolabelling

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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.

Addresses

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

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1 Summary

The environmental impact from the production of textiles, hides/skins and leather is linked to the production of the raw material itself, i.e. the fibre or hide, and to the various processes involved, such as dyeing, spinning, tanning and finishing. In recent years, the textile industry has received more attention relating to environmental impact and ethical conditions, and several reports show that the environmental and ethical problems in textile production can be great. By labelling textiles, hides/skins and leather with the Nordic Swan Ecolabel, Nordic Ecolabelling wishes to show consumers that it is possible to produce products in a more environmentally friendly and health-conscious way, and thereby guide consumers towards choices that are better for the environment.

Nordic Swan Ecolabelling's criteria for textiles were first adopted in 1994, and in the revision to version 3 (adopted March 2004) it was also decided that hides/skins and leathers should be incorporated into the product group. In addition, it was decided that the Nordic Ecolabel's requirements should be partially harmonised with the EU Ecolabel's criteria for textiles. This attitude is maintained in the consultation paper for textiles, hides/skins and leather version 4, and several of the requirements can therefore be documented with a valid EU Ecolabel certificate.

Throughout the revision, focus has been placed on preparing a background document that describes the environmental impact of the textile and clothing industry. This provides the basis for the requirements that are set. There has been a dialogue with licensees, the authorities, NGOs and other interested parties, and experts within different areas, throughout the revision work.

Several changes have been made to the requirements in version 4. One of the most significant changes is to move away from requiring that natural fibres, such as cotton, linen and hemp, shall be organically certified. For cotton, there should still be a percentage of the cotton that is organic. Other significant changes are:

- Clarification and change in the product group definition regarding which products can be labelled. Among other things, products treated with flame retardants cannot be labelled.
- Requirements for traceability and the legal extraction of raw materials for regenerated fibres.
- Absolute requirements for water consumption during the tanning of hides/skins.
- Requirements for the content of lead, cadmium and nickel in metal parts and reflector strips.
- Requirements for dyes are extended with the prohibition of, among other things, environmental hazard classification.
- Introduction of animal ethics requirements, with a prohibition against mulesing and the use of down and feathers from live birds.
- Introduction of requirements for foam materials such as latex and PUR.
- Introduction of requirements for prohibition of substances on the REACH candidate list, the use of fluorinated organic compounds and nano particles in finishing.

2 Introduction

The Nordic Swan Ecolabel's version 4 of the criteria for Textiles, hides/skins and leather covers the ecolabelling of products that include clothing, accessories, home textiles, fibre, yarn and fabric, as well as hides/skins and leather. In the previous version of the Nordic Swan Ecolabel's criteria for textiles, it was decided that the Nordic Ecolabel should harmonise most requirements with the EU Ecolabel's criteria for textiles. In addition, the Nordic Ecolabel should set some extra requirements, including regarding the organic production of vegetable fibres, as well as requirements regarding working conditions.

The harmonisation with the EU Ecolabel's requirements is also maintained in version 4 of the Nordic Swan Ecolabel criteria for textiles, hides/skins and leather, but the Nordic Ecolabel still sets additional requirements for the farming of cotton, as well as ethical requirements linked to animal welfare and working conditions at the production sites. The Nordic Ecolabel's additional requirements have been evaluated during the revision, and options to make the application process easier have been evaluated, for example by harmonising the requirements with other labelling schemes such as GOTS. During the revision work on the Nordic Swan Ecolabel's criteria version 4, it was decided that the textile criteria for the EU Ecolabel that were adopted in 2009 are going to be revised again. The revision of the EU Ecolabel started in the autumn of 2011.

This document describes the background for the requirements that have been set in version 4 of the criteria.

3 Facts about the criteria

3.1 Products which can be Nordic Swan Ecolabelled

The criteria include products from textile fibres, hides/skins and leather, and a combination of these. The term 'Textiles, hides/skins and leather' refers to:

- Apparel and accessories, for example trousers, shirts, jackets, underwear, handkerchiefs, scarves, bags and purses.
- Furnishing fabrics, i.e. textiles produced for use and interior decoration in the home (including cars/boats), such as towels, bedding, curtains, tablecloths, rugs, cushions, duvets and upholstery.
- Fibres, yarn and fabric, including durable non-woven, which are to be used in textiles for clothing and accessories or in furnishing fabrics as mentioned above. 'Durable non-woven' refers to products that can be reused and washed.
- Hide and leather products, such as jackets, trousers or bags, and hides/skins and leather as raw materials for clothing or home furnishings, (cars/boats), from the following species of animal: sheep, goat, ox, horse, pig, elk, deer and reindeer.

Both products for private and public use can carry the Nordic Swan Ecolabel. The textiles can be made from new fibres and/or recycled fibres.

The following products and materials cannot be ecolabelled in accordance with the criteria for textiles, hides/skins and leather:

- Mineral fibre, glass fibre, metal fibre, carbon fibre and other inorganic fibres
- Products or materials that are treated with flame retardants. This also applies to flame retardants that are integrated in the product or material
- Wall coverings, such as textile wallpapers
- Advertising materials, banners, roll-ups
- Disposable products. 'Disposable products' refers to products that cannot be washed/cleaned or reused
- Products containing electronic components
- Products containing perfume or other fragrances

Products that can be ecolabelled in accordance with other Nordic Swan Ecolabelling criteria are not covered by the textile criteria. Examples include:

- Disposable products made from non-woven material that cannot be washed or reused, for example kitchen paper and cleaning cloths (criteria for soft paper)
- Disposable products such as cotton pads for personal care (criteria for hygiene products)
- Wet wipes (criteria for cosmetics)
- Floor coverings, such as wall-to-wall carpets (criteria for flooring)
- Textile products that form part of a piece of furniture, e.g. sofa cushions, mattresses and booster cushions (beanbags) (criteria for furniture and fittings). Cushions which are part of a combined furniture license, for example with beds or mattresses, and the padding is of the same type, can be ecolabelled according to the criteria for furniture and fittings.
- Microfiber cloths (criteria for microfiber cloths)
- Toys/soft toys (criteria for toys)
- Shoes (included in the EU-Ecolabel´s criteria for shoes)

3.2 Motives for the Nordic Swan Ecolabelling of Textiles, hides/skins and leather

Nordic Ecolabelling bases its requirements on an analysis of RPS. RPS stands for relevance, potential and steerability. Below, relevant environmental problems are described, as well as potential improvements and the possibility to set requirements that form the basis for Nordic Ecolabelling's criteria for textiles, hides/skins and leather.

In recent years, the textile industry has received more attention linked to the environmental impact and ethical conditions relating to production. This is partially related to the fact that much textile and clothing production has been moved to low-cost countries. Developing countries are now responsible for half of the world's textile exports and ¾ of the world's clothing exports.

According to the English report "Well dressed?" from 2006[1], countries such as China, Pakistan, Bangladesh, India, Mexico, Romania, Cambodia and Turkey increased the number of employees in the textile industry in recent years. In addition, cheaper textiles and a focus on fashion have contributed to an increased demand for textile fibres. Consumerism, with its "use and throw away" mentality has resulted in increased quantities of waste, and textiles have a shorter lifetime. With increased demand and production, as well as shorter lifetimes, it becomes even more important to maintain control of how textiles and clothes are produced.

Several environmental problems are related to the production of textile fibres. Relevant environmental parameters are energy consumption, water consumption, the use of chemicals, effluent and land use. The production of textile fibres and clothing involves many stages, such as farming and the extraction of raw materials, spinning, bleaching, dyeing, washing, impregnating and sewing. Many chemicals are used in order to give textiles the desired properties and appearance.

Several reports show that environmental and ethical problems relating to the production of textiles are great. The "Well dressed?" report highlights the use of energy and toxic chemicals as important environmental factors. In December 2008, a Norwegian report was published by Forum for Environment and Development: "Skitne klær – En vurdering av miljø og arbeidsforhold ved produksjon og bruk, og sammenligning av leverandører"[2]. The report states that the brands and business chains have poor control over the long production chain, and that it is probable that poor working conditions, child labour and the excessive use of environmental pollutants are still widespread within the production of textiles.

SwedWatch and Naturskyddsföreningen in Sweden (Swedish Society for Nature Conservation) have written the report "Den blinda klädimporten – Miljöeffekter från produktionen av kläder som importeres til Sverige".[3] This report also points out a lack of control and knowledge about the conditions with sub-suppliers, and that the demand for clothing that is produced in a more environmentally friendly way is limited. The reason for this is thought to be a lack of knowledge among consumers. Another report, "The sustainability of cotton"[4] describes the environmental problems linked to the farming and harvesting of cotton. It is the use of pesticides and fertiliser in particular that leads to both environmental and health problems.

Greenpeace recently stated that nonylphenol ethoxylates (NPEs) are found in clothing and shoes in the report "Dirty laundry 2: Hung out to dry"[5]. NPEs are used to wash excess dyes from clothing. These substances break down to nonylphenol, which is a substance that has endocrine disrupting properties.

[1] "Well dressed? The present and future sustainability of clothing and textiles in the United Kingdom", Allwood et al., 2006, University of Cambridge, Institute for Manufacturing.
[2] Skitne klær – En vurdering av miljø og arbeidsforhold ved produksjon og bruk, og sammenligning av leverandører", December 2008, Forum for Utvikling og miljø.
[3] "Den blinda klädimporten – Miljöeffekter från produktionen av kläder som importeres til Sverige", A report by Swedwatch and Naturskyddsföreningen, 2008
[4] "The sustainability of cotton – consequences for man and environment", Kooistra K., Termorshuizen A., Pyburn R., Wageningen University & Research Centre, report number 223, April 2006.
[5] "Dirty laundry 2: Hung out to dry", a report by Greenpeace, August 2011

Nonylphenol ethoxylates are also highlighted as problematic substances in textiles from Asia in the Swedish report from Naturskyddsföreningen in 2008, “T-tröjor med ett smutsigt förflutet".[6] A test of bedding in Öko-Test[7] shows that other problematic chemicals are found, including heavy metals such as chromium, halogenated organic compounds and optical white.

All these reports clearly show that there are relevant environmental problems for which Nordic Ecolabelling can set requirements. It is also clear, for example, that not all textiles contain problematic substances, so it is possible to set requirements, i.e. there is steerability. Textile manufacturers and wet treatment plants do exist that continually work to avoid and limit the use of harmful chemicals, and reduce the manufacturer’s environmental impact through a focus on emissions and water and energy consumption.

In recent years, there has also been much focus on “new” environmental pollutants, such as fluorinated compounds, which are used in impregnation and coatings for outdoor clothing. These substances are persistent, harmful to health, and can damage fertility. There is great concern around the increased use of fluorinated substances, and studies show that they are accumulated in nature and transported over long distances to the Arctic[8]. In addition, new technology has entered the market, including the use of nano materials such as nano silver. Products in which nano technology is used are often placed on the market without a good evaluation of their health and environmental effects.

The purification of effluent varies greatly, particularly in Asia. Poor purification can result in chemicals that are harmful to health and the environment from the effluent being released into nature. There can also be problems with a high level of organic material in the effluent, which can result in a lack of oxygen and poor living conditions for organisms in the aquatic environment. Here, it is clear that there is potential to set Nordic Ecolabelling requirements that can result in environmental improvements.

Hides/skins and leather are also included in the product group. The environmental impact from this industry is linked in particular to energy consumption, the use of chemicals such as heavy metals, and emissions of substances that are harmful to health and the environment, as well as COD in the effluent. Chromium is a substance that is usually used in the tanning of hides/skins. Chromium is both harmful to the environment and allergenic. There are several forms of chromium, and it is hexavalent chromium (CrVI) that is regarded as most problematic. A report from Miljøstyrelsen (the Danish Ministry of the Environment), “Kortlægning og sundhedsmæssig vurdering (kun allergi) af krom i lædersko” from 2011[9] shows that 8 of 18 surveyed leather shoes contained chromium (VI) in quantities that can be harmful to those who are allergic.

[6] ”T-tröjor med ett smutsigt förflutet”. A report from Naturskyddsföreningen 2008
[7] Aus der Traum, A test of bedding in Öko-Test no. 11/2008
[8] "Organophosphorous flame retardants in Arctic biota”, State programme for the monitoring of pollution, report no. 1092/2011
[9] Miljøstyrelsen 2011, “Kortlægning og sundhedsmæssig vurdering (kun allergi) af krom i lædersko”, no. 112 2011

The dyeing of hides/skins and leather can also be problematic. Both the dyes themselves and other chemicals such as detergents and complexing agents can be harmful to the environment.[10]

Nordic Ecolabelling believes that the Nordic Ecolabel has good opportunities to influence the textile industry and result in more environmentally friendly production methods. Increased focus on the environment from both consumers and producers results in increased potential to achieve a breakthrough in the market. Relevant environmental parameters for which requirements can be set include the use of pesticides and organic production, the use of chemicals, purification of effluent and the quality and durability of the textile. By setting strict requirements for the use of chemicals, this will simultaneously improve the health of workers. By placing focus on the fact that licensees shall have a conscious awareness of the working environment and ethical production methods, the Nordic Ecolabel can steer the industry towards improved production.

3.3 The criteria document's version and period of validity

Nordic Ecolabelling first adopted criteria for the ecolabelling of textiles in December 1994. Version 2 of the criteria was adopted in December 1999, with validity until June 2003. In the revision to version 3, it was decided that the Nordic Ecolabel's criteria for textiles should be expanded so that products made of hides/skins and leather would also be covered by the criteria. In addition, a partial harmonisation with the EU Ecolabel's criteria for textiles was carried out. The Nordic Ecolabel had some additional requirements relating to individual parameters such as requirements regarding the organic production of natural fibres. Version 3 of the criteria was expanded three times and now has validity until December 2013.

3.4 The Nordic Market

There are currently a total of 12 Nordic Ecolabel licences on the Nordic market. There are also several EU Ecolabel licences (see table 1).

Table 1. Number of licences in the Nordic region as at 10 December 2011

	Denmark	Finland	Norway	Sweden
The Nordic Ecolabel	4	0	3	5
EU Ecolabel	18			6

For several years, there was little activity and interest in the Nordic Ecolabelling of textiles, but in recent years interest has been increasing. On evaluation in 2007, only two licences existed, while on evaluation in 2009 there were 10 Nordic Ecolabel licences. As at December 2011, the number of Nordic Ecolabel licences is 12 and the number of EU Ecolabel licences in the Nordic region is 24. Products that are licenced include garments and under-garments for children and adults, home textiles such as bedding and hand towels, and string bags. There have also been some companies that have held a licence for a period, which have included fashion clothing such as jeans and t-shirts.

[10] Information from forbrugerkemi.dk: http://www.forbrugerkemi.dk/test-og-rad/toj/skind-og-laeder (accessed 30 Aug 2011).

In Norway, the Teko trade association for Norwegian textiles, clothing, shoes and sports equipment has 110 member companies with approximately 3,300 employees.[11] According to the Danish trade association Dansk Mode og Tekstil, 350 companies are members. In Sweden, TEKO has 220 member companies (producers, importers, finishers, etc.). There are approx. 10 production sites for fibres in Sweden and approx. 10 larger weaving mills.

3.5 Other Ecolabelling of Textiles, hides/skins and leather

There are several different types of labels for textiles. Some are type one ecolabels such as the Nordic Ecolabel, which assess the entire life cycle of a product and set requirements for the relevant stages in the life cycle. These are based on the ISO 14024 standard. Other labels are raw material labels, such as organic labels or fair trade labels. There are also so-called health labels, such as Øko-Tex, which shows that the final product has been tested for a range of substances.

3.5.1 Other type 1 ecolabels

EU Ecolabel

The EU Ecolabel is the official European ecolabel, established by the EU Commission in 1992[12]. It is a type 1 ecolabel, which is also life cycle based. It sets requirements for relevant parameters for textiles such as raw materials and the use of pesticides, the use of chemicals, and emissions to water. The Nordic Ecolabel's requirements are generally the same as the EU Ecolabel's requirements, since the Nordic Ecolabel has harmonised many of its requirements with the EU Ecolabel. However, the Nordic Ecolabel has some requirements of its own, and additional requirements for ecology and ethics, for example. For ecology, the EU Ecolabel's requirement is that 3% organic cotton shall be used for the textiles on an annual basis. The criteria also provide the right to an "organic" subtitle if the product consists of over 95% organic cotton, and the % of organic cotton can be stated on the product if this is between 70 and 95%. The EU Ecolabel is found on a range of textile products in Europe across several different branches, but perhaps within the professional contract market and the children's and baby clothes market in particular.

Bra Miljøval

Bra Miljøval is a Swedish ecolabel created by Naturskyddsföreningen[13] and has divided its requirements into two parts; "good fibre" and "good process"[14]. "Good fibre" sets requirements for the farming of the raw material, and cotton and other natural fibres must be organically farmed. Synthetic fibres are approved if at least 70% of the raw material comes from recycled material. "Good process" sets requirements for spinning, weaving, bleaching and dyeing, and concerns the use of chemicals, purification of effluent and energy consumption during production. The manufacturers must fulfil the requirements for "good production", while the requirements for "good fibre" are optional. The products can therefore be labelled with either "good process" or with both "good fibre" and "good process".

[11] www.norskindustri.no/om_teko/ (accessed 31 August 2011)
[12] http://www.eco-label.com/
[13] http://www.naturskyddsforeningen.se/bra-miljoval/
[14] http://www.naturskyddsforeningen.se/bra-miljoval/textil/kriterier/

The reason that the label is divided into two is said to be that it is easier to adapt the treatment of the fibre (the process) than it is to transit to organic production. The criteria cover natural fibres such as cotton, hemp, linen and wool, as well as regenerated fibres such as viscose. Synthetic materials such as polyester can only be included if they are recycled. Bra Miljøval's criteria for textiles are from 1996, and suggestions for new criteria are now out for consultation. The consultation paper[15] states that Bra Miljøval will approve GOTS (the Global Organic Textile Standard) as verification for a range of requirements that are set. The division into "good fibre" and "good process" is maintained in the consultation paper.

3.5.2 Organic labelling schemes

GOTS

The Global Organic Textile Standard (GOTS) is a global textile standard that was developed in 2002 by a working group consisting of the certifying body The Soil Association (Great Britain), the IVN – International Association Natural Textile Industry (Germany), the US Organic Trade Association and the Japanese Organic Cotton Association (JOCA).[16] Int. Federation of Organic Culture Movement (IFOAM) also contributed to this work. Version 1 of GOTS was finalised in 2005. The standard is currently in version 3, and the standard is now being used by 14 different large certifying bodies[17]. GOTS also follows the ISO 14024 standard for ecolabels, but is not a member of GEN (Global Ecolabelling Network). GOTS includes the entire production process from ginning, spinning, weaving, dyeing, finishing and packaging of textile products. GOTS does not only certify cotton, but all types of natural vegetable and/or animal fibres used in textile manufacturing. GOTS is not an organic label for organic raw materials for textile manufacturing. The GOTS standard refers to the requirement that organic raw materials shall be certified according to EU Regulation 834/2007 and/or United States Department of Agriculture - National Organic Program (USDA NOP). GOTS has two types of labelling schemes. The GOTS organic label is only used on textile products containing at least 95% organic fibres. In GOTS' secondary standard, where at least 70% shall be organic fibres, it is stated in version 3 that 30% of the fibres used may be of conventional origin, however, within these 30%, 10% must be solely regenerated or synthetic fibres, therefore the GOTS organic label cannot be used for these products. From 2014, polyester that is included must be post-consumer recycled. GOTS also prohibits genetically modified raw materials. GOTS is a relatively widespread labelling scheme for organic textiles. In 2008, 1,000 factories were certified, and the figure is currently approx. 2,800. Familiarity with the label among consumers in the Nordic market is limited, and much lower than that for the Nordic Ecolabel.

[15] Bra Miljöval kriterier Textil,remissversion 2, 2011

In a survey carried out by YouGov on behalf of Ecolabelling Denmark, 76% responded that they were not familiar with the label[18]. The equivalent figure for the Nordic Ecolabel was 16% and 43% for the EU Ecolabel.

Purely organic labels

Textiles can in some cases be labelled with national organic labels such as the Norwegian Debio Ø label[19]. The Swedish organic scheme KRAV does not permit the labelling of textiles with KRAV, but it can be stated that the raw material is KRAV approved[20]. In Denmark, textiles cannot be labelled with the Danish Ø-label.

3.5.3 Other labelling schemes

Øko-tex

Øko-tex is a private, third party certification label for textiles.[21] 17 testing institutes are behind the scheme, collaborating through the international organisation the Oeko-Tex Association. The label exists in three versions: 100, 1000 and 100 plus. Øko-tex 100 is clearly the most widespread and only covers testing to ensure that the products do not include dangerous chemicals. There are limit levels for how much of the individual substance the final product can contain. Øko-tex 100 is a health label, which focuses on the safety of consumers, and the requirements are formulated so that the closer to the skin that the products are intended to be, the stricter the requirements. Øko-tex 1000 is a labelling of environmentally adapted production sites throughout the entire production chain and goes somewhat beyond the testing of chemicals alone.[22] In order to be certified in accordance with Øko-tex 1000, it is required that a minimum of 30% of the total production is already certified in accordance with Øko-tex 100. Øko-tex 100 plus is a certification which is given if it can be documented that all parts of the production chain fulfil Øko-tex 100.

Asthma and allergy recommendations

Other health labels on the market are recommendation labelling schemes from asthma and allergy associations in Norway, Sweden, Denmark and Finland respectively. The labelling schemes have no requirements regarding organic fibres. There are differences in the requirements that the national asthma and allergy labels set, and the requirements are not always publicly available. In Norway, the requirements set are described, but an explanation of and information on how the requirements shall be documented is limited.

Asthma and allergy labels are not particularly widespread on textile products. In Norway, there are duvets and pillows produced by Mascot Høie and Nordicform which are sold by Princessgruppen. There is also bedding from Høie AS, Normed, and Sleep Scandinavia. The Swedish allergy association has approved bedding from Høie AS.

[18] Survey carried out by YouGov on behalf of Miljømerking Danmark, YEAR?
[19] http://www.oikos.no/newsread/news.asp?docid=11576&wce=aktuelt (accessed 20/12/2011)
[20] http://www.krav.se/Om-KRAV/Helenas-svar/Dates/2011/10/Skillnader-mellan-KRAV-och-EU-ekologisk-odling/2011-10-30-101748/ (accessed 20/12/2011)
[21] http://www.oeko-tex.com/
[22] http://www.oeko-tex.com/oekotex100_public/content5.asp?area=hauptmenue&site=oekotexstandard1000&cls=02 (accessed 01 September 2011)

Bluesign

Bluesign is a system/label for textiles and leather from Bluesign Technologies ag[23]. The Bluesign standard was developed in 1997, and in order to guarantee an independent and applicable standard, Bluesign Technologies ag was established in 2000. Bluesign Technologies ag is organised as a global network which has a Board consisting of representatives from political organisations, trade and industry, and consumer and environmental organisations Bluesign has three different sets of criteria, one for textile manufacturers, one for the production sites, and one for chemical suppliers. The criteria are partly built upon the premise that BAT shall be used (Best Available Technology). The criteria are otherwise focused on environment management and that the production shall be carried out in accordance with authority requirements. The formulations in the requirements are not absolute.

The system divides production processes, technologies and components into the categories blue, grey and black. Processes and components in the blue category can always be used and follow the Bluesign standard, the grey category is for those that can be used under certain conditions, while processes and components in the black category can never be used. It is unclear how a process or component is placed in the different categories. The processes and components that are approved can be viewed in a dedicated database, Bluefinder. Bluesign operates with three different labels; “bluesign® approved” (for chemical components), “bluesign® approved fabric” (for semi-finished products), and “bluesign® safety” (for final products that fulfil all the requirements in the standard). Bluesign is a relatively new system/label, and has achieved a certain distribution, particularly within the sports market and other areas where the production process/product is more technically advanced.

Better cotton initiative

The better cotton initiative (BCI) is a voluntary programme that was started by a number of different organisations and clothing brands along the supply chain for cotton (adidas, Gap Inc., H&M, ICCO, IFAP, IKEA, Organic Exchange, Oxfam, PAN UK and WWF) in 2005[24]. Until June 2009, BCI was organised through a steering committee consisting of global organisations that included producer organisations and trade and industry organisations. As of June 2009, BCI is a member-based organisation under Swiss law. BCI is financed by its members, SECO (the Swiss State Secretariat for Economic Affairs) and the Better Cotton Fast Track Programme, which consists of various organisations such as IKEA, H&M and adidas.

BCI works for a cotton production that shows more concern for farmers and the environment. This means that requirements are set for which pesticides are used and how they are used, including through the use of the programme for Integrated Pest Management (IPM). The quality of the soil and biodiversity shall be considered, as well as the quality of the cotton and working conditions. Requirements are also set regarding the use of water. The requirements are generally formulated, such as “a practice for optimising water consumption shall be established” or “nutrients are added on the basis of the crop and soil’s needs”.

[23] http://www.bluesign.com/
[24] “Better cotton initiative” – information from www.bci.org, accessed 30 August 2011

Through a dedicated "monitoring, evaluation and learning" system, the requirements are followed up through the annual collection of information on a range of parameters. The methods include both the collection of quantitative data (for example water consumption) and qualitative data based on interviews with people involved in BCI. The results are published in a report every year. It is somewhat unclear who carries out the data collection and interviews. In 2010, BCI cotton was produced in India, Pakistan and Mali. Projects were started in Brazil in 2011. There are different rules for when an organisation can use the BCI logo and refer to participation in BCI. In some cases it is possible to add a logo to the relevant product.

Japan Eco Leather
The Japanese label "Japan Eco Leather"[25] for hides/skins and leather labels hides/skins and leather from either domestic animals or wild animals that are not under threat of extinction. The requirements are generally based on limit values, as for Øko-tex, where the content of individual substances may not exceed a limit in the final product. Also, it is not permitted to use dyes that are classified as carcinogenic. Requirements are also set regarding the quality of the product.

3.5.4 Various initiatives

Nordic Initiative Clean and Ethical (NICE) is an initiative that was started by the Nordic fashion industry in 2008[26]. The organisation aims to inspire consumers, designers and others in the textile industry to undertake more sustainable and ethical production and trade. NICE has developed a guide for the textile industry with 13 principles about how this can be done. NICE is currently working with three projects. The first is NICE's 10 year plan, where the five Nordic countries have agreed to collaborate for 10 years with a focus on educating and promoting a sustainable and ethical Nordic fashion industry. Water consumption, CO2 emissions, the use of chemicals, waste and working conditions are points of focus. The second project involves learning more about wool production and promoting wool products. The last project looks at how textile waste can be used as a resource.

Virke, the Enterprise Federation of Norway, has developed a chemical guide, where chemical products that are used in the production of textiles are reviewed[27]. A list of prohibited chemicals and a guide with more information about the problems associated with chemicals have been created. Kemiinspektionen in Sweden has prepared a document[28] with advice for textile importers, and refers to TEKO (Sveriges Textil- och Modeföretag) and Textilimportörerna for the textile industry's lists of problematic substances.

[25] http://www.jlia.or.jp
[26] http://www.nicefashion.org/en/about/ (accessed 24/10/2011)
[27]http://www.virke.no/eway/default.aspx?pid=302&trg=Main_8836&Main_8836=9069:346868::0:9068:3:::0:0&noobjurl=1 (accessed 24/10/2011)
[28] Kemikalieinspektionen, Kemikalier i textilier, råd till dig som importerar och säljer textilier

4 About the revision

4.1 The aim of the revision

The aim of the revision has been to develop version 4 of the criteria for the ecolabelling of textiles, hides/skins and leather. The criteria shall still be partially harmonised with those of the EU Ecolabel, but some areas will have stricter requirements where the Nordic Ecolabel sees this as necessary and wants to maintain its own attitude to what can be ecolabelled. Nordic Ecolabelling has wanted to look at individual requirements and the application process in order to see whether it is possible to make a greater impact in the market and simplify the process for applicants. Another aim of the revision is to make the environmental benefits of the ecolabelling of textiles easier to communicate.

4.2 About this revision

The revision work has been undertaken by a workgroup within Nordic Ecolabelling. The revision is based on an evaluation of version 3 of the criteria. There has been contact with relevant bodies and licence holders throughout the revision. The criteria were out for consultation from 27 March 2011 – to 8 June 2012.

The workgroup has consisted of Eline Olsborg Hansen (Norway), Marianne B. Eskeland (Norway), Ulf Eriksson (Sweden), Ingrid Elmedal (Denmark). Karen Dahl Jensen was the project manager (PM) until spring 2011, when Eline Olsborg Hansen took over as PM. Ingvild Kvien Bengtsson has been the PM since March 2012.

5 Motives for the requirements

Chapter 5 provides an overview of the textile market, various textile fibres and the impact of the textile, hides/skins & leather industry on the environment and health. A more detailed explanation for the individual requirements that are set is given in Chapter 6.

5.1 The textiles market and textile fibres

The clothing and textile industry is important to the global economy. According to the report “Well dressed? The present and future sustainability of clothing and textiles in the United Kingdom”[29], textiles contribute to 7% of the total exports in the world. China dominates with more than ¼ of the world’s production. The textiles industry has partly been regulated by international trade agreements that were created in order to protect domestic textile production. This has limited exports from developing countries to industrialised countries. This agreement has expired, and there is now free trade for textiles. Clothing has become cheaper, and the turnover from clothing and footwear has increased in recent years. Despite a reduction in the share of the household budget used on clothing and textiles, the purchasing of these products is increasing.

[29] ”Well dressed? The present and future sustainability of clothing and textiles in the United Kingdom”, Allwood et al. 2006, University of Cambridge, Institute for Manufacturing

Much of the textiles production that was previously carried out in industrialised countries has now been moved to low-cost countries, and the import of clothing and textiles from Asia has increased significantly. Developing countries are now responsible for half of the world's textile exports and ¾ of the world's clothing exports. Cheaper textiles and a focus on fashion are factors that contribute to the world's increasing demand for textile fibres.

Textile fibres can be divided into two main groups; natural fibres and synthetic (man-made) fibres. Natural fibres can again be divided into two sub-groups; animal fibres such as wool, mohair and silk, and vegetable fibres such as cotton and flax. Man-made fibres can also be divided into two sub-groups; regenerated cellulose fibres (e.g. viscose) and synthetic fibres based on oil (e.g. polyester and polyamide)[30]. Table 2 provides an overview of the different types of textile fibres in the two main groups mentioned above.

Table 2: Overview of different textile fibres

Natural fibres		**Synthetic fibres (man-made)**	
Animal fibres - Wool (sheep) - Cashmere (goat) - Mohair (goat) - Angora (goat/rabbit) - Camel (camel family) - Alpaca (camel family) - Vicuña (camel family) - Silk (silk worm)	Vegetable fibres - Cotton - Flax - Ramie - Hemp - Jute - Sisal - Bamboo - Coconut - Kapok	Regenerated fibres (from wood or bamboo) - Viscose - Modal - Lyocell - Kupro	Synthetic fibres - Polyamide (nylon) - Polyester - Polyacrylic - Polypropylene - Polyeurethane

In addition to regenerated fibres and synthetic fibres, there are also so-called derivative fibres based on cellulose, such as acetate and triacetate. There are also other materials used in textiles, such as membranes like Goretex and various types of coatings.

The share of the various fibres types on the market is estimated based on information from various sources[31,32,33,34,35] and shown in Figure 1.

[30] "Tekstiler og klær – fremstilling, behandling, miljøbevissthet", 2009, Haldis Haugland Solås
[31] Market research 2010 "Statistics: Global and Regional Trends in Textile Fibre Consumption, March 2010 edition" http://www.marketresearch.com/product/display.asp?productid=2615724
[32] Oerlikon Textile 2010 "The Fiber Year 2009/10 – preliminary version" http://www.oerlikontextile.com/Portaldata/1/Resources/saurer_textile_solutions/media_center/fiber_year_2009_10/The_Fiber_Year_2009_10_english.pdf
[33] Textile World "The Rupp Report: The Fiber Year 2009-10" http://www.textileworld.com/Articles/2010/May/The_Rupp_Reportx_The_Fiber_Year_2009-10.html
[34] Fibersource "Fiberfacts - Worldwide fiber production 2002, share by fiber type" (data are taken from the report "World Surveys of Manufactured Fiber Production" made by Fiber Economics Bureau) http://www.fibersource.com/f-info/fiber%20production.htm
[35] Organic Exchange 2010 "Organic Cotton Market Report 2009 Executive Summary" http://organicexchange.org/oecms/images/stories/publications/2009_OE_Market_Report_Executive_Summary_for_web.pdf

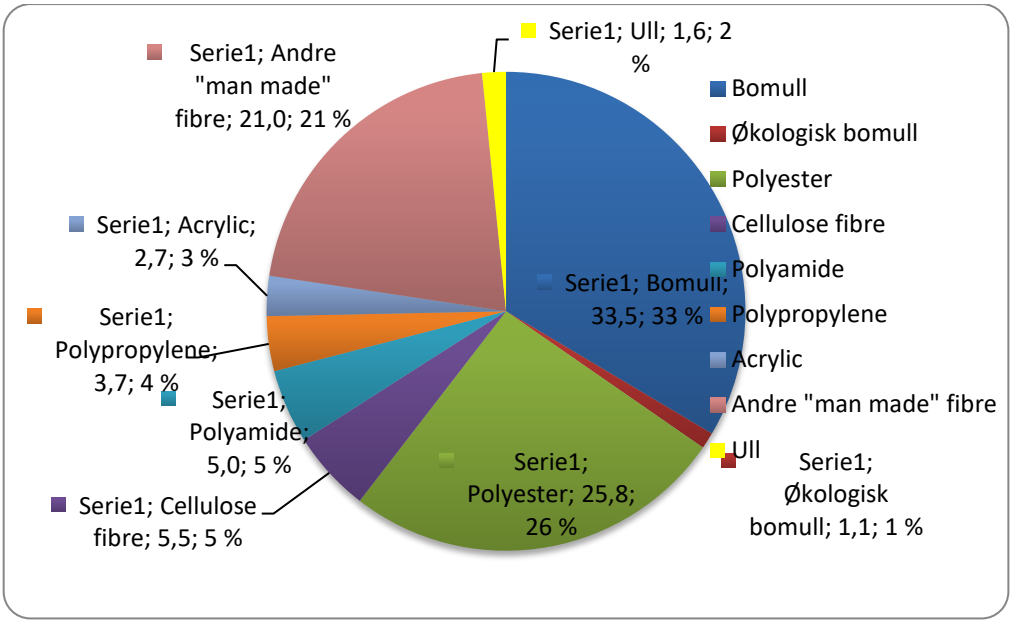

Figure 1: Estimated shares for raw materials

The overview shows that synthetic fibres constitute approx. 60% of the fibre types on the market. Of natural fibres, cotton is the dominating fibre type.

Cotton is currently the most used textile fibre in the world, which it has been for a long time. However, in recent years, cotton has lost market shares to synthetic fibres. The trend shows a marked increase in the demand for synthetic fibres, dominated by polyester, while the demand for natural fibres has been relatively constant[36]. In recent years, there has been more focus on ethical aspects and environmental problems linked to the production of textiles. This has resulted in producers and chains marketing the fact that they use organic cotton in their garments. However, on a world-wide basis, the share of organic cotton is very low, and was estimated to be approx. 1.1% in 2010[37].

5.1.1 Vegetable fibres

Vegetable fibres are fibres whose main component is cellulose. The fibres can be produced from the plant's stem (bast fibres, such as linen), leaves (e.g. sisal) or fruits (seed hair, such as cotton).

[36] "Well dressed? The present and future sustainability of clothing and textiles in the United Kingdom", Allwood et al. 2006, University of Cambridge, Institute for Manufacturing
[37] Textile exchange, 2010 Farm and Fiber report, 2010, http://farmhub.textileexchange.org/upload/library/Farm%20and%20fiber%20report/Farm_Fibre%20Report%202010%20Final_exec%20summary_web.pdf (accessed 06 September 2011)

Cotton

As Figure 1 shows, cotton is clearly the most used natural fibre on the market, with a 33% market share. Cotton is produced in more than 100 countries, but the most important are China (24%), the USA (19%), India (16%), Pakistan (10%), Brazil (5%) and Uzbekistan (4%)38. In total, cotton is farmed on 2.4% of the world's arable land. This figure varies somewhat from year to year, while the total cotton production and yield per area increases. The increased production of textiles has resulted in an increased demand for cotton, and in 2010 there was a cotton deficit of around 15%. It is estimated that approx. 20 million farmers are dependent upon cotton production, and that another 30 million farmers include cotton in their agricultural rotations.

There is great variation in how cotton is farmed. High-tech cotton production with large farmed areas and machines is typical in the USA and Australia, while in most other countries in which cotton is farmed, such as China, India, Pakistan, Uzbekistan, Egypt and Uganda, there is low-tech production where the farmed areas are small and the workforce consists of animals and people. Cotton can either be farmed on the same area year after year, or be included in rotational farming, where the type of plant grown varies from year to year.

The areas in which cotton is currently farmed are mainly tropical and sub-tropical areas. Cotton requires a high temperature, and is sensitive to drought[39]. Cotton is farmed both in areas where irrigation is used, and in areas where only rain water is used in the farming. Typical rain water areas are mainly found in parts of India, Brazil and West Africa. The yield is often lower in these areas, since the farmers depend upon getting enough rain. 53% of cotton farming uses irrigation, but since the yield is often greater when irrigation is used, this production accounts for a total of 73% of the world's cotton production.

Much of the cotton that is produced is sold on to other countries where the further production of the fibres and product is carried out. Cotton is traded on the cotton exchange, where cotton from different producers and of different qualities is mixed together. It is therefore difficult to maintain traceability of cotton that is traded on the exchange. Cotton that is certified in accordance with a scheme, such as organic and fair trade cotton, is easier to trace through the certification systems. It is also possible to purchase GOTS certified cotton. Specific traceability standards have been developed for organic cotton. IMO, the Institute for Marketecology, is a certifying body certifying according to the standards OE 100 Standard and OE Blended Standard[40]. During the hearing, it was pointed out that these standards are developed by the Textile Exchange. The main goal of the OE standards is to ensure full traceability for organic fibres. The OE 100 standard shall ensure third party control of the cotton in products being organic, while the OE Blended standard shall ensure that organic cotton in mixed products is used in the percentage stated on the product. Both standards shall ensure traceability throughout the production chain.

38 "The sustainability of cotton – consequences for man and the environment", Kooistra K., Termorshuizen A., Pyburn R., Wageningen University & Research center, report number 223, April 2006.
39 "The sustainability of cotton – consequences for man and the environment", Kooistra K., Termorshuizen A., Pyburn R., Wageningen University & Research center, report number 223, April 2006.
40 http://www.imo.ch/imo_services_textile_news3_en.html (accessed 27/10/2011)

Flax
Flax fibre is produced from the flax plant, and has a long history as a raw material in the production of clothing[41]. The largest manufacturers of flax are currently France, Belgium, the Netherlands, China, Poland, the Czech Republic and Slovakia. 122,000 tonnes of flax fibre were produced in the EU in 2007, while China produced 25,000 tonnes[42]. Flax grows best in a cool and damp climate, and has been farmed throughout Europe. However, the production of flax has declined, and is small compared with cotton30. The production process from plant to fibre is long, which can be one reason why flax is more expensive than cotton.

Hemp
Hemp fibre is produced from Cannabis plants, and the farming of hemp is therefore forbidden in several countries. In the EU, only approved types of hemp which contain very low levels of narcotics may be farmed. Hemp can be used for many purposes and is an extremely more productive plant than the other plant fibres. China is the world's leading hemp manufacturer, but there is also some production in Europe, Chile and Korea. The production of hemp increased from 50,000 tonnes in 2000, to 90,000 tonnes in 2006[43]. There are few clothing products made from hemp on the market.

Other vegetable fibres
There are a number of other vegetable fibres used in the production of textiles, such as sisal, jute, ramie, coconut and bamboo. Several of these fibres are used extensively in the production of carpets, mats, rope, bags, furnishing fabrics and the like, since they have qualities that render them suited to such products[44].

Bamboo can also be used as a raw material in the production of regenerated cellulose fibres such as viscose, and is often marketed as being environmentally friendly.

PLA (polylactic acid)
PLA (polylactic acid) is a polymer produced from renewable raw materials such as maize, and which can be used in textiles. This is a new polymer which is not currently in widespread use on the market. NatureWorks, a producer of PLA, writes on its website that PLA has good qualities relating to breathability, moisture and isolation, and is suitable for use in sportswear[45].

5.1.2 Animal fibres

Wool
Of all animal fibres, wool from sheep is by far the most dominating wool fibre on the market. The annual production of sheep's wool is approx. 2.1 million tonnes[46]. Australia is the largest manufacturer, with 1/5 of the market, while other large wool producers include China, New Zealand, Iran, Argentina and the UK.

Some of the most exclusive wool on the market is cashmere wool from the cashmere goat. Cashmere is produced in China and Mongolia, with China being the largest manufacturer.

[41] Haldis Haugland Solås, "Tekstiler og klær – fremstilling, behandling, miljøbevissthet", 2009
[42] http://www.naturalfibres2009.org/en/fibres/flax.html
[43] http://www.naturalfibres2009.org/en/fibres/hemp.html (accessed 13 September 2011)
[44] http://www.naturalfibres2009.org/en/fibres/index.html (accessed 13 September 2011)
[45] http://www.natureworksllc.com/Product-and-Applications/Apparel.aspx (accessed 25/01/2012)
[46] http://www.naturalfibres2009.org/en/fibres/wool.html (accessed 13 September 2011)

Approximately 15-20,000 tonnes of coarse cashmere wool are produced annually, but following treatment only approx. 6,500 tonnes of "pure" cashmere remain[37].

Another type of goat's wool is mohair. South Africa is the largest mohair manufacturer, while the USA is another large manufacturer. Annual mohair production totals approx. 5,000 tonnes[37].

A third type of exclusive wool is angora wool from rabbits. France was previously the largest manufacturer of angora, but China has now taken over as the largest manufacturer. Other countries that produce angora are Argentina, Chile, the Czech Republic and Hungary. Between 2,500 and 3,000 tonnes are produced annually[47].

Of other animal fibres, there is wool from alpaca and camels. Alpaca is mainly produced in Peru, Bolivia and Chile, and is the main source of income for approximately 120,000 families in the highlands (the Andes mountains) here. There are also herds in North America and Australia, and the share in these areas is increasing. There are limited opportunities to extend production in the Andes due to a lack of suitable grazing areas. Peru is the largest manufacturer, and it is estimated that the country produces 6,500 tonnes of alpaca wool annually[48].

Camel fibre is mainly produced in China, Mongolia, Afghanistan and Iran. There is little information on the total production. In the 1990s, production was estimated at a total of approx. 2,000 tonnes in China. Only a small proportion of camel fibres are exported and sold on the international market[49].

Silk
Silk is produced by the silkworm, Bombyx mori. Silk is produced in many countries, but the largest manufacturers are located in Asia. Brazil is also a large manufacturer. The production and further treatment of the silk thread is an important source of income for many households in China, India and Thailand. Global silk production totals around 150,000 tonnes[50].

5.1.3 Man-made fibres

Man-made fibres can be separated into oil-based fibres (synthetic) and regenerated cellulose fibres.

Synthetic fibres
Synthetic fibres constitute approx. 60% of the consumption of fibres in the world (see Figure 1). There are four dominating fibre types; polyester, nylon, acrylic and polyolefins[51]. The most common synthetic fibre is polyester[52]. In 2004, a total of approx. 28 million tonnes of polyester were produced. Of other synthetic fibres, approximately 6 million tonnes of nylon and 4 million tonnes of acrylic were produced in 2004. In recent years, much of the production of synthetic fibres has been moved from the USA and Europe to Asia. In 1990, China was responsible for approximately 8% of the production, while in 2002, this had increased to 30%[39].

[47] http://www.naturalfibres2009.org/en/fibres/angora.html (accessed 13 September 2011)
[48] http://www.naturalfibres2009.org/en/fibres/alpaca.html (accessed 13 September 2011)
[49] http://www.naturalfibres2009.org/en/fibres/camel.html (accessed 13 September 2011)
[50] http://www.naturalfibres2009.org/en/fibres/silk.html
[51] http://oecotextiles.wordpress.com/2010/07/07/man-made-synthetic-fibers/ (accessed 21 September 2011)
[52] "Well dressed? The present and future sustainability of clothing and textiles in the United Kingdom", Allwood et al. 2006, University of Cambridge, Institute for Manufacturing

Regenerated cellulose fibres
Viscose, which is produced from regenerated cellulose fibres, constitutes approximately 5% of the total fibre production (see Fig. 1). The main production of viscose is carried out in Asia, (approx. 85%), with China as the dominating country. Europe stands for approx. 15% of the viscose production[53]. Viscose is also known as rayon. Other cellulose fibres are Modal and Lyocell. Modal is a fibre that has been developed from viscose by Lenzing. Lyocell is a relatively new cellulose fibre, which is similar to viscose, but more durable. Lyocell is also known by the trade name Tencel, for which Lenzing has the patent.

5.1.4 Hides/skins and leather

Hides/skins and leather that are used to create clothing, shoes and accessories can be from many different species of animal. Usually, leather comes from livestock such as ox and sheep. Leather from ox comes mainly from the USA, Argentina, Russia and various EU countries[54]. New Zealand, Australia, and parts of Asia and the EU are the main exporters of sheepskin. Hides/skins from other domestic animals such as goats and pigs are also used. In addition, there are hides/skins from wild animals such as elk, reindeer and deer on the market. The hides/skins of more exotic species, such as crocodile and snakes, are not common in the Nordic countries or the EU. In some parts of the world, mainly in Arctic regions, seal skin is also used. The EU is a net importer of hides/skins, but the world's largest exporter of leather[48]. Italy and Spain are the largest manufacturers of leather, followed by France, Germany and the UK. However, the EU's market share is decreasing since the leather industry is increasing in other parts of the world, such as Asia and America.

The main product of the European leather industry is leather for footwear (approx. 50%). Leather for the clothing industry constitutes approx. 20% and leather for furniture and cars approx. 17%. The share of leather for other types of products is approx. 13%.

5.2 The impact of textiles, hides/skins and leather on the environment and health

5.2.1 LCA of textiles

Several LCA studies of textiles have been done. The number of fibre types included in the studies is unfortunately limited. Of natural fibres, cotton is the most dominating, and it is rare that other natural fibres are investigated. Of the synthetic fibres, polyester is the fibre that is most often studied. The most common environmental factors that are studied are energy consumption and water consumption. For other parameters, such as global warming, the depletion of natural resources, the use of chemicals, pesticides and fertilisers and land use, varying information is available.

[53]World Viscose fiber report 2010:
http://www.yarnsandfibers.com/revamp_ir/report_fullstory.php3?desc=yes&id=542&p_type=15&source_id=15&source=1111ial%20Reports&story_type=F&BF=&show=Description (accessed 21 September 2011)
[54] BAT, 2003: Reference document on Best Available Techniques for the tanning of hides and skin

In general, the environmental impact in the various phases of the product's life cycle varies with the type of fibre, and it is therefore difficult to identify a fibre type that is better than others in all parameters. An attempt has been made to simplify and summarise this complexity in Table 3, taken from the report "The role and business case for existing and emerging fibres in sustainable clothing"[55]. Here, it is pointed out that this is based on LCA studies that look at fibre production, i.e. cradle to gate. The use phase and waste phase are not included in the considerations below.

Table 3: Ranking of different fibres' environmental impact in various categories (Chemical use is not included directly here; see more about chemicals later in this section).

Reduced environmental impact	Energy use	Water consumption	Greenhouse gases	Effluent	Land use
↓	Acrylic Nylon Polyester Regenerated cellulose (viscose, Modal) PLA/Cotton/Lyocell Wool Natural bast fibre (nettle, hemp, flax)	Cotton Silk Nylon Regenerated cellulose Acrylic Hemp Wool Natural bast fibre Polyester	Nylon Polyester Lyocell PLA Viscose Modal Cotton Natural bast fibre Wool	Wool Regenerated cellulose Natural bast fibre Nylon Polyester	Wool Ramie Cotton Flax Hemp Viscose and Modal Jute PLA Lyocell

Some general traits are that the production of synthetic fibres has higher energy consumption than that for natural fibres. However, the production of cotton has somewhat higher energy consumption than that of other natural fibres.

In terms of water consumption, cotton is the fibre type which clearly uses the most water. This is particularly due to high water consumption during the cultivation of the cotton plant. Silk has high water consumption during spinning, while nylon uses a lot of water during both polymer production and spinning. Regenerated cellulose fibres have relatively high water consumption due to the production of pulp. Other natural fibres and polyester have low water consumption.

Greenhouse gas emissions will to a great extent be linked to energy consumption. Also, the synthetic fibres will appear worse in this area due to the use of fossil fuels as a raw material in polymer production.

Emissions of dyes, finishing agents, traces of pesticides and the amount of organic material are relevant parameters linked to effluent. Here, natural fibres, and wool in particular, have the highest environmental impact, because raw wool has high lanolin content. The last parameter, land use, is only relevant to natural fibres, regenerated cellulose fibres and polymers from natural raw materials such as PLA. This is a complex parameter, and there is little concrete data that can be used to estimate the environmental impact. In general, cotton has a greater environmental impact than regenerated fibres and PLA. Wool is highlighted as the fibre with the highest environmental impact, but since wool is mainly a bi-product from meat production, and grazing is carried out on non-farmable land, this is less relevant.

[55] " The role and business case for existing and emerging fibres in sustainable clothing", April 2010, report from Department for Environmental, Food and Rural Affairs, UK.

A parameter that is not directly mentioned in Table 2 is the use of chemicals. Many chemicals are used in the textile industry, in the farming of raw materials, production of polymers, dyeing and other chemical treatment of textiles in order to achieve the desired quality. This will be shown in the "effluent" parameter to a certain extent, but not all the chemical use will be covered here. In terms of the cultivation of fibres, it is particularly the use of pesticides that is relevant. Cotton stands out here with a high consumption of pesticides[56]. The use of artificial fertiliser and natural fertiliser, if any, is important. Many chemicals are used in the production of synthetic fibres. For example, the production of nylon will result in emissions of nitrous oxide, which is a greenhouse gas, while antimony trioxide, which is classified as possibly carcinogenic, can be a problem in catalysts in the production of polyester.

In cradle to grave studies, where the use phase and waste phase are also included, it is clear that the use phase has a great effect on the result. This phase actually often has the greatest total environmental impact in a textile product's life cycle, followed by the production phase.[57,58] The use phase includes washing, dry cleaning and possibly ironing. Especially the use of energy and chemicals is affected. The consumer's washing frequency, the use of tumble dryer and possibly ironing are the factors that have the greatest effect here. Since this varies greatly from person to person, the assumptions made here may significantly affect the result, but this is a factor over which Nordic Ecolabelling has little control. It is, however, worth noting that the selection of fibre affects the environmental impact during the use phase. For example, the study "Environmental profile of cotton and polyester-cotton fabrics"[59] has shown that, despite a higher energy consumption during the production of a mixed fibre product made from polyester/ cotton, a purely cotton fabric would have a significantly higher energy and water consumption overall when compared with the mixed product. This was mainly due to a higher energy and water consumption for the pure cotton sheets during the use phase. In order to reduce the environmental impact during the use phase, mixed fibre products can be created, coatings can be added, or antibacterial agents can be added which reduce smells. However, it is not given that this is positive in terms of the environment, since coatings and antibacterial agents can be problematic. There is for example concern linked to the use of silver as an antibacterial agent, since this can contribute to an increased distribution of silver in the environment and possibly increased bacterial resistance to antibiotics. In this context, it should also be taken into account that mixed fibre products can reduce any effective reuse of the fibres. The waste phase has relatively little importance in the life cycle of a textile, but generally reuse will provide a lower impact than recycling, which again will provide a lower impact than combustion or landfill disposal.

A summary of the results shows that the use phase contributes most to the impact of most of the environmental indicators in cradle to grave studies.

[56] "The sustainability of cotton – consequences for man and the environment", Kooistra K., Termorshuizen A., Pyburn R., Wageningen University & Research center, report number 223, April 2006.
[57] "UMPITEX – Miljøvurdering af tekstiler", arbejdsrapport fra Miljøstyrelsen nr. 3, 2006
[58] "Mistra future fashion – Review of life cycle assessments of clothing", Chapman, Oakdene Hollins Research and consulting, report for MISTRA, October 2010
[59] "Environmental profile of cotton and polyester-cotton fabrics", Kalliala E.M. and Nousiainen P., AUTEX Research Journal Vol 1, No. 1, 1999

However, it should be noted that this is to a great extent dependent on the assumptions that are made in the study. After the use phase comes the production phase. Other activities, such as transport, storage and waste, contribute little.

5.2.2 The impact of the production of fibres on the environment and health

Cotton

The cultivation and harvesting of cotton is linked to serious environmental and health problems. This is mainly due to the use of pesticides and other chemicals during production, but other factors, such as water consumption, can also be significant for the environmental impact.

The cotton plant is exposed to attacks from insects which can reduce the yield significantly. On a worldwide basis, it is estimated that 15% of cotton is lost due to insect attacks. The solution to this has mainly been the use of pesticides. On a worldwide basis, cotton is farmed on approx. 2.5% of land areas, but accounts for 25% of the world's pesticide use60. Many of the pesticides that are used are extremely harmful to both health and the environment. Despite the fact that several of the most harmful pesticides are prohibited, many of these are still used in developing countries. Several are neurotoxic and classified by the WHO as highly or extremely harmful. Much of the cotton production is done in developing countries, and the most common method of applying pesticides is through the use of hand pumps and other types of spraying equipment directly in the field. Since there is often insufficient use of protective equipment, the exposure is great. The use of pesticides is also problematic for small farmers who also produce food. It is estimated that approx. 40,000 people die annually due to pesticide use. In industrialised countries, such as the USA, there is greater control of which pesticides can be used, and the application methods used are better. Environmental problems linked to the use of pesticides are among other things an effect on biodiversity, since other species are also affected. It is estimated that 67 million birds die annually due to the use of pesticides. Natural predators are also often affected, something which will again result in a higher incidence of harmful insects. In addition, species can develop resistance to the pesticide.

Other chemicals that result in environmental problems equivalent to those of pesticides are those that remove leaves. This is done in order to harvest the cotton more easily, and is an effective method. Such chemical products are used in approx. 15% of all cotton production.

The use of chemical fertiliser has recognised negative environmental effects. Run off from agriculture is one of the main reasons for eutrophication. In addition, chemical fertiliser is energy-intensive to produce, and the mining industry that extracts phosphorus and potassium can result in environmental effects such as a change in the landscape, and water and air pollution.

There is also concern regarding the total quantities of phosphorous found in the earth, since phosphorous is very important in food production. The excessive use of phosphorous will result in resources of phosphorous being depleted more quickly[61].

[60] "The sustainability of cotton – consequences for man and the environment", Kooistra K., Termorshuizen A., Pyburn R., Wageningen University & Research center, report number 223, April 2006.
[61] http://www.forskning.no/artikler/2008/desember/202763 (accessed 20/12/2011)

Problems linked to artificial irrigation can also be significant. Fresh water is an important resource, and overconsumption can result in great problems. Ruining the soil through increased salt content is one of the most serious effects. This results in agricultural land being ruined, and that areas must be abandoned. Other side effects include a lack of water downstream of the water supply, with consequences for animal life and access to water for humans. The use of groundwater is not often sustainable, since the extraction exceeds the natural supply. It should however be pointed out that irrigation and overconsumption are not only related to the production of cotton, but a general problem in agricultural areas with little water. It has been estimated that the farming of cotton is responsible for 1-6% of the reduction in the world's fresh water resources[56].

There are several ways to reduce the impact of the production of cotton on the environment and health. The use of protective equipment and training of the farmers in the use of pesticides, as well as improved control of which pesticides are used, are important measures. These are focus points in the so-called IPM (Integrated Pest Management) system[56]. Here, requirements are also set for the reduction of the use of fertilisers and energy. Globally, it is estimated that approx. 20% of all cotton production is IPM.

The environmental impact of cotton production can also be reduced through organic farming. The main difference between conventional and organic cotton production is that no pesticides or fertilisers are used during organic production. This results in less damage to the natural environment and the health of farmers. This is, however, probably one of the greatest challenges for those who carry out organic cotton production, since the cotton plant is easily exposed to attack by insects. Environmental problems that are not solved by organic production are problems linked to irrigation. How much water is used is dependent upon both the country/area and irrigation method. Much of the organic farming that is currently carried out is undertaken in areas where rainwater is the main water source, which reduces the problems relating to water consumption[62]. During the hearing it was commented that although organic production does not necessarily reduce water consumption, organic production will have a great impact on the quality of the spill water from land areas to the outlet. It was also remarked that the water footprint of commercial cotton is generally larger than that of organic cotton due to the amount of fresh water used to dilute contaminants (pesticides and chemical fertiliser) before it is drained. Another aspect often discussed in connection with organic production, is the yield. For cotton it is difficult to say whether there is a difference between the yield in conventional production compared to organic production. Some of the reason for this is that there are already significant differences in yield within each system.

Another large difference between conventional and organic farming is the use of genetically modified (GM) plants. This is not permitted in organic production, but much of today's cotton production is based on GM plants. The share of genetically modified cotton on the world market is approx. 30% (2008), but this figure is expected to increase. 80% of the cotton that is farmed in the USA and 66% of that which is farmed in China is genetically modified. The most common genetically modified cotton has been given a gene from bacteria that produce a poison which is not tolerated by insects, the so-called Bt cotton.

[62] "The sustainability of cotton – consequences for man and the environment", Kooistra K., Termorshuizen A., Pyburn R., Wageningen University & Research center, report number 223, April 2006.

Another genetically modified cotton variety is cotton that is resistant to glyphosate, the active ingredient in herbicides such as Roundup. Both these variants are developed by Monsanto, which produces both the genetically modified cotton and the relevant chemical sprays[63].

There is great uncertainty linked to the environmental effects of genetically modified plants. There are great questions relating to whether the use of chemical sprays will be reduced through the use of GMO, as GMO supporters claim. There are also various social and ethical problems related to GMO production[64].

Other vegetable fibres

Compared to cotton, other vegetable fibres are often regarded as a more environmentally friendly alternative. For example, flax and hemp are plants that grow with the use of few nutrients. Flax is seldom attacked by pests – although it does face competition from weeds. For hemp, there is little need for chemical sprays and the plant can add nutrients to the soil (Teknologirådet, 2001)[65].

The following treatment in order to extract the fibres, known as water retting, can however lead to pollution, since the plants soak in water. The problem is that great quantities of oxygen-consuming substances end up in the effluent. Purification of the water is simple, but often not done. This method for treating plants is therefore prohibited in Germany and France, but not for example in Poland and China. A newer, more environmentally friendly method is to place the plant in a tank and add various enzymes.

Textiles made of flax and hemp are also known to crease more easily, something which results in these textiles often being surface treated, for example with substances that can release formaldehyde.

Another vegetable fibre that has entered the market in recent years is bamboo. Bamboo textiles are marketed with properties such as being extra soft, strong, quick drying and having natural antibacterial and anti-static properties. Bamboo towels soak up more moisture than cotton ones. The bamboo fibres are created from a bamboo mass that is spun[66]. Bamboo is a fast growing grass, and does not normally require fertilisation or the use of pesticides, and is therefore often presented as an environmentally friendly alternative to other natural fibres such as cotton. China has a lot of bamboo, and the grass is regarded as a natural resource and extracted from unregulated natural forests in southwest China.

There can however be problems with such felling because this can damage habitats that are important for animals such as the red panda and giant panda, as well as damage the ecosystem in general[67]. Bamboo is also farmed in different forms of plantation. Bamboo can be included as a raw material in the production of regenerated cellulose fibres such as viscose.

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[63] Skitne klær – En vurdering av miljø og arbeidsforhold ved produksjon og bruk, og sammenligning av leverandører", December 2008, Forum for Utvikling og miljø.
[64] "Genetically modified organisms – a summary of potential adverse effects relevant to sustainable development", 2011, report ordered by Miljømerking
[65] Teknologirådet, 2001; no. 112: Fordele og ulemper ved hampdyrkning i Danmark.
[66] LoveToKnow, an American online media firm that wishes to provide high quality information on the internet. http://organic.lovetoknow.com/Organic_Bamboo_Fabric
[67] From INBAR's website about the «Bamboo Forest Biodiversity Conservation project", http://www.inbar.int/Board.asp?BoardID=280

Animal fibres

Sheep can be exposed to the use of chemicals that are harmful to health and the environment in order to remove parasites from the wool. Organophosphates and pyrethroids are used, among others. The chemicals can result in nerve damage in humans and are extremely toxic for the environment. During the further wet treatment of wool, much organic material (lanolin) is released into the effluent, which can create problems in the environment. A high COD content can result in a lack of oxygen in the aquatic environment and be harmful to animal and plant life. However, lanolin is often retained and used for other purposes, such as in cosmetics.

Synthetic fibres

In the production of synthetic fibres, oil or gas is the raw material. Oil is non-renewable, and the extraction of oil can create great environmental problems. Environmentally harmful chemicals are used in the production of different synthetic fibres, including antimony trioxide in the production of polyester. In addition, the production can result in emissions of problematic compounds to the air, such as NOx and VOC.

Regenerated cellolose fibres

In the production of regenerated cellolose fibres such as viscose, the extraction of raw material – the forest – is important for cellose production. In order to maintain a productive forest where biological diversity is retained, it is important to focus on sustainable forestry. Much energy and many chemicals are used in the production of cellulose mass. Following cleaning and bleaching with NaOH (alkalinisation), the mass swells and is trated furher with CS_2 to become cellulose zanthogenate. This coagulates in an acid bath containing H2SO4, NaSO4 and ZnSO4. Following further maturation, filtering and degassing, the viscose is spun. Because viscose is normally produced on the basis of a chemical mass, there can be great COD emissions from the production. Further production of viscose results in emissions of both sulphur and zinc. Other regenerated cellulose fibres than viscose are Modal and Lyocell. Modal is a further development of viscose, and has slightly different qualities. For example, it is easier to wrinkle-free treat than viscose. Lyocell, also known under the trade name Tencell, is also a cellulose fibre that is similar to viscose, but with a slightly different production process.

For more information about environmental problems linked to the production of cellulose masses, refer to Nordic Ecolabelling's background document for the Basis module, version 2.

5.2.3 The impact of the finishing of fibres and the production of textiles on the environment and health

In addition to environmental and health problems associated with the production of fibres, there are also problems linked to the further treatment of fibres. The fibre and textile undergo many chemical processes in order to attain various qualities. Common fibre and textile treatments include dyeing, printing and finishing. The finishing can include softening, anti-wrinkle treatment, impregnation or antibacterial treatment. From all these processes, undesirable chemicals can remain in the textile, and several Nordic and international surveys have shown this.

Some of the chemicals found during analyses include prohibited azo dyes, heavy metals, nonylphenol etoxylates, polyfluorinated organic compounds (PFCs), phthalates and triclosan[68],[69],[70],[71]. Several azo dyes are prohibited. These are dyes that may be carcinogenic[72]. Nonylphenol etoxylates are used in the textile industry as detergents and are harmful to the environment and can cause reproduction problems[64]. Phthalates are a group of chemicals that can cause endocrine disturbances and which can be harmful to reproduction[73]. They can be found in rainwear and in PVC printing on textiles. Triclosan is an antibacterial substance. Such substances can for example be added to sportswear. They are harmful to the environment and suspected of increasing resistance to antibiotics[74]. Polyfluorinated organic compounds are used in the impregnation and coatings of textiles. They are toxic, can accumulate in the environment, and are difficult to break down. Many of these substances are thought to be harmful to the reproductive system[75].

It is also common for textiles to contain chemicals that can result in allergic reactions. The use of such chemicals presents a risk for the end user of the product, workers and the environment.

Emissions of polluted water can be a great strain on the environment at the production sites. With the increased production of textiles in poorer countries, there can be poorer chemical regulations and emissions requirements than in industrialised countries, which can result in an increase in the problems associated with the use of chemicals.

5.2.4 The impact of the production of hides/skins and leather on the environment and health

The production of hides/skins and leather can have a great impact on the environment[76]. There can be environmental effects linked to the use of chemicals, effluent, waste, and emissions to both the air and soil.

In order to make hides/skins into leather, the hide must go through a tanning process, in which a number of chemicals are used. Leather is a stable material that can be used in the production of many different products. Often, the leather must be transported over great distances, and can then either be cooled using ice or refrigerated storage, which requires energy, or be salted. Salt can be a problem in the drainage system, with 65kg chloride per tonne of leather[61].

The actual tanning of the leather can be carried out in various ways, but the most common method is to use chromous salt, which is a limited resource.

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[68] SFT 2004, Kartlegging av tilførsel og spredning av farlige stoffer fra utvlagte tekstiler, TA-2002/2004
[69] Miljøstyrelsen 2011. Kortlægning af kemiske stoffer i forbrugerprodukter Nr. 113 2011
[70] Kemikalieinspektionen 1997, Kemikalier i textilier, KEMI-rapport 2/97
[71] Greenpeace 2011, Dirty laundry 2:Hang out to dry
[72] Miljøstyrelsen,faktaark om azo-farvestoffer: http://www.mst.dk/Virksomhed_og_myndighed/Kemikalier/regulering_og_regler/faktaark_kemikaliereglerne/Azofarvestoffer.htm (accessed 04/11/2011)
[73] Miljøstatus i Norge: http://www.miljostatus.no/no/Tema/Kjemikalier/Noen-farlige-kjemikalier/Ftalater/(accessed 04/11/2011)
[74] Miljøstatus i Norge: http://www.miljostatus.no/Tema/Kjemikalier/Produkter/Tekstiler/ (accessed 04/11/2011)
[75] Miljøstatus i Norge: http://www.miljostatus.no/no/Tema/Kjemikalier/Noen-farlige-kjemikalier/PFOS-PFOA-og-andre-PFCs/ (accessed 04/11/2011)
[76] BAT 2003, Reference document on Best Available Techniques for the tanning of hides and skin

According to the BAT document from 2003, 90% of leather is tanned through the use of chromium. A report from Miljøstyrelsen, "Kortlægning af kemiske stoffer i forbrugerprodukter" from 2011[77] states that 80% of leather is tanned using chromium. Traces of chromium, particularly hexavalent chromium, in the leather can result in allergic reactions for the user, since this is an allergenic substance. In addition, it is carcinogenic and extremely toxic to aquatic life[78]. Hexavalent chromium is not used during tanning, but trivalent chromium can be transformed into hexavalent chromium under certain conditions[62]. A reduction in the amount of chromium, recycling of chromium and control of the process and effluent can reduce the environmental problems associated with chromium tanning. An alternative to chromium tanning is vegetable tanning, but this has a limited area of use since vegetable-tanned leather has different qualities to chromium-tanned leather.

During vegetable tanning, various plant extracts are used, such as from bark or roots. Informasjonssenteret for miljø og sundhed in Denmark[79] and an LCA study from Ecobilan in 2003[80] state that vegetable tanning is not generally better for the environment than chromium tanning, since this is more dependent upon the conditions at the individual tannery. Heavy metals such as cadmium and lead can also be found in hides/skins and leather. Other problematic substances can be complexing agents such as EDTA and NTA, halogenated organic compounds, surfactants such as alkylphenol etoxylates (APEOs) and dyes. Effluent from tanneries which contain COD, organic compounds which use up the oxygen in the aquatic environment on breaking down, can be a great problem if an adequate purification plant does not exist.

The BAT report states that there is limited information about the energy consumption in tanneries, but there may for example be significant consumption linked to the drying processes during tanning.

5.3 Ethical problems

There are several ethical problems that are relevant to the production of textiles, hides/skins and leather. In the textiles industry, there are problems with poor working conditions in several parts of the production chain. These might be related to the use of dangerous chemicals, poor protective equipment, long working hours, poor working conditions and child labour.

There can also be several ethical issues relating to animals. One example is Merino wool. The majority of this type of wool comes from Australia. The Merino sheep is specially bred to have a wrinkled skin in order to achieve more wool on the sheep. This excess skin collects urine and faeces in the hindquarters, which attracts flies that lay eggs in the folds of the skin. Mulesing is the method used to keep the flies at bay, which involves the coat and skin of the hindquarters of the sheep being removed without anaesthetic[81].

[77] Miljøstyrelsen, Kortlægning af kemiske stoffer i forbrugerprodukter", no 112 2011
[78] http://www.erdetfarlig.no/Farlige-stoffer/Krom/
[79] http://www.forbrugerkemi.dk/test-og-rad/toj/skind-og-laeder/rad-og-fakta-om-skind-og-laeder (accessed 02/11/2011)
[80] Ecobilan, 2003, LCA Study – a comparison of tanning technologies.
[81] RSPCA: (http://kb.rspca.org.au/What-is-mulesing-and-what-are-the-alternatives_113.html) accessed 09 December 2011.

Mulesing has been much discussed in recent years, and in 2004, the industry in Australia (AWI) promised that mulesing would be phased out by the end of 2010, but how successful this has been has been criticised[82],[83]. Due to animal rights reasons, there are therefore some companies that select alternative sources of Merino wool, for example from Patagonia in Argentina, where they can guarantee that the wool has been produced without mulesing.

Another example of ethical issues relating to animals is down that is plucked from live geese without anaesthesia. The European Food Safety Authority (EFSA) has looked into this problem and concluded that it is possible to remove down and feathers from living geese without causing pain to the animals, as long as this is done during the period when the feathers are shed[84]. The problem is that this is not followed in the commercial production.

6 Background for the requirements

Chapter 6 provides the reasons for the requirements set by the Nordic Ecolabel. The requirements are based on a review of the RPS analysis for textiles, hides/skins and leather in Chapter 3.2, and the environmental impact of textile production and ethical problems as described in Chapters 5.2 and 5.3. This means that the requirements are focused on relevant (R) environmental and health problems linked to the production of textiles, hides/skins and leather, while also focusing on whether there is potential (P) for improvement. In addition, Nordic Ecolabelling evaluates whether it is possible to set a requirement, i.e. whether there is steerability (S). It must be practically possible for the producers to fulfil the requirement, and to acquire reliable documentation.

6.1 The relationship to the EU Ecolabel

The Nordic Ecolabel has partially harmonised its requirements with the EU's criteria for the ecolabelling of textiles version 3, adopted 9 July 2009. The requirements that are harmonised with the EU's criteria are inserted in the Nordic Ecolabel's criteria document in order to provide applicants with a better overview of which requirements shall actually be fulfilled. The EU Ecolabel's requirements were previously an attachment to the Nordic Ecolabel's criteria document. All requirements that are harmonised with the EU Ecolabel's requirements can be documented with a valid EU Ecolabel licence. A table in Appendix 31 of the criteria document shows which requirements are harmonised with the requirements of the EU Ecolabel. The Nordic Ecolabel sets some additional requirements in relation to those of the EU Ecolabel. The additional requirements are mainly requirements relating to cotton, as well as ethical requirements.

[82] (http://theconversation.edu.au/how-the-wool-industry-has-undercut-itself-on-mulesing-956) accessed 09 December 2011.
[83] (http://www.firstthings.com/blogs/secondhandsmoke/2011/04/07/peta-attacks-australia-wool-industry-again-for-musling/) accessed 09 December 2011.
[84] EFSA Scientific Opinion on the practice of harvesting (collecting) feathers from live geese for down production, 25 November 2010

In addition to the ecolabelling of textiles, the Nordic Ecolabel has included hides/skins and leather in the criteria, since there has been an interest in this in the market. The EU Ecolabel does not have specific criteria for hides/skins and leather in the textile criteria, but does have criteria for shoes. The Nordic Ecolabel has therefore been inspired by these requirements in the formulation of the requirements for hides/skins and leather.

6.2 The relationship to GOTS

During the revision work, it has been assessed whether individual requirements should be able to be documented with a GOTS certificate, so that the application process can be simplified for applicants with a GOTS certificate. It has been decided that organic cotton can be documented with a GOTS certificate, since GOTS is mainly an ecolabelling scheme for organic cotton, and GOTS certified organic cotton is available on the cotton exchange. It has also been evaluated whether some of the chemical requirements could be documented with a GOTS certificate.

In the hearing, several critical replies were received wanting the Nordic Ecolabel to take GOTS more into consideration. After having studied how Naturskyddsföreningen in Sweden has recently handled the GOTS criteria for Bra Miljöval, a proposal was chosen which accepts GOTS for limited steps in yarn and fabric production with additional requirements for chemicals in important areas where Nordic Ecolabelling considers GOTS requirements to be inadequate. In this way we secure certain important areas where the Nordic Ecolabel wants to be strict and at the same time open for a more efficient ecolabelling, and the possibility to maintain credibility and environmental gains. Besides, the proposal is in line with requests from several sides for taking a step towards harmonisation of international ecolabelling schemes for textiles, which can promote increased environmental benefit in the long run. The table in Appendix 31 of the criteria document shows which requirements can be documented with a GOTS certificate.

6.3 Product group definition

Which products can be ecolabelled in accordance with the textiles criteria is stated in the product group definition. This has been changed somewhat from the previous version, and it has been clarified which products and materials that can be labelled. Generally, clothing products and furnishings products can be labelled, such as jackets, jumpers, trousers, shirts, underwear, curtains, towels, bedding, duvets and cushions. It is also clarified that textiles or hides/skins and leather for items such as car seats can be labelled. Accessories such as scarves, handbags and handkerchiefs are also included in the product group. Fibres, yarn and fabric to be used in textiles for clothing and furnishings can also be labelled.

It is specified in the product group definition that mineral fibres, glass fibre, coal fibre and other inorganic fibres cannot be ecolabelled or included in a Nordic Ecolabelled textile. This has not changed from the previous version of the criteria. Wall coverings, such as textile wallpapers, cannot be labelled. These are products that have a different function and other quality requirements than traditional textile products such as clothes, and are therefore not included in these criteria.

Advertising materials, banners and roll-ups cannot be labelled. These are often made of non-woven materials. They are often also single-use products, and Nordic Ecolabelling wants to mainly label products that can be used multiple times.

Nordic Ecolabelling has decided to include in the product definition that textiles or materials that are treated with flame retardant agents cannot be ecolabelled. This applies both to flame retardants that are integrated in the fibre (chemically bonded) and retardants that are not chemically bonded. The use of flame retardants is generally increasing in society, and this is not seen as a positive development. Halogenated flame retardants in particular can have serious effects on health and the environment. One of the most relevant groups of flame retardants are those which are brominated. The use of brominated flame retardants has significantly increased since the 1990s. The authorities in the Nordic countries and the EU have placed great focus on brominated flame retardants, and some are prohibited. The Norwegian authorities have placed brominated flame retardants on their priority list, where the goal is to stop emissions by 2020[85]. It is questionable whether it necessary to use flame retardants in an increasingly greater proportion of textile products. For example, flame retardants are used on wool products, despite the fact that wool is not particularly flammable.

According to a report from April 2012 on «Fire safety and the effects on health and the environmental in connection with upholstered furniture, mattresses and furnishing fabrics»[86] by the Norwegian research foundation SINTEF, there is a great deal of international research with regard to new, more environmentally friendly chemicals and methods for increasing the fire safety of foam and textiles. There is a relatively strong focus on research and development with regard to flammability and fire scenarios, but less with regard to the risk of forming toxic fumes and their effects on health and the environment in a fire.

The report describes a survey conducted among actors in the furniture and textile industries of whether they were aware of any new flame retardant chemicals in the market for their use. The responders said that there was nothing new which was legal, health- and environmentally friendly and that there had not been much change these past few years. Further the report says that no large quantities of flame retardants are used in furniture, mattresses and furnishing textiles in the private market today. The reason is that there is no need for it. Most upholstered furniture, mattresses and bedding would be able to resist ignition by a glowing cigarette even without the use of flame retardants.

Nordic Ecolabelling is aware that a prohibition against the use of flame retardants will prevent some products for the professional market from being ecolabelled. Nordic Ecolabelling will evaluate this again for the next revision of the textile criteria, where there will, hopefully, be more alternative flame retardants or methods for flame retardation in the market than what we see today. Previously, very strict requirements were set regarding the use of flame retardants, which in practice resulted in it being difficult to label flame retardant textiles. The change in the product group definition will therefore not have particularly significant consequences for the types of products that can be labelled.

In order to make it clearer which products cannot be labelled in accordance with the textile criteria, but which can be included in another criteria document within Nordic Ecolabelling, a list of examples of relevant products has been created.

[85] Miljøstatus i Norge: http://www.miljostatus.no/Tema/Kjemikalier/Noen-farlige-kjemikalier/Bromerte-flammehemmere/
[86] K. Storesund, S. Steinbakk and A Steen-Hansen, Brannsikkerhet og helse- og miljøeffekter i forbindelse med stoppete møbler, madrasser og innredningstekstiler, SINTEF Report NBL A12106, version 1, 2012.

There has been uncertainty linked to whether cushions can be ecolabelled in accordance with the criteria for textiles or furniture, and whether carpets can be ecolabelled in accordance with the criteria for floors or textiles. This has now been clarified in that cushions that are a part of a piece of furniture, for example a sofa cushion, cannot be ecolabelled in accordance with the criteria for textiles. However, Nordic Ecolabelling has criteria for furniture, under which cushions that are a part of a piece of furniture can be labelled. Cushions intended for decoration or pillows can be labelled in accordance with the criteria for textiles. Cushions which are part of a combined furniture license, for example with beds or mattresses, and the padding is of the same type can, however, be ecolabelled according to the criteria for furniture and fittings. For carpets, it is clarified that wall-to-wall carpets are not included in the product group definition, but textile floorings are included in Nordic Ecolabelling's criteria for floors. Other types of carpets, such as rugs and mats, can be ecolabelled in accordance with the textiles criteria. It is also clarified that wall coverings, such as textile wallpapers, cannot be ecolabelled. Toys made of textiles, such as soft toys, cannot be ecolabelled in accordance with the textile criteria, but are covered by the criteria for toys.

For the labelling of fibres, yarn and fabric, a clarification has been made in relation to non-woven products. Nordic Ecolabelling does not wish to ecolabel single use non-woven products that cannot be washed and reused in accordance with the textiles criteria. Examples of such products are paper towels and cleaning cloths. It is not natural to label single use products in accordance with the textiles criteria, since they are aimed at durable, long-life products. In addition, Nordic Ecolabelling does not want to contribute to the increased consumption of single use products when products that can be used multiple times and which are regarded as better for the environment are available on the market. On the other hand, durable non-woven products, which can be reused and washed, can be ecolabelled in accordance with the textiles criteria.

This is also in line with the EU Ecolabel's product group definition. Other single use products, such as cotton pads for personal care and surgical gowns are not covered by the criteria for textiles. These single use products can be labelled in accordance with other Nordic Ecolabelling criteria, such as the criteria for hygiene products.

Microfiber cloths have separate Nordic Ecolabelling criteria, and are therefore not included in the textiles criteria. The same applies for soft toys/toys. It is also clarified that shoes cannot be ecolabelled in accordance with these criteria, but that there are separate criteria for shoes within the EU Ecolabel's ecolabel.

Products made from hides/skins and leather can also be ecolabelled in accordance with the criteria for textiles. On this point, the Nordic Ecolabel differs from the EU Ecolabel's criteria, under which hides/skins and leather cannot be labelled. In relation to the product group definition in version 3, the product group definition has been expanded to include that hides/skins and leather from reindeer (*Rangifer tarandus*), deer (*Cervus elaphus*) and elk (*Alces alces*) can also be ecolabelled. These species are not threatened, and used on a commercial scale alongside hides/skins and leather from domestic animals[87]. In addition, the group of domestic animals has been expanded so that hides/skins and leather from horses can also be labelled together with those from pigs, goats, oxen and sheep.

[87] Personal communication with Åke Lindström, environment responsible at Tärnsjö garveri AB

The product group definition is as follows:

The criteria include products from textile fibres, hides/skins and leather, and a combination of these. The term 'Textiles, hides/skins and leather' refers to:

- Apparel and accessories, for example trousers, shirts, jackets, underwear, handkerchiefs, scarves, bags and purses.
- Furnishing fabrics, i.e. textiles produced for use and interior decoration in the home or in cars/boats, such as towels, bedding, curtains, tablecloths, rugs, cushions, duvets and upholstery.
- Fibres, yarn and fabric, including durable non-woven, which are to be used in textiles for clothing and accessories or in furnishing fabrics mentioned above. ‘Durable non-woven’ refers to products that can be reused and washed.
- Hide and leather products, such as jackets, trousers, belts or bags, and hides/skins and leather as raw materials for clothing or home furnishings, (including for cars/ boats), from the following species of animal: sheep, goat, ox, horse, pig, elk, deer and reindeer.

Both products for private and public use can carry the Nordic Ecolabel. The textiles can be made from new fibres and/or recycled fibres.

The following products and materials cannot be ecolabelled in accordance with the criteria for textiles, hides/skins and leather:

- Mineral fibre, glass fibre, metal fibre, carbon fibre and other inorganic fibres
- Products or materials that are treated with flame retardants. This also applies to flame retardants that are integrated in the product or material
- Wall coverings, such as textile wallpapers
- Advertising materials, banners, roll-ups
- Disposable products. ‘Disposable products’ refers to products that cannot be washed/cleaned or reused
- Products containing electronic components
- Products containing perfume or other fragrances

Products that can be ecolabelled in accordance with other Nordic Ecolabelling criteria are not covered by the textile criteria. Examples include:

- Disposable products made from non-woven material that cannot be washed or reused, for example kitchen paper and cleaning cloths (criteria for soft paper)
- Disposable products such as cotton pads for personal care (criteria for hygiene products)
- Wet wipes (criteria for cosmetics)
- Floor coverings, such as wall-to-wall carpets (criteria for flooring)
- Textile products that form part of a piece of furniture, e.g. sofa cushions, mattresses and booster cushions (beanbags) (criteria for furniture and fittings). Cushions which are part of a combined furniture license, for example with beds or mattresses, and the padding is of the same type, can be ecolabelled according to the criteria for furniture and fittings.
- Microfiber cloths (criteria for microfiber cloths)

- Toys/soft toys (criteria for toys)
- Shoes (included in the EU-Ecolabel´s criteria for shoes)

6.4 Information about the product

In order to obtain an overview of the products that shall be ecolabelled and the production chain, requirements are set that the applicant provides information about the product, including the trade name, production site, an overview of production processes and sub-suppliers, and where the products shall be sold. The overview of the production process and sub-suppliers should preferably be provided in the form of a flow chart.

A separate requirement is also set where the product shall be described and the composition of the product stated. This is important in order to know whether the products meet the product group definition and to know which other requirements in the document must be fulfilled by the products.

Since the criteria set requirements for the production and treatment of textile fibres, hides/skins and leather, it is important that the ecolabelled product consists of these materials so that it can be communicated that the product has low impact on the environment. A limit has therefore been set for how much of other materials can be included in the product. It is possible to ecolabel both individual garments, e.g. a sweater or a pair of trousers with a fixed composition of fibre types and other materials, or a collection consisting of various compositions of the approved materials, i.e. that different compositions of fibre types that fulfil the requirements can be combined in different quantities in the final products.

Some products, such as all-weather jackets and rainwear, feature a coating in addition to the fibre. In order for such products to be ecolabelled, this coating, membrane or laminate shall not be included in the calculation of the share of textile fibres, but can be included up to a maximum of 20% of the weight of the product. Such an exception has also been made for zippers, buttons reflector strips and other details, which can be included up to a maximum of 15% of the total weight of the product. Please note that requirements are set for coatings, membranes, laminates and metal/plastic parts such as buttons and reflector strips, which are included in the product. Refer to the background for the individual requirements for a description of the environmental and health problems linked to these. Please note that velcro is considered a textile fibre and shall fulfil the requirements relevant to the type of fibre. In order to make it possible to ecolabel duvets, cushions and down jackets, no limit has been set for filling materials such as down, feathers, grains, latex and polyurethane. Requirements for latex and polyurethane have been made in the criteria document.

Textile fibres and other materials, for which no requirements have been made in the criteria document, may be included with a maximum of 5 weight % in the product, with the exception of corn, seeds and grains. This limitation is made because Nordic Ecolabelling wants to be sure that an ecolabelled product mainly contains materials for which requirements have been made in the criteria.

Fibre types, hides/skins and leather for which requirements are made in the criteria are also exempt from the requirements if the fibre type, hide or leather together is included with a total of 5 weight %. There has also been made an exception for sewing thread, which no longer needs to fulfil the requirements or be calculated into the share of fibre, hide and leather. For a product that consists of 95% cotton and 5% elastane, only the cotton needs to fulfil the requirements in the criteria.

Recycled fibres do not need to fulfil the requirements for the production of fibres. 'Recycled fibres' refers to fibres from excess materials from the textile and clothing industry or from plastic waste which can be used for manufacturing fibres, for example, to fibres produced from plastic bottles.

From version 4.9 there is inserted an exception for elastic bands, which is included with up to 25% in the product in underwear. For underwear such as a bra, even very small elastane parts can make up a high weight % of the total product and therefore there is a need for another limit for activation of specific requirements here. The prerequisite for using this exception is that the elastic bands meet the requirements for limit values for chemicals stated in GOTS for assessories or Oeko-tex (Oeko-Tex 100 class I certificate or tests and requirement levels according to Oeko-Tex 100 class I).

The chemical requirements require full mapping of chemicals used in all processes in textile production and this is resource-intensive. From version 4.9 an exception has been made for textile elements (small components of textile fiber), each with up to 5% by weight (total max. 10% by weight in the final product) can be exempted from the chemical requirements in the production of the textile element, if one of the following points are met:

- The textile element has a GOTS transaction certificate or
- The textile element has Oeko-Tex 100 class I certificate, or
- The textile element can document with a test report, that the limit values for Oeko-Tex 100 class I are met.

This means that all textiles elements mets requirements that ensure minimal exposure to harzardous chemichals and for textile elements larger than 5 weight %, all the Swan chemical requirements are activatet.

It is now also described from version 4.9 that info labels of textile (eg care label, brand name label and size label) is exempt from the requirements in this document. Info labels in PVC can not be used. Info label made as direct print on the textile product itself, must meet the requirements for printing chemicals and dyes.

From version 4.11, a total of 25% by weight of metal buckles and other metal details may be included in the finished belt. This is to adapt the requirement for belts where the metal buckle often constitutes a high share of the product by weight.

O1 Information on the product

The applicant shall provide the following information about the product:

1. Brand/trade name, possibly article number
2. Where the products shall be sold (store, web-shop, etc.)
3. An overview of the production process and sub-suppliers

The production process shall be described by providing the names and production locations of sub-suppliers, and describing which processes each sub-supplier carries out, e.g. washing, dyeing, and printing.

It is recommended that a flow chart is used to illustrate the production process, for example as shown in Appendix 1.

✉ Description in accordance with the requirement.

O2 Description and composition of the product

The product(s) that shall be ecolabelled shall be described. The description shall cover the product composition with weight % of the various materials included.

There are the following exceptions and material thredsholds in the criteria:

- Coating, membrane and laminate may be included with a total weight % of 20 in the finished product.
- Zippers, buttons, reflectors and other details must comply with requiremt O23 and may be included with a total weight % of 15 in the finished product. Metal buckles and other metal details on belts can be used with a total of 25% by weight in the finished belt.
- For underwear: Elastic bands are exempt from requirements, if included with total of max. 25% by weight and must then comply with limit values in one of the following:
    - GOTS for "assessories" or
    - Oeko-tex 100 class I (documented with either certificate or relevant test reports).
- Paddings/fillings of latex, polyurethane, down, feathers, seeds or grains: Percentage shall be stated, but the amount is not limited.
- Sewing thread and info labels of textile (eg care label, brand name label and size label) is exempt from the requirements in this document. Info label made as direct print on the textile product itself, must meet the requirements for printing chemicals and dyes.
- Velcro is considered a textile fibre and shall fulfil the requirements relevant to the type of fibre.
- Fibre types, hides/skins and leather or other materials for which requirements are not set in this document can be included with up to a total of 5% of the weight of the product. Seeds and grains are exempt from this limitation.
- Fibre types, hides/skins and leather for which requirements are made in the criteria are exempt from the requirements for fiber in section 6.5 and requirements for hide and leather, if the fibre type/hide/leather together is included at less than 5% of the total weight.
- Textile elements (small components of textile fiber), each with up to 5% by weight (total max. 10% by weight in the final product) can be exempted from the chemical requirements in the production of the textile element, if one of the following points are met:
    - The textile element has a GOTS transaction certificate or
    - The textile element has Oeko-Tex 100 class I certificate, or
    - The textile element can document with a test report, that the limit values for Oeko-Tex 100 class I are met.
- Recycled fibres do not need to fulfil the requirements for the production of fibres. ‘Recycled fibres’ refers to fibres from excess materials from the textile and clothing industry or from collected textile waste or from plastic waste which can be used for manufacturing fibres, for example, to fibres produced from plastic bottles.

It is recommended that a table is used to illustrate the product composition, for example as shown in Appendix 2.

✉ Description of material composition of the product in accordance with the requirement. See Appendix 2 for a template.

- ☒ Elastic bands, must document that the requirements of GOTS or Eoko-Tex 100 class I are met, by a certificate or test report. It must be clear that the requirements for the elastic band are met.
- ☒ Small textile components < 5 weight % (which uses the exception for chemical requirements) must documet that the requirements of GOTS or Oeko-Tex 100 class I are met with a certificate or test report.

6.5 Production of fibres

The Nordic Ecolabel sets requirements for the production of both natural and synthetic fibres. For vegetable fibres, specific requirements are set for the cultivation of cotton and other cellulose seed fibres as well as flax and other bast fibres. For animal fibres such as wool and other keratin fibres, requirements are set for the content of certain chemical substances, as well as COD emissions in the effluent.

For different types of synthetic fibres, requirements are set regarding the use of chemicals during production, as well as VOC emissions to the air. For regenerated cellulose fibres, requirements are set regarding the content of chemicals, as well as emissions to air and water. Recycled fibres do not need to fulfil the requirements for the production of fibres.

No requirements for silk have been made in the criteria since no resources have been allocated to examine environmental challenges in connection with silk production in this revision. The background documents for the EU Ecolabel criteria from 2009 and the new criteria proposal from EU Ecolabel has a very limited mention of silk. Nordic Ecolabelling considers introducing requirements for silk if EU Ecolabel introduces requirements in the revised criteria. Nordic Ecolabelling wishes to limit the content of materials for which no requirements have been made in ecolabelled textiles, and silk and other textile fibres for which no requirements have been made, such as PLA, can be included with a maximum of 5 weight %. Requirements for silk and PLA will be considered at the next revision.

6.5.1 Cotton and other natural cellulose seed fibres

For cotton, Nordic Ecolabelling sets a requirement that at least 10% of the total weight of the cotton that is used in the Nordic Ecolabelled production on an annual basis shall be organically farmed or cultivated in transition to organic farming. Organic fibres shall be produced and controlled in accordance with European Council Regulation (EEC) no. 2092/91 of 24 June 1991 on the organic production of agricultural products or equivalent systems, such as KRAV, IFOAM, KBA, OCIA, TDA, DEMETER, NOP and NPOP, etc. Beyond this, requirements are set for the rest of the cotton, in that it shall be tested for traces of pesticides. The requirement has been changed from the previous version of the criteria, where 100% of the cotton and other cellulose seed fibres should be organically farmed.

A market survey carried out by Nordic Ecolabelling and contact with licensees has shown that the requirement of 100% organically farmed cotton has been a significant challenge for individual market participants in ecolabelling products.

Only 1.1% of the world's cotton production is organic, which is equivalent to 241,697 million tonnes in 2010[88]. The production of organic cotton has increased by 40% each year in the last ten years, but the percentage is still so low that the availability is unstable.

Another challenge that was mentioned in the market survey is varying quality, since the quality of organic cotton is significantly improved after it has been cultivated for 3-5 years. Nordic Ecolabelling has therefore chosen to suggest moving away from a 100% organically farmed cotton requirement, but wishes to stimulate the demand for organic cotton.

Conventional cultivation of cotton can be extremely harmful to health and the environment, since many pesticides and other chemicals are used during farming[89]. The use of pesticides or chemical fertilisers is not permitted in organic farming. See Chapter 5.2.2 for more information about the environmental problems linked to the farming of cotton. By setting a requirement that at least 10% of the cotton must be produced organically, Nordic Ecolabelling can help to increase the demand for organic cotton and hopefully have a positive effect on the farming of cotton. At the same time, we hope that this can give the Nordic Ecolabel greater success in the market, which will again be positive for both the demand for organic cotton, and which will reduce the environmental impact of the rest of the textile production.

In order to ensure that the share of organic cotton is a minimum of 10% of the total weight on an annual basis, a production plan shall be submitted, as well as routines that describe how it is ensured that this share is fulfilled. The plan shall contain a description of which parts of the production shall include organic cotton. This can for example be that all shirts in an ecolabelled collection are created from organic cotton. In addition, the description shall show that the share of organic cotton in the production of Nordic Ecolabelled textiles fulfils the requirement of at least 10% weight organic cotton. This can for example be done by stating the kg of organic and conventional cotton that are purchased or planned to be purchased, and how this is used in the relevant garments.

Of course, it is also possible to use a mix where the organic and conventional cotton fibres are spun together so that the share of organic cotton in the fibre is a minimum of 10%, when the entire production is of mixed quality. If the products/collection to be Ecolabelled are manufactured at several production sites/factories, the percentage of organic cotton can be calculated based on the total amount of organic and conventional cotton purchased for all the products/the entire collection, so that the requirement does not need to be fulfilled per production site/factory. During the revision, it has been discussed whether an ecolabelled textile must contain organic cotton, or whether only parts of the Nordic Ecolabelled production can be made of organic cotton. Nordic Ecolabelling believes that it is most important to stimulate the demand for organic cotton, and that it is therefore not important that every individual garment that is Nordic Ecolabelled contains organic cotton. It is therefore up to the manufacturer to decide how to fulfil the requirement of at least 10% of the total weight in organic cotton.

[88] Textile exchange, 2010 Farm and Fiber report, 2010, http://farmhub.textileexchange.org/upload/library/Farm%20and%20fiber%20report/Farm_Fibre%20Report%202010%20Final_exec%20summary_web.pdf (accessed 06 September 2011)
[89] "The sustainability of cotton – consequences for man and environment", Kooistra K., Termorshuizen A., Pyburn R., Wageningen University & Research Centre, report number 223, April 2006

It is also important that the licensee ensures that the requirement regarding the share of organic cotton is fulfilled in the period after the licence is awarded.

A requirement is therefore set that annual reports must be submitted to Nordic Ecolabelling, which show that the requirement of at least 10% of the total weight in organic cotton is fulfilled by stating the quantity of organic cotton (kg) and the quantity of conventional cotton (kg) that is purchased and used on an annual basis.

For cotton that is conventionally farmed, and for other cellulose seed fibres, requirements are set for the testing of traces of pesticides.

Tests for a range of harmful pesticides shall be carried out, and each individual substance may be included in the cotton to a maximum of 0.05 ppm. In the EU Ecolabel background document from 2007[90] the limit is set to 0.05 ppm in order to account for test method sensitivity. The raw cotton shall be tested before wet treatment, and every batch of cotton that the manufacturer receives shall be tested. By having such a requirement, Nordic Ecolabelling will ensure that the cotton that is included in Nordic Ecolabelled textiles is not farmed using the substances that are most harmful to health and the environment. The requirement regarding the testing of traces of pesticides is identical to the EU Ecolabel's requirement, with the exception that the Nordic Ecolabel sets a requirement that every batch of cotton that is received shall be tested. After the hearing, pesticides glufosinate and glyphosate have also been included in the list of pesticides which may be included with a maximum of 0.05 ppm, see the background for this further down under GM cotton. After the hearing there has been information that the pesticide tests do not necessarily show traces of the pesticide used. In the new draft for the proposed criteria from EU Ecolabel of September 2012[91] it says that results from testing of raw cotton between 1994 and 2011 show very limited detection of pesticide traces. The document says that this is in spite of proof that hazardous pesticides are still used in developing countries.

In order to document the requirement, test reports shall be submitted in accordance with one of the following testing methods:

- US EPA 8081 A (organochlorine pesticides with ultrasound or Soxhlet extraction and nonpolar solvents (isooctane or hexane))
- 8151 A (chlorinated herbicides using methanol)
- 8141 A (organic phosphorus compounds)
- 8270 C (partially volatile organic compounds)

It has been considered setting requirements regarding the prohibition of the use of genetically modified (GM) cotton. There is great uncertainty linked to the environmental effects of genetically modified plants. There are questions relating to whether the use of chemical sprays will be reduced through the use of GMO, as GMO supporters claim. There are also various social and ethical problems related to GMO production[92].

[90] EU Ecolabel's background document, Revision of the Textile Eco-label, 2007
[91] Revision of the European Ecolabel and Green Public Procurement (GPP) Criteria for Textile Products, technical report and criteria proposals Draft Working Document from 2nd AHWG meeting, September 2012
[92] "Genetically modified organisms – a summary of potential adverse effects relevant to sustainable development", 2011

Nordic Ecolabelling has wished to set a prohibition against GM cotton, but cannot see that this is steerable at this point in time.

According to the report "Skitne klær – En vurdering av miljø og arbeidsforhold ved produksjon og bruk og sammenligning av leverandører"[93], the share of genetically modified cotton on the world market was approx. 30% in 2008, but this is estimated to increase and is probably higher today.

According to Wikipedia[94] and GMO Compass[95], genetically modified cotton is farmed globally on 49% of the total area that is used for the cultivation of cotton. It is improbable that conventional cotton can be distinguished from genetically modified cotton on the cotton exchange. Setting a requirement that genetically modified cotton cannot be included would require traceability back to the farmer, something that is thought to be improbable when the cotton is not farmed organically. Nordic Ecolabelling finds it difficult to see what kind of documentation that would be reliable and possible to obtain in order to prevent the use of GM cotton. Nordic Ecolabelling has therefore chosen not to introduce such a prohibition, since we see that the steerability of such a requirement is poor. This will however be reassessed in later revisions of the criteria. After the hearing, Nordic Ecolabelling has chosen to add pesticides glufosinate and glyphosate to the list of pesticides to be tested for traces. These are pesticides used in the farming of GM cotton that exists on the market today. Nordic Ecolabel considers this an opportunity to reduce the increased use of toxic pesticides in the production of GM cotton, and hopefully, this will contribute to preventing GM cotton from being used in ecolabelled textiles. However, as mentioned above, there has been information that testing on raw cotton does not necessarily catch the pesticides used.

O3 Cotton and other natural cellulose seed fibres

The requirement applies to cotton and other natural seed fibres from cellulose including kapok, which is indicated as cotton below.

At least 10% of the weight of the cotton that is used in the production of ecolabelled textiles shall be organically farmed or farmed during a transition to organic farming. The percentage shall be calculated in kg of organic cotton per total purchased kg cotton for the ecolabelled production on an annual basis. The remaining part of the cotton shall at least fulfil the requirements for conventional cotton as described below. If the products/collection to be ecolabelled are manufactured at several production sites/factories, the percentage of organic cotton can be calculated based on the total amount of organic and conventional cotton purchased for all the ecolabelled products/collection, so that the requirement does not need to be fulfilled per production site/factory

A production plan and procedures which show how the share of at least 10% of the weight in organic cotton is fulfilled shall be submitted.

Organic cotton
'Organic' means cotton farmed in accordance with the European Council's regulation (EEG) no. 834/2007 of 28 June 2007 on the organic production of agricultural products, or products produced in the same way and under equivalent control measures. Examples are: KRAV, IFOAM, KBA, OCIA, TDA, DEMETER.

[93] Skitne klær – En vurdering av miljø og arbeidsforhold ved produksjon og bruk, og sammenligning av leverandører", December 2008, Forum for Utvikling og miljø.
[94] http://www.en.wikipedia.org/wiki/cotton (accessed 25/01/2012)
[95] http://www.gmo-compass.org/eng/agri_biotechnology/gmo_planting/343.genetically modified_cotton_global_area_under_cultivation.html (accessed 25/01/2012)

Conventional cotton
The conventionally farmed cotton may contain a maximum of 0.05 ppm of each of the following substances: aldrin, captafol, chlordane, DDT, dieldrin, endrin, heptachlor, hexachlorobenzene, hexachlorocyclohexane (total isomers), 2,4,5-T, chlordimeform, chlorobenzilate, dinoseb and its salts, monocrotophos, pentachlorophenol, toxaphene, methamidophos, methylparathion, parathion, phosphamidon, glufosinate and glyphosate. Tests are to be performed on raw cotton, i.e. before wet treatment, on each batch of cotton received, according to test methods given in Appendix 29.

If the traceability of the cotton can be documented back to the individual farmer for at least 75% of the utilised cotton, and these can confirm that the aforementioned substances are not used during the farming of the cotton, it is not necessary to submit test reports.

✉ For the organic percentage: state the supplier of the organic cotton, including the name and address. Valid certificate that shows that the cotton is organically farmed in accordance with European Council Regulation (EEG) no 2092/91 of 24 June 1991 on the organic production of agricultural products or equivalent systems. A valid GOTS-certificate in accordance with version 3.0 or later versions can also be used to document that the cotton is organically certified.

✉ Production plan and procedures, as well as calculations that show how the requirement regarding the percentage of organic cotton is fulfilled are to be submitted, as well as procedures for annual reporting on the share of organic cotton.

✉ For the conventional percentage: Test reports showing that the requirement is fulfilled or a confirmation from the farmers that the aforementioned substances are not used, as well as an overview of the percentage of cotton in question. A valid EU Ecolabel licence in accordance with the Commission's decision from July 2009 can be used as part of the documentation. An additional test of glufosinate and glyphosate is required. Appendix 3 can be used.

6.5.2 Flax, bamboo and other bast fibres (hemp, jute and ramie)

The requirement has changed from the previous version of the criteria. Previously, a requirement was set that vegetable fibres, such as flax, hemp, ramie and jute should be organically farmed.

This was an additional requirement in the Nordic Ecolabel's criteria in relation to the EU Ecolabel. Now, requirements are set equivalent to the EU Ecolabel. Water retting is prohibited unless the effluent is purified in order to reduce the organic material content. Retting is necessary in order to divide the fibres in the stem from the shell/bark, and is done by exposing the stem or other bast fibre to damp and heat[96]. Water retting is the most effective method, but there are other methods such as placing the fibres in tanks and adding enzymes. Effluent emissions from water retting with a high content of organic material to the aquatic environment can result in a lack of oxygen as they break down, and therefore damage the aquatic animal and plant life.

There are two main reasons why this requirement has been changed. The first is that the farming of these fibres generally has little effect on the environment. They are seldom subject to attack by pests, and there is little need for pesticide sprays. In addition, the fibres require few nutrients.

[96] Haldis Hauland Solås, Tekstiler og klær – fremstilling-behandling-miljøbevisshet, Portal forlag, 2009

Another reason is that there is hardly any organic production of these fibres. Nordic Ecolabelling has been in contact with Helvetas (a Swiss NGO that works with organic fibres, among other things). According to them, there is some organically farmed linen, particularly from the Baltic, but presumably not certified as organic in accordance with the standards required by Nordic Ecolabelling. In the hearing it was proposed to exclude pesticides other than those approved in EU Regulation 1107/2009. Nordic Ecolabel introduces this requirement to ensure that farming outside Europe also follows this regulation.

O4 Flax, bamboo and other bast fibres

Flax, bamboo and other bast fibres shall only be farmed with pesticides allowed used in EU Regulation 1107/2009.

Production of flax, bamboo and other bast fibres using water retting is only allowed if the effluent from the water retting is treated so that the chemical oxygen demand (COD) or the total organic carbon (TOC) is reduced by at least 75% for hemp fibre and at least 95% for flax and other bast fibres.

Bamboo shall in addition fulfil O16.

Requirements for the laboratory and test method for COD/TOC are given in Appendix 29. Measuring of PCOD or BOD can also be used if a correlation to COD is shown.

✉ Declaration that only approved pesticides are used.

✉ Test report from the flax/bast fibre manufacturer showing that the requirement is fulfilled or a valid EU Ecolabel licence in accordance with the Commission's decision from July 2009 if water retting is used. Appendix 4 can be used.

6.5.3 Unprocessed wool and other keratin fibres

The requirement is not changed from version 2 of the EU Ecolabel's criteria. In order to avoid parasites in the wool, the animals can be exposed to harmful chemicals such as organophosphates and pyrethroids. In order to prevent the animals being exposed to a range of problematic substances, a requirement is set that test reports shall be submitted in accordance with IWTO Draft Test Method 59 or the equivalent.

The levels that are permitted in the requirement are so low that if these substances are used they will be over the limit, and in practice these substances are therefore prohibited for use in wool that shall be approved for a Nordic Ecolabel. The requirement can also be documented through traceability back to the farmers for at least 75% of the weight of the wool or keratin fibres, and a confirmation from these that the substances are not used. Since the requirement is equivalent to the EU Ecolabel's requirement, it can also be documented with a valid EU Ecolabel licence.

Whether a requirement shall be set that the wool must be organically produced has also been evaluated. It is possible to obtain organically produced wool, but the market is very small. Contact with the industry[97] shows that organic wool is difficult to obtain. The total wool production is estimated to be approx. 2.1 million tonnes[98], and Australia is the largest manufacturer with approx. 25%[99].

[97] Personal communication: JOHA: Ingemette Jakobsen, Gabriel: Kurt Nedergaard (QEP) and Neutral.com: Christina E. Larsen.
[98] http://www.naturalfibres2009.org/en/fibres/wool.html
[99] http://en.wikipedia.org/wiki/Wool (accessed 15 September 2011)

In Australia, approx. 1% of the wool production is organic[100]. Nordic Ecolabelling has not been able to obtain a more accurate figure regarding how much of the world's total wool production is organic, but based on these figures, it can be said that access to organic wool is limited. Nordic Ecolabelling has therefore chosen not to set a requirement that the wool must be organic, since the availability on the market is small, and the steerability and potential are low.

O5 Wool and other keratin fibres (wool from sheep, camel, alpaca and goat)

The total content of the following substances must not exceed 0.5 ppm: ɣ-hexachlorocyclohexane (lindane), α-hexachlorocyclohexane, β-hexachlorocyclohexane, δ-hexachlorocyclohexane, aldrin, dieldrin, endrin, p,p'-DDT and p,p'-DDD, cypermethrin, deltamethrin, fenvalerate, cyhalothrin and flumethrin.

The total content of the following substances must not exceed 2 ppm: diazinon, propetamphos, chlorfenvinphos, dichlorfenthion, chlorpyriphos, fenchlorphos, diflubenzuron and triflumuron.

The analysis shall be performed on raw wool before wet treatment for each batch of wool that is received.

The tests shall be in accordance with IWTO Draft Test Method 59 or the equivalent.

The requirement does not apply if the applicant can document which farmers have produced at least 75% of the weight of the wool or keratin fibres, and that the farmers can confirm that the substances mentioned in the criteria are not used in the relevant areas or on animals.

Also, the requirement does not apply if the wool is organically certified. For the definition of 'organic', see O3.

✉ A test report showing that the requirement is fulfilled or similar, or a declaration from the farmers that the stated substances are not used, as well as an overview of the percentage of wool that this applies to or a valid certificate which shows that the wool is organic in accordance with European Council Regulation (EEC) no. 2092/91 of 24 June 1991 on the organic production of agricultural products or equivalent systems.

A valid EU Ecolabel licence in accordance with the Commission's decision from July 2009 can also be used as part of the documentation for this requirement. Appendix 5 can be used.

COD, pH and temperature of the effluent

The requirement is changed and relaxed from version 2 of the EU Ecolabel's criteria, but stricter in relation to version 3 of the requirements for EU Ecolabel. Scouring of wool happens through a series of washes. By adding detergents, dirt and fat is removed from the wool. The fatty substance, lanolin, is a valuable fatty substance which can be used in ointments, creams and soaps. The effluent can contain large quantities of substances that use oxygen when breaking down. When effluent with a high COD content (chemical oxygen demand) is released into the aquatic environment, the breaking down of these substances can result in a lack of oxygen in the water and damage animal and plant life.

[100] http://www.treehugger.com/files/2007/09/organic_wool_th.php (accessed 15 September 2011)

The COD content of wool scourings ranges from 150-500 g/kg unprocessed wool as well as a number of micropollutants from pesticide treatments of the sheep101. A requirement is therefore set that the COD content of the effluent shall be minimized. Several wool washing plants have closed in recent years, and there are currently wool washing plants in a few European countries, such as England and Belgium[102], as well as the Czech Republic and Italy[103].

The same trend is evident in the large wool producing countries such as Australia and New Zealand, where the number of washing plants are currently strongly reduced, unlike in China which experiences growth and currently washes 80% of the Australian wool[104].

In version 2 of EU Ecolabel's criteria for wool washing plants, the requirement for COD contents in effluent at on-site cleansing 5 g/kg unprocessed wool. In version 3 of EU Ecolabel's criteria, the value was raised to 45 g/kg unprocessed wool. For both version 2 and 3 of the criteria the COD level was 60 g/kg unprocessed wool when derivating effluent from the wool washing plant to off-site cleansing, with a further reduction of 75%, which corresponds to a final level of 15 g COD/kg. According to Australian CRISO, Commonwealth Scientific and Industrial Research Organisation, there are currently only two washing plants in Australia, and only one company with two washing plants in New Zealand. Both in Australia, NZ and England, the (Andar system) Sirolan CF-A chemical coagulation/flocculation as the primary on-site cleansing, which can process 60 g COD/kg wool if run on full capacity. After this the cleansing can continue to the second phase of the system, CF-B, which performs a biological flaring of the effluent from CF-A. This process reduces COD content further with 77-88% in 70 hours. However, most above mentioned wool washing plants currently send their effluent for external cleansing instead of using CF-B105. For the washing plants the unit mg/L is often used when calculating COD in the effluent and it is therefore important to be aware of which unit is asked for in the documentation.

Confusion with regard to the use of units has, according to CRISO, been a possible cause for caution as to whether 45 g/kg can be obtained. In the revision of EU Ecolabel version 3, it has been suggested a COD level of 20 g/kg unprocessed for both on-site and off-site cleansing. Achievement of this cleansing within derivation to surface water is also confirmed by Europe's largest wool washing plant; Modiano and BremerWoll trade office106 as well as Kaputone of New Zealand107. This value is identical to other requirements to effluent in wet processes in connection with textile production in both Nordic Ecolabel and EU Ecolabel criteria version 3.

In addition to COD emissions, pH and temperature shall also be measured. In order to document the requirement, test reports for the COD content in accordance with ISO 6060 shall be submitted.

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[101] Integrated Pollution Prevention and Control (IPPC) Reference Document on Best Available Techniques for the Textiles Industry July 2003
[102] Kjersti Kviseth, Norwegian sheep husbandry as basis for Cradle to Cradle ® development, Oslo 10/05/2011
[103] G. Modiano Limited, http://www.gmodiano.com/new/
[104] Ian Russel, CSIRO (Commonwealth Scientific and Industrial Research Organisation, Australia)
[105] Ian Russel, CSIRO (Commonwealth Scientific and Industrial Research Organisation, Australia) 06/08/2012
[106] Jens Behrmann, BremerWoll Trade office , 13/08/2012
[107] Christine Nunn, The Merino company, information forwarded from Don Caradus of Kaputone, 13/8/2012.

The requirement can be documented by COD emissions on an annual basis. Reports showing the measurement of pH and temperature of the effluent shall also be submitted. This part of the requirement can also be documented with a valid EU Ecolabel licence.

O6 Scouring effluent

For scouring effluent treated on-site or off-site and discharged to surface waters, the COD discharged to surface waters shall not exceed 20 g/kg greasy wool, expressed as an annual average. When treated off-site, the COD discharge is calculated by multiplying the COD discharge from the scouring with the treatment plant's average cleaning effect. Measuring of PCOD, TOC or BOD can also be used if a correlation to COD is shown.

The responsible for the scouring shall describe how the scouring effluent is treated and show how discharge of COD is monitored.

The pH value of the waste water released into surface water shall be 6 – 9 (unless the pH value of the recipient is outside this range), and the temperature shall be below 40°C (unless the temperature of the recipient is higher).

Requirements for the laboratory and test method for COD/TOC are given in Appendix 29.

✉ For COD: a test report from the scoring site showing that the requirement is fulfilled. For pH and temperature: reports from the scoring site showing measurements of pH and temperature of the waste water or a valid EU Ecolabel licence in accordance with the Commission's decision from July 2009.

6.5.4 Synthetic fibres

The Nordic Ecolabel currently has the same requirements for synthetic textile fibres as the EU Ecolabel. Requirements are set for the production of acrylic, elastane, polyamide, polyester and polypropylene. However, after the hearing, the requirements for acrylic and elastane are somewhat changed, see more on this in the section on acrylic.

Nordic Ecolabelling has chosen not to report on and set requirements for other synthetic polymers such as PLA, since these are currently used to a very limited extent. Note that fibre types for which requirements are not set in the criteria can be included to a total of 5% of the total weight of the product.

Acrylic

Acrylic fibres are produced through the polymerisation of acrylonitrile (at least 85%) with a comonomer (max. 15%). Acrylonitrile is relatively toxic, LC50 (Daphnia) = 7.6 mg/l, and is classified as carcinogenic[108]. Nordic Ecolabelling therefore sets requirements for remaining monomers in the polymer, and for emissions of acrylonitrile in the process.

Toxic solvents are also used in spinning, dimethylformamide (DMF) or N,N Dimethylacetamide (DMAc). No good alternatives exist for these solvents, and the EU Ecolabel's background document from 199810 concludes that neither of these solvents is better than the other. Both are toxic and must be handled with care. Due to the lack of potential and steerability, Nordic Ecolabelling therefore does not set requirements regarding the use of solvents in the spinning of acrylic fibres.

[108] EU Ecolabel background report; «Establishment of ecological criteria for textile products", final report April 1998.

After the hearing it became evident that N,N Dimethylacetamide (DMAc, cas no. 127-19-5) is among the new substances on the REACH candidate list, and Nordic Ecolabel changes the requirement to not allow DMAc in the production of acrylic and elastane.

O7 Acrylic

The residual of acrylonitrile content in raw fibres from the fibre production plant shall be less than 1.5 mg/kg. The amount of acrylonitrile shall be measured using the following method of analysis: Extraction with boiling water and quantification with capillary gas-liquid chromatography.

Emissions of acrylonitrile to the air (during polymerisation and until the solution is ready for spinning) shall be less than 1g/kg produced fibre, expressed as an annual average.

N,N - Dimethylacetamide (DMAc, cas no 127-19-5) may not be used in acrylic production.

✉ An analysis report from the acrylic manufacturer showing that the requirement is fulfilled. For emissions to the air, the applicant shall attach documentation and/or test reports, as well as a confirmation that the requirement is fulfilled. A valid EU Ecolabel licence in accordance with the Commission's decision from July 2009 can document the requirements to acrylonitrile.

✉ A declaration from the acrylic manufacturer that DMAc is not used in acrylic production. Appendix 6 can be used.

Elastane

Elastane is a polyurethane elastomer. It is not used as a textile fibre alone, but is incorporated in other textiles in order to make them elastic. Either special amines or organic tin compounds can be used as catalysts in the polymerisation[109]. Organotin compounds are very toxic, both for humans and animals[110], and a requirement is set that organotin compounds shall not be used. The requirement shall be documented with a statement that organotin compounds are not used, or an EU Ecolabel licence.

Requirements are also set for emissions of aromatic diisocyanates in the polymerisation and spinning. These compounds can cause allergic reactions in the eyes, lungs and skin in the event of emissions to the air[11]. The requirement shall be documented through test reports and/or detailed information that shows that emissions of aromatic diisocyanates do not exceed 5 mg/kg produced fibre, or with a valid EU Ecolabel licence.

Elastane can be produced in four different ways: by extrusion, reaction spinning, solution dry spinning or solution wet spinning[111]. Solution dry spinning is used in more than 94.5% of the world's elastane production. With this method, DMAC is used as a solvent[112]. Many other solvents can also be used, such as dimethylformamide (DMF) and nitric acid (HNO_3). As mentioned above, DMAc is among the new substances on the REACH candidate list, and Nordic Ecolabel changes the requirement to not allow DMAc in the production of acrylic and elastane.

[109] IBID.
[110] http://www.miljostatus.no/tema/Kjemikalier/Noen-farlige-kjemikalier/TBT/ (accessed 18/11/2011)
[111] Wikipedia.com: http://en.wikipedia.org/wiki/Elastane (September 2012)
[112] http://www.kpatents.com/pdf/applications/apn-4-05-03.pdf (September 2012)

O8 Elastane

Organotin compounds shall not be used.

Emissions to the air of aromatic diisocyanates during polymerisation and fibre production shall be less than 5 mg/kg produced fibre, expressed as an annual average.

N,N - Dimethylacetamide (DMAc, cas no 127-19-5) may not be used in elastane production.

✉ A declaration from the elastane manufacturer that organotin compounds are not used. Detailed information and/or analysis reports from the elastane manufacturer showing that the requirement is fulfilled A valid EU Ecolabel licence in accordance with the Commission's decision from July 2009 can document this requirement.

✉ A declaration from the elastane manufacturer that DMAc is not used in elastane production. Appendix 7 can be used.

Polyamide

The two commercial polyamide products are polyamide 6.6 and polyamide 6.

Polyamide 6.6 is created through the polymerisation of adipic acid and hexamethylenediamine, while polyamide 6 (Nylon 6) is created through the polymerisation of melted ε-caprolactam.

We currently only have requirements for emissions of nitrous gases (N2O) during the production of monomers for polyamide production. In the first version of our requirements, we had an additional requirement that the fibre should be produced through melt spinning without the use of solvents, as well as a requirement for a management plan to control VOC emissions from the fibre production. These requirements were omitted when we harmonised the Nordic Ecolabel's requirements with those of the EU Ecolabel. The BAT report cites melt spinning as the preferred method for polyamide production, so it is not relevant to set a requirement that the fibre production shall be produced using this method[113].

O9 Polyamide (nylon)

Emissions of nitrogen dioxide (N_2O) to the air from the production of monomers must not exceed 10 g/kg produced polyamide 6 fibre, and 50 g/kg produced polyamide 6.6 fibre, expressed as an annual average.

✉ Detailed information and/or a test report from the polyamide manufacturer showing that the requirement is fulfilled or a valid EU Ecolabel licence in accordance with the Commission's decision from July 2009. Appendix 8 can be used.

Polyester

In a textile context, polyester means PET, a synthetic polymer made of terephthalic acid (or dimethyl terephthalate) and monoethylene glycol. These are raw materials that are easily available from the cracking of crude oil. The raw materials are therefore not from renewable sources, but regarded as not very toxic and easily accessible chemicals. The fibre production results in no dangerous by-products and is carried out in a closed process that results in low emissions[114]. The fibre production is energy-intensive, but the water consumption is very low.

[113] BAT 2003
[114] Wikipedia

The majority of polyester production takes place in Asia, and is particularly concentrated in large factories in China, but there are also producers in the EU, for example in France and Germany. Of the world's PET production of 60 million tonnes/year, 65% goes to textile fibres and approx. 30% to packaging/bottles[115]. PET fibre production often happens with the catalyst diantimontrioxide (Sb2O3). From this material approx. 120 Megatonnes were produced globally in 2005 and it is primarily used as a flame retardant in plastics and textiles as well as a catalyst in PET production and in pigments. We currently have requirements regarding traces of the antimony catalyst in polyester, since antimony is a toxic substance with the classification Carc 2 (previously cat 3) and has been risk assessed as an existing material in EU 2008 (SE)[116]. The risk assessment concluded that the material's classification could remain (without environmental classification).

The report says that the risk areas that should be investigated further were exposure of humans and environment in production and handling of pure diantimontrioxide, also within the PET industry. Polyester usually contains antimony in concentrations of 150-350 ppm (mg/kg)[117]. In the EU Ecolabel criteria work from 2001-2002 it was found, through information on «best available technology» (BAT) and the PET fibre industry, that 260 ppm was a suitable basic level for EU Ecolabel, with a best level called «antimony free». Alternative catalysts are being developed, but Nordic Ecolabel has no information on any major progress for these, and we will monitor the issue until the next revision. According to one agent in the textile market, there is more pressure on phasing out antimony in the production of PET bottles than in textiles, since PET bottles are used in the food industry. In order to minimize anthropogenic production, accumulation and exposure to harmful substances in the environmental cycle, Nordic Ecolabel should still maintain a limiting requirement to the remnants of such substances, even though the requirement primarily functions as a signal to the industry to keep PET production at a high technical level.

Since the diantimontrioxide (Sb_2O_3) content in finished PET can vary somewhat, the requirement should be set as an average over a period of a number of months or a year.

There are also requirements to VOC emissions during polymerisation. The requirements have not changed and are harmonised with the EU Ecolabel criteria from 2009. The EU Ecolabel background document from 2007 (see previous reference) says that according to manufacturers, it is not feasible to tighten the requirement to VOC emissions further for the dominating technology or by direct esterification. According to the background document, large differences have been reported in VOC values from various manufacturers. This is because it has not been specified where the measurements are to be done, in the chimney or within the factory. It is therefore specified in the requirement that VOC measurements are to be performed in the process steps where they occur, including diffuse emissions. Further requirements could be linked to energy consumption, but we have been unable to find detailed information about how much energy is used during the fibre production.

[115] On PET at Wikipedia.com (August 2012)
[116] European Union, Risk Assessment Report DIANTIMONY TRIOXIDE, Swedish Chemicals Inspectorate, DRAFT 2008
[117] Miljøstyrelsen, Miljøprojekt nr. 892, 2004, Antimon - forbrug, spredning og risiko

Average figures for energy consumption, which are stated in Plastic Europe's database, are not enough for the Nordic Ecolabel, since we need information at factory level in order to be able to set an energy requirement which distinguishes the best factories in terms of energy consumption.

O10 Polyester

The amount of antimony in polyester fibre measured as an annual average shall not exceed 260 ppm.

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

VOC emissions during polymerisation and fibre production, measured in the process steps where this occurs, including diffuse emissions, must not exceed 1.2 g/kg produced polyester resin, expressed as an annual average.

VOC are defined as organic compounds that have a vapour pressure of 0.01 kPa or higher at 293.15 K or an equivalent volatility under the conditions of use.

✉ A declaration from the polyester manufacturer that antimony is not used, or a test report showing that the antimony requirement is fulfilled For VOC emissions, detailed information and/or test reports shall be submitted, as well as a declaration from the polyester manufacturer that the requirement is fulfilled. A valid EU Ecolabel licence in accordance with the Commission's decision from July 2009 can document this requirement. Appendix 8 can be used.

Polypropylene

Polypropylene is used a lot in the production of carpets, but can also be used in other types of products. The production process consists of the polymerisation of propene with the help of a catalyst. The polymer is melted and the fibre is created through extrusion. This is an extremely simple process which results in few environmental problems.

Inorganic pigments can be used to dye the fibre the correct colour. The use of lead based pigments is therefore prohibited in the production of polypropylene.

O11 Polypropylene

Lead-based pigments shall not be used.

✉ A confirmation from the polypropylene manufacturer that lead-based pigments are not used or a valid EU Ecolabel licence in accordance with the Commission's decision from July 2009. Appendix 8 can be used.

6.5.5 Regenerated cellulose fibres

The requirements for the production of regenerated cellulose fibres limit the emissions of harmful chemicals to the air and water, and set requirements for the use of raw materials that are legally harvested and which do not come from protected areas.

For regenerated cellulose fibres and dissolving masses, the applicant may choose either to fulfill and document requirement O16 below or the alternative requirement O16 in Appendix 12b. Using the requirement in Appendix 12b, the declaration in Appendix 12c and 12d shall be used.

Bleaching with chlorine gas

The cellulose mass shall not be bleached using chlorine gas. This is not currently used in Europe, but the use of chlorine gas has not stopped in all parts of the world. Chlorine gas is an effective bleaching agent, but gives great emissions of chlororganic compounds. There are currently good alternative bleaching methods for cellulose masses. In the previous version of the criteria, there was a requirement regarding the content of AOX in the fibres, and this was equivalent to the requirement in the EU Ecolabel's criteria. This has been removed and replaced with this requirement. The previous requirement regarding AOX in the fibres is not regarded as relevant, since it is emissions of AOX in the effluent that is problematic. Setting requirements that chlorine bleaching is forbidden will reduce AOX emissions. However, it is accepted that the requirement can be documented with a valid EU Ecolabel licence in accordance with the Commission's decision from July 2009, since the EU Ecolabel's requirement in practice means that bleaching with chorine gas is prohibited.

O12 Bleaching with chlorine gas

Chlorine gas must not be used when bleaching cellulose mass or cellulose fibres.

✉ A declaration from the cellulose mass and regenerated cellulose manufacturers that the requirement is fulfilled or a valid EU Ecolabel licence in accordance with the Commission's decision from July 2009.

Sulphur, zinc and copper emissions

The production of viscose results in emissions of both sulphur (S) and zinc (Zn). In the production of cupro fibre, copper emissions are a problem. Therefore, in order to limit these emissions, requirements are set for the emissions of these substances. The requirements have not changed and are harmonised with the EU Ecolabel criteria from 2009.

O13 Viscose, sulphur emissions

The sulphur content of the emissions of sulphur compounds to the air shall not exceed 120 g S/kg filament fibre and 30 g/kg staple fibre produced, expressed as an annual average.

✉ A test report from the viscose manufacturer showing that the requirement is fulfilled or a valid EU Ecolabel licence in accordance with the Commission's decision from July 2009.

O14 Viscose, zinc emissions

Emissions of zinc to water shall not exceed 0.3 g Zn/kg regenerated cellulose, expressed as an annual average.

Information on sampling, test methods and laboratories are given in Appendix 29.

✉ A test report from the viscose manufacturer showing that the requirement is fulfilled or a valid EU Ecolabel licence in accordance with the Commission's decision from July 2009.

O15 Cupro fibre, copper emissions

The copper content of the effluent from the plant that produces cupro fibre shall not exceed 0.1 ppm, expressed as an annual average.

✉ A test report from the cupro fibre manufacturer showing that the requirement is fulfilled or a valid EU Ecolabel licence in accordance with the Commission's decision from July 2009.

Traceability and certified raw materials

The raw materials for regenerated cellulose fibres, such as viscose, are mainly wood pulp (cellulose) and waste from the cotton plant, but can also be bamboo. In the event of the use of wood or bamboo in products, it is therefore relevant to look at whether the extraction of the raw materials does not come from protected areas or areas where there are unclear rights of ownership or use. Also, it is important that the raw materials come from legal sources. The requirement is new in this version of the criteria. After the hearing, a requirement has been introduced for a certified percentage of wood and fibre raw materials. Bamboo is exempt from the requirement for a certified percentage because there is little certified bamboo.

O16 Traceability and certified raw materials

a) Traceability

The manufacturer of regenerated fibres or the manufacturer of the dissolving mass shall:

1. state the name (in Latin and in a Nordic language) as well as geographical origin (country/state and region/province) for the raw materials used. Appendix 12a can be used.
2. have traceability of wood and fibre raw materials
3. have a written procedure/routine for purchasing raw materials which ensures that the raw materials come from legal sources. Raw materials from wood and fibres must not originate from:
    - Protected areas or areas being processed to become protected areas
    - areas with unresolved ownership or usage rights
    - illegally harvested raw materials
    - genetically modified trees and plants

Besides, forestry operations must not damage:

- Natural forests, biodiversity, specific ecosystems and important ecological functions
- Social and cultural preservation assets

A Chain of Custody certificate can be used to document item 2.

b) Certified raw material from wood or fibre.

On an annual basis, at least

30% of raw materials from fibres shall originate from areas where operations are certified according to a forestry standard and certification system described in Appendix 12a

or

75% of raw materials from fibres shall be recycled fibre, wood shavings or sawdust

or

a combination of these, calculated by the following formula:

Requirements to the percentage of fibre raw material from certified areas (Y):

$$Y\ (\%) \geq 30 - 0.4x$$

where x = % of recycled fibre, wood shavings or sawdust.

The percentage of certified fibre shall be updated and reported annually during the validity of the licence.

Bamboo is exempt from the requirement of a certified percentage.

Percentage of raw material from certified regions and the corresponding proportion recycled fibre, sawdust or wood shavings in textile fibre is calculated as a weighted sum of the percentage of each incoming mass.

✉ Name (in Latin and in a Nordic language) as well as geographical origin (country/state and region/province) for the raw materials used. Appendix 12a can be used.

✉ The system of traceability shall be described. A Chain of Custody certificate can be used to document item 2.

✉ Written procedures/routines to ensure the procurement of legal raw materials. The procedure/routine shall contain updated lists of all raw material suppliers. Appendix 12a can be used.

6.6 Paddings/Fillings

The chapter on paddings/fillings covers both synthetic and natural padding/filling materials. Paddings/fillings include down, feathers, seeds, corn, grain, latex, polyurethane foam, and various textile fibres. These can be used, for example, in duvets, cushions and jackets. The requirements for latex and polyurethane foam are taken from the Nordic Ecolabel's criteria for furniture.

Paddings/fillings from textile fibres shall fulfil all relevant requirements for textile fibres in O3-O16.

O17 Paddings/Fillings

Textile fibres shall fulfil relevant criteria for textile fibres in O3-O16.

Detergents and other chemicals used to wash padding/filling materials shall fulfil O26 regarding forbidden substances and O29 regarding the biodegradability of detergents, fabric softeners and complexing agents.

Padding/filling materials shall in addition to chapter 2.2 fulfil O27 regarding biocidal products and antibacterial substances.

Padding/filling materials shall in addition to chapter 2.2 fulfil O68 regarding formaldehyde.

✉ Equivalent documentation as specified in the requirements referred to.

O18 Additives

Additives shall fulfil O26 Forbidden substances and O27 Biocides; also, the following chemicals must not be added[1]:

- halogenated organic compounds in general (including chlorinated polymers). For example PVC, organic chlorinated paraffins, organic fluoride compounds and bleaching chemicals.
- aziridine and polyaziridines
- carcinogenic and mutagenic compounds as well as compounds harmful to reproduction (category 1 and 2 according to 67/548/EF)

[1] *Added substances comprise all chemical products and ingredients of these, including additives (e.g. pigments) in ingredients, but not contaminants from raw material, incl. raw material production. Contaminants are defined as residues from raw material, incl. raw material production present in the finished product in concentrations of less than 100 ppm (0.01 weight %, 100 mg/kg), but not substances that are added to a raw material or product for a purpose, irrespective of quantity.*

✉ Documentation from the supplier of chemicals is required for each chemical product/raw material added to the filling material according to Appendix 14.

O19 Dyes

Dyes can only be used to distinguish between various qualities (for example hard and soft foam) within the same type of filling, or if the filling is visible and is used without padding. If dyes are used, the relevant requirements in chapter 2.4.2 shall be fulfilled.

✉ Justification + Declaration according to Appendix 13.

O20 Requirements for recycling

A minimum of 90% of all production waste from manufacturing of latex and polyurethane shall be recycled.

✉ A description from the manufacturer of the padding of how production waste is recycled.

O21 Synthetic latex (SBR) and natural latex

The butadiene content shall be less than 1 mg/kg latex.

The concentration of N-nitrosamines must not exceed 0.0005 mg/m^3 measured in climate chamber test.

✉ The latex manufacturer shall state test results in accordance with measuring methods provided in Appendix 29.

O22 Polyurethane foam

CFC, HCFC, HFC, methylene chloride or halogenated organic compounds must not be used as blowing agents.

Isocyanate compounds shall only be used in a closed process with the required protective equipment and in accordance with regulatory requirements.

N,N - Dimethylacetamide (DMAc) must not be used in production.

✉ Declaration according to Appendix 13.

6.7 Other materials

In reports and tests[118],[119] there is often information about an undesirably high content of metals such as lead in metal parts for clothing and accessories of phthalates in plastic parts. This can result in a risk of undesirable spreading or concentration of harmful metals in the environment, as well as result in exposure that is hazardous to health for consumers. In a test of children's rainwear carried out by the magazine "Foreldre og barn", lead was found in the buttons of 6 of 13 products[120]. There are no EU regulations regarding the content of lead in such products, but whether rules for the lead content of jewellery should be introduced is currently under discussion. It is, however, unclear whether this regulation could also apply to buttons for clothes. In an article on the Norwegian authorities' website, erdetfarlig.no[121], Bergans states that customers often ask about the nickel content in buttons and zippers.

[118] Stockholm Vatten AB, Miljö och hälsoaspekter vid slamspridning, Rapport nr 2 - 2000
[119] www.testfakta.se, 30 July 2011, Test of rainwear
[120] http://www.dagbladet.no/2011/06/30/tema/klikk/helse/17146626/ (accessed 25/01/2012)
[121] http://www.erdetfarlig.no/Artikler/Nyhetsartikler/Bruk-makten-din-nar-du-handler/ (accessed 25/01/2012)

The nickel content of items such as buttons and zippers is regulated in EU directive 94/27/EØF[122]. The Danish Asthma & Allergy Foundation writes that Nickel is the most frequent cause of contact allergies in Denmark, despite the EU directive[123].

Buttons, zippers, buckles, reflector strips and other details on textile products constitute a considerable amount of material sold and which also often comes in direct contact with the user. Nordic Ecolabel therefore believes that it is important to limit unwanted substances in these parts, and has introduced requirements which prohibit lead, cadmium, nickel, phthalates and chlorinated plastic. For lead and cadmium, the requirement can also be documented with a valid certificate from the Øko-Tex 100 standard if the test result shows that the actual lead or cadmium comply with that requirement levels.

(The standard allows up to 90 ppm lead and 100 ppm cadmium (50 ppm for children's clothes) for actual content of the metals.).

There are from version 4.0 to 4.1 introduced a new requirement levels for cadmium, lead and nickel in O23 Sliding Locks, buttons, reflectors and other non-textile details. The requirement levels are hamoniseret with the lowest levels from GOTS, Oeko-tex and the EU Ecolabel. The previous levels in the requirement for heavy metals was max. 3 ppm. The limit of 3 ppm was set, as it was the detection limit. However, it has been found that contaminants may be way higher than 3 ppm. The requirement is, therefore amended, hence requirements limits at the lowest levels used in other textile labels are accepted.

O23 Zippers, buttons, reflectors and other details

The requirement applies to individual materials in non-textile details on the textile product (e.g. buttons, zipper, buckles, reflectors, plastic emblems, metal parts. Plastic parts must not contain phthalates or consist of chlorinated plastic.

Cadmium, lead or nickel in non-textile details may only be included with the levels described below.

Requirement levels for total content of heavymetals (digested sample):

Cadmium (Cd) < 40 mg/kg (testmethod: ICP-MS, ICP-OES, AAS)

Lead (Pb) < 50 mg/kg (testmethod: ICP-MS, ICP-OES, AAS)

Only for metalparts:

Nickel, release < 0,5 µg/cm2/week (testmethod: EN 12472, EN 1811).

✉ A test report from the manufacturer of details showing that the requirements for metals is fulfilled. Valid GOTS and Oeko-Tex 100 certificate can be used, if the test reports shows compliance with the requirement levels.

✉ A declaration that plastic parts do not contain phthalates or consist of chlorinated plastic. Appendix 15 may be used as a template.

6.8 Textile chemicals

Following the production of the fibre, the fibre can go through several processes, such as dyeing, washing, spinning, weaving, shrinking and impregnation. Chemicals that are harmful to health and the environment can be used in these processes, and Nordic Ecolabelling therefore sets requirements for the chemicals that are used in these processes.

[122] http://www.klif.no/publikasjoner/kjemikalier/1902/ta1902.html (accessed 25/01/2012)
[123] http://eksem.astma-allergi.dk/kontakteksem/allergiskkontakteksem/nikkel (accessed 25/01/2012)

The requirements are divided into general chemical requirements that apply to all textile products, including yarn and fabric. In addition, specific requirements are set for individual products, such as yarn and fabric.

The requirements in this chapter are requirements that apply for all types of textile products, including yarn, fabric and final products. The requirements cover chemicals that are used in spinning, weaving, wet processes (washing, bleaching and dyeing) as well as printing.

6.8.1 Overview of chemicals

In order to obtain an overview of the chemicals that are used in the various processes after fibre production, a requirement is set that an overview of the chemicals used shall be submitted. O27 for biocides and antibacterial substances also apply to fibre production.

O24 Overview of chemicals

An overview of all chemicals with safety data sheets used in the various processes after the production of fibre and which are stated in O1, for example spinning, weaving, wet processes (washing, bleaching, dyeing) and chemicals for coating, membranes and laminates shall be submitted.

✉ An overview of chemicals and safety data sheets (in accordance to current European legislation) for all chemicals used at the various processes. It must be specified to which processes the various chemicals belong.

6.8.2 REACH's candidate list

The requirement is new in this version of the criteria. The substances on REACH's candidate list are very problematic substances, and can be carcinogenic and harmful to the environment. Nordic Ecolabelling regards it as important to ensure that no substances on this list are used in Nordic Ecolabelled products. The candidate list can be found on the ECHA webpage: http://echa.europa.eu/web/guest/candidate-list-table.

O25 Substances on the REACH candidate list

Substances on the Reach candidate list cannot be used in the processes following fibre production. Link to the Reach's candidate list: http://echa.europa.eu/web/guest/candidate-list-table

✉ A declaration from the sub-supplier performing the various processes declaring that no substances on the candidate list are used. Appendix 16 can be used.

6.8.3 Forbidden substances

The use of a number of chemicals is prohibited in the further treatment of the fibre. The requirement has not changed and is harmonised with the EU Ecolabel criteria version 2009. Alkylphenol ethoxylates (APEO) are banned, because the products of its biodegradable products are not easily broken down, and some of the products of the breakdown of these substances are deemed to be endocrine disrupting by the EU (e.g. nonylphenol). Linear alkyl benzene sulphonates (LAS) is toxic to aquatic organisms and non-degradable in anaerobic environments. Ethylenediaminetetraacetate (EDTA) and diethylenetriaminepentaacetate (DTPA) are not easily broken down. They are also suspected of being able to mobilise heavy metals in certain environments, because they can bind with these.

Dimethyl ammonium chloride (DTDMAC), distearyl dimethyl ammonium chloride (DSDMAC), and di (hardened tallow) dimethyl ammonium chloride (DHTDMAC) are examples of quaternary ammonium compounds. Quaternary ammonium compounds have several undesirable environmental effects. They are difficult to break down and are often extremely toxic to aquatic organisms.

Polyfluorinated organic compounds (PFCs) are used in the impregnation of textile products, particularly in sportswear for outdoor use to make the materials water repellent. The report "Fluormiljøgifter i allværsklær" published by Naturvernforbundet in Norway and Naturskyddsföreningen in Sweden in 2006 shows that there are several different fluorides in jackets on the market. There are several different types of PFCs and a number of these are extremely harmful to health and the environment. One of these, PFOS (perfluorooctane sulphonates) is prohibited in textiles and impregnating agents in Norway. A survey published by Danish researchers in Environmental Health in October 2011 links the use of fluorinated substances to an increased risk of breast cancer.

The use of polyfluorinated compounds is not desirable in Nordic Ecolabelled textiles, and a prohibition has therefore been introduced. The requirement is new in this version of the criteria.

In the hearing it was found that phthalates can be used in further treatment of the fibre. According to the Norwegian Institute of Public Health, there are a number of different phthalates used in textiles as carriers when dyeing and as softeners in the production of synthetic fibres[124]. According to the Norwegian Ministry of the Environment, phthalates can also be included when impregnating textiles[125]. Many phthalate compounds have unwanted effects on health and the environment. Some phthalates are on the REACH candidate list and will therefore be excluded in O25. These are currently phthalates DBP, BBP, DEHP, DIBP and Bis (2-methoxyethyl) phthalate[126]. In the hearing it was found that some phthalates are also in the REACH Appendix XVII and not on the candidate list. In REACH Appendix XVII a number of substances are listed which can constitute a risk for health and the environment. When substances are on this list, it means that they are either illegal to produce, market or use in any type of product. Phthalates DEHP, DBP, BBP, DINP, DIDP, DNO and bis (2-ethylhexyl) phthalate are currently listed in Appendix XVII[127]. DEHP and DINP are also on the Danish Ministry of the Environment's «List of unwanted substances» together with phthalates DBP, BBP and DMEP from the candidate list. In the EU it is a legal requirement that toys for children under the age of 14 must not contain DBP, BBP and DEHP from the candidate list[128]. Another 3 phthalates are forbidden if the toy gets in the mouth. These are phthalates DNOP, DINP and DIDP, which are all in the REACH Appendix XVII. Therefore, Nordic Ecolabel wishes to put phthalates which are also on the REACH Appendix XVII on the list of forbidden substances.

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[124] Website of the Norwegian Institute of Public Health: http://www.fhi.no/eway/default.aspx?pid=233&trg=MainLeft_6039&MainArea_5661=6039:0:15,4521:1:0:0:::0:0&MainLeft_6039=6041:70095::1:6043:3:::0:0 (accessed July 2012)
[125] Website of the Ministry of the Environment: http://www.regjeringen.no/nb/dep/md/dok/nou-er/2010/nou-2010-9/11/3.html?id=623080 (accessed July 2012)
[126] Website for ECHA, candidate list: http://echa.europa.eu/web/guest/candidate-list-table
[127] REACHs Appendix XVI: http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2009:164:0007:0031:da:PDF
[128] Website of Danish «informasjoncenter for mijlø og kjemi»: http://www.forbrugerkemi.dk/fokus/ftalater/fokus-pa-ftalater

O26 Forbidden substances

The following chemicals must not be added[1]:

- Alkyl phenol ethoxylates (APEO)
- Linear alkyl benzene sulphonates (LAS),
- Ditallow dimethyl ammonium chloride (DTDMAC), distearyl dimethyl ammonium chloride (DSDMAC), dihydrogenated tallow dimethyl ammonium chloride (DHTDMAC)
- Ethylene diamine tetra acetate (EDTA) and diethylene triamine penta acetate (DTPA)
- Phthalates[2]
- Fluorinated organic compounds, such as PFOA (perfluorooctanoic acid and salts/esters thereof), PFOS (perfluorooctyl sulphonate and its compounds), PTFE (polytetrafluoroethylene), etc.

must not be used and must not be included as a component in the used preparations or mixtures.

[1] Added substances comprise all chemical products and ingredients of these, including additives (e.g. pigments) in ingredients, but not contaminants from raw material, incl. raw material production. Contaminants are defined as residues from raw material, incl. raw material production present in the finished product in concentrations of less than 100 ppm (0.01 weight %, 100 mg/kg), but not substances that are added to a raw material or product for a purpose, irrespective of quantity.

[2] This applies to phthalates listen in Reach's Appendix XVII. Phthalates listed in the candidate list are excluded in requirement O25.

A declaration from the chemical supplier that these chemicals and chemicals that contain these substances are not used. Appendix 16 can be used.

6.8.4 Biocide products and antibacterial substances

Previously, there was a requirement that biocide products or biostatic products could not be added if they could be emitted during use. This requirement has been removed in the new criteria for the EU Ecolabel from 2009. Biocide products and antibacterial products are not desirable in ecolabelled products. Nordic Ecolabelling has therefore introduced a requirement that prohibits the addition of biocides and antibacterial substances. An increase has been seen in products to which such substances are added, e.g. in sportswear in order to prevent odours. One of the substances added is nano silver. Biocides and antibacterial substances are not necessary additives in a product, and there is concern that the increased use of such substances can increase bacterial resistance to antibiotics.

O27 Biocides and antibacterial substances

Adding and/or integrating substances which can have a biocide and/or antibacterial effect in the fibre, fabric or textile is not permitted.

Silver compounds, nano silver and nano gold are also considered antibacterial substances.

✉ A declaration from the fibre, fabric or textile manufacturer that biocides and/or antibacterial substances are not added.

6.8.5 Bleaching agents

The requirement is changed from the previous version, and is partially harmonised with the EU Ecolabel criteria from 2009. Bleaching agents that contain chlorine are harmful to the environment and are therefore prohibited. The use of chlorine containing bleaching agents is reduced, and there are alternatives such as hydrogen peroxide (H_2O_2)[129]. The requirement does not apply to the production of regenerated cellulose fibres; since this is a process where it can be difficult to use an alternative to chlorine based bleaching agents. Requirements for bleaching agents for regenerated cellulose fibres are set in O12. Halogenated agents are added in order to avoid felting of wool and to make wool machine washable. These can react with other organic compounds in water and form AOX, among other things.

It has therefore been incorporated in the requirement that the requirement also applies to carded wool and loose, washed wool in connection with the finishing treatment against felting. This is new and not harmonised with the EU Ecolabel criteria from 2009.

O28 Bleaching agents and anti-felting treatments

Chlorinated substances must not be used as a bleaching agent for yarn, fabrics and finished goods or on carded and loose, washed wool in connection with the finishing treatment against felting.

This requirement does not apply to the manufacturing of regenerated cellulose fibres, which shall fulfil O12.

✉ A declaration that chlorinated bleaching agents or chlorinated finishing treatment against felting are not used. A valid EU Ecolabel licence in accordance with the Commission's decision from July 2009 can be used, except for the treatment of wool. Appendix 17 can be used.

6.8.6 Detergents, emollients/fabric softeners and complexing agents

The formulation of the requirement has been changed somewhat, since it has been harmonised with the EU Ecolabel's criteria from 2009. Requirements regarding biodegradability for surface active substances and other relevant substances is a standard requirement in the Nordic Ecolabelling criteria for various chemical products, and statutory requirements in the EU. Biodegradability is an important parameter in order to reduce environmental impact, and extremely relevant for productions outside Europe.

O29 Biodegradability of detergents, fabric softeners and complexing agents

Surfactants in detergents and fabric softeners at each wet treatment plant shall be completely aerobically biodegradable.

At least 95% of the weight of fabric softeners, complexing agents and detergents at each wet treatment plant shall be sufficiently biodegradable, or able to be eliminated in the waste water treatment plants.

For testing methods for completely aerobically biodegradable substances, see Appendix 29.

[129] EU Ecolabel background document, 2007

✉ A list of products used, safety data sheets (in accordance to current European legislation) and test report in accordance with the testing methods described in Appendix 29 or a valid EU Ecolabel licence in accordance with the Commission's decision from July 2009.

6.8.7 Cerium compounds in yarn and fabric

The requirement is not changed from the previous version and is harmonised with the EU Ecolabel's criteria. According to the EU Ecolabel background document[130], this is not particularly relevant for yarn manufacturers and factories in Europe, but such compounds can still be used in developing countries and the requirement is therefore maintained.

O30 Weight increase

Yarn and fabric must not be treated with cerium compounds to increase the weight.

✉ A declaration from the yarn and fabric manufacturer that these compounds are not used or a valid EU Ecolabel licence in accordance with the Commission's decision from July 2009. Appendix 17 can be used.

6.8.8 Dyeing

A number of requirements are set for chemicals used in dyeing processes. Some of the requirements have been reformulated in relation to the previous criteria.

6.8.9 Classified dyes and pigments

Requirements are set that dyes, pigments or mixtures that are used may not be classified as harmful to the environment, carcinogenic, mutagens, harmful to fertility or allergenic. The requirement has been changed and is no longer harmonised with the EU Ecolabel's criteria. In the EU Ecolabel's criteria from 2009, the requirements are divided into lists of dyes that are prohibited, and a requirement where dyes that contain more than 0.1% of their total weight of substances that are classified as carcinogenic, harmful to fertility, mutagens (CMR classified substances) or allergenic may not be used. Nordic Ecolabelling has chosen to formulate the requirement without negative lists with a general prohibition against the stated classifications in order to include all problematic dyes. The requirement is identical to the requirement for textiles in Nordic Ecolabelling's criteria for furniture. In addition to the prohibition of CMR and carcinogenic substances, a requirement regarding substances classed as hazardous to the environment and toxic substances has been introduced. The EU Ecolabel does not have requirements for these classifications. Reducing the use of environmentally harmful chemicals is central in Nordic Ecolabelling's environmental pollutants policy. In the hearing it was found that some dyes on the EU Ecolabel prohibition list in the 2009 criteria document are not covered by the requirement. Nordic Ecolabel has therefore chosen to list these in addition to the requirement.

A ban on all dyes and pigments classified with H334 (R42) or H317 (R43) has proven to be very difficult to fulfil. Other labels have a more targeted approach to allergenic dyes.

[130] EU Ecolabel background document, 2007

GOTS only prohibits the disperse dyes classified allergenic (with H334 (R42) or H317 (R43)), not other types of dyes based solely on allergy-classification. The reason is, that it is the dispersed dyes, there is still allergenic after the wet process, while other types of dyes, for example. reactive dyes, reacts in the wet process and therefore are not allergenic afterwards.

The requirement is adjusted from version 4.1 to 4.2 of the criteria. Now only disperse dyes classified allergenic (with H334 (R42) or H317 (R43)) are prohibited. The requirement is supplemented with work requirements for the use of dyes. Overall, the requirement therefore become more targeted towards to problematic dyes and colorants.

O31 Dyes, colorants and pigments

Dyes, colorants and pigments shall not be classified in accordance with table 1.

Only disperse dyes must meet the requirement for allergen classification (H334 (R42) or H317 (R43)).

For not disperse dyes classified with H334 (R42) or H317 (R43) it shall be proven that the dye, colorant or pigment is a non-dusting formulation or that it is used by automatically dosed dyeing and printing processes.

In addition, the following colouring agents must not be used:

C.I. Basic Red 9, C.I. Disperse Blue 1,3,7,26,35,102,106,124, C.I. Acid Red 26, C.I. Basic Violet 14, C.I. Disperse Orange 1,3,11, 37, 76, 149, C.I. Direct Black 38, C.I. Direct Blue 6, C.I. Direct Red 28, C.I. Disperse Yellow 1,3,9,23,39,49, C.I. Disperse Brown 1, C.I. Disperse Red 1, 11, 17.

Table 1. Classification of dyes, colouring agents and pigments

Hazard class	Hazard symbols and R-phrases in accordance with directive 67/548/EEC*	CLP-regulation 1272/2008*
Environmental hazard	N with R50, R50/53, R51/53 and/or R59	Dangerous to aquatic environments. Category acute 1 H400, category chronic 1 H410, category chronic 2 H411. Ozone EUH 059
Highly toxic	Tx (T+ in Norway) with R26, R27, R28 and/or R39	Acute toxicity, Category 1 or 2 with H330, H310 and/or H300 and/or specific organic toxic-single
Toxic	T with R23, R24, R25, R39 and/or R48	Acute toxicity, Category 2 or 3 with H330, H331, H311 and/or H301 and/or specific organic toxic-single exposure, category 1 with H370, and/or specific organic toxic - repeted exposure category 1 with H372.
Carcinogenic	T with R45 or R49. Or Xn with R40	Carc 1A/1B/2 with H350, H350i and/or H351
Mutagenic	T with R46 or Xn with R68	Mut 1B/2 with H340 and/or H341
Harmful to reproduction	T with R60 and/or R61. Or Xn with R62 and/or R63	Repr 1A/1B/2 with H360, H361
Allergenic	R42 and/or R43	Resp.Sens 1 with H334 or Skin Sens 1 with H317

** The classification applies in accordance with EU substance directive 67/548/EEC with later changes and adjustments, and/or CLP regulation 1272/2008 with later changes. In the transition period, i.e. until 1 June 2015, classification in accordance with the EU substance directive or the CLP regulation can be used. After the transition period, only classification in accordance with the CLP regulation will apply. A list of R-phrases and their meaning is provided in Appendix 30.*

Please note that the chemical manufacturer is responsible for correct classification.

Declaration from the colorant manufacturer that colours, colouring agents and pigments are not classified according to table 1 and that the colouring agents mentioned are not used. Appendix 18 can be used.

✉ Documentation of the dye, colorant or pigment is a non-dusting formulations or that it is used by automatically dosed dyeing and printing processes. Applies to not disperse dyes classified with H334 (R42) or H317 (R43).

6.8.10 Impurities in dyes and pigments

Dyes can contain metal impurities because metals are used as catalysts during production. Inorganic pigments are based on metals such as zinc, barium, lead, iron, cadmium and chromium. Some of the metals are heavy metals. In order to limit the content of metals in dyes and pigments, a requirement is set that a range of metals must not exceed stated limit values.

The limit values are in accordance with the EU Ecolabel's background document checked in accordance with ETAD (The Ecological and Toxicological Association of Dyes and Organic Pigments Manufacturers) and are still relevant. The requirements have not changed and are harmonised with the EU Ecolabel criteria from 2009.

O32 Impurities in dyes with fibre affinity

Impurities in colorants with fibre affinity must not exceed the following values: Ag 100 ppm, As 50 ppm, Ba 100 ppm, Cd 20 ppm, Co 500 ppm, Cr 100 ppm, Cu 250 ppm, Fe 2 500 ppm, Hg 4 ppm, Mn 1 000 ppm, Ni 200 ppm, Pb 100 ppm, Se 20 ppm, Sb 50 ppm, Sn 250 ppm og Zn 1 500 ppm.

✉ A declaration from the colorant manufacturer showing that the requirement is fulfilled or a valid EU Ecolabel licence in accordance with the Commission's decision from July 2009. Appendix 19 can be used.

O33 Impurities in pigments: Insoluble colorants without fibre affinity

Impurities in pigments without fibre affinity must not exceed the following values: As 50 ppm, Ba 100 ppm, Cd 50 ppm, Cr 100 ppm, Hg 25 ppm, Pb 100 ppm, Se 100 ppm, Sb 250 ppm and Zn 1 000 ppm.

Pigments are defined as insoluble colorants without fibre affinity.

✉ A declaration from the colorant manufacturer showing that the requirement is fulfilled or a valid EU Ecolabel licence in accordance with the Commission's decision from July 2009. Appendix 19 can be used.

6.8.11 Chrome mordants

The requirement has not changed and is harmonised with the EU Ecolabel criteria from 2009. Chromium is toxic, and is therefore used to a limited extent. It can, however, still be relevant for wool and polyamide, and chrome mordants are therefore prohibited.

O34 Chrome mordants

The use of chrome mordants is not permitted.

✉ A declaration from the dye works that chrome dyeing is not used or a valid EU Ecolabel licence in accordance with the Commission's decision from July 2009. Appendix 18 can be used.

6.8.12 Metal complex dyes

The requirement is changed from the previous version, and is not harmonised with the EU Ecolabel criteria from 2009. However, the EU Ecolabel criteria are currently under revision, and it is not known what the requirement will be.

Previously, the use of metal complex dyes was permitted if a cleaning plant which reduced the emissions of metals to the environment was used. At the hearing it was proposed to allow metal complex dyes for the dyeing of wool, polyamide and woolblends. The requirement has been changed after the hearing. It is now proposed to allow metal complex dyes only for dyeing wool mixed with viscose. It is difficult to avoid the use of metal complex dyes for these materials, particularly in the dyeing of dark colours and for turquoise, and the same colour clarity and colour fastness is not obtained when using alternative dyeing methods as when using metal complex dyes for these colour shades. Wool and viscose absorb colour differently, and the dye which is optimal for wool is not optimal for viscose.

In order to obtain fabric with even dyeing without metal dyes, one must either dye the wool and the viscose separately before spinning, or dye the spun yarn (or the woven, white fabric) in two different dyes. Then one can obtain a good dye and good colour fastness (especially fastness to rubbing), but still not the same colour clarity as when metal complex dyes are used. Both involve the use of two dyes with increased water and energy consumption, and with regard to dyeing yarn/woven fabric, it also involves a lot of wear on the wool fibre.

The industry often needs to dye white, spun yarn and then dye it according to the customer's order, especially for colours that do not sell much. We believe that it is justifiable to use metal complex dyes for the colours where it is also necessary for quality.

It is also known that for wool/polyamide mixes it can be difficult to obtain certain colours with the colour clarity and fastness to rubbing that the customer wants without the use of metal complex dyes. The problems here are smaller, however, because the polyamide fibres behaves relatively similar to the wool fibre, and yarn and fabric can be dyed in the same dye also when using alternative dyes. Parts of the industry believe that it is completely acceptable to phase out metal complex dyes also for dark colours and still produce fabrics of good quality demanded by the market. Other businesses believe that this makes it more difficult for them to produce all the goods the market demands, with the limitation which are now being introduced. This is probably due to the businesses addressing different markets.

Metal complex dyes are problematic because they contain toxic heavy metals. A requirement has therefore been set that if metal complex dyes are used, the effluent shall be purified. The testing method that shall be used has been changed to ISO 17294-2, since contact with the industry[131] shows that the previous testing methods, ISO 8288 for Cu and Ni and EN1233 for Cr are outdated, and seldom used today.

The limits for emissions to water after cleansing has so far been harmonised with the EU Ecolabel. After comments to the hearing we have examined this more closely, and concluded that they can be reduced considerably. The industry reports emissions as mg/l water.

[131] Ragnvald Svarstad, GU, personal communication January 2012

Conversion to kg produced goods and the following reduction of municipal treatment plants, as well as pollution, such as heavy metals in water, give insecure calculations.

Adjusting requirements O35 from version 4.4 to 4.5: It has become more clear that there are major challenges in the dyeing of wool fibers, polyamide fibers and blends of wool and/or polyamide with regenerated cellulose fibers (eg viscose) without the use of metal complex dyes. The current exemption in the requirement is therefore extended with these fiber types. EU Ecolabel has exemptions for the same fiber types.

Adjusting requirements O35 from version 4.5 to 4.6: A ban on metal complex dyes for cotton restricts both the spectrum of colors that can used and the quality of the finished fabric regarding the colour fastness to light of the finished textile. At the same time the problem, with poor fixation of the dye to the cotton fabric, is now possible to solve by using new, multifunctional color metal complex dyes,that give high fixation of color and thus small discharge to wastewater.

Requirement O35 is therefore adjusted, so that it is possible to use metal complex dyes based on copper for cotton. By use of the exemption, stricht requirements for the dyes and wastewater have to be fullfilled. At the same time the exemption activates requirement (O73) of high light fastness of the cotton fabrics dyed with metal complex dyes.

O35 Metal complex dyes

Metal complex dyes based on copper, chromium or nickel are only permitted when dyeing

- wool fibers
- polyamide fibers
- mixtures af wool and / or polyamide with regenerated cellulose fibers

Emissions to water after treatment must not exceed 5 mg/kg fibre for Cu, 5 mg/kg fibre for Ni, and 3 mg/kg fibre for Cr.

For cotton, metal complex dyes based on chromium or nickel are not allowed. For cotton is only metal complex dyes based on copper allowed and only if the following are met:

- The metal complex dye is a polyfunctional (bifunctional) reactive metal complex dye.
- The fixation ratio (guideline specified by the manufacturer of dye) is minimum 80%.
- Copper must be a maximum of 5% by weight of metal complex dye.
- For the dyed textile, it must be documented, that it achieved at least level 4 for colour fastness to light (see requirement O73).

Emissions of Cu and Ni shall be analysed in accordance with ISO 17294-2 or similar methods.

✉ A declaration from the responsible for the dyeing that metal complex dyes are not used.

or

✉ For dyeing of wool, polyamide, wool blend or polyamide with regenerated cellulose fibers with metal complex dyes, a declaration from the responsible for the dyeing is required of which metal complex dyes are used, as well as test report on emissions of the relevant heavy metals, showing that the requirement is fulfilled.

For metal complex dyes used for cotton it shall be stated whether it is polyfunctional (bifunktionelt), fixation degree, weight % of Cu, test report for colour fastness to light. Appendix 18 can be used by the dye house and Appendix 19 by the dye stoff producer.

6.8.13 Azo dyes

The requirement has been expanded to include two aromatic amines, but is otherwise unchanged. It is harmonised with the EU Ecolabel criteria from 2009. Azo dyes which release a range of amines are prohibited in the EU in accordance with directive 2002/61/ EC, but can still be used outside of the EU. The amines that are released from azo dyes can be carcinogenic, allergenic, irritant and toxic.

O36 Azo dyes

Azo dyes which can release the aromatic amines given in Table 2 may not be used.

Table 2. Aromatic amines

4-aminodiphenyl
Benzidine
4-chlor-o-toluidine
2-naphthylamine
o-amino-azotoluene
2-amino-4-nitrotoluene
p-chloraniline
2,4-diaminoanisol
4,4´-diaminodiphenylmethane
3,3´-dichlorbenzidine
3,3´-dimethoxybenzidine
3,3´-dimethylbenzidine
3,3´-dimethyl-4,4´-diaminidophenylmethan
p-cresidine
4,4'-oxydianiline
4,4'-thiodianiline
o-toluidine
2,4-diaminotoluene
2,4,5-trimethylaniline
4-aminoazobenzene
o-anisidine
2,4-Xylidine
2,6-Xylidine

An analysis of azo dyes shall be performed in accordance with EN 14 362-1 and 2.

✉ A declaration from the dye manufacturer that these dyes are not used and/or a test report showing that the requirement is fulfilled or a valid EU Ecolabel licence in accordance with the Commission's decision from July 2009. Appendix 19 may be used as a template. Appendix 19 may be used as a template.

6.8.14 Special textile processes

Sizing agents

The requirement has been changed from the previous version, in that the possibility for the sizing agent to be eliminated in a purification plant is removed. The reason that this has been removed is that sizing agents that are not biodegradable will accumulate in sludge, which is not desirable. The requirement is harmonised with the EU Ecolabel criteria from 2009. Biodegradability is an important quality in order to reduce the impact on the environment, and biodegradable sizing agents are easily available. The requirement regarding biodegradability is also in line with BAT[132] which says that sizing agents should be easy to break down or sufficiently biodegradable.

O37 Sizeing agents

At least 95% (dry weight) of the components of sizeing agents used for yarn shall be sufficiently biodegradable. If they are not sufficiently biodegradable, they shall be recycled.

The calculation is based on the sum of the individual components.

For a description of testing methods for sufficient biodegradability, see Appendix 29.

✉ A test report from the manufacturer of sizeing agent in accordance with the testing methods described in Appendix 29 or a valid EU Ecolabel licence in accordance with the Commission's decision from July 2009.

Spinning additives

The requirement has not changed and is harmonised with the EU Ecolabel criteria from 2009. Various additives are added to the fibre and yarn during the spinning process, and then removed during treatment before dyeing. These additives can be lubricants, surfacetants and anti-static substances. These substances contribute to the emission of pollutants to water and air from the dyeing processes. A requirement is therefore set that 90% of the dry weight of additives for spinning solutions, spinning and preparations for primary spinning shall be sufficiently biodegradable or eliminated in the water purification plant.

O38 Additives for primary spinning

For additives for spinning solutions, spinning and preparations for primary spinning (including carding oil, spin finish and lubricants); at least 90% (dry weight) of the used preparations' components shall either be sufficiently biodegradable or able to be eliminated in the waste water treatment plant.

For a description of testing methods for sufficient biodegradability, see Appendix 29.

✉ A test report from the manufacturer of additives in accordance with the testing methods described in Appendix 29 or a valid EU Ecolabel licence in accordance with the Commission's decision from July 2009.

PAH

The requirement is changed from the previous version, and is harmonised with the EU Ecolabel criteria from 2009. Previously, the polycyclic aromatic hydrocarbons (PAH) content in the mineral oil should be 1.0% of the total weight.

[132] European Commission, July 2003, Integrated Pollution Prevention and Control (IPPC), Reference Document on Best Available Techniques for the Textile Industry

This has now been changed to 3.0% of the total weight. It is possible to fulfil the previous requirement of 1.0% total weight, but due to the high costs linked to producing products with such a low content, the content has been permitted to increase to 3% of the weight[133].

O39 PAH content in auxiliary chemicals for spinning and weaving

The content of polycyclic aromatic hydrocarbons (PAH) in the mineral oil part of an auxiliary chemical shall be less than 3.0% of the total weight.

'Auxiliary chemicals for spinning and weaving' are the chemicals included in O37 and O38. The requirement applies to primary and secondary spinning.

✉ Relevant information such as safety data sheets, product data sheets (in accordance to current European legislation) or declarations which clarify the polycyclic aromatic hydrocarbons content, or declarations that products containing mineral oils are not used, or a valid EU Ecolabel licence in accordance with the Commission's decision from July 2009. Appendix 16 can be used.

6.9 Hide and leather chemicals

Nordic Ecolabel also wants to ecolabel hide and leather products, requirements are therefore made to relevant environmental problems win hide and leather production. Tanning is an important process in production.

The requirements in this chapter concern chemicals used in the treatment of hides/skins and leather, and cover tanning and other wet processes.

6.9.1 Overview of chemicals

In order to have an overview of and ensure the quality of the information that is provided, it is important for Nordic Ecolabelling to have relevant knowledge of which chemicals are used in the treatment of hides/skins and leather.

O40 Overview of chemicals

An overview of all chemicals that are used in the treatment (tanning and other wet processes) of hides/skins and leather shall be submitted.

An overview of chemicals and safety data sheets (in accordance to current European legislation).

6.9.2 REACH's candidate list

The requirement is new in this version of the criteria. The substances on REACH's candidate list are very problematic substances, and can be carcinogenic and harmful to the environment. Nordic Ecolabelling regards it as important to ensure that no substances on this list are used in Nordic Ecolabelled products. The candidate list can be found on the ECHA webpage: http://echa.europa.eu/web/guest/candidate-list-table.

O41 Substances on the REACH candidate list

Substances on the Reach candidate list cannot be used in the tanning process. Link to the Reach's candidate list: http://echa.europa.eu/web/guest/candidate-list-table

[133] EU Ecolabel's background document, Revision of the Textile Eco-label, 2007

✉ Declaration from the tannery that no substances on the candidate list are used. Appendix 20 can be used.

6.9.3 Chromium

The most common tanning method is to use chromous salt. During tanning trivalent chromium (CrIII) can be transformed into hexavalent chromium (CrVI). Chromium (VI) is allergenic, carcinogenic and very toxic to aquatic life, which is why Chromium (VI) is not desirable in ecolabelled products. The requirement is that Chromium (VI) must not be found in hides/skins and leather. The requirement has not been changed, but the test method to document the requirement, is new. It shall be documented by a test report in accordance with EN ISO 17075-2007 or similar, where the detection limit is 3 ppm.

This method measures extractable chromium VI and not the actual content, but it is the most common method for analysing chromium (VI) in leather.[134]

The previous method, CEN/ITS 149495, could create problems due to interference from dyes and other chemicals in the leather during analysis. The requirement can also be documented by a valid Øko-Tex 100 certificate. This standard has a threshold value «below detection limit» which is 0.5 ppm for Cr (VI) extractable from an artificial perspiration solution.

O42 Chromium (VI)

Chromium (VI) shall not be found in processed hides/skins or leather.

The content of chrome shall be tested according to EN ISO 17075:2007 (detection limit 3 ppm) or similar.

✉ A test report from the tannery showing that the requirement is fulfilled. Appendix 20 can be used.

6.9.4 Heavy metals

Heavy metals such as cadmium and lead can also be found in hides/skins and leather. Lead occurs most often due to contaminants in the chromate during chromium tanning. The requirement is changed, since the previous requirement was also a prohibition against arsenic content. Arsenic is no longer relevant according to contact with the industry[135]. The testing methods for documenting the requirement have also been updated. The requirement can also be documented with a valid certificate from the Øko-Tex 100 standard if the measurement result shows that the actual Pb or Cd content is no higher than maximum10 ppm. (The standard allows 90 ppm Pb and 100 ppm Cd (50 ppm for children's clothes) for actual content of the metals.)

O43 Cadmium and lead

Cadmium and lead shall not be found in processed hides/skins or leather.

The content of cadmium and lead shall be tested according to the methods AAS, ICP-OES or ICP-MS (detection limit 10 ppm).

✉ A test report from the tannery showing that the requirement is fulfilled. Appendix 20 can be used.

[134] Anders Blom, Swerea, personal communication 13/12/2011
[135] Stefan Rydin, Nordeconsult, personal communication March 2012

6.9.5 Alkyl phenol etoxylates and organic fluorine compounds

The requirement is partly new and taken from the EU Ecolabel requirement for shoes. Previously, it was stated that the requirement regarding auxiliary chemicals, equivalent to O17 in this document, should be fulfilled, but it is assumed that alkylphenol ethoxylates and perfluorooctane sulphonates are most relevant to hides/skins and leather. Nonylphenol is endocrine disrupting, and has previously been used in the removal of fat from hides/skins such as sheepskin, as an emollient, and in certain finishing mixtures[136]. Nonylphenols are also mentioned in BAT, where it is stated that they can be replaced.

PFOS can still be used globally as a treatment for stain resistant properties, despite the fact that it is now being phased out in the EU[137].

After the hearing, perfluorooctanoic acid (PFOA) has also been added to the requirement because both PFOS and PFOA have been used in treating hides/skins and leather. PFOA is suspected of the same harmful effects as PFOS.

O44 Alkyl phenol etoxylates and organic fluorine compounds

The following chemicals must not be added[1]:

Alkyl phenols, alkyl phenol ethoxylates or other alkyl phenol derivatives[2]

Fluorinated organic compounds, such as PFOA (perfluorooctanoic acid and salts/esters thereof), PFOS (perfluorooctyl sulphonates and its compounds), PTFE (polytetrafluoroethylene), etc.

[1] Added substances comprise all chemical products and ingredients of these, including additives (e.g. pigments) in ingredients, but not contaminants from raw material, incl. raw material production. Contaminants are defined as residues from raw material, incl. raw material production present in the finished product in concentrations of less than 100 ppm (0.01 weight %, 100 mg/kg), but not substances that are added to a raw material or product for a purpose, irrespective of quantity.

[2] Alkyl phenol derivatives are defined as substances liberated from alkyl phenols at degradation.

✉ Declaration from the tannery that these chemicals are not used. Appendix 20 can be used.

6.9.6 Dyes and pigments

Dyes, colorants, and pigments for hides/skins and leather shall fulfil the same requirements as dyes for textiles. This has not been changed from the previous version, but the requirement for the classification of dyes, colorants and pigments has been changed, see O31. The dyes which are developed for the textile industry are often the same dyes that are used by the tanning industry The requirements ensure low levels of undesirable heavy metals, aryl amines and allergens.

O45 Dyes and pigments for dyeing

Dyes and pigments shall fulfil O31, O32, O33 and O36.

[136] Stefan Rydin, personal communication March 2011
[137] Study For the Footwear Criteria Revision, Prel. Rep. – 1st Background Report, 23 Oct 2008

✉ Safety data sheets (in accordance to current European legislation) and documentation as specified in the requirements referred to. Appendix 25, Dyes and pigments – hides/skins and leather can be used as a template.

6.9.7 Biocides

Biocides are used in various steps of the production processes to prevent the hides/skins and leather being attacked by bacteria and fungi. Biocides are also added during transport and storage. Biocides in themselves are problematic substances because they have the property that they shall prevent the growth of undesirable organisms, and can be harmful to the environment, allergenic, and have CMR qualities.

According to the new BAT document for hides/skins and leather,[138] biocides that are prohibited in Europe can be imported in hides/skins and leather from other countries. It can be difficult to avoid the use of biocides in the production process, and it can be necessary to shift between various different biocides so that the organisms do not become resistant. The Biocide directive is divided into various product groups, where group 9 covers hides/skins and leather. No biocides are currently approved for use in group 9. According to contact with the industry, an evaluation of biocides for the hides/skins and leather industry should have been carried out in 2010, but this work has been delayed. Nordic Ecolabelling is therefore unsure of how far the work has come, and unsure of how the suggested requirement will work. The Biocide Directive 98/8/EF will be replaced by the Biocide Regulation 528/2012 01 September 2013, and both are therefore included in the requirement.

O46 Biocides

State which biocides are used in manufacturing/tanning. The biocides must follow the provisions of the Biocide Directive 98/8/EF (Biocide Regulation 528/2012 from 01 September 2013).

✉ Information on what kind of biocides that are used and declaration from the manufacturer/tannery that the biocides follow the provisions of the Biocide Directive 98/8/EF (Biocide Regulation 528/2012 from 01 September 2013). Appendix 20 can be used.

Halogenated organic compounds

The requirement is new in this version of the criteria. According to the draft of the new BAT document from July 2011,[139] halogenated organic substances can be used in several process stages. Normally, large quantities of halogenated substances should not be used in the EU or globally, but they can exist in preservatives (biocides) and fattening agents, including chloroalkanes and SCCP (short chained chlorinated paraffins with a chain length of C10-C13) are used in particular[140]. Fattening agents that contain SCCP (over 1%) may not be used in the EU in accordance with REACH (EU Regulation 1907/2006), and SCCPs are also on the candidate list. Some of the biocides can be halogenated. Biocides following the Biocide Directive 98/8/EC are exempted from the requirement.

[138] Draft Reference document on Best Available Techniques for the Tanning of hides and skin, draft July 2011
[139] Draft reference Document on Best Available Techniques in the Tanning of hides and skins, draft 2 July 2011
[140] Stefan Ryding, personal communication

O47 Halogenated organic compounds

Halogenated organic substances must not be used in the treatment of hides/skins and leather.

Halogenated biocides that are following the regulations of the Biocide Directive 98/8/EC (Biocide Regulation 528/2012 from 01 September 2013) are exempt from the requirement. The exemption does not apply to chlorophenols and their salts and esters.

Note the national legislations concerning PFOA in the Nordic countries. In Norway PFOA is regulated in «Forskrift om begrensning i bruk av helse- og miljøfarlige kjemikalier og andre produkter (produktforskriften)», §2- 32.

✉ A declaration from the tannery that halogenated organic compounds are not used or that these follow the regulations of the Biocide Directive 98/8/EF (Biocide Regulation 528/2012 from 01 September 2013). Appendix 20 can be used.

6.10 Finishing and mounting

The requirements apply to finishing, manufacturing of membranes, laminates and coating, and any mounting of fibres, yarn, textiles, fabric, hides/skins and leather. Examples of finishing are treatment for water, oil and dirt resistance, anti-felting treatment, anti-shrinkage, anti-creasing, antistatic treatment, softening, biocide treatment, and coating, laminating and printing. Chemicals used for finishing and mounting shall also fulfil the general chemical requirements in chapter 2.4 for textiles and chapter 2.5 for hides/skins and leather in the criteria document.

Coatings, laminates and membranes shall fulfil the relevant material requirements in chapter 6.5.4. In addition, requirements are set for other materials such as PVC, and requirements for the use of chemicals that are harmful to health and the environment in the production of the coatings, laminates and membranes. Requirement O52 has not changed and is harmonised with the EU Ecolabel criteria from 2009. The requirement which prohibits PVC and fluorinated polymers and VOC emissions is new. The prohibition of PVC and fluorinated polymers is specific to the Nordic Ecolabel, while the requirement regarding VOC emissions is harmonised with the EU Ecolabel's criteria from 2009. The EU Ecolabel background document from 2007 says that VOC emissions are regulates by the EU Directive 1999/13/EC on limitations of emissions of volatile organic compounds. According to the background document, measurings have been done of various manufacturers in order to find a suitable level for this requirement. Measured values vary greatly, between 1 and 400 gC/kg, but most results are between 1 and 10 gC/kg, and the requirement is therefore set to 10 gC/kg in the EU Ecolabel criteria from 2009.

The two main coating products on the market are vinyl products and polyurethane. It is not desirable to label textile products that consist of PVC (polyvinyl chloride). PVC is used in rainwear, among other things. PVC can contain phthalates which are harmful to health, and since they are not chemically bonded to the plastic, they can leak out of the products[141].

Fluorinated polymers are often used as coatings, laminates and membranes in order to achieve a product with breathable qualities and which at the same time is also water repellent.

[141]Miljøstatus i Norge: http://www.miljostatus.no/no/Tema/Kjemikalier/Noen-farlige-kjemikalier/Ftalater/ (accessed 4 December 2011)

These can take the form of a coating, as in rainwear, impregnation, such as in shell jackets, or as a laminate or membrane in all-weather jackets, for example. The compounds within this group that have been investigated have environmentally harmful qualities, and do not meet the EU Ecolabel's requirements from 2009. However, we suggest that this should be clarified further by introducing a new requirement against fluoropolymers in coatings, laminates and membranes in O51.

In order to make clear what is a coating, laminate or membrane, the following definitions have been introduced:

Coating: a textile is covered by a resin which is transformed into a coating film.

Laminate: a film or foam that is adhered to the textile with the use of glue (can be several layers).

Membrane: is an example of a laminate with a breathing, synthetic film, but these can also take the form of a layer which is added between the external fabric and lining in all-weather jackets, for example.

6.10.1 Classification of finishing substances

The requirement is not changed, but a definition of what is meant by finishing has been added, and the title is changed. The requirement is harmonised with the EU Ecolabel criteria from 2009. Finishing refers to any physical or chemical treatment that gives the textile, hide/skin or leather specific properties, so that it for example becomes soft, waterproof, or non-iron. In general, this finishing is done after the dyeing, even though some chemicals can be added to the dye bath, such as anti-moth agents in wool. Other finishing treatments can be "easy care" for cellulose fibres and anti-static treatment for synthetic fibres. In the requirement, it is forbidden to use chemicals that are classified as harmful to the environment, carcinogenic, harmful to reproduction or mutagens.

O48 Classification of finishing chemicals

Finishing agents or preparations that contain more than 0.1% weight of substances that have been assigned or may be assigned one or more of the risk phrases in Table 3 are prohibited.

Table 3. Classification of finishing chemicals

Hazard class	Hazard symbols and R-phrases in accordance with directive 67/548/EEC*	CLP-regulation 1272/2008*
Environmental hazard	N with R50, R50/53, R51/53, 52/53 and R53	Dangerous to aquatic environments. Category acute 1 H400, category chronic 1 H410, category chronic 2 H411, category chronic 3 H412 and/or category chronic 4 H413
Carcinogenic	T with R45 or R49 Or Xn with R40	Carc 1A/1B/2 with H350, H350i and/or H351
Mutagenic	T with R46 or Xn with R68	Mut 1B/2 with H340 and/or H341
Harmful to reproduction	T with R60 and/or R61 Or Xn with R62 and/or R63	Repr 1A/1B/2 with H360, H361

** The classification applies in accordance with EU substance directive 67/548/EEC with later changes and adjustments, and/or CLP regulation 1272/2008 with later changes. In the transition period, i.e. until 1 June 2015, classification in accordance with the EU substance directive or the CLP regulation can be used.*

After the transition period, only classification in accordance with the CLP regulation will apply. A list of R-phrases and their meaning is provided in Appendix 3.

Please note that the chemical manufacturer is responsible for correct classification.

✉ A declaration from the finisher that finishing agents are not used, or an overview of the finishing agents that are used, as well as safety data sheets or the equivalent showing that the requirement is fulfilled, or a valid EU Ecolabel licence in accordance with the Commission's decision from July 2009. Appendix 21 can be used.

O49 Nano particles

Finishing treatments with nano particles (from nano materials*) is not permitted.

** The definition of nano materials follows the EU Commission's definition of nano materials from 18 October 2011, except that the limit for particle size distribution is reduced to 1%: Nano material: "a natural, randomly occurred or manufactured material, which consists of particles in an unbound state as an aggregate or as an agglomerate, and where at least 1% of the particles in a numerical size distribution in one or more external dimensions are in the size range of 1-100 nm".*

✉ A declaration from the finisher that nano particles are not used. Appendix 21 can be used.

O50 Synthetic polymers

Products from polyurethane, polyester, polyamide and other polymers which have requirements in chapter 2.1.3 of the criteria document shall fulfil the relevant requirements i chapter 2.1.3. Products from polyurethane shall fulfil requirements for elastane.

✉ Documentation as stated in the requirements.

O51 PVC and fluorinated polymers

Coatings, laminates or membranes from PVC are not permitted.

Coatings, laminates or membranes coated with or based on fluorinated organic compounds are not permitted. This requirement also applies to printing.

✉ A declaration from from the manufacturer of coating, laminate or membrane that fluorinated organic compounds are not included and that PVC is not used. Appendix 22 can be used.

O52 Softening agents or solvents

Coatings, laminates and membranes must not be produced using softening agents or solvents which are or can be classified according to risk phrases in Table 4.

Table 4. Classification of softening agents and solvents.

Hazard class	Hazard symbols and R-phrases in accordance with directive 67/548/EEC*	CLP-regulation 1272/2008*
Environmental hazard	N with R50, R50/53, R51/53, 52/53 and R53	Category acute 1 H400, category chronic 1 H410, category chronic 2 H411, category chronic 3 H412 and/or category chronic 4 H413
Carcinogenic	T with R45 or R49 Or Xn with R40	Carc 1A/1B/2 with H350, H350i and/or H351

Mutagenic	T with R46 or Xn with R68	Mut 1B/2 with H340 and/or H341
Harmful to reproduction	T with R60 and/or R61 Or Xn with R62 and/or R63	Repr 1A/1B/2 with H360, H361

** The classification applies in accordance with EU substance directive 67/548/EEC with later changes and adjustments, and/or CLP regulation 1272/2008 with later changes.*

In the transition period, i.e. until 1 June 2015, classification in accordance with the EU substance directive or the CLP regulation can be used. After the transition period, only classification in accordance with the CLP regulation will apply. A list of R-phrases and their meaning is provided in Appendix 3.

Please note that the manufacturer is responsible for correct classification.

✉ A declaration from the coating/membrane/laminate manufacturer showing that softening agents or solvents with the specified classifications are not used, or a valid EU Ecolabel licence in accordance with the Commission's decision from July 2009. Appendix 22 can be used.

O53 The coating or lamination process

VOC emissions to air during the coating or lamination process must not exceed 10 g C/m^2.

✉ Declaration and documentation and test reports from the coating or laminating agent showing that the requirement is fulfilled or a valid EU Ecolabel licence in accordance with the Commission's decision from July 2009. Appendix 22 can be used.

6.10.2 Printing – VOC in printing pastes and plastisol-based printing

The requirement regarding the VOC content of printing pastes and the prohibition of plastisol-based printing is unchanged, and is harmonised with the EU Ecolabel's criteria from 2009. The requirement regarding VOC in printing pastes is set in order to avoid printing pastes with a high VOC content being used, e.g. white spirit. Plastisol-based printing is prohibited because the ink is based on PVC. After the hearing it became evident that there are various types of plastisol dyes, also dyes without PVC and without phthalates. Nordic Ecolabel wishes to permit plastisol-based printing without halogenated polymers (including PVC) and phthalates. During the hearing it was found that a problem with water-based printing is that if dyed textiles are to be printed, the textile must first be decolourised, which requires the use of a discharge base or an activator, which often contains formaldehyde. Nordic Ecolabel therefore introduces a requirement that formaldehyde and heavy metal salts must not be used in decolourisation. This requirement is harmonised with the EU Ecolabel criteria from 2009.

O54 VOC in printing pastes

Printing pastes must not contain more than 5% volatile organic compounds (VOC), such as mineral turpentine.

VOC are defined as compounds which have a vapour pressure of 0.01 kPa or higher at 293.15 K or an equivalent volatility under the conditions of use.

✉ A declaration that printing is not used, or documentation from the finisher showing that the requirement is fulfilled as well as a declaration of conformity, or a valid EU Ecolabel licence in accordance with the Commission's decision from July 2009. Appendix 21 can be used.

O55 Colour extraction or depigmentation

Salts from heavy metals (except iron) or formaldehyde must not be used for colour extraction or depigmentation.

✉ The applicant shall submit a declaration that these products are not used or a valid EU Ecolabel licence in accordance with the Commission's decision from July 2009. Appendix 23 can be used.

O56 Plastisol-based printing

Plastisol-based printing is only permitted if halogenated polymers and phthalates are not ingredients in the printing paste.

✉ A declaration from the finisher that printing is not used, or a declaration and documentation from the finisher showing that the requirement is fulfilled. Appendix 21 can be used.

6.10.3 Finishing with silicone

According to the article «Silicone chemistry for fabric use» from 2009,[142] a large variation of silicone technology is used in the textile industry from the production of fibre, yarn and fabric to finishing of the finished product. Silicone can also be used to impregnate hides/skins and leather[143]. According to the 2009 article, a great advantage of silicone materials is that even small amounts give a good effect, which makes silicone treatment economically profitable. In the textile industry silicone is often used modified with functional amine groups because the amine groups give better affinity to the textile fibres. The article says that these silicones obtain the best qualities after 2-3 washes. Silicone is used to give the products water repellent properties, and silicone treatment can make hard and brittle materials soft.

Silicones are organically modified polymerized siloxans with the general chemical formula [R2SiO]n, where R = organic groups such as: methyl, ethyl, and phenyl[144]. These consist of an inorganic silicon-oxygen skeleton (...-Si-O-Si-O-Si-O-...) with organic side groups bound to silicon. Siloxans are chemical compounds consisting of R2SiO, where R is a hydrogen atom or a hydrocarbon group.

Siloxans are a substance group which has been in the focus of environmental authorities for a while, since some of the substances are very little degradable and are easily accumulated in organisms. According to the Norwegian Climate and Pollution Agency (Klif), especially the cyclic siloxans octamethyl cyclotetrasiloxane (D4) and decamethylcyclopentasiloxane (D5) have questionable environmental properties since they are not very degradable in water and sediment, and can accumulate in organisms[145]. D4 is toxic to aquatic organisms.

D4 is classified as harmful to reproduction with risk phrase; "Possible danger of damaging fertility" and shall also be marked with the risk phrase "May cause long-term adverse effects in the aquatic environment". In the autumn of 2006, D5 was listed on the authorities' priority list.

[142] M. Muthu Manickam, Silicone chemistry for fabric care, Colourage, vol 56, issue 22, p86, nov 2009
[143] Website of chemicals manufacturer Wacker Chemie AG: http://www.wacker.com/cms/en/products-markets/consumer_care/household_care/polishes/textileimpregnation/textile_impregnation.jsp?country=NO&language=no (September 2012)
[144] Wikipedia.no: http://no.wikipedia.org/wiki/Silikon (September 2012)
[145] Klif website in Norway: http://www.klif.no/Sok/?query=siloksan (September 2012)

Klif has submitted a proposal for also entering D4 on the priority list of the Ministry of the Environment. According to Klif's webpage, stopping the D5 emissions by 2020 is a national goal. Klif has proposed that the D4 emissions are also stopped by 2020. There is currently a process in the EU evaluating the regulation of the use of siloxans D4 and D5.

According to Klif's webpage, siloxans are used in industry, are added to fuel and are included in a number of consumer products such as car wax, detergents, cosmetics, hygiene products and foam suppressing agents. The use of siloxans is extensive and the consumption may increase in the future.

According to the report «Kartlegging av siloksaner» from 2008[146], the short-chain compounds occur mainly as residual monomers from polymerisation processes, except in cosmetics and care products.

According to Klif, researchers at the Norwegian Institute for Water Research (NIVA) and the University of Stockholm have documented high levels of the environmentally hazardous siloxane D5 in fish species trout, vendace and smelt in Lake Mjøsa, as well as in zooplankton and the small shrimp-like ice age crayfish (Mysis). The study was published in May 2012[147]. The new results show for the first time that siloxane D5 is accumulated in the food chain, so that large, fish-eating trout contains more than plankton eating fish like vendace and smelt. A survey published by the Norwegian Pollution Control Authority (SFT) in the spring of 2007 showed that D5 was also found in glaucous gulls at Bjørnøya. The concentrations were at the same level as what was measured in fresh water fish and salt water fish from densely populated areas in the Nordic region. This suggests that the substances can be spread over large distances, far from the sources. So far, no regulations have been implemented neither in Norway nor internationally to reduce D5 emissions.

Two new requirements have been introduced for finishing with silicones. Requirement O57 is motivated by working environment concerns and shall ensure that workers are protected if solvents are used in silicone treatment. In O58 a prohibition is set against the use of octamethyl cyclotetrasiloxane (D4) and (CAS 556-67-2) and decamethylcyclopentasiloxane (D5) in chemical products for silicone treatment. No chemical analysis is required, but the manufacturer shall declare that the requirement is fulfilled.

O57 Silicone treatment, solvents

If solvents are used in silicone treatment, the manufacturer must ensure that the workers are protected from the solvents.

✉ Information on the method used for silicone treatment, and documentation that workers are protected if solvents are used. Appendix 23 can be used to document if solvents are used.

O58 Silicone treatment, siloxane

Neither octamethyl cyclotetrasiloxane, D4, (CAS 556-67-2) nor decamethylcyclo-pentasiloxane, D5, (CAS 541-02-6) may be included in chemical products used in silicone treatment of components for hygiene products. D4 and D5 present as contaminants are exempt from this requirement.

[146] Statens forurensningstilsyn, Kartlegging av siloksaner, Kartlegging av bruk i Norge i 2008, Cowi
[147] Borgå, Fjeld et.al.: Food web accumulation of cyclic siloxans in Lake Mjøsa, Norway, Environmental Science and Technology

Contaminants are defined as residues from raw material production present in concentrations of less than 100 ppm (0.01 weight %, 100 mg/kg) in the finished product, but not substances that are added to the raw material or product for a purpose, irrespective of quantity.

✉ Declaration that the requirement is met. Appendix 23 can be used.

A requirement for glue has been introduced in the criteria document since glue can be used when mounting various products, such as bags and other accessories. The requirement says that the glue shall not contain colophon resin and formaldehyde, except as pollutants.

Colophon resin is not permitted because it can give contact allergy. Colophon resin is drained as resin from pine trees and is extracted with turpentine. The mix contains many allergens. Contaminants of resin are defined as residues from raw material production present in concentrations of less than 100 ppm (0.01 weight %, 100 mg/kg), but not substances that are added to the raw material or product for a purpose, irrespective of quantity. The formaldehyde content shall not exceed 250 ppm in newly produced polymer dispersion and 10 ppm in hardened glue, since formaldehyde can give allergic reactions. This requirement is identical to the formaldehyde requirement for Nordic Ecolabelling of chemical construction products. Hot melts are exempt from this requirements, since formaldehyde is not relevant for hot melt adhesives. Phthalates can also be included in glue. unwanted phthalates are already excluded in O25 and O26.

O59 Glue

Colophon resin or formaldehyde must not be added to glue, except as contaminants.

Contaminants are defined as residues from raw material production present in concentrations of less than 100 ppm (0.01 weight %, 100 mg/kg), but not substances that are added to the raw material or product for a purpose, irrespective of quantity.

However, the maximum limit for formaldehyde content in glue, generated during the production process, is 250 ppm (0.0250%) measured on newly produced polymer dispersion. The content of free formaldehyde in hardened glue must not exceed 10 ppm (0.001%). Hot melt adhesives are exempt from this requirement.

✉ Declaration from the glue supplier that colophon resin or formaldehyde is not added to the glue.

The analysis result for the content of formaldehyde in the glue. Appendix 24 can be used.

6.11 Emissions

6.11.1 Textiles

Effluent from wet processes

The requirement has been changed in that the limit value for COD emissions in the effluent has been reduced from 25 to 20g COD/kg. The requirement is harmonised with the EU Ecolabel criteria from 2009. The reason for the reduction is based on data from licensees. The requirement is to be documented with test reports in accordance with ISO 6060. High COD levels in the effluent can result in a lack of oxygen in the aquatic environment, and thereby harm animal and plant life.

A requirement is also set that the temperature of the effluent shall be below 40 °C (unless the temperature in the recipient is higher) and that the pH shall be between 6 and 9 (unless the pH value in the recipient lies outside of this interval). During the hearing it was found that the test ampullas used when measuring COD can contain mercury, and Nordic Ecolabel will therefore incurporate in the COD requirements that measurements of PCOD, TOC, or BOD can also be used if a correlation to COD is shown.

O60 COD, temperature and pH of effluent from wet processes

COD emissions in effluent from wet processes that do not go to municipal or other external purification plants may be a total of 20g/kg fibre.

The COD content shall be tested in accordance with ISO 6060 or the equivalent. The report shall contain a calculation which shows the COD emissions in g per kg textile. The requirement can be documented by COD emissions on an annual basis. Measuring of PCOD, TOC or BOD can also be used if a correlation to COD is shown.

The pH value of the waste water released into surface water shall be 6-9 (unless the pH value of the recipient is outside this range), and the temperature shall be below 40°C (unless the temperature of the recipient is higher).

✉ A test report for COD emissions showing that the requirement is fulfilled, as well as reports showing measurements of pH and temperature of the effluent or a valid EU Ecolabel licence in accordance with the Commission's decision from July 2009.

6.11.2 Hides/skins and leather

Chromium and COD in the effluent

Emissions of effluent from tanneries can contain chromium (III) and COD. The COD requirement is changed, and the chromium (III) was changed after the hearing. Previously, the COD content should be reduced by 85% in the effluent, but the requirement is now that the chemical oxygen demand in the effluent cannot exceed 10 kg/tonne raw material of hide/leather. The limit of 10 kg/tonne raw material is based on the draft of the new BAT document. The reason for the change is that it is more relevant to link COD emissions in the water to the quantity of hides/skins and leather that are treated. Water savings will have a negative effect on the amount of COD, since a low water consumption gives a higher content of pollutants even though the level of the pollution remains the same.

The COD content of the effluent is a parameter that has high RPS. Organic compounds that use up the oxygen in the aquatic environment when breaking down can be a great problem in the absence of a good purification plant, and this is something that tanneries are working actively to reduce. Nordic Ecolabelling therefore sets requirements to limit COD emissions. After the hearing it was found that in the updated BAT document for hides/skins and leather there are requirements that the total chromium content shall be maximum 1 mg per litre of water, which is a stricter requirement than what Nordic Ecolabel proposed in the hearing. The requirement is therefore changed from chromium (III) to total chromium.

O61 Chromium in the effluent

Effluent from tanneries shall contain less than 1 mg of total chromium per litre of water. The total chromium content shall be tested in accordance with ISO 9174, EN 1233 or EN ISO 11885 for chromium, or the equivalent.

✉ A test report from the tannery showing that the requirement is fulfilled. Appendix 20 can be used.

O62 COD in the effluent

The chemical oxygen demand (COD) in the effluent shall not exceed 10 kg/tonne raw material (raw hide or hide) expressed as an annual average.

The COD content shall be tested in accordance with ISO 6060 or the equivalent. Measuring of PCOD, BOD, or TOC can also be used if a correlation to COD is shown.

✉ A test report from the tannery showing that the requirement is fulfilled. Appendix 20 can be used.

6.12 Energy and water consumption

6.12.1 Textiles

The requirement has been changed in order to obtain clearer, production specific information about the water and energy consumption in wet processes during textile production. The wet treatment of textiles can take the form of washing, bleaching, dyeing, printing and finishing. All these processes involve a broad range of chemicals, as well as a relatively large water and energy consumption. Wet treatment applies to fibres, yarn and knitted/woven goods[148]. For version 3 of the criteria, Nordic Ecolabelling has requested data for energy and water consumption. The data that is received in connection with licencing has been highly variable in terms of quality as well as level.

For example, water consumption during the treatment of cotton varies between 8 l/kg textile and 204 l/kg textile. Basic data from licensees is not clear enough and there is far too little information for any significant difference to be seen. One of the reasons for this great variation is that some producers purify and reuse the water, a so-called “Zero liquid discharge system”, while others send the water to purification. Another reason for the varying consumption is the producer’s selection of methods, such as for dyeing.

Here, batch dyeing can be used, or continuous/semi-continuous dyeing. The latter dyeing processes have lower water consumption, but a disadvantage in relation to the amount of resulting pollution[149]. The water consumption is within the range of 110-290 l/kg for the dye works that use batch processes. Dye processes that mainly use continuous dyeing come below 100 l/kg, and printers works are at around 60 l/kg[150]. Which method the licensee uses is not stated in the documentation that is asked for in the current requirements, and it can therefore not be guaranteed with certainty which method gives which result when used.

Together with water consumption and effluent, energy consumption is one of the most significant environmental factors in the production of textiles. Data from the licensees also shows that the level of energy consumption is highly variable. The lowest consumption is 0.22 kWh/kg textile, compared to 3.8 kWh/kg textile. Beyond data on electricity, data on the use of gas and fuel is received.

[148] Miljøstyrelsen 1999, Renere teknologi i tekstil- og beklædningsindustrien, Miljøprojekt, no. 502
[149] European Commission, July 2003, Integrated Pollution Prevention and Control (IPPC), Reference Document on Best Available Techniques for the Textile Industry
[150] Information from licensees

Nordic Ecolabelling wishes to continually direct focus on energy and water consumption in the production of textiles, and therefore sets requirements that the consumption of energy and water shall be reported. The requirement is formulated so that what information shall be submitted is clearer.

O63 Energy and water consumption

The consumption of electricity (in kWh) and fuel as well as water consumption (in litres) for each wet treatment shall be stated. The data shall also contain information on the amount of fibre/textile which is treated in kg.

'Wet treatment' refers to pre-treatment, dyeing and finishing.

✉ Provide details of the wet treatment process and consumption of water and electricity (in kWh), and procurement of fuel, and include confirmation from the supplier or a copy of an invoice showing consumption and procurement. State the amount of fibre/textile treated in kg.

6.12.2 Hides/skins and leather

The requirement to provide information about energy consumption and the absolute requirement for water consumption are new to the criteria. In the IPPC draft for a new BAT report[151] for hides/skins and leather from July 2011, there is limited information about the energy consumption of tanneries, but there may be significant energy consumption linked to drying processes during tanning, for example. Nordic Ecolabelling therefore wishes to direct focus on energy consumption during tanning, and therefore sets requirements that the consumption of electricity and fuel shall be reported. During the hearing, the final draft document for BAT in tanning hides and leather was published[152] with limit values for energy consumption for hides and leather from ox and sheep.

In the report it is stated in BAT 26 that BAT own consumption for the industry is under 14 GJ/tonne for processed bovine hides, under 3 GJ/tonne for 'wet blue/wet white' bovine hides and under 6 GJ/tonne for processed sheep hides. Nordic Ecolabel will not introduce limit values in the requirement because we have no experience with how the various tanneries will meet the requirements, but will consider limit values in the next revision when the experience base is greater.

Reducing water consumption is regarded as important environmental work. According to IPPC's draft from 2011,[153] the usual water consumption of modern tanneries can be reduced from 40 - 50 m^3/tonne raw hides/skins to 12 – 30 m^3/tonne for bovine hides/skins, if the tannery has effective control of its processes. According to the draft, there are tanneries in Germany that use 15 – 20 m^3/tonnes and one tannery reports 9 m^3/tonnes. One tannery in the Netherlands states a usage of approx. 20 m^3/tonne for fresh bovine hides/skins. More water is required in the tanning of calf skin, approx. 40 m^3/tonnes. The conclusion in the BAT draft is that water consumption for bovine hides/skins varies between 16-28 m^3/tonnes raw hide for the skins of other animals, such as sheep and reindeer, the value is normally somewhat higher[154].

[151] Draft reference Document on Best Available Techniques in the Tanning of hides and skins, draft 2. July 2011
[152] JRC, Reference Document on Best Available Techniques for the Tanning of hides and skins, Final draft June 2012
[153] Draft reference Document on Best Available Techniques in the Tanning of hides and skins, draft 2. July 2011
[154] Stefan Rydin, personal communication March and December 2011

Based on this information, Nordic Ecolabelling has chosen to set the requirement at 25 m^3 water/tonne hides/skins and leather that is treated.

O64 Energy consumption

The consumption of electricity (in kWh) and fuel used during the tanning of hides/skins and leather shall be stated.

✉ Provide details of the consumption of electricity (in kWh), and procurement of fuel, and include confirmation from the supplier or a copy of an invoice showing consumption and procurement. State the amount of hides/skins and leather treated in kg.

O65 Water consumption

The annual average water consumption during the tanning of hides/skins and leather shall not exceed 25 m^3/tonne of raw hides.

✉ Provide details of the water consumption and include a confirmation from the supplier or a copy of an invoice which details the consumption. Also state the total quantity of hide/leather treated in tonnes and calculations showing the water consumption per tonne hide/leather.

6.13 Packaging, storage and transportation

The requirement that chlorophenols, PCB and organotin compounds must not be used in connection with the transport or storage of products and semi-finished goods is maintained and harmonised with the EU Ecolabel. These chemicals can be used to prevent the textiles being exposed to moths and other insects during storage and transport. These are all chemicals that are harmful to health and the environment, and are therefore prohibited.

During the hearing it was pointed out that in the criteria document there is only focus on the recycling and return systems, but there is no requirement for the packaging going on the market.

Chlorophenols and their salts and esters, PCB and organotin compounds are substances which are rarely used, but are still considered relevant as some suppliers still use these biocides in transportation and storage. These are not to be used within the EU, but from raw materials coming from outside the EU, they can still occur[155].

PVC packaging can occur (e.g. as sales packaging), and because of problems with phthalates in soft PVC, Nordic Ecolabel has chosen to introduce a prohibition against chlorinated plastic in transport and sales packaging.

O66 Chlorinated plastics

Chlorinated plastics must not be used in packaging.

✉ Materials used in transportation and sales packaging must be described. Declaration from the manufacturer of the plastic packaging.

[155] Stefan Rydin, personal communication

O67 Chlorophenols (and salts and esters of chlorophenol), PCB and organotin compounds during transport and storage

Chlorophenols (and salts and esters of chlorophenol), PCB and organotin compounds must not be used in connection with transportation or storage of products or semi finished goods.

✉ Declaration from the supplier in each link of the production chain that these substances or compounds are not used in the yarn, fabric and/or finished product, or a valid EU Ecolabel licence in accordance with the Commission's decision from July 2009. If the declaration is to be verified, the following test method and limit value shall be used: Derivatization with acetic anhydride, determination with capillary gas-liquid chromatography with electron capture detection; the limit is 0.05 ppm. Appendices 17 and/or 23 can be used.

6.14 Quality and functionality requirements

Nordic Ecolabelling sets requirements for the usage properties and durability of textiles, hides/skins and leather. The requirements are important since a Nordic Ecolabelled product shall be of good quality, and seen from an environmental and resources perspective, products shall be able to be used for a certain period of time before they become worn out and must be replaced.

6.14.1 Product requirements for textiles

Formaldehyde

The requirement is changed and harmonised with the EU Ecolabel criteria from 2009. The limit values for the permitted quantity of formaldehyde in the finished textile have been tightened from 300 ppm to 75ppm in products. In addition, a separate limit value of 20 ppm has been introduced for products for babies and children under the age of three years. The limit value for products in direct contact with the skin, such as underwear, is unchanged at 30 ppm. Formaldehyde is an irritant to the eyes, throat and skin, and is classified as harmful to health with a danger of being carcinogenic.

Traces of formaldehyde often remain following treatment with anti-wrinkle agents[156]. After the hearing the requirement for formaldehyde has been harmonised with the Nordic Ecolabel's requirement for furniture, and the limit value is set to 20 ppm.

O68 Formaldehyde

The amount of free or partly hydrolysable formaldehyde in the final fabric must not exceed 20 ppm. The formaldehyde content shall be tested in accordance with EN ISO 14184-1.

✉ A test report showing that the requirement is fulfilled.

Functionality requirements

The basis for the tests is the wish to ecolabel textiles of high quality, which is an important environmental aspect. Several requirements for testing textiles are changed and sharpened.

[156] Folkehelseinstiuttet: http://www.fhi.no/eway/default.aspx?pid=233&trg=MainLeft_6039&MainArea_5661=6039:0:15,4521:1:0:0:::0:0&MainLeft_6039=6041:70095::1:6043:3:::0:0 (accessed 26/11/2011)

The tests are harmonised with the EU Ecolabel draft document for new criteria[157]. However, the previous requirement for sweat fastness is deleted because the testing industry no longer considers it relevant[158]. Other testing methods than those mentioned can be used if it can be confirmed by an independent third party that the testing method is equivalent to the testing method mentioned.

O69 Dimensional changes during washing and drying

Dimensional changes during washing and drying shall not exceed:

± 2% for curtains and furniture fabrics that are removable and can be washed.

± 5% for woven products for duvets and pillows in accordance to EN 13186 - Specification of feather and down filled bedding materials.

± 3% for woven products in cotton and cotton mixes.

± 2% for woven products in wool mix and synthetic fibres.

± 4% for knitted products.

± 6% for chunky knit.

± 5% for jersey (Interlock).

± 7% for terry towels and fine rib products.

The requirement does not apply to fibres or yarn products labelled «dry clean only» or similar (if the product is normally labelled in this way) or furniture fabrics which cannot be removed and washed.

Testmethod:The tests shall be performed in accordance with EN ISO 6330, ISO 5077, or the equivalent. The following procedure shall be followed when testing: Wash three times at the temperature that is stated on the product, followed by drying in a tumble dryer unless another drying process is stated on the product.

For woven products for duvets and pillows tests shall be performed in accordance with EN 13186 - Specification of feather and down filled bedding materials.

✉ A test report showing that the requirement is fulfilled.

O70 Colour fastness to washing

The colour fastness to washing shall be at least level 3-4 for colour change and at least level 3-4 for discoloration.

The requirement does not apply to products that are clearly labelled “dry clean only” or the equivalent (if the product in question is normally labelled in this way), white products, products that are neither dyed nor printed, or for non-washable furniture fabrics.

The tests shall be performed in accordance with ISO 105 C06 (a single wash at the temperature that is stated on the product) or the equivalent.

✉ A test report showing that the requirement is fulfilled.

O71 Wet rubbing

Wet rubbing shall be at least level 2-3.

The requirement does not apply to white products or products that are neither dyed nor printed, or to curtains.

The test shall be performed in accordance with ISO 105 X12 or the equivalent.

[157] Revision of the European Ecolabel and Green Public Procurement (GPP) Criteria for Textile Products, technical report and criteria proposals Draft Working Document from 2nd AHWG meeting, September 2012
[158] Communication with Textil & Läderlaboratoriet Stockholm AB.

Indigo dyed denim is exempt from the minimum level 2-3. Indigo dyed denim shall instead meet level 1 for color fastness to wet rubbing. When using the exemption the product shall be accompanied by information about the colour fastness saying, that the fabric may cause colour staining.

✉ A test report showing that the requirement is fulfilled.

Background for the requirement

A excemt for indigo dyed demin is inserted. When no finishing of textiles, it is not possible to obtain a high color fastness of indigo dyed denim. If colour staining should be avoided from raw denim, fixation chemicals, that are often environmentally harmful and dangerous, are used. These chemicals are not fulfilling the chemical requirements for finishing. Finishing is then not a preferable environmentally solution.

O72 Dry rubbing

Colour fastness for dry rubbing shall be at least level 4. Level 3-4 is permitted for indigo dyed denim.

The test shall be performed in accordance with ISO 105 X12 or the equivalent.

The requirement does not apply to white products, products that are neither dyed nor printed, or to curtains or similar textiles intended for interior decorating.

Indigo dyed denim is exempt from the minimum level 4. Indigo dyed denim shall instead meet level 2-3 for color fastness to dry rubbing. When using this exception the product shall be accompanied by information about the colour fastness saying, that the fabric may cause colour staining.

✉ A test report showing that the requirement is fulfilled.

Background for the requirement

A excemt for indigo dyed demin is inserted. When no finishing of textiles, it is not possible to obtain a high color fastness of indigo dyed denim. If colour staining should be avoided from raw denim, fixation chemicals, that are often environmentally harmful and dangerous, are used.

These chemicals are not fulfilling the chemical requirements for finishing. Finishing is then not a preferable environmentally solution.

O73 Colour fastness to light

Colour fastness to light shall be at least level 5 for fabrics that shall be used for furniture, curtains or drapes.

For all cotton textiles dyed with metal complex dyes, colour fastness to light shall be at least level 4.

For furniture, curtains or drapes, a result of 4 is allowed when the fabric is both light coloured (standard depth < 1/12) and consists of mixes with more than 20% wool or other keratin fibres, or of mixes with more than 20% linen or other bast fibres.

The test shall be performed in accordance with EN ISO 105 B02 or the equivalent.

The requirement does not apply for mattress bolsters and mattress covers.

✉ A test report showing that the requirement is fulfilled.

O74 Pilling

Furniture fabrics shall have a pilling resistance equivalent to level 4.

The test shall be performed in accordance with EN ISO 12945-2 or an equivalent standard. Load: 9 kPa wool > 25,000 rotations.

✉ A test report showing that the requirement is fulfilled.

6.14.2 Hides/skins and leather

The quality requirements for hides/skins and leather are unchanged from the previous version, with the exception that the bending test requirement only applies to leather which is surface-coated. The reason for this change is that this test is not relevant for uncoated leather, since the test is used to investigate the flexibility and quality of the surface treatment. In the hearing it was stated that it can be difficult for products without finish to meet the requirement for light fastness. Nordic Ecolabel changes the requirement to only apply to products with finish in order not to award products being treated with additional chemicals.

Formaldehyde

The requirement is new in this version of the criteria. The amount of formaldehyde in the finished leather must not exceed 75 ppm. The requirement is based on the requirement for formaldehyde in the EU's criteria for the ecolabelling of shoes and the Japanese Japan Eco Leather label.

O75 Formaldehyde

The amount of free or partly hydrolysable formaldehyde in the final leather must not exceed 75 ppm.

The formaldehyde content shall be tested in accordance with EN ISO 17226-1 or 2.

✉ A test report showing that the requirement is fulfilled.

O76 Tear strength of leather

The tear strength shall be over 20 N. The test shall be performed in accordance with ISO 3377 or the equivalent.

✉ A test report showing that the requirement is fulfilled.

O77 Bending test

Bending resistance shall manage 20,000 test repetitions (20 kc) without visible damage. The requirement only applies to leather with a surface coating.

The test shall be performed in accordance with ISO 5402 or the equivalent.

✉ A test report showing that the requirement is fulfilled.

O78 Colour fastness to light

Light fastness shall be at least level 3 for leather with a surface coating (finish).

The test shall be performed in accordance with ISO 105 B02 or the equivalent.

✉ A test report showing that the requirement is fulfilled.

O79 Wear test

The wear for wet and dry conditions shall be at least level 3.

The test shall be executed in accordance with ISO 11640 or the equivalent with 20 repetitions for wet conditions and 50 repetitions for dry conditions. The result shall be read in accordance with ISO 105-A02 and ISO 105-A03 or the equivalent.

✉ A test report showing that the requirement is fulfilled.

6.15 Labelling of the product

The requirement is new in this version of the criteria. Only products which consist of a minimum of 95% organic fibres, hides/skins and/or leather can be labelled with the text “organic” if the licensee desires to do this.

O80 Organic labelling

The labelling of products with the text ‘organic’ is not permitted unless the product consists of a minimum of 95% organic fibre, hide and/or leather.

'Organic' means fibres/hides/leather produced in accordance with the European Council's regulation (EEG) no. 2092/91 of 24 June 1991 on the organic production of agricultural products or equivalent schemes. Examples are: KRAV, SKAL, IFOAM, IMO, KBA, OCIA, TDA, DEMETER.

✉ A copy of the label/tag and a valid certificate that shows that the raw material is organically produced in accordance with European Council Regulation (EEG) no 2092/91 of 24 June 1991 on the organic production of agricultural products or equivalent schemes.

6.16 Ethical requirements

There are several ethical problems relating to the textile, hides/skins and leather industry.

Several reports[159],[160],[161],[162] point to poor control in the supply chain, and poor working conditions such as the use of dangerous chemicals, poor protective equipment, long working hours, a lack of rights and child labour. Nordic Ecolabelling therefore sets a requirement that the basic principles and rights that follow from the ILO’s Core Conventions shall be followed. In addition, relevant ethical requirements relating to animals are set. The requirement regarding the working environment is not new, but reformulated to clarify what is required. The ethical requirements relating to animals are new in this version of the criteria.

6.16.1 Traceability and animal husbandry for products made from hides/skins and leather

Nordic Ecolabelling may benefit from having traceability of hides/skins and leather in order to obtain information about the possible problematic use of chemicals or the unethical treatment of animals. It is important to ensure that Nordic Ecolabelled products come from producers that ensure good animal husbandry. There is good traceability back to the stock/abattoir, with the exception of bovine hides/skins. In the EU there is traceability due to BSE (Bovine Spongiform Encephalopathy, or mad-cow disease), but traceability does not exist globally. There is an extensive global trade in bovine hides/ skins, and there can be many suppliers behind each batch[163].

[159] “Det som ikke står på vaskelappen”, report from Etisk forbruk.no
[160] “Syr klær for lommerusk – hvorfor levelønn må erstatte minstelønn i klesproduksjon”, Framtiden i våre hender, report no. 1/2009
[161] [161] Skitne klær – En vurdering av miljø og arbeidsforhold ved produksjon og bruk, og sammenligning av leverandører”, December 2008, Forum for Utvikling og miljø.
[162] "Den blinda klädimporten – Miljöeffekter från produktionen av kläder som importeres til Sverige”, A report by Swedwatch and Naturskyddsföreningen, 2008
[163] Stefan Rydin, personal communication

No requirements are therefore set for traceability back to the abattoir for bovine hides/skins. After the hearing Nordic Ecolabel has received new information on this, and the requirement has been changed so that it also requires traceability back to the abattoir for bovine hides/skins.

Within ISO (CEN/TC 289/WG 4) one is now working on a proposal for an ISO standard (pr EN 16484, Leather – Guidelines for the determination of the origin of leather) where the origin of the hide/leather is defined. It is not unusual that some of the processes are performed in one tannery and the finishing processes are performed in another tannery (for example wet-blue from Brazil, which gets finishing treatment in Italy or China). According to the EU definition (EU customs codex 2913/92) the hide/leather comes from the tannery (country) where the final processes were performed in these cases. This applies primarily to bovine hides, which is a great global commodity.

In June 2009, Greenpeace published the report «Slaughtering the Amazon» which points out that the Brazilian rainforest is cut down in order to make room for cattle ranches, and that the (bovine) meat and hide/leather is exported. The report followed the hides and showed that a number of known brands used hides/leather from these cattle ranches for leather (either hides/leather from Brazil or semi-finished goods from Brazil which were then tanned in Italy or China). As a result of this survey some brands required guarantees from their suppliers that the raw material did not come from these cattle ranches (which in many cases are illegal in Brazil).

According to expert Stefan Rydin, one can find the origin and also obtain information on the abattoir and/or country of origin even for bovine hides. Nordic Ecolabel has therefore chosen to remove the exemption for traceability to the abattoir for cattle after the hearing. Tracing back to the origin will not raise the cost of the process significantly, and it is not unusual. However, it is easiest with the Nordic region, but it should also be possible for hide/leather outside the Nordic region.

Nordic Ecolabel has not received any information on on-going work on finding formal ways of eco certification of hides/leather within the EU. And the global market for so-called «eco-leather» does not seem to increase. However, if eco-hides were to be sold in a more formalised way (with accepted requirements) before the next revision, Nordic Ecolabel may look at aspects of animal husbandry as part of the requirements. Today, for example, the Swedish organic certification body (KRAV) only gives the possibility to mention in a small text on the leather that it comes from farms with KRAV certified organic animal husbandry. Previously (about 2004) leather was part of real KRAV certification.

Animal husbandry is an important part of a sustainable production of hides/leather, and a requirement to state the country of origin is a good signal to the industry and may help us avoid the worst places.

O81 Traceability and animal husbandry for products made from hides/skins and leather

The applicant must be able to document traceability of the hides/skins and leather for the following stages in the production chain:

- Abattoir
- Hide distributors
- Tannery

✉ The production chain shall be described, and the name and telephone number of the abattoir, hide distributor and tannery shall be given.

6.16.2 Down and feathers

Down and feathers can be plucked from live birds, which is painful. This applies first and foremost to down from geese, but can also apply to other species of duck. The EFSA has looked into this problem and concluded that it is possible to remove down and feathers from living geese without causing pain to the animals, as long as this is done during the period when the feathers are shed[164]. The problem is that this is not followed in the commercial production.

The EFSA recommends that down and feathers should only be plucked from geese during the malting period, and that control systems are established for this. However, such a control system is not in place, and Nordic Ecolabelling has therefore set a requirement which prohibits the use of down and feathers plucked from live birds.

O82 Down and feathers plucked from live birds

The use of down and feathers plucked from live birds is prohibited.

Recycled down and feathers are exempt from the requirement, but must instead comply with the hygiene requirement in the standard EN 12935: Feather and down – Hygiene and cleanliness requirements.

Sampling must be carried out in accordance with EN 1883 Feather and down - Removal for testing.

Chemicals used for washing or other treatment of down and feathers must always meet the chemical requirements of section 6.8 criteria.

✉ Declaration from the supplier of down and feathers. Appendix 26 can be used.

✉ For recycled down and feathers: Test results, showing that the level in EN 12395 is met.

6.16.3 Mulesing

Mulesing is a problem in the production of Merino wool, i.e. the removal of wool and skin from the sheep's hindquarters to prevent parasites. This is a method that is primarily used in Australia. The requirement is new in this version of the criteria. The requirement shall be documented with confirmation from the wool manufacturer.

O83 Mulesing

Mulesing is not permitted.

✉ A declaration from the manufacturer of merino wool that mulesing is not used. Appendix 27 can be used.

[164] EFSA Scientific Opinion on the practice of harvesting (collecting) feathers from live geese for down production, 25 November 2010

6.16.4 Working conditions

The requirements for working conditions are based on the ILO's (International Labour Organisation, which is subject to the UN) Conventions for child labour, forced labour, health and safety, the right to organise and the right to collective bargaining, discrimination, discipline, working hours and salary.

The ILO has eight Core Conventions, or human rights conventions, which set minimum standards for employment.

Nordic Ecolabelling does not wish to set separate qualitative requirements and requirement levels for working conditions. Rather, requirements will be based on documenttation through the manufacturer's certification in accordance with existing standards. The requirement for working conditions will therefore be able to be documented through SA8000 certification, where a valid certificate or other documentation which shows that the requirement is fulfilled shall be submitted. SA8000 stands for Social Accountability and is a global scheme. The SA8000 standards contain requirements for:

- The prohibition of child labour
- The prohibition of forced labour and prison labour
- Health and safety requirements
- The right to organise and collective bargaining
- Discrimination
- Disciplinary practices (punishment)
- Working hours
- Salaries
- Management systems

As of September 2011, there are 2,785 SA8000 certified production sites in various countries, and approx. 20% of these are within the clothing, textiles and leather industry[165].

One of the ILO Core Conventions, ILO 98, covers the right to organise and to bargain collectively. This involves the protection of employees who exercise their right to organise, non-interference between workers' and employers' organisations, and the promotion of voluntary collective bargaining. In some countries, including China, this is a limited right in relation to authority requirements. In China, for example, there is only one professional organisation.

Nordic Ecolabelling believes that the right to organise is fundamental, but despite this, does not set a requirement that ILO 98 shall be followed, since we see no possibility to control this. However, requirements for working conditions is an area that we wish to set stricter requirements for in the future, e.g. in that we set a requirement that alternative ways in which workers can freely and independently organise themselves and bargain must be facilitated.

In order not to exclude manufacturers currently involved in a process to become SA8000 certified, a licence can be awarded under certain conditions. In order to award a licence under such conditions, the last report from the certifying body will be evaluated with regard to how much work remains before a licence can be awarded, as well as which areas deviate from the standard. Also, it is a requirement that concrete action plans with specified deadlines must be submitted.

[165] http://www.sa-intl.org/

The licence can be withdrawn if the licensee no longer fulfils the SA8000 requirements or does not meet the given deadlines in any action plans.

Nordic Ecolabelling can, by agreement, approve that the requirement is documented if the production company makes public, for example on its website, how the requirements of the ILO's Conventions are adhered to and controlled by a third party.

O84 Working conditions

The basic principles and rights relating to working conditions shall be fulfilled during the production of the ecolabelled textile, hide and/or leather.

The licensee shall ensure that the relevant applicable laws and provisions, as well as the ILO's Conventions below, are followed at all production sites for the ecolabelled textile, hide and/or leather. Relevant laws and provisions can relate to factors such as safety, the working environment, environmental legislation, and plant specific conditions/permits.

The licensee shall ensure that the production of textiles, hides/skins and/or leather follows the ILO's Core Conventions, which include:

- the prohibition of child labour (Minimum Age for Admission to Employment, Convention 138 and Prohibition and Immediate Action for the Elimination of the Worst Forms of Child Labour, Convention 182).
- the right to organise (Freedom of Association and Protection of the Right to Organise, Convention 87).
- the prohibition of discrimination (Equal Remuneration, Convention 100 and Discrimination in Respect of Employment and Occupation, Convention 111).
- the prohibition of forced labour (Forced or Compulsory Labour, Convention 29 and Abolition of Forced Labour, Convention 105).

The employees or unions shall be informed of the statutory working rights and how the company follows up these (Code of Conduct equivalent to SA8000).

✉ The license holder shall have routines ensuring that relevant laws and regulations are adhered to in all production sites for the Nordic Ecolabelled textile, hide and/or leather, and routines showing that they are working to facilitate that the production plant is focused on adhering to rights based on ILO's core conventions.

The requirement is to be documented through one of the following alternatives:

- SA8000 certification (valid certificate) or
- Nordic Ecolabelling can, by agreement, approve that the requirement is documented if the production company makes public, for example on its website, how the requirements of the ILO's Conventions are adhered to and controlled by a third party (valid certificate), or other documentation which shows that the requirement is fulfilled.

If the manufacturer is currently involved in a process to become SA8000 certified, a licence can be awarded under certain conditions. The last report from the certifying body, including an action plan with given deadlines, must be submitted for evaluation. The Nordic Ecolabel licence can be withdrawn if the licensee no longer fulfils the SA8000 requirements or does not meet the given deadlines in any action plans.

6.17 Requirements for environmental and quality assurance

In order to ensure that the requirements in this document are fulfilled, the producers or any distributors/importers shall have an adequate environmental and quality assurance system. This is particularly important to ensure that the requirements are adhered to throughout the validity of the licence, and is a standard requirement in Nordic Ecolabelling's criteria.

O85 Legislation and regulations

The licensee shall ensure compliance with all applicable local laws and provisions at all production facilities for the Nordic Ecolabelled product, e.g. with regard to safety, working environment, environmental legislation and site-specific terms/permits.

✉ Duly signed application form.

O86 Nordic Ecolabel representative

The company shall appoint individuals who are responsible for ensuring the fulfilment of Nordic Ecolabel requirements, for marketing and for finance, as well as a contact person for communications with Nordic Ecolabelling.

✉ Organisational chart showing who is responsible for the above.

O87 Documentation

The licensee must archive the documentation that is sent in with the application, or in a similar way maintain information in the Nordic Ecolabelling data system.

🔑 Checked on site as necessary.

O88 Planned changes

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

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

O89 Unplanned non-conformities

Unplanned nonconformities that have a bearing on Nordic Ecolabel requirements must be reported to Nordic Ecolabelling in writing and journalled.

✉ Procedures detailing how unplanned nonconformities are handled.

O90 Traceability

The licensee must be able to trace the Nordic Ecolabelled textiles in the production.

✉ Description of/procedures for the fulfilment of the requirement.

O91 Recycling and return system

The Nordic Ecolabelling's Criteria Group decided on the 9 October 2017 to remove this requirement.

O92 Annual follow-up

Every year a follow-up of the environmental requirements must be made in line with instructions from Nordic Ecolabelling.

7 Future criteria

In future criteria it will be relevant to consider among other things:

- Organic cotton and organic production of other natural fibres
- Genetically modified raw materials
- Evaluating current requirements for fibre production and extend to other types of fibre, such as silk, biopolymers and synthetic fibres
- Evaluating the requirements to energy consumption, water consumption and emissions in wet treatment of fibres, hides/skins and leather
- Flame retardants
- Antimony in polyester

8 References

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GOTS, http://www.global-standard.org/the-standard.html

The Ecological and Toxicological Association of Dyes and Organic Pigments Manufacturers, ETAD, http://www.etad.com/

Lenzing 2010: http://www.lenzing.com/fileadmin/template/pdf/konzern/lenzinger_berichte/ausgabe_88_2010/LB_88_2010_paper_1.pdf

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