About Nordic Swan Ecolabelled

Textiles, hides/skins, and leather

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Nordic Ecolabelling

Content

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

Contact info

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

Denmark
Ecolabelling Denmark
www.svanemaerket.dk

Finland
Ecolabelling Finland
www.ecolabel.fi

Sweden
Ecolabelling Sweden
www.svanen.se

Iceland
Ecolabelling Iceland
www.svanurinn.is

Norway
Ecolabelling Norway
www.svanemerket.no

1 Summary

Nordic Swan Ecolabelling of textiles is a highly relevant. The textile industry has realised that something must be done about achieving more sustainable textile production and consumption. The focus areas for the industry are:

1. Sustainable fibre
2. Substitution of hazardous chemicals
3. Reduction in energy and water consumption
4. Recycling and a circular economy
5. Responsible production in terms of workers' rights
6. Focus on quality and slow fashion rather than fast fashion

Brands vary in how many of these areas they tackle. Since the Nordic Swan Ecolabelling of textiles evaluate the entire life cycle of the textile, and all the relevant sustainability parameters, the criteria deal with all six areas listed above.

New fibre requirements

This 5th generation of Nordic Swan Ecolabelling for Textiles, hides/skins and leather includes newly developed requirements concerning textile fibres. The fibres in Nordic Swan Ecolabelled textiles must be either organic, recycled, or biobased meeting other relevant environmental requirements. This means, in part, that:

Cotton must be 100% organic or recycled. Only selected textiles for professional use may, alternatively, be made from fibre 100% certified by either BCI (Better Cotton Initiative), FairTrade cotton or CmiA (Cotton Made in Africa).
Synthetic fibre must be based on either recycled or bio-based materials. With a test requirement for specific chemicals in recycled fibres as well as requirements for the bio-based raw material.

Regenerated cellulose fibre must be recycled or FSC or PEFC certified, and the actual fibre production must be with closed loop technology if the fibre constitutes more than 30% of the total fibre content.

Updated chemical requirements

The following three requirements are tightened and covers all the chemicals in the textile production:

Chemicals with undesirable classifications such as toxic, carcinogenic and harmful to the aquatic environment are prohibited.
Chemicals classified as CMR substances are prohibited.
It must be clearly demonstrated that none of the 11 groups of substances from Greenpeace's Detox My Fashion campaign[1] have been used in the production of Nordic Swan Ecolabelled textiles.

As in the previous generation of the criteria, the chemical requirements in the new generation use a definition of ingoing substances that entails a ban on specific ingoing substances down to 0 ppm. As such, a safety data sheet alone is not enough to meet the documentation requirement. Further information about the chemicals will

[1] Destination Zero: Seven Years of Detoxing the Clothing Industry, https://storage.googleapis.com/planet4-international-stateless/2018/07/destination_zero_report_july_2018.pdf accessed 07.08.2019

always be needed. Other certifications that do not require chemical documentation down to the same level will therefore not be permissible as documentation for these requirements.

Sharpening of the requirements for energy and water consumption

The requirement concerning energy and water consumption has been expanded to include a requirement on implementation of a minimum of BAT practices to reduce energy and water consumption. This means that the textile production must be water- and energy-efficient and thus deliver reduced CO_2 emissions.

Textiles and a circular economy

In addition to recycled fibres, it is now also possible to use reused textiles to make new textiles, with some requirements for either a previous certification or restrictions on which products it can be used. There is also a requirement that unsold textiles must not be sent for incineration or to landfill and that the brand owner must be transparent about this.

In addition, the requirements on the prohibition of unnecessary details/accessories on the textile and the strict requirements on the chemicals used, coupled with the quality requirements, support a circular economy.

Requirements for brand owner – new licence structure

The textile manufacturer and brand owner must each hold their own type of licence. The brand owner is now subject to requirements that ensure the traceability of the Nordic Swan Ecolabelled product on the market.

2 Motives for the Nordic Swan Ecolabelling of textiles, hides/skins, and leather

The description of what characterizes Nordic Swan Ecolabelled textiles, skins and leather is divided into 2 product areas:

1. Textiles - with specific communication for textiles for consumer and for professionals
2. Skins and leather

Nordic Swan Ecolabelled textiles

Nordic Swan Ecolabelled textiles have reduced environmental impact throughout the lifecycle of the textile. Among other things, through strict requirements for fibers and chemicals. At the same time, the textile producer must ensure that production complies with UN’s International Labour Organization (ILO) conventions on workers’ rights.

The requirements promote a more circular economy, reduce climate impact, and save resources: Textiles with the Nordic Swan Ecolabel must be suited for a long lifetime and the quality is therefore tested and documented. Recycled fibres and reused textile can be used in the Nordic Swan Ecolabelled product if it complies with requirements to previously used chemicals. At the same time several of the Nordic Swan Ecolabel requirements support that the textile can be used in new resource loops after use and the textile production itself must be energy efficient.

The requirements for textiles include such as:

- Made from fibres, that are either organic, recycled or based on renewable resources complying with specific environmental requirements.
- Meets strict environmental and health requirements for chemicals used in textile production - this is important for wastewater, the people who produce the textiles and those who wear them.
- Meet strict requirements for substances that are classified carcinogeni, toxic to reproduction and can damage genetic material. Identified and potential endocrine disruptors on up-to-date lists from EU and national authorities are excluded. Also, flame retardants, fluorinated substances, and antibacterial additives incl. nanoparticles are excluded.
- Produced with water and energy efficient technology, which saves water and reduces CO2 emissions.
- Quality tested to enable a long lifetime.
- Only contain metal parts – e.g., zippers and buttons - that meet strict requirements for heavy metals, and plastic parts are without phthalates.
- Is produced under proper working conditions, where UN's International Labour Organizations (ILO) conventions on workers' rights has been complied with.
- Unsold textiles must not be sent for incineration or dumped in landfill. This motivates to avoid overproduction.

Nordic Swan Ecolabelled textiles contribute to circular economy by:

- the use of either recycled or bio-based raw materials,
- strict control of the chemicals included in the textile,
- quality test of the finished textile
- prohibition of plastic and metal applications if only for decorating.
- unsold Nordic Swan Ecolabelled textiles must not be burnt or sent to landfill.
- packaging must be designed for recycling

Nordic Swan Ecolabelled products of skins and leather

Nordic Swan Ecolabelled skins and leather have reduced environmental impact throughout the life cycle. Among other things, through strict requirements for the production of skins and leather and chemicals used. At the same time, the UN's International Labour Organizations (ILO) conventions on workers' rights must be complied with in the production of hides and skins.

The requirements promote a more circular economy, reduce climate impact, and save resources: Only skins and leather which are residuals or by-products, or comes from reindeer and elk can be Nordic Swan Ecolabelled. Skins and leather with the Nordic Swan Ecolabel must have the ability to have long lifetime, and the quality is therefore tested and documented. Reused skins and leather can be used for re-design in the Nordic Swan Ecolabelled product if it complies with requirements to previously used chemicals. Several of the Nordic Swan Ecolabel requirements support that skins and leather can be used in new resource loops after ended use.

Nordic Swan Ecolabelled products in hide/skin and leather:

- Are produced by residuals or by-products or skins from free-living, non-endangered species.
- Meet strict requirements for substances that are classified carcinogenic, toxic to reproduction and can damage genetic material. Identified and potential endocrine disruptors on up-to-date lists from EU and national authorities are excluded. Also, flame retardants and fluorinated substances are excluded.

- Meets strict environmental and health requirements for chemicals in the tanning process, but also for dyes, coatings, solvents, and biocides. This is important for wastewater, the people who produce the products and those who use them.
- Are tested free of chromium VI, which can be allergenic.
- Meets strict requirements for wastewater treatment from tanneries.
- Only contain metal parts – e.g., zippers and buttons - that meet strict requirements for heavy metals, and plastic parts are without phthalates.
- Quality tested to enable a long lifetime.
- Is produced under proper working conditions, where UN's International Labour Organizations (ILO) conventions on workers' rights has been complied with.
- Unsold skin and leather must not be sent for incineration or dumped in landfill. This motivates to avoid overproduction.

Nordic Swan Ecolabelled skin and leather contribute to circular economy by:

- Only residues and by-products or skins from free-living non-endangered species are used
- Possibility of re-design of recycled skins and leather for selected product types
- Strict control of which chemicals have been used and are included in the finished product
- Quality test of the finished skin and leather
- Prohibition on the use of plastic and metal applications without function on the leather
- Unsold skins and leather must not be sent for incineration or landfill

2.1 UN's Sustainable Development Goals

The Nordic Swan Ecolabel actively contributes to fulfilment of Goal 12 to "Ensure sustainable consumption and production patterns".

Nordic Swan Ecolabelled textiles, hides/skins and leather have a reduced environmental footprint throughout the life cycle of the textile – from fibre production and textile production to requirements ensuring the high quality of textiles, so it can last a long lifetime. The Nordic Swan Ecolabel encourages reuse and recycling without the spread of harmful chemicals.

How Nordic Swan Ecolabelled textiles, hides/skins and leather contribute to Goal 12
Here, the focus is on sustainable and efficient utilization of resources by the fact that the fibres in the textile must be either organic, recycled, or biobased, complying with specific environmental requirements.

At the same time, the textile production must use water- and energy efficiency technologies or use self-produced solar energy and if packaging it used it must be designed so that it can be recycled today.

A long list of chemicals that are harmful to health and the environment are prohibited in the production of the textile. All the chemicals in the textile production are checked regarding their environmental and health effects. For example, all the substances on

Greenpeace's Detox List are prohibited. In addition, the detergents and softeners used in the wet processes must be biodegradable. This ensures responsible handling of the chemistry throughout the life cycle of the textile, with a positive impact on human health and the environment.

Nordic Swan Ecolabelled textiles shall contribute to more sustainable consumption patterns and therefore could be used for a long time. Hence the quality is tested for properties such as abrasion resistance, colour fastness and shrinkage.

Unsold Nordic Swan Ecolabelled textiles must not be sent for incineration or landfill. This is for reducing overproduction and promote recycling of textiles.

Contributes to goal 3 by reducing exposure to hazardous chemicals

Contributes to sustainable management of water, by promoting water-saving technologies, requirement for wastewater treatment and strict requirements for harmful chemicals.

The working conditions in the textile production must comply with relevant workers' rights as set out in the ILO Core Conventions. E.g. this includes a ban on child labour and forced labour.

Promotes energy efficiency in the textile production and the use of local produced solar energy.

Strict chemical requirements in the textile production reduce discharges of unwanted chemicals into the sea.

Requirements for certified raw materials promoting sustainable use of areas and conservation of areas that are particularly important for biodiversity.

3 Environmental impact of Nordic Swan Ecolabelled textiles, hides/skins, and leather

The textile industry is one of the largest industries in the world, with as many as 100 million tonnes of textiles making their way onto the global market annually. At the same time, the fashion and textile industry are one of the most polluting and resource-heavy industries in the world and its scale alone says something about the environmental impact associated with the textile industry.

Increasing consumption

The Nordic region has a high consumption of textiles. The average annual consumption per inhabitant in the Nordic countries ranges from 13 to 16 kg of new textiles (clothing and household textiles)[2]. Fast fashion, whereby several trend-based collections are launched each year, is one of the things stimulating the increasing consumption of textiles. Slow fashion is now growing as a counterpoint to fast fashion, with more and more fashion brands and consumers focusing on the quality and long lifetime of the textile.

Environmentally harmful production

The LCA study “Advancing life cycle assessment of textile products to include textile chemicals”, in which Sandra Roos of Chalmers University of Technology includes the environmental impact of chemicals, states that the greatest environmental impact from textiles is associated with their actual production. The primary impacts come from the use and discharge of harmful chemicals and the use of water and energy in the textile production[3]. Energy consumption is significant for both resource consumption and emissions of greenhouse gases. The greatest impact on the climate change thus comes from the textile production, including all the wet processes. Next comes the contribution from transport of the textile from the retailer home to the consumer.

Cultivation of cotton is one of the most problematic processes in the production chain for textiles. The cultivation of conventional cotton requires intensive use of both water and chemicals. Similarly, wet processes (bleaching, dyeing, and finishing) in textile production often have a significant impact on the environment. In addition to making intensive use of water and chemicals, the wet processes can also involve high levels of energy consumption.

It is estimated that between 1.5 kg and 6.9 kg of chemicals are used to produce 1 kg of finished clothing. As such, the chemicals used in production will often weigh considerably more than the textile itself[4].

Not all LCA studies of textiles have the same focus on chemicals. When using LCA studies as a tool for assessing a textile’s environmental impact across its life cycle, it is important to note that endocrine disruption, allergens, and other harmful properties in the chemicals used are often poorly handled in the analysis. There is thus a risk that LCA tools do not give the best picture of where to target environmental improvements most usefully in the textile’s life cycle[5]. In relation to ecolabelling, there is therefore a need to combine LCA studies with a more specific chemical analysis that examines both how problematic the chemistry is and the options for substitution.

The Swedish Chemicals Agency has identified 2,450 different chemicals that are used in textile production. 1,150 of these are identified as harmful and 368 are functional chemicals such as dyes, impregnation agents and anti-bacterial treatments. These chemicals are present in the finished textile and therefore may pose a potential risk to consumers and the environment in the use stage. Chemicals with no function in the end product may also be present in the textile, with a potential

[2] NMR 2014, Towards a new Nordic textile commitment: Collection, sorting, reuse, and recycling
[3] Advancing life cycle assessment of textile products to include textile chemicals, CHALMERS UNIVERSITY OF TECHNOLOGY 2016
[4] Advancing life cycle assessment of textile products to include textile chemicals, CHALMERS UNIVERSITY OF TECHNOLOGY 2016.
[5] Advancing life cycle assessment of textile products to include textile chemicals, CHALMERS UNIVERSITY OF TECHNOLOGY 2016.

risk to health and the environment[6]. As an example, several studies indicate that allergic reactions to chemicals and textiles may be a problem[7].

The Dirty Laundry report published by Greenpeace International[8] focuses on the discharge of harmful chemicals in wastewater from Chinese wet processing plants as part of textile production. A later study, also by Greenpeace, shows the presence of per- and polyfluorinated compounds (PFASs) in all the analysed snow samples and many water samples taken in the mountain areas of 10 countries on three continents[9]. Greenpeace describes how even major textile brands with CSR programmes lack an effective strategy to ensure that the textiles they source from China do not lead to harmful substances polluting watercourses. The study also states that harmful chemicals with persistent or endocrine disrupting properties were found in wastewater samples from the factories. Even wastewater from factories with modern wastewater treatment systems was found to contain alkylphenols and polyfluorinated compounds such as PFOA and PFOS[10]. With its Detox Catwalk campaign in 2010, Greenpeace urged the global textile industry to phase out 11 harmful chemical groups by 2020 (see more in section 4.1).

3.1 Qualitative MECO analysis for textiles

A qualitative MECO analysis has been conducted for textiles in general. This describes the key areas that impact on health and the environment throughout the life cycle of the textiles – including consumption of materials/resources (M), energy (E), chemicals (C) and other impact areas (O) such as microplastics and biodiversity. The product group covers many different types of textiles, hide/skin, and leather products. These may include everything from clothing to home furnishings and professional textiles such as workwear to bags, gloves, and upholstery fabrics. It is therefore not possible to perform a quantitative analysis that covers all these product types. The decision was thus taken to conduct a qualitative MECO analysis showing the key environmental and health impacts associated with the product group, without quantifying these impacts. The magnitude of the stated impacts depends on many factors, such as the choice of fibre type, fibre thickness and density, the choice of textile chemicals, finishing treatments, technology and production processes, design and the collection or waste systems in the respective countries.

The table shows that the choice of fibre type affects the kind of environmental impact that the raw material stage contributes. Here, resource consumption comes either in the form of crude oil for fossil synthetic fibre production or land use and the risk of biodiversity losses due to the use of renewable raw materials. Both the cultivation of raw materials and the production of synthetic fibres require energy, with harmful chemicals from pesticides and production chemicals another relevant factor for consideration. When it comes to animal fibres, it is also important to consider animal welfare, for example with regard to sheep.

[6] Norden – velklædt i et rent miljø, Handlingsplan for bæredygtig mode og tekstil, Nordic Council of Ministers 2015.
[7] Kemi 2014, Chemicals in textiles – Risks to human health and the environment.
[8] Greenpeace International (2011) Dirty Laundry: the toxic secret behind global textile brands.
[9] Greenpeace International (2015) Footprints in the snow.
[10] Greenpeace International (2011) Dirty Laundry: the toxic secret behind global textile brands.

Table 2: Qualitative MECO matrix for the life cycle of textiles

	Raw material phase	Production	Use phase	Waste and recycling phase
Raw materials/ inputs	Crude oil (synthetic fossil fibres) Wood raw material (cellulose-based fibres) Land use (vegetable fibres, silk, and wool) Water (cotton and other vegetable fibres) Energy resources for extraction, cultivation, and fertilisation	Energy resources for production Water for wet processes	Energy resources and water for washing and poss. energy resources for drying	Either landfill, incineration, or recycling of textile fibres. A small proportion is reused
Energy	Energy for production of synthetic fibres and farming for vegetable fibres and wool	Energy for the processes, spinning, weaving/knitting, dyeing, finishing, and manufacturing	Energy for washing and poss. drying	Loss of resources due to landfill and incineration Energy recovery from incineration of textile fibre Energy and resource savings through reuse of textile fibres
Chemicals	Cotton and wood raw material for cellulose and any other vegetable raw materials: Pesticides for cultivation Wool: Organophosphates and pyrethroids for treatment. COD emissions from wool scouring plants. Acrylic fibres: DMAc and acrylonitrile Elastane fibres: Organotin compounds, emission of aromatic diisocyanates to air, DMAc Polyamide fibres: N2O emissions to air Polyester fibres: antimony, VOC Polypropylene: lead-based pigments Cellulose fibre: chlorine gas, sulphur emissions, zinc emissions to water, copper emissions to water Membranes coated with fluorinated substances	Chlorine treatment of wool. Emissions of chemicals from the wet processes that are harmful to health and the environment E.g. carcinogenic azo dyes (amines) PFAS for resistance to water, dirt and grease Phthalates in print or plastic detailing. Pesticides, heavy meals, or pH-changing chemicals	Exposure to chemicals that are harmful to health: antibacterial biocides (silver ions, triclosan or triclocarban), PFAS, NPEO, allergenic dyes, CMR substances and endocrine disruptors Detergents for washing the textiles	Risk of passing undesirable chemicals onwards in the lifecycle using textiles with no traceability. Potential to reduce chemical impact from raw material phase by reusing textile fibres
Other	Animal welfare in farming (e.g., sheep). Also relevant for birds in the case of fillings (feathers). Sustainable cultivation of raw materials, not least to ensure biodiversity and protection of natural areas.	Temp. changes in aquatic environment (wet processes). Social and ethical challenges associated with working conditions for production outside the EU.	Microplastics from textile wear and washing.	

3.2 RPS analysis

Nordic Ecolabelling sets requirements concerning the topics and processes in the life cycle that have a high environmental impact – also called hotspots. An RPS tool is used to identify where ecolabelling can have the greatest effect. R represents the environmental relevance; P is the potential to reduce the environmental impact and S is the steerability on how compliance with a requirement can be documented and followed up.

Therefore, it makes sense for the criteria to contain requirements in areas in the life cycle that have been found to have a high overall RPS, since there is potential to achieve positive environmental gains. The table below provides an overview of the key areas where requirements are appropriate due to a high RPS.

Location of high RPS

Raw materials stage	
Fibre type	There is high relevance for the production/cultivation of textile fibres, but considerable variation in the type of environmental impact, depending on the type of fibre. It is difficult to pick out one fibre type as the best option on every environmental impact category. In terms of environmental impact from the textile fibres, the potential for greatest steerability lies in ensuring that the individual fibre type is either cultivated or produced in the least environmentally impactful way possible. **RPS for natural fibre requirements** - Here, a high RPS has been found for requiring 100% organic cotton for textiles for retail and professional fabrics – either 100% organic or IPM cotton. - For flax and other bast fibres, there is RPS for specific requirements concerning cultivation and processing. - Animal fibres such as wool and other keratin fibres demonstrate a high RPS for requirements on the level of residues of pesticides against parasites in the wool, as well as COD and detergent discharges in wastewater. **RPS for synthetic fibre requirements** - Synthetic fibres are subject to the requirement that either they must be bio-based or recycled materials are used in production. - For bio-based fibres, there are also requirements stipulating the types of raw materials that may be used and that they must not be cultivated using genetically modified raw materials. - Recycled fibres are required to have been tested for content of undesirable chemicals. - For regenerated cellulose fibre, the production process must be free from discharges and the wood fibre must be sourced from sustainable forestry.
Textile production	
Chemicals that are harmful to health and the environment	In this area, tackling harmful chemicals in textile production has high relevance, and there is also potential to set chemical requirements for textile production that exclude a wide range of chemical substances. To ensure that harmful chemicals are not discharged from wet processes, the greatest steerability as regards ecolabelling lies in ensuring that the harmful chemicals, such as organic fluorinated compounds and heavy metals, are not used in the processes. This ensures that these chemicals are not discharged into the aquatic environment and that they are not present in the finished textile that the consumer is in contact with. The Nordic Swan Ecolabel's chemical requirements, under which a ban means 0 ppm of the constituent chemical substances, provide high steerability. Testing for chemicals in wastewater is also an option but provides only a snapshot and would be a major undertaking if all the excluded substances had to be tested for. Here there is both potential and steerability in requiring that the detergents and softeners used in the textile production must be readily degradable in the wastewater treatment plant, so that they do not end up in the aquatic environment. Potential and steerability also exist for requirements concerning COD, temperature, and pH in wastewater from wet processes.
Energy and water consumption	Overall, a high RPS has been found for requiring that the textile production uses a minimum of best available water and energy efficiency technologies or has measures in place for self-production of solar energy.

Use stage	
Exposure to chemicals that are harmful to health	Exposure to textile chemicals that are harmful to health is an area with high relevance [11]. There is also good potential to ensure the avoidance of, amongst other things, CMR substances such as carcinogenic dyes, allergenic dyes, endocrine disrupting dyes such as certain phthalates or to ensure that no harmful flame retardants have been used. These are just a few of the chemicals associated with textile production that are harmful to health. This can either be documented using information back along the production chain on exactly which chemicals have been used in production, or tests can be carried out on the finished textile. Collecting data from back along the production chain also ensures that there is no use of harmful chemicals that impact on the environment due to discharges from wet processes. Testing the finished product does not achieve this in the same way– particularly if the chemical is an auxiliary chemical, which is usually removed from the textile during its manufacture.
Harmful chemicals from recycled fibre or reuse of textiles	Relevance and potential are judged to be medium to high in this area. Testing of recycled fibre is considered the most steerable way of ensuring that specific harmful chemicals are not present. When reusing textiles in new Nordic Swan Ecolabelled products, steerability regarding exposure to harmful chemicals can be achieved by only using products with chemical traceability, when it comes to products with close skin contact.
Quality and lifetime	For the textile industry in general, there is considered to be high potential in confirming the high quality and long life of the textile. There is also steerability regarding the quality, since it is possible to set requirements in the criteria that specific quality parameters must be documented using standardised quality tests. The lifetime is more difficult to control since the real-world lifetime (not just its technical life expectancy) is also affected by consumer behaviour and this is difficult to control through the ecolabelling of the textile. There is therefore no RPS for direct requirements, but the Nordic Swan Ecolabel requires third-party approval of all materials and chemicals – something that can be difficult to fit into the schedule for fast fashion products. The Nordic Swan Ecolabel is thus more suited to slow fashion products with a design that is likely to last longer.
Waste and recycling	
Textiles for recycling (Free from harmful chemicals)	The highest RPS in relation to how ecolabelling of a textile can promote recycling is to ensure that textiles are free from harmful chemicals, making their reuse desirable. Requiring all the chemicals used to be approved has relevance, potential and steerability.
Textiles for recycling (Design for disassembly)	Here, a high RPS has been found in reducing the use of metal and plastic details on the textile as much as possible – metal rivets, for example, are not permitted for purely decorative purposes. The combination of different fibre types is also of high relevance in terms of a textile's suitability for fibre-to-fibre recycling. However, there is currently no realisable potential for all types of textile products. In the area of professional textiles, for example, there is a need to use cotton/polyester blends to achieve the required performance and save energy in industrial laundering. There is considered to be a medium RPS for ensuring that jeans and other denim goods are suitable for fibre-to-fibre recycling.

3.3 Textiles and a circular economy

Textile consumption is high in the Nordic countries and the time during which the individual textile is actively used is often short. Over half of garments are neither reused or recycled and are instead discarded after use. At the same time, large amounts of clothing and textiles that have barely been used – and so could remain in use for a long time to come – are simply thrown away[12]. The Nordic Council of Ministers is one of the bodies focusing on reversing this trend, as described in the report "Well dressed in a clean environment: Nordic action plan for sustainable fashion and textiles" from 2015. This states that "the environmental and social footprint of the Nordic region's textile consumption shall be significantly reduced, while at the same time advancing the Nordic industry's position in sustainable fashion." This is further explained with a focus on making textiles part of a circular

[11] Chemical in textiles – Risk to human health and the environment, Swedish Chemicals Agency 2014
[12] NMR 2014, Towards a Nordic textile strategy.

economy rather than ending up as waste. To make Nordic textile consumption more circular, it is important to place an emphasis on increasing the lifetime of products, and on ensuring that the textile fibres are free from specific problematic substances. This way, the textiles or their fibres can be held in a closed, toxin-free resource cycle that allows for their use repeatedly.

The recycled feedstock for textile fibre production often comes from materials other than textiles, such as PET bottles. Wool and cotton can also be recycled by shredding the textile and spinning the fibres again.

The fibre-to-fibre recycling can be either mechanical, often resulting in the downcycling of the fibres to a lower quality product or chemical. The chemical recycling processes for fibre-to-fibre recycling are in development and may potentially bring greater benefits, such as improved quality. The recycling of textile fibres into new textile fibres remains limited globally due to technical barriers and low prices for virgin fibre, combined with high recycling costs and obstacles to trade in recovered textiles. For polyester and regenerated cellulose, however, there are already commercial fibre-to-fibre processes such as ECO CIRCLE ™ FIBERS by Teijin, Refibra from Lenzing and Circulose® pulp from Renewcell.

Over time, there is considerable potential for value creation in a circular economy, if the fashion industry is able to convert textile waste into raw material for textile production using advanced recycling techniques. However, this type of recycling technology is not yet available for a broad spectrum of fibres, and such a system has not proven economically viable on a large scale[13].

For specific fibre types, the industry is well advanced in its use of recycled materials for the production of new textiles. This is particularly for polyamide (nylon) and polyester, where the technology (mechanical or chemical), availability and quality make it possible to turn recycled materials into new fibres – not necessarily fibre-to-fibre, but instead using other recycled materials. An analysis conducted as part of a project for the Nordic Council of Ministers shows an environmental effect from the use of recycled materials for the fibre types studied. This generation of the criteria thus includes a requirement concerning the use of recycled materials based on fossil resources to make synthetic fibres[14].

Ecolabels such as the Nordic Swan can be used as a tool to stimulate a circular economy. They are a particularly good tool for ensuring that textiles are produced using the least harmful chemicals, making it more desirable to recycle the textile or its fibres after its final use.

Ecolabels are unable to control what happens to the textile in the use and waste stage. This can, however, be influenced via specific measures in the textile production or requirements imposed on the textiles that can make resource efficient waste management possible, for example by prohibition of harmful chemicals makes it more desirable to recycle the textile.

The Nordic Swan Ecolabel sets quality requirement for textiles in the form of minimum permitted dimensional changes in the textile and a requirement for colour fastness during washing, use and exposure to light. Ensuring the high quality of the textile makes a long use stage more likely. The greatest potential for reducing the

[13] PULSE OF THE FASHION INDUSTRY, Global Fashion Agenda & The Boston Consulting Group 2017.
[14] Nordic Council of Ministers (2016). Gaining benefits from discarded textiles: LCA of different treatment Pathways.

environmental impact of textiles is linked with extending their use stage so that clothing, for example, is worn many times over. This reduces the need to purchase and produce new textiles.

However, several factors come into play in this context. The quality of the textile is one thing, but user behaviour and durable design are also key parameters. There is, however, little scope to influence these through ecolabelling.

3.4 Environmental impact from different types of fibre

There is often a focus on identifying the best fibres for textile production in environmental terms, and various reports have analysed how fibres impact on the environment. But in addition to different textile fibres having a different environmental impact, they also have different functionality in the use stage and at end-of-life[15]. This functionality can have a major impact on the textile's quality, area of use and lifetime, and is thus significant for the overall environmental impact throughout the life cycle of the textile.

One example of the variation among different fibre types can be found in cradle-to-grave analyses such as the one presented in the Global Fashion Agenda's Pulse report from 2017[16]. This provides a cradle-to-gate environmental impact index per kg of material using data from the Higg Material Sustainability Index (MSI). In the ranking of the various fibres, several of the synthetic fibres, such as polyester and polypropylene, do well environmentally, whereas the natural fibres such as cotton, wool and silk are down at the bottom end. In this case, however, there is no differentiation between conventional and organic fibre production, or between virgin and recycled fibres. The danger of using such an index lies in the underlying weighting of the different environmental impact categories. This is done in order to be able to add up all the environmental impact categories and give a total quantitative value for each fibre type. This weighting determines how much importance is attached to impacts such as harmful chemicals, water consumption, land use, biodiversity, use of fossil resources, energy consumption and climate impact. The Sustainable Apparel Coalition (SAC), which is responsible for the Higg Index, stresses in its own article "Materials Sustainability in the Higg Index"[17] that the MSI is not an LCA tool, and nor should it replace LCA studies. The MSI's reliance on weighting and its allocation of a simple total score are not in line with standardised LCA methods.

Nordic Ecolabelling has chosen not to rank the individual fibre types against each other. The considerable difference in functionality in the use stage and end-of-life means that this product group contains countless functional units. Instead, the criteria focus on setting requirements that promote the environmentally best variant of the particular fibre type. Fibre types for which it has not been possible to set good requirements that can be documented have not been included, or a limit has been set on the use of the fibre type in the criteria. The criteria for the Nordic Swan Ecolabelling of textiles, hides/skins and leather do, however, set joint requirements for all fibres regarding the relevant processes and properties in the production of the finished textile, plus quality requirements that are relevant for the use stage.

[15] Laitala, K. Does Use Matter? Comparison of Environmental Impacts of Clothing Based on Fiber Type, MDPI 2018 https://www.mdpi.com/2071-1050/10/7/2524
[16] http://globalfashionagenda.com/wp-content/uploads/2017/05/Pulse-of-the-Fashion-Industry_2017.pdf
[17] Materials Sustainability in the Higg Index, 2013 http://www.chinawaterrisk.org/interviews/materials-sustainability-in-the-higg-index/

3.5 Microplastics and fibre fragment loss

Textiles from synthetic fibres such as polyester are a source of microplastics when fibre fragments are detached from textiles. Microplastic can be harmful to health and the environment.[18,19] The Nordic Swan Ecolabel takes the concerns about microplastics seriously and wishes to limit the release of microplastics from textiles. Here it is important to wash textiles less often. New standardized methods have just been developed to test for fibre fragment loss from textiles. However, there is still a lack of knowledge about which characteristics of textile production are important for the release of microplastics. Therefore, it is difficult to set absolute requirements for the textile production itself.

Lack of knowledge
A major challenge that many researchers point out, has been a lack of standardised methods for examining fibre fragment loss/microplastics from textiles.[20,21] These test methods are now ready and now there is a need for studies that collect and compare test results and thus find out what should be done. Both the fibre type, yarn properties, textile structure, brushing and cutting techniques can have a bearing on how much microplastics/fibre fragment is released from the fabrics. Fibre fragments/microplastics, can also be collected during the production process, for example after washing or by removing loose fibre fragments from dry fabrics.[22,23] Currently, there is a lack of knowledge about methods for this. Some microplastics from production as well as from washing machines are, however, retained in wastewater treatment plants.[24,25,26]

Ecolabelling of both natural and synthetic fibres
Synthetic fibres constitute a large share of the market for textiles and have applications that natural fibres cannot fully cover. Completely excluding synthetic fibres from ecolabelled textiles will make the Nordic Swan Ecolabel not relevant to a large part of the market. The Nordic Swan Ecolabel believes that it will have greater environmental impact to set requirements that can contribute to reducing the environmental burden from both synthetic and natural fibres. Here, the overall requirements for chemicals, resource use, biodiversity and climate impact are important.

When it comes to synthetic fibres, the Nordic Swan Ecolabel requires that recycled or bio-based fibres be used so that less new plastics from fossil sources are produced.

[18] Gaylarde C, Baptista-Neto JA, da Fonseca EM (2021) Plastic microfibre pollution: how important is clothes' laundering? Heliyon 7 e07105
[19] Henry B, Laitala K, Klepp IG (2018) Microplastic pollution from textiles: A literature review. Project report No. 1-2018. Oslo and Akershus University College of Applied Sciences.
[20] Ramasamy R, Subramanian RB (2021) Synthetic textile and microfiber pollution: a review on mitigation strategies. Environment Science and Pollution Research 28(31):41596–41611.
[21] Henry B, Laitala K, Klepp IG (2019) Microfibres from apparel and home textiles: Prospects for including microplastics in environmental sustainability assessment. Science of the Total Environment 652:483–94.
[22] Roos S, Arturin OL, Hanning AC (2017) Microplastics shedding from polyester fabrics. Mistra Future Fashion Report number 2017:1. Swerea
[23] http://oceancleanwash.org/solutions/ (11.10.2021)
[24] Habib RZ, Thiemann T, Al Kendi R (2020) Microplastics and wastewater treatment plants – a review. Journal of Water Resources and Protection 12:1–35.
[25] Cesa FS, Turra A, Baruque-Ramos J (2017) Synthetic fibers as microplastics in the marine environment: A review from textile perspective with a focus on domestic washings. Science of the Total Environment 598:1116–1129.
[26] Xu X, Hou Q, Xue Y, Jian Y, Wang LP (2018) Pollution characteristics and fate of microfibers in the wastewater from textile dyeing wastewater treatment plant. Water Science and Technology 78(10):2046–2054.

Fleece
Polyester is the most common synthetic fibre, and polyester fleece was early mentioned as a source of microplastics. However, all synthetic textiles shed microplastics. Very little research has been published on whether fleece is worse than other polyester fabrics, and the results are contradictory.[27,28,29,30] Currently, a lot of research is being done on how the production of fleece and other polyester fabrics can be improved. Fleece textiles will now have to be tested for loss of fibre fragments and over time possibly comply with a requirement which exclude fleece with high fibre loss when washing.

Cotton, regenerated cellulose and wool
Textiles made from cellulose fibres, such as cotton and regenerated cellulose fibre, also shed microfibres, and such microfibres have also been found in aquatic environments.[31,32,33] However, there is greater concern about plastic fibres because they more easily attract environmental toxins, which are then transported with the fibres.[34, 35] In addition, cellulosic fibres degrade. Wool is a protein fibre that also degrades, but little has been investigated as to whether microfibres from woollen fabrics are present in the environment. Even natural fibres are today treated with wax or various types of plastics to make the fabrics softer or shrink less when washed. How this affects how the fibres degrade or shed microplastics is little known.[36] Therefore, The Nordic Swan Ecolabel requires that any coating on the wool must be degradable, see requirement O31.

Laundry requirements
The Nordic Swan Ecolabel also sets requirements for textile services (laundries) to reduce microplastics release. Ecolabelled laundries are rewarded if they have installed filters that collect microplastics. Scientists and industry are constantly working to develop better filters.

Guidance of the consumer
Filters for washing machines for consumers have also been developed but have not

[27] Bendt E, Rabe M, Stolte S, Zhang YQ, Klauer R, Kraas C, Alrajoula T, Kolberg A (2021) Textiles mikroplastik reduzieren. Erkenntnisse aus einem interdisziplinären forschungsprojekt. Bundesverband der Deutschen Sportartikel-Industrie e.V.
[28] Cai Y, Yang T, Mitrano DM, Heuberger M, Hufenus R, Nowack B (2021) Systematic study of microplastic fiber release from 12 different polyester textiles during washing. Environmental Science and Technology, 54(8): 4847-4855.
[29] Jönsson C, Arturin OL, Hanning AC, Landin R, Holmström E, Roos S (2018) Microplastics Shedding from Textiles – Developing Analytical Method for Measurement of Shed Material Representing Release during Domestic Washing. Sustainability 10(7):2457.
[30] Almroth BMC, Åström L, Roslund S, Petersson H, Johansson M, Persson NK (2018) Quantifying shedding of synthetic fibers from textiles; a source of microplastics released into the environment. Environmental Science and Pollution Research International 25(2):1191–9.
[31] Suaria G, Achtypi A, Perold V, Lee JR, Pierucci A, Bornman TG, Aliani S, Ryan PG (2020) Microfibers in oceanic surface waters: A global characterization. Science Advances 6(23): eaay8493.
[32] Savoca S, Capillo G, Mancuso M, Faggio C, Panarello G, Crupi R, Bonsignore M, D'Urso L, Compagnini G, Neri F, Fazio E, Romeo T, Bottari T, Spanò N (2019) Detection of Artificial Cellulose Microfibers in Boops Boops from the Northern Coasts of Sicily (Central Mediterranean). Science of the Total Environment 691:455–65.
[33] Woodall LC, Sanchez-Vidal A, Canals M, Paterson GLJ, Coppock R, Sleight V, Calafat A, Rogers AD, Narayanaswamy BE, Thompson RC (2014) The Deep Sea Is a Major Sink for Microplastic Debris. Royal Society Open Science 1(140317).
[34] Gaylarde CC, Baptista-Neto JA, da Fonseca EM (2021). Nanoplastics in aquatic systems - are they more hazardous than microplastics? Environmental Pollution 272, 115950.
[35] Wang F, Wang F, Zeng EY (2018) Chapter 7 - Sorption of Toxic Chemicals on Microplastics. In Zeng EY (ed.) Microplastic Contamination in Aquatic Environments. Elsevier, 225–247.
[36] Hassan MM, Carr C (2019) A Review of the Sustainable Methods in Imparting Shrink Resistance to Wool Fabrics. Journal of Advanced Research 18:39–60.

become standard yet.[37] Washing bags that retain microplastics also exist, but research shows that both filters and washing bags vary in how much they retain.[38],[39] Good advice is not to wash your clothes more often than necessary, use a front-feed washer and wash at a low temperature.[40,41,42]

Research
The last years several major research projects on microplastics are carried out, with researchers, organisations and the textile industry collaborating, and new projects are underway.[43] Efforts are being made both to identify the sources of release and how the environment is affected, and to develop better materials and production methods.

The Nordic Swan Ecolabel follows these projects and will continue to gather new knowledge. The Nordic Ecolabel now requires synthetic textiles to be tested for loss of fibre fragments in accordance with either test standards from TMC (The Microfiber Consortium) or future equivalent EN / ISO standards. Nordic Ecolabelling can subsequently insert a limit value in the requirement during the period of validity of the criteria, when a relevant rating system with applicable limit values has been developed.

4 Other labelling schemes and steering instruments

The global textile industry uses many different labels with a focus on health, the environment and working conditions. One explanation for the many types of labels may be the complex value chain, which makes it difficult for the manufacturer or Brand Owner to control every step back along the production chain. In this respect, labels that include third-party certification provide greater peace of mind regarding the product and the underlying production and pass credible information further up the value chain. However, with textile production known to be among the most environmentally impactful industries globally, there is strong demand to know that something is being done to reduce that environmental impact.

Some of the labels are type 1 ecolabels, such as the Nordic Swan Ecolabel, the EU Ecolabel and GOTS. These assess the entire life cycle of the product and target requirements at the stages in the life cycle that have relevance and potential.

[37] Brodin M, Norin H, Hanning AC, Persson C, Okcabol S. (2018) Microplastics from Industrial Laundries - A Study of Laundry Effluents. The Swedish Environmental Protection Agency.
[38] Napper IE, Barrett AC, Thompson RC (2020) The efficiency of devices intended to reduce microfibre release during clothes washing. Science of the Total Environment 738:140412.
[39] McIlwraith HK, Lin J, Erdle LM, Mallos N, Diamond ML, Rochman CM (2019) Capturing Microfibers – Marketed Technologies Reduce Microfiber Emissions from Washing Machines. Marine Pollution Bulletin 139:40–45.
[40] www.oceancleanwash.org/solutions/solutions-for-consumers (11.10.2021).
[41] Vassilenko K, Watkins M, Chastain S, Posacka A, Ross P (2019) Me, My Clothes and the Ocean: The Role of Textiles in Microfibre Pollution. Ocean Wise Conservation Association.
[42] Hartline NL, Bruce NJ, Karba SN, Ruff EO, Sonar SU, Holden PA (2016) Microfiber Masses Recovered from Conventional Machine Washing of New or Aged Garments. Environmental Science & Technology 50(21):11532–38.
[43] Examples are projects led by the Swedish research institute Swerea https://www.ri.se/sv/vad-vi-gor/projekt/minshed, the Norwegian research institute SINTEF www.sintef.no/en/projects/microfibre-evaluating-the-fate-effects-and-mitigat/, the German industry organisation Bundesverband der Deutschen Sportartikel-Industrie e.V. http://textilemission.bsi-sport.de/, the organisation OceanWise and American apparel companies https://ocean.org/action/microfiber-partnership/, and the organisation The Microfibre Consortium https://www.microfibreconsortium.com/ (05.09.2022)

These labels are based on the ISO 14024 standard and set requirements regarding the relevant environmental parameters for textiles. Other labels are raw material labels, such as the organic label, plus there are labelling schemes for social and ethical conditions, such as the Fair-Trade label. There are also health labels that focus on the chemical content of the finished product, such as the OEKO-TEX standard 100 and the Asthma and Allergy label.

4.1 Important substance lists

The Detox Catwalk, Greenpeace

With its Detox Catwalk campaign in 2010, Greenpeace urged the global textile industry to phase out 11 harmful chemical groups by 2020. Greenpeace places an emphasis on four principles that underpin a company's undertaking to phase out chemicals by 2020: responsibility, the precautionary principle, a credible definition of "zero chemicals" and the public's right to know about the toxic chemicals used – including by suppliers.

Nordic Ecolabelling prohibits the use of all the 11 below listed substance groups in the production of the textile and defines "zero chemicals" as follows. When prohibiting ingoing substances, Nordic Ecolabelling's requirements mean all substances, whatever their concentration in a used chemical or chemical blend, including additives and known products released from ingoing substances. Impurities cannot, however, always be completely avoided. The only permitted impurities are residual products from production, including raw material production, that can be found in a used chemical in concentrations below 100 ppm. Such impurities may be reagents such as monomers, catalysts, by-products, or carry-over from previous production lines.

The 11 prioritised chemical substance groups are:

1. Alkylphenols and their ethoxylates (APEOs & APs)
2. Phthalates
3. Brominated and chlorinated flame retardants (BFRs, CFRs)
4. Azo dyes that may release carcinogenic aromatic amines
5. Organotin compounds
6. Per- and polyfluorinated chemicals (PFCs)
7. Chlorobenzenes
8. Chlorinated solvents
9. Chlorophenols
10. Short chain chlorinated paraffins
11. Heavy metals such as cadmium, lead, mercury, and chromium (VI)

ZDHC – Zero Discharge of Hazardous Chemicals programme

The ZDHC Roadmap to Zero Programme is an international partnership between major textile brands and other actors in the textile industry, who are working to phase out harmful chemicals from the industry.

The programme has its own Manufacturing Restricted Substances List, ZDHC Manufacturing Restricted Substances List (ZDHC MRSL) V1.1[44], published in 2014, which sets out which chemical substances are banned from intentional use in the

[44] ZDHC Manufacturing Restricted Substances List (ZDHC MRSL), https://www.roadmaptozero.com/mrsl_online/ accessed 01.08.2019

production of textiles, leather and trim for textiles, clothing and footwear. The limit values for the substances are stated for two groups.

Group A, which covers raw materials, finished textile products and supplier guidance, has a total ban on all chemicals on the list.

Group B, which relates to chemical suppliers and the “commercial formulation limit”, has specific limit values for the individual substances, ranging from 2 ppm to 1000 ppm.

Chemical suppliers can choose to register their chemicals that comply with the ZDHC MRSL in the ZDHC Gateway – Chemical module. Third-party certification may be used to confirm compliance with the requirements, but this is optional[45].

5 Justification of the requirements

This chapter presents proposals for new and revised requirements, as well as explaining the background to the requirements, the requirement levels, and any changes since generation 4.

5.1 Product group definition

The criteria cover products made from textiles, hides/skins, and leather, or a combination of the above. In this context, textiles, hides/skins, and leather means:

Products for both private and professional use may carry the Nordic Swan Ecolabel.

- Fibres*, yarn, fabric, and finished textile products.
- Apparel and accessories, for example trousers, shirts, jackets, workwear, uniforms, underwear, handkerchiefs, scarves, purses, wallets, and bags.
- Furnishing fabrics (for both private and professional use), such as towels, bedding, curtains, tablecloths, pillows, duvets, and upholstery textiles, plus textiles for use in the furnishing of cars/trains/aircraft/boats.
- Durable non-woven textiles that are to be used for apparel and accessories or in interior furnishings as described above. Durable non-woven products are those that can be used multiple times 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 (including for cars/trains/aircraft/boats), from the following species of animal: sheep, goat, cow, horse, pig, elk, deer, and reindeer.
- Synthetic leather is included if textile fibre requirements, coating requirements (for textiles) and chemical requirements (for textiles) can be complied with.

** Only the following fibre types can be certified with the Nordic Swan Ecolabel as a certified fibre and only if the relevant fibre requirements of the criteria are met: Organic cotton fibres, wool, and other creatine fibres (either sheep, camel, alpaca, or goat), regenerated cellulose produced by closed loop process, flax (linen), silk, bamboo, sisal and other bast fibres.*

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

[45] Programme’s Manufacturing Restricted Substances List (MRSL) Conformance Guidance https://www.roadmaptozero.com/fileadmin/pdf/Files_2017/MRSL_Conformance_Guidance_052017.pdf accessed 01.08.2019

- 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.
- 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 paper towels (criteria for tissue paper).
- Microfibre cleaning cloths (criteria for supplies for microfibre based cleaning).
- Disposable products such as cotton pads for personal care (criteria for sanitary products).
- Wet wipes (criteria for cosmetic products).
- Baby products with textiles such as strollers and nursing pillows (criteria for baby products with textiles).
- Textile floor coverings, such as wall-to-wall carpets and floor mats (criteria for textile floor coverings and carpets).
- Textile products that form part of a piece of furniture, e.g., sofa cushions, mattresses and floor cushions (beanbags) (criteria for furniture and fitments). Pillows that are part of a combined furniture licence, for example with beds or mattresses, and have the same type of filling, can be ecolabelled according to the criteria for furniture and fitments.
- Microfibre cloths (criteria for supplies for microfibre based cleaning).
- Textile banners and roll-ups with print on them (criteria for printing companies, printed matter, envelopes, and other converted paper products).
- Toys/soft toys (criteria for toys).
- Shoes (covered by the EU Ecolabel’s criteria for shoes).

5.2 Definitions

Terms	Definition
Product licence	Only with a product licence the product is Nordic Swan Ecolabelled. It is a mandatory licence for companies, that want to place products in its own brand on the market with the Nordic Swan Ecolabel. The ecolabelled product may be e.g., fibres, yarns, fabric or finished goods for the end marked. A product licence will always draw on one or more manufacturing licences.
Manufacturing licence	The licence where most of the environmental requirements are documented. A manufacturing licence does not provide Nordic Swan Ecolabelled products. The licence gives the right to produce for product licences and this within a product range specified in the manufacturing licence (product types and material compositions). A holder of a manufacturing licence can communicate to brand owners, that they can produce for Nordic Swan Ecolabelled products if the brand owner applies for a product licence within the same product range as defined in the manufacturing licence. A manufacturing licence does not give the right to communicate that the product is Nordic Swan Ecolabelled or meets the requirements of the Nordic Swan Ecolabel. A brand owner who also produces the textile or wants to be the holder of a manufacturing licence, must always also have a product licence.

Ingoing substances	All substances, in the chemical product, including additives (e.g., preservatives and stabilisers) in the raw materials. Substances known to be released from ingoing substances (e.g., formaldehyde, arylamine and in-situ generated preservatives) are also regarded as ingoing substances.
Impurities	Residuals, pollutants, contaminants etc from production, including production of raw materials, that remain in the raw material/ ingredient and/ or in the chemical product in concentrations less than 100 ppm (0.0100 weight%, 100 mg/kg). Impurities according to this definition are not regarded as ingoing substances and are therefore except from the 0ppm restriction. Examples of impurities are residues of the following: reagents including monomers, catalysts, by-products, "scavengers" (i.e., chemicals used to eliminate/minimise undesirable substances), cleaning agents for production equipment, and carry-over from other/earlier production lines.
Laminate	A laminated fabric is a two (or more) layer construction with a polymer film bonded to a fabric. Laminated fabrics are used in rainwear, automotive, and other applications.
Textile	Material made from weaving, knitting, crocheting, thread lacing, or made from felted fibres.
Textile element	"Textile element" is the designation of a unique textile element on the final product. "Textile element" describes the finished textile. Various textile elements have different supply chains or are produced differently, but may be of the same fibre type. Textiles which are only distinguished by dyeing or printing by the same supplier are considered to be the same textile element. For example, polyester from supplier 1 is one textile element, and polyester from supplier 2 will thus be another textile element. Two different types of polyester from the same supplier will also be separate textile elements.
Fibre type	Types of textile fibre such as cotton, wool, polyester, and regenerated cellulose.
Reused textiles, hides/skins, leather	Reused textiles, hides/skins, leather, and filler materials are defined here as post-consumer materials or pre-consumer, where it can be documented that the material is a residual material or waste from another business. Fabrics (not made-up) are only counted as reused textiles, if it can be documented that more than two years have elapsed since the fabric was originally produced
Recycled material **Chemical recycling**	Recycled material is defined in the requirement according to ISO 14021, which applies the following two categories: **"Pre-consumer/commercial"** is defined as material that is recovered from the waste stream during a manufacturing process. Materials that are reworked or reground, or waste that has been produced in a process, and can be recycled within the same manufacturing process that generated it, are not considered to be pre-consumer recovered material. Nordic Ecolabelling considers reworked, reground or scrap material that cannot be recycled directly in the same process, but requires reprocessing (e.g. in the form of sorting, remelting and granulating) before it can be recycled, to be pre-consumer/commercial material. This is irrespective of whether the processing is done in-house or externally. **"Post-consumer/commercial"** is defined as material generated by households or commercial, industrial, or institutional facilities in their role as end-users of a product that can no longer be used for its intended purpose. This includes materials from the distribution chain. The definition of chemical recycling used here includes processes in which the final product is either monomers, oligomers, or higher hydrocarbons. Processes with end-product in the form of naphtha or pyrolysis oils are not covered.
Recycled fibres	This covers both mechanical and chemical recycling of fibres and materials.

In this generation 5 of the criteria there are two types of licences:

1. Product Licence
2. Manufacturing Licence

Each licence type requires a separate application. To get a Nordic Swan Ecolabelled product, you must have both types of licences. See definitions in the table above in section 5.2.

5.3 Product licence

A company that, sells Nordic Swan Ecolabelled products under its own brand, or in other ways places a Nordic Swan Ecolabelled product on the market, shall as a minimum to obtain their own product licence meet the requirements O1 to O4 in this section, relevant part of requirement O96 and relevant requirements in section 5.18.

See more about product licence under definitions in section 5.2.

Background to requirement O1 Traceability of the Nordic Swan Ecolabelled product

This new requirement has been added to establish a licence structure that ensures contact between Nordic Ecolabelling and the brand owner regarding the Nordic Swan Ecolabelled product. Nordic Ecolabelling will now have the correct information about trade names, which can then be used to inform consumers and professional purchasers about the availability of Nordic Swan Ecolabelled textile products.

Logo print/brand name on the fabric is not necessarily the brand owner of the textile. Here the brand owner sells the Nordic Swan Ecolabelled products under its own brand, or in other ways places a Nordic Swan Ecolabelled product on the market.

Background to requirement O2 Unsold textiles, skins, and leather

The requirement has been set to ensure that unsold textiles, skins and leather and defect products from productions are used in the redesign of new products, sent for recycling, or donated to a charity. The aim of this is to achieve as great an environmental benefit as possible, despite the textiles not being sold for their intended purpose. The requirement also seeks to increase the focus on producing the “right” quantities and so avoiding overproduction.

The requirement has a few exemptions. Textiles, with contaminations which is either harmful to the environment or to health, are exempt from this requirement. The contamination must be documented by a test report, which is archived at the company and thus accessible by inspection from Nordic Ecolabelling. At the same time for security reasons military and police uniforms are also exempt from this requirement.

Background to requirement O3 Information on reduced washing

The use stage itself has a significant impact on energy consumption and thus climate change when it comes to clothing that is washed. In particular, the washing temperature, the washing frequency and the use of the dryer are of great importance. As a consumer, it is possible to reduce the climate impact by washing only when necessary and washing at lower temperatures[46]. Textiles for the B2B market, e.g., bed linen and towels for hospitals and hotels, often require to be washed according to strict hygiene standards and are therefore exempt from the requirement.

Background to requirement O4 Primary textile packaging

See background to requirement: O91, O92, O93 and O94.

5.4 Manufacturing licence

All the following requirements in the criteria are included in the manufacturing licence.

For more about manufacturing licence see under definitions in section 5.2.

[46] The life cycle of a pair of jeans, understanding the environmental impact of a pair of Levi’s 501 jeans, Levi Strauss &Co, http://levistrauss.com/wp-content/uploads/2015/03/Full-LCA-Results-Deck-FINAL.pdf

5.4.1 Description of product and production methods

This section contains the general requirements for the products and is where the Nordic Swan Ecolabelled products and their production methods are to be described. Requirement limits concerning sewing thread, care labels, elastic and small textile elements are also outlined here.

Background to requirement O5 Product description

The requirement has been set to ensure that Nordic Ecolabelling has the correct information about the product, which can then be used to inform brand owners, consumers, and professional purchasers about the availability of Nordic Swan Ecolabelled textile products.

Background to requirement O6 Material composition

It is important that this information is entered correctly, as it determines which requirements are relevant for the licence in question.

Background to requirement O7 Production chain

The requirement has been set to ensure that the correct suppliers and processes are associated with the production licence. If any changes occur in the production chain, these changes must be reported to Nordic Ecolabelling.

5.5 Material limitations

Background to requirement O8 Material limits

The requirement has been set to adapt the criteria to specific materials such as sewing thread and embroidery thread and to control the types of products that can be Nordic Swan Ecolabelled with regard to the number of materials that are included. The aim of this is to ensure that the product fits in with the criteria and that the requirements are therefore relevant.

Embroidery is often used for logos. An exception to the requirements is granted if the total embroidery area on the product is a maximum of 50 cm2, i.e. that if several areas on the product are embroidered, then these areas must be added together and be max. 50 cm2. The exception is given to avoid documentation far back in the production chain for small embroideries and thereby make the application process easier.

Background to requirement O9 Smaller textile elements

The requirement makes it possible for small textile elements that have either an EU-Ecolabel, a GOTS certificate or Oeko-Tex 100 class I certification (and have been declared free from fluorinated substances) to be exempt from documenting the requirements for fibre and textile production. Textile products may comprise many different fabrics with totally different production chains. The requirements for the fabrics used are comprehensive in these criteria, going all the way back to the raw material supplier, and require documentation of all the chemicals used in every stage of the textile production. The choice has therefore been made to permit the use of the other stated certifications for smaller textile elements to make the application process easier.

The previous generation of the criteria included an exemption where fibre types that are not subject to requirements in the document may make up a total of 5% of the product by weight. This has been removed, since the criteria now cover more relevant fibre types, including silk.

Background to requirement O10 Elastic bands

The requirement allows the use of up to a maximum of 25% by weight of elastic bands. Here, an exception is given for the fibre requirements in section 5.7 on recycled or bio-based elastane fibres. Instead, the elastic band must be either GOTS (certification for "accessories") or Oeko-tex 100 Class I certified. Elastane fibres of recycled or bio-based material are not easily commercially available.

The assessment has been made that e.g., for underwear and sportswear there is a need to be able to use elastane fibres and elastic bands in order to achieve the desired function. These textile products come into close contact with the body, and it is therefore important to ensure that they do not contain any of the most undesirable substances that are harmful to health. A chemical test of the elastic band is therefore required either as a GOTS (certification for "accessories") or Oeko-tex 100 Class I certification.

Background to requirement O11 Info print/labels

The requirements for the fabrics used are comprehensive in these criteria, going all the way back to the raw material supplier, and require documentation of all the chemicals used in every stage of the textile production. The decision has therefore been taken to set a triviality limit for info labels, which are such a tiny part of the finished textile product, to make the application process easier. Though information printed directly on the textile product itself must meet the stated requirements.

Background to requirement O12 Zippers, buttons and other details

Details without any function such as sequins and rivets only for decoration are not allowed as they will interfere with future recycling of the fabric. Thus, for example, a sequin dress will not be able to carry the Nordic Swan Ecolabel. The requirement for metals has been set to ensure that people are not exposed to the effects of heavy metals and phthalates that are harmful to health. The lead requirement has been changed to harmonise with the equivalent requirements of Oeko-Tex 100 class I, GOTS and the EU Ecolabel. It is thus now possible to use a certificate from GOTS or Oeko-Tex 100 class I for metal details. The EU Ecolabel cannot be used as documentation for the cadmium requirement since the EU Ecolabel accepts 50 mg/kg. The limit values for cadmium and nickel are the same as in generation 4 of the criteria. The plastic requirement also remains unchanged since generation 4.

By details is meant, for example, buttons, pushbuttons, zippers, sequins, rivets. In case of doubt contact Nordic Ecolabelling.

5.6 Re-design of re-used textiles, hides/skins, and leather

Nordic Ecolabelling wishes to promote the re-use of textiles, hides/skins, and leather. However, to prevent the spread of substances that are harmful to health and the environment, the reused textile, hide/skin, and leather elements used must meet the requirements below. Other newly produced elements of the product and details such as buttons and zippers must meet the relevant requirements in the criteria.

If the re-used material or the finished product is subject to additional processing with chemical products (e.g. dyes, printing, finishing, etc.), the requirements in sections 5.8.1 and 5.8.2 regarding the relevant chemicals must be fulfilled and documented. Reused textiles, hides/skins or leather that are not further processed using chemicals

do not need to meet the requirements concerning chemicals used in textile, hide/skin, and leather production.

The requirements regarding recycled fibres are described in the section on fibre production since this section only addresses textile recycling.

Background to requirement O13 Re-design of re-used textiles, hides/skins, and leather

The aim of the requirement is to promote reuse of used textile, hide/skin, and leather products. There is also an environmental gain associated with the use of textile, hide-skin and leather residues/waste which cannot otherwise be used in the production system that generated it. Increased reuse is important in stimulating a circular economy for textiles. This maintains the value of the material at a high level, as it saves on resources, energy, and chemical load by not having to produce new textiles[47].

There is generally no traceability for reused textiles, hides/skins, and leather with regard to the chemicals used in the original production, and so the recycled material may contain harmful chemicals. The Swedish Chemicals Agency has identified 2,400 substances that are used in textile production.

Of these, 10% are considered to pose a potential health risk for humans by being carcinogenic, allergenic, endocrine disruptors and so on[48]. Even post-consumer textiles that have been washed several times have been found to contain harmful chemicals[49]. The requirement concerning textiles not previously ecolabelled or Oeko-Tex certified therefore contains a limitation on the product types for which reused material may be used. These limitations have been set, based on how the product is normally used and thus how the user is exposed to any harmful chemicals.

5.7 Fibre production

Nordic Ecolabelling sets requirements concerning the production of both natural fibres and synthetic fibres. Natural and synthetic fibres all impact on the environment in one way or another. Synthetic fibres, for example, uses fossil resources, while conventional cultivation of cotton involves high consumption of water and pesticides.

The criteria cover the most common fibre types in the textile industry, with the intention of promoting the variants of each individual fibre type with the best environmental profile. Nordic Ecolabelling also wishes to encourage the textile industry to work towards more sustainable textile production along the whole value chain. The approach here is therefore to focus on the fibre types that are most widely used and thus make a major contribution to the textile industry's environmental impact – in order to nudge them in a less environmentally harmful direction – and to promote new, less environmentally harmful, fibres. This makes it possible to steer even more textile production in a sustainable direction.

[47] Ellen MacArthur Foundation, A new textiles economy: Redesigning fashion's future, (2017, http://www.ellenmacarthurfoundation.org/publications).
[48] Swedish Chemicals Agency (2014). Chemicals in Textiles – risks to human health and the environment. Report from a government assignment. Report 6/14.
[49] Nordic Council of Ministers (2016). Gaining benefits from discarded textiles: LCA of different treatment pathways.

The fibres are usually spun. However, if the if fabric is non-woven, for example as a substrate (e.g., for laminates, coatings, and membranes), the fibre raw materials must also meet the requirements associated with the relevant fibre in this section.

Fibres must comply with relevant requirements for the type of fibre in the criteria, regardless of whether they apply for Nordic Ecolabelling of fibre, yarn, fabric or finished textile product. The following fibre types can be Nordic Ecolabelled at fibre level: Organic cotton fibres, wool, and other creatine fibres (either sheep, camel, alpaca, or goat), regenerated cellulose, flax (flax), silk, bamboo, sisal and other bast fibres.

Natural fibre

Vegetable fibres are subject to specific requirements concerning 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 level of residues of pesticides against parasites in wool, as well as COD discharges in wastewater.

Regenerated cellulose fibre

Raw material for regenerated cellulose fibres must either consist of recycled raw material or a high proportion of certified FSC or PEFC wood raw. In addition, requirements banning use of endangered wood species. The production of regenerated cellulose fibres must be a closed loop system or for textiles with less than 30% regenerated cellulose in the fabric, productions that meet strict requirements for emissions are also accepted. In addition, bleaching of cellulose pulp or cellulose fibres with chlorine gas or hypochlorite is prohibited.

Synthetic fibre – recycled fossil or biobased

Synthetic fibres are subject to the requirement that either they must be bio-based or recycled materials are used in production. For bio-based fibres, there are also requirements stipulating the types of raw materials that may be used and that they must not be cultivated using genetically modified raw materials. Recycled fibres are required to have been tested for content of harmful chemicals. For regenerated cellulose fibre, requirements are set regarding the production processes. Here, the fibre production must involve no discharge to wastewater, and sourcing of a high share of fibres from sustainable forestry or as recycled.

Fibre from recycled material

Fibre from recycled material/fibres* is exempted from the requirement for virgin fibre but, instead of meeting the requirements for the type of fibre concerned, the applicant must document that the material or fibre is purchased as recycled, and document requirement O30 on testing for content of undesirable substances. There are no requirements concerning chemicals used in the actual recycling processes. However, as with other chemicals added, for example during dyeing or spinning, there are requirements concerning the chemicals used in the treatment of the fibres in requirement O31 and the requirements for chemicals used in all the processes in the textile production, as set out in section 5.8.

** See definition of recycled material and fibre in section 5.2 Definitions.*

Fibre not covered by the criteria

Textile fibres that are not subject to any fibre requirements in these criteria may account for no more than 5% by weight of the individual fabric.

5.7.1 Cotton and other natural seed fibres of cellulose

Background to requirement O14 Cotton fibres

Cultivation of cotton is linked to serious health and environmental problems caused by the use of pesticides, fertilisers, irrigation water and monocultures.[50,51,52] Pesticides for cotton cultivation accounted for 5.7% of global pesticide sales and 16.1% of insecticide sales in 2014.[53] The environmental impacts of cotton production vary between countries and production systems. Production ranges from highly mechanised in Australia, Brazil and the US to smallholder farms or a mixture of scales in for example India, China and African countries.

Integrated pest management (IPM)[54] and agro-ecological[55] practises can reduce pesticide use. IPM means that growers must consider all available pest control techniques, for example biological control, crop rotation and resistant varieties, and pesticides must be the last choice. Training of farmers and farm workers and use of protective equipment are also important.

In organic farming, IPM is required along with other practises that promote soil health and biodiversity, and synthetic pesticides and fertilisers as well as genetically modified cotton are prohibited.[56]

IPM is required by law in some countries, for example in all of the EU. Voluntary private certification schemes and national programs promoting IPM also exist. The sustainability standards Fairtrade, CmiA and BCI encourage IPM and prohibit certain hazardous pesticides, including those on the Stockholm Convention and Rotterdam Convention lists and those classified by WHO as 1a and 1b.

In this revision, Nordic Ecolabelling has chosen to require organic cotton for most of the products that carry the Nordic Swan Ecolabel. This is in line with Nordic Ecolabelling's view of organic farming as a means of sustainably protecting soil, water resources and biodiversity. Although organic cotton production is low on a global basis, there is a strong interest in organic products in the Nordic market. This requirement sees us return to the requirement in version 3 of the criteria for Nordic Swan Ecolabelled textiles, and increase the level from version 4, which requires 10%

[50] Pesticide Action Network UK (2018) Is cotton conquering its chemical addiction? A review of pesticide use in global cotton production. https://issuu.com/pan-uk/docs/cottons_chemical_addiction_-_update?e=28041656/62705601
[51] European Commission, Joint Research Centre (2013) Revision of the European Ecolabel and Green Public Procurement (GPP) Criteria for Textile Products – Technical report and criteria proposal, Working document, Institute for Prospective Technological Studies (IPTS).
[52] Kooistra K, Termorshuizen A, Pyburn R (2006) The sustainability of cotton – consequences for man and the environment. Wageningen University & Research, report no. 223.
[53] Pesticide Action Network UK (2018) Is cotton conquering its chemical addiction? A review of pesticide use in global cotton production. https://issuu.com/pan-uk/docs/cottons_chemical_addiction_-_update?e=28041656/62705601
[54] https://www.fao.org/pest-and-pesticide-management/ipm/principles-and-practices/en/
[55] https://www.fao.org/agroecology/overview/en/
[56] Nordic Swan Ecolabel: Organic farming (accessed 02.09.2022) https://www.nordic-ecolabel.org/nordic-swan-ecolabel/environmental-aspects/sustainable-raw-materials-and-biodiversity/organic-farming/

organic cotton with the addition that the remaining 90% should document a low pesticide content.

Although this is a major tightening of the requirement, experience tells us that many of the licences for generation 4 already used 100% organic cotton.

Exemptions from the requirement for 100% organic cotton

However, the cost of organic cotton can be a barrier in relation to competitiveness, particularly for professional textiles. An exception has therefore been made for these to ensure that these are still relevant for e.g., public procurement. Since professional textiles are not a clearly defined product group, this review narrows it down to clothing (uniforms and workwear) and textiles such as towels, bathrobes, bed linen, duvets, pillows, curtains and rugs for hotels, hospitals, and other institutions. Products not listed may be judged to be professional textiles by Nordic Ecolabelling or through a Nordic assessment.

Textiles where exemptions from the requirement for 100% organic cotton can be used shall meet the standards of FairTrade cotton, CmiA (Cotton made in Africa) or BCI (Better Cotton Initiative). A certificate from one of the standards is required as documentation. Genetically modified cotton is also prohibited. This must be documented for BCI cotton that permits its use. A genetic test of the cotton for every batch purchased is required as documentation. The test must be performed to standard IWA 32:2019, a relatively new test that can identify the presence of genetically modified raw cotton.

Recycled cotton fibre

It is also possible to Nordic Swan Ecolabel textiles that contain recycled cotton fibre. This is cotton fibre that is recovered from used clothing and textiles from consumers or industrial waste (post- or pre-consumer textile waste). Industrial textile waste may be surplus material from the production of yarns, textiles, and textile products, for example selvedge from weaving and fabric remnants from factory cutting rooms. The textiles are stripped and pulled into fibres, which are then carded and spun into new yarn. Recycled cotton may also be blended with virgin fibres to improve yarn strength.[57]

GMO

GMO is a highly debated topic, and several countries have banned cultivation of GMOs. Topics discussed are food security, land use, lack of scientific knowledge about effects under local agricultural/forest conditions and risk of adverse effects on health and the environment.

Nordic Ecolabelling emphasises the precautionary principle and bases its position on regulations that have a holistic approach to GMOs. This means that sustainability, ethics, and benefit to society must be emphasised together with health and the environment. We are not in principle against genetic engineering and GMOs per se but are concerned about the consequences when genetically modified plants, animals and microorganisms are propagated in nature. Nordic Ecolabelling believes that GMOs should be assessed on a case-by-case basis.

[57] Wikipedia - Cotton recycling, https://en.wikipedia.org/wiki/Cotton recycling (accessed 26.08.2019).

Research has not clearly shown that today's GMOs contribute towards sustainable agriculture with less use of pesticides, and there is a lack of research into long-term consequences of GMOs, both environmental, social, and economic consequences.

There are potential adverse effects of GMOs along the entire value chain from crop research and development, through cultivation, storage, use and waste management.[58] In several of these stages, there is a lack of scientific studies, and there is a lack of holistic assessment.[59,60,61,62] Today's GMOs are also adapted to industrial agriculture with companies that have obtained a monopoly-like position, and Nordic Ecolabelling wishes to contribute to limiting the negative consequences of this.

Genetically modified cotton is grown primarily in India, the United States, China, and Australia. Most common is Bt cotton, which produces a substance that is toxic to certain insects' pests. Despite years of use there is still uncertainty about the long-term ecological consequences.[63,64] In several countries and regions, insects have become resistant to the toxins produced by the cotton plants, but it varies how long it has taken.[65,66] In India, Bt cotton was first used in 2002. Up to 2006, less insecticide was used overall (amount of active ingredient per hectare) because Bt cotton fought the most common insect pest. [67] However, due to spraying against other insect pests, the use of insecticides increased overall again until 2013, and after 2015 resistant insects have also become a problem.[68] In Australia, integrated pest management was used from the 1990s, which probably contributed to delaying resistance. The use of insecticides in Australia has decreased, first in Bt cotton and then in non-organic cotton, but the use of herbicides has not been reduced.[69]

5.7.2 Silk, flax (linen) and other bast fibres (hemp, jute, and ramie)

Background to requirement O15 Silk

This requirement is new since the previous generation of the criteria did not include silk. The use of silk in Nordic Swan Ecolabelled textiles has been assessed to be

[58] Catacora-Vargas G (2011): "Genetically Modified Organisms – A Summary of Potential Adverse Effects Relevant to Sustainable Development. Biosafety Report 2011/02, GenØk – Centre for Biosafety.
[59] Catacora-Vargas G (2011): Genetically Modified Organisms – A Summary of Potential Adverse Effects Relevant to Sustainable Development. Biosafety Report 2011/02, GenØk – Centre for Biosafety.
[60] Kolseth et al (2015) Influence of genetically modified organisms on agro-ecosystem processes. Agriculture, Ecosystems and Environment. 214 (2015) 96–106.
[61] Fischer et al. (2015) Fischer et al. (2015): Social impacts of GM crops in agriculture: a systematic literature review. Sustainability 7:7.
[62] Catacora-Vargas G et al. (2018): Socio-economic research on genetically modified crops: a study of the literature. Agriculture and Human Values 35:2
[63] Venter HJ, Bøhn T (2016) Interactions between Bt crops and aquatic ecosystems: A review. Environ Toxicol Chem 35(12):2891–2902.
[64] Kolseth et al (2015) Influence of genetically modified organisms on agro-ecosystem processes. Agriculture, Ecosystems and Environment. 214 (2015) 96–106.
[65] Blanco CA et al. (2016) Current situation of pests targeted by Bt crops in Latin America. Curr Opin Insect Sci 15:131–8.
[66] Tabashnik BE, Brévault T, Carrière Y (2013) Insect resistance to Bt crops: lessons learned from the first billion acres. Nature Biotechnology 31:6.
[67] Pesticide Action Network UK UK (2017) Is cotton conquering its chemical addiction. A review of pesticide use in global cotton production. http://issuu.com/pan-uk/docs/cottons_chemical_addiction_-_final_?e=28041656/54138689
[68] Pesticide Action Network UK UK (2017) Is cotton conquering its chemical addiction. A review of pesticide use in global cotton production. http://issuu.com/pan-uk/docs/cottons_chemical_addiction_-_final_?e=28041656/54138689
[69] Pesticide Action Network UK UK (2017) Is cotton conquering its chemical addiction. A review of pesticide use in global cotton production. http://issuu.com/pan-uk/docs/cottons_chemical_addiction_-_final_?e=28041656/54138689

relevant. Silk is often used in the textile products of brands that mainly use timeless basic designs in their collections – also known as slow fashion[70]. Natural fibres such as silk and wool are generally considered to be an obvious choice for textiles that last. These fibres provide good breathability and are slow to take on odours[71]. There is no specific standard for organic silk, but as with other organic natural fibres, silk fibre can be certified as organic according to an approved standard within the Organic IFOAM Family that is relevant to the production type in question[72]. Organic cultivation means no use of artificial fertilisers or pesticides when growing mulberry trees or other plants for silkworms.

Background to requirement O16 Flax (linen) and other bast fibres

The use of natural fibres in textiles has the advantage that it does not draw directly on fossil resources. It remains relevant, however, to consider whether these natural fibres are sustainably cultivated with minimum damage to the environment. It is, for example, important to ensure that there has been no use of harmful pesticides that could lead to a loss of biodiversity.

Pesticides may only be used for the cultivation of flax (linen) and other bast fibres if those pesticides are permitted according to Regulation (EC) No 1107/2009. The requirement is documented with the European Flax Standard certificate or equivalent. European Flax Standard is a certification scheme for flax grown in Europe. The flax is thus grown in accordance with EU 1107/2009. It is not uncommon for flax from Europe to be sold to countries in Asia for use in textiles and several Asian productions have a certificate for the European Flax Standard.

Background to requirement O17 Water retting of flax (linen) and other bast fibres

Water retting is prohibited unless the wastewater is cleaned to reduce the content of organic material and so comply with the requirement levels. Either biological or chemical retting is necessary to separate the fibres from the inner stem and the outer shell. This is done by exposing the stem or other bast fibre to moisture and heat. Water retting is the most effective method, but there are other methods such as placing the fibres in a tank and adding enzymes. Emissions of retting wastewater with a high content of organic material to the aquatic environment can result in a lack of oxygen during degradation, which can damage the aquatic animal and plant life. Water retting is used not only for bast fibres but also for sisal fibres[73]. The requirement is unchanged since the current level remains relevant. The EU Ecolabel for textile products has an equivalent requirement concerning COD emissions from water retting. It also includes a requirement that flax and other bast fibres shall be rented under ambient conditions and without thermal energy inputs. Nordic Ecolabelling has chosen not to set this requirement, but instead to focus on pesticide use during fibre cultivation. Requirements for water retting are not covered by the European Flax Standard.

5.7.3 Wool and other keratin fibres

Background to requirement O18 Woll and other keratin fibres

[70] Slow fashion https://en.wikipedia.org/wiki/Slow_fashion
[71] Design for Longevity Guidance on increasing the active life of clothing, 2013, http://www.wrap.org.uk/sites/files/wrap/Design%20for%20Longevity%20Report_0.pdf
[72] Organic IFOAM Family of Standards https://www.ifoam.bio/en/ifoam-family-standards-0
[73] Buch, Lignocellulosic Composite Materials, Springer International Publishing 2018.

The requirement only accepts wool fibre from sheep and other keratin fibres from camels, alpaca, and goats. Angora wool from rabbits is not accepted, for example.

Wastewater from washing wool (scouring) often contains large quantities of pesticides that are used to treat sheep. Pesticide residues can have a significant environmental impact if discharged into the aquatic environment. At the same time, pesticides such as organochlorine compounds, which are known to be toxic, non-readily degradable and bio accumulative, may also harm the environment while active in the wool. Despite a ban, this type of pesticide is still used[74]. Wool scouring firms and exporters of wool have the greatest scope to control the use of pesticides for ectoparasites by issuing absolute requirements to the wool producers (farmers). This requirement can therefore be documented by at least 75% of the wool farmers declaring that they do not use the above-mentioned pesticides. Organic wool automatically meets the requirement. According to the International Wool Textile Organization (IWTO), in 2015 less than 1% of global sheep farming was organic[75]. Since wool at the same time accounted for only 1% of the total fibre production (figures from 2017), the total amount of organic wool is not that extensive. The judgement has therefore been made that only accepting organic wool would be too tough a requirement.

Test method IWTO DTM-59: 2009; Method for the Determination of Chemical Residues on Greasy Wool[76]. This method tests for the presence of four groups of pesticide residues: organochlorine compounds, organophosphates, synthetic pyrethroids and insect growth regulators.

Background to requirement O19 Scouring agents

The requirement is set to minimize the environmental impact of washing of wool. Here wool detergents are used, which are discharged with the wastewater and thus can affect the aquatic environment. Therefore, these are required to be biodegradable. Raw wool is washed (scoured) to remove dirt, grease, and suint. This is typically performed using water, detergent, and an alkali, but a solvent may also be added to remove oils that are not water soluble.

Background to requirement O20 COD emissions from wool scouring plants

The COD (chemical oxygen demand) requirement remains unchanged from the previous generation of the criteria. The requirement has now been harmonised with requirements set by both the EU Ecolabel and GOTS. The requirement is now split into differentiated requirement levels for fine and coarse wool. The requirement was formerly 20 g/kg for all wool, whether fine or coarse, which did not work optimally. The decision has therefore been made to set the same requirement levels as both the EU Ecolabel and GOTS. This will make it possible to use these wool certifications as documentation for the COD requirement. The EU Ecolabel does not have a pH or temperature requirement, and therefore cannot be used as documentation for that part of the requirement.

Dirt, grease, and suint that are washed out before the wool can be further processed can pollute wastewater discharged into the environment. COD indicates the amount of oxygen consumed through complete oxidation of the organic material under

[74] Ravidnran, J. et al., Organochlorine pesticides, their toxic effects on living organisms and their fate in the environment, Interdiscip Toxicol. 2016 Dec; 9(3-4): 90-100.
[75] International Wool Textile Organization (IWTO), “Wool Production.” Accessed 07.09.2017: http://www.iwto.org/wool-production
[76] https://www.iwto.org/sites/default/files/images/iwto_news/image/INDEX-Red%20Book%202015.pdf accessed 13.05.2019.

aerobic conditions. The higher the COD emissions, the more oxygen consumption the discharge will cause and the greater the risk of oxygen deficiency in the aquatic environment. This potential environmental impact can be significantly reduced by removing dirt, grease, and suint from the wool, with the resource-efficient bonus of maximising their value as by-products. Removing dirt and grease from the wool also helps to minimise energy consumption and the need for detergents in the wool scouring plant[77].

Background to requirement O21 pH value and temperature of wastewater from scourign

The requirement has been set so that the discharge of wastewater into surface water does not interfere with the aquatic environment by changing the pH or temperature to a large extent locally, thereby disturbing the natural balance of the aquatic environment. If national legislation sets requirements in this area, this must also be complied with. However, the requirement in these criteria must still be documented. The requirement remains unchanged from the previous generation of the criteria.

Background to requirement O22 Ban on mulesing

Mulesing remains a problem associated with merino wool. Merino sheep are specially bred to have wrinkled skin, so that they produce more wool. This causes urine and faeces to collect around the hind quarters, which attracts flies, who then lay eggs in the folds of skin. Surgical mulesing involves removing wool and skin on the rear end of the sheep to avoid parasites from egg-laying flies. This method is primarily used in Australia. The requirement prohibits this type of treatment and must be documented with a declaration from the wool producer stating that mulesing is not performed.

In 2018, the New Zealand government imposed a ban on surgical mulesing. In Australia, the majority of the country's wool producers still use surgical mulesing [78]. There is, however, a move to find alternatives and Australia's newest non-surgical alternative to the surgical method will be available to sheep farmers in 2019. The process involves the use of liquid nitrogen on the rear of the sheep[79]. Existing alternatives to surgical mulesing include breeding programmes, which involve selective breeding of sheep with low sensitivity to fly strike. Other measures focus on the actual farming practices, such as adjusting the time of shearing the sheep and the time of lambing, as this also helps to minimise the problem of blowfly strike. Work is also under way on various forms of blowfly control. The combination of these measures is considered to be sufficiently effective, compared to surgical mulesing[80].

5.7.4 Regenerated cellulose fibre

Raw materials for regenerated cellulose fibres must meet either requirements O23 or O24 for recycled textile fibre and wooden fibre materials, respectively. A fibre which is based on raw materials from a combination of requirements O23 and O24 can also be approved if the different raw materials each meet their own requirements.

[77] Revision of the EU Green Public Procurement (GPP) Criteria for Textile Products and Services, Technical report with final criteria, JRC 2017.
[78] New Zealand Bans Mulesing, article Sept. 2018 at https://www.peta.org.au/news/new-zealand-bans-mulesing/
[79] Non-surgical mulesing alternative for Australasia, article Sept. 2018 at https://www.ecotextile.com/2018091123719/materials-production-news/non-surgical-mulesing-alternative-for-australasia.html
[80] Mulesing & Welfare at http://blogs.ubc.ca/mulesing/take-home-message/

Background to requirement O23 Regenerated cellulose fibre, recycled textile fibre

With this requirement Nordic Ecolabelling wants to promote the use of recycled cellulose based textiles, as a raw material for the production of new regenerated cellulose fibres. It is positive for the environment and contributes to the circular economy. E.g., the company Renewcell[81] produces Circulose® which is a cellulose pulp made from old textiles. This can be used for the production of new fibres with viscose or lyocell processes. Other companies[82,83,84] also say they will or already produce new fibres from cellulosic waste from textiles and other waste.

Recycled material is defined as pre-consumer and post-consumer waste according to ISO 14021. As documentation for the material to be traced as recycled, certificates from Global Recycled Standard (version 4 or later) or Recycled Claim Standard (version 2 or later) must be used. The minimum requirement for recycled fibre is only 5% for Recycled Claim Standard and 20% in Global Recycled Standard. Hence the proportion of recycled material must also be documented to be 100%.

The requirement can be combined with the following requirements if the material of the regenerated cellulose fibre is a combination of recycled cellulosic textile waste and cellulose fibres, that comes from wood fibres that meet the requirement O24.

Background to requirement O24 Regenerated cellulose fibre, recycled textile fibre

Several tree species are restricted or not permitted for use in Nordic Swan Ecolabel products. Many of the restricted tree species are grown in countries which still have large areas of Intact Forest Landscape (IFLs). These are important to protect due to biodiversity and climate. A lot of these countries also have a high risk of corruption and the national legislation related to environment, human rights and ownership to land are weak and/or not controlled by the authorities. Applying a precautionary approach, the use of listed restricted tree species must comply with strict requirements on origin, traceability and certification.

The list of prohibited species contains species on the CITES list while the list of restricted species contains species on the IUCN red list (categorized as critically endangered (CR), endangered (EM) and vulnerable (VU)), Rainforest Foundation Norway list and Siberian Larch (originated outside the EU). Restricted species can be used in Nordic Swan Ecolabelled products if certain strict conditions on origin, certification and traceability are met.

The requirement only applies to virgin wood and not wood defined as recycled material in accordance with ISO 14021. For more information about Nordic Swan Ecolabelling's approach on forest, click here.

Background to requirement O25 Regenerated cellulose fibre, traceability, and certified raw materials

The requirement concerns the use of raw materials, which must be legally harvested and not come from protected areas of land. The raw material for regenerated cellulose fibre is usually wood fibre or bamboo. Recycled cotton or viscose fibre may also be used. This revision retains the requirements for the use of certified wood and the certification share has been increased from 30 to 50%. In addition, bamboo is

[81] https://www.renewcell.com/en/
[82] https://infinitedfiber.com/
[83] https://www.tencel.com/refibra
[84] https://spinnova.com/product/

required to be grown in forest areas that are certified according to one of the FSC or PEFC standards. More information about Nordic Ecolabelling's forestry requirements can be found on the Nordic website[85]. Nordic Ecolabelling also wants to stimulate the use of recycled fibre and sees that in Sweden renew cell is produced as a cellulose pulp of old cotton and viscose fibres, which can be used in new fibre production.

Background to requirement O26 Bleaching with chlorine gas

Chlorine gas is not used for bleaching cellulose pulp in Europe today, but it is still in use in some parts of the world. In the hearing, we were told that chlorine gas and hypochlorite can still be used in the production of cellulose for regenerated cellulose fibres. Because there are good alternative bleaching methods for cellulose pulp today, the previous ban on bleaching with chlorine gas will be continued. When bleaching with chlorine dioxide, residues may arise as a by-product, and these are therefore exempt from the requirement. Hypochlorite is still used in the bleaching of regenerated cellulose fibres in Europe and is prohibited in this revision.

Background to requirement O27 Regenerated cellulose fibre, process

The requirements regarding the production of regenerated cellulose have been tightened in this generation of the criteria. The purpose is to promote the more environmentally friendly manufacturing methods such as the lyocell process and the Spinnova process. I.e., processes with more than 98% recycling rate for chemicals used or processes without the use of chemicals. This limits emissions of harmful chemicals to air and water. Examples of such processes are the lyocell process (>99% recovery of biodegradable solvent) and the Spinnova process (mechanical spinning without chemicals). Other newly developed processes can be approved as "closed loop" after the assessment of Nordic Ecolabelling.

A consultation response was given that viscose fibres have desired properties in combination with other types of fibres that the more environmentally friendly regenerated cellulose fibres do not have. It has therefore been opened that a limited amount of the fibres in the fabric can be viscose fibres that meet the same emissions requirements as before. Since the forest requirement has also been tightened up, the requirement will still promote fibres from the best producers.

5.7.5 Synthetic fibre

Synthetic fibre is subject to the requirement that the fibre must either comprise recycled material, if it is of fossil origin, or be bio-based (see further definition of these in the requirements below). The requirement sets out which types of recycled and bio-based raw materials are acceptable.

Background to requirement O28 Synthetic fibre – fossil origin

Nordic Ecolabelling wishes to support a circular economy by encouraging the use of recycled materials over virgin raw material – in this case crude oil. The requirements for the various synthetic fibres have therefore been changed in this generation of the criteria. The criteria now only accept recycled materials as the input for synthetic fossil textile fibres that account for more than 5% by weight of the individual textile element.

Elastane fibres based on recycled material are still not widespread. As elastane is included in many different textile products, an exception has been inserted for

[85] Nordic Ecolabelling, Forestry requirements. https://www.nordic-ecolabel.org/certification/paper-pulp-printing/pulp--paper-producers/forestry-requirements/

elastane fibres for up to a maximum of 10% elastane fibres in the fabric if the elastane fibre instead is STANDARD 100 by OEKO-TEX (annex 4 class II) certified.

Substantial environmental potential is expected in the future with regard to reduce resource consumption and CO_2 emissions[86], if the textile industry is able to covert textile waste into new raw materials. However, today fibre-to-fibre recycling remains limited for textiles[87], and recycled polymers from other synthetic materials such as plastics are often used today. The requirement therefore accepts both fibre-to-fibre recycling and polymer-to-fibre recycling. Nordic Ecolabelling wishes to stimulate increased use of recycled materials in textile production, thus avoiding the use of virgin fossil materials. It is currently reasonably possible to use recycled material for fibre types such as polyester and polyamide, but the same options are not as widely available for other fibre types as yet (August 2019). The review “Environmental impact of textile reuse and recycling - A review”[88] describes that there is strong support for claims that textile reuse and recycling in general reduce environmental impact compared to incineration and landfilling, and that reuse is more beneficial than recycling. Benefits mainly arise because of the assumed avoidance of production of new products. The is also scenarios under which recycling may not be beneficial, for example in cases where the avoided production processes are relatively clean.

The requirement therefore seeks to encourage fibre types, that are able to make use of recycled feedstock. Advancements are being made in this area all the time and the possibility of using recycled feedstock may therefore change over time.

Prohibition on the use of re-granulate resulting from reprocessing processes that have obtained an approval pursuant to Commission Regulation (EC) No 282/2008 on recycled plastics materials and articles intended for food contact or approval pursuant to Regulation (EC) No 282/2008 to the Code of Federal Regulations Title 21: Food and Drugs, PART 177 — INDIRECT FOOD ADDITIVES: POLYMERS. These are both approvals for the material to be used for food contact. It is not desirable for textile production to use processed, recycled raw materials approved for food packaging production. Plastic materials approved for food packaging require the highest traceability and purity of the plastic raw material and it will therefore be down cycling to use this plastic for anything other than food contact products.

The requirement states that the feedstock used in the recycled raw material must be traceable. Without traceability, it is difficult to ensure that the material really is recycled. Traceability can be documented with a certificate from a third-party certifier of the supply chain, such as the Global Recycled Standard, for example. The Global Recycled Standard (GRS) is an international, voluntary standard that sets requirements for third-party certification of recycled content and chain of custody in the supply chain. This standard restricts the use of undesirable chemicals in the manufacture of new products, but the standard does not cover chemicals that may enter via the recycled materials, and thus gives no guarantee about what may be present in the finished GRS product[89] (see more on undesirable chemicals in recycled materials in requirement O30). Alternatively, traceability may be

[86] Sandin, G, Environmental impact of textile reuse and recycling – A review, Journal of Cleaner Production Volume 184, 20 May 2018, Pages 353-365.
[87] PULSE OF THE FASHION INDUSTRY, Global Fashion Agenda & The Boston Consulting Group 2017.
[88] Sandin, G, Environmental impact of textile reuse and recycling – A review, Journal of Cleaner Production Volume 184, 20 May 2018, Pages 353-365.
[89] Global Recycled Standard http://textileexchange.org/wp-content/uploads/2017/06/Global-Recycled-Standard-v4.0.pdf

documented by the producer of the recycled raw material declaring that 100% recycled feedstock has been used.

Recycled polyester

The main source of recycled feedstock for polyester fibre is currently rPET from used water bottles. PET may be recycled both mechanically and chemically[90]. An LCA conducted for the Nordic Council of Ministers[91] describes the environmental effects of chemical recycling of PET. The analysis shows that chemical recycling is better than incineration of PET, in terms of the following impact categories: climate change, water consumption and total energy consumption, but is worse than incineration when it comes to eutrophication and photochemical ozone creation potential. Several other studies confirm this result. A point is also made about uncertainty linked to data sets originating from the Teijin factory in Japan – one of the only commercial plants in operation today, where waste polyester products are chemically processed into new polyester filament fibres under the brand name ECO CIRCLE™ FIBERS. Teijin also produces rPET from PET bottles for polyester staple fibre and textiles under the brand name EcoPET[92].

Right now, there is a development in chemical recycling and here is a potential to be able to completely change the PET economy, so that all forms of PET in the future can be recycled and fibre-to-fibre[93].

Recycled polyamide

Polyamide (PA, nylon) can be recycled via the mechanical or chemical processing of nylon waste, as happens, for example, in the carpet industry. A comparative LCA study of virgin nylon and recycled nylon for carpet manufacturing, conducted for Shaw Carpets (2010) and reviewed by LBP-GaBi University of Stuttgart, highlights significant environmental benefits from the use of recycled nylon. There are, however, still only a limited number of recycled nylon suppliers. Econyl is one of the leading suppliers, with its nylon 6 for textile production, which uses a chemical process with 100% pre- and post-consumer recycled content[94]. The split is around 50% pre- and 50% post-consumer[95]. There are several examples of textile brands that use Econyl in their polyamide products. An EPD for Econyl declares that ECONYL® polymer is free from substances that are harmful to health and the environment due to being carcinogenic, mutagenic or reprotoxic, allergenic, PBT or vPvB[96].

Recycled polyurethane

Sheico Group, a Taiwanese sportswear manufacturer that also produces spandex, is able to produce 100% spandex with Global Recycled Standard (GRS) certification. Their Sheiflex spandex yarn is made from 100% recycled industrial waste spandex from its own and competitors' production lines. Sheico has managed to recycle

[90] Ragaert, K. Mechanical and Chemical Recycling of Solid Plastic Waste, 2017 Waste Management publication.
[91] Nordic Council of Ministers (2016). Gaining benefits from discarded textiles: LCA of different treatment pathways.
[92] Nordic Council of Ministers (2016). Gaining benefits from discarded textiles: LCA of different treatment pathways.
[93] Chemical Recycling, Making Fiber-to-Fiber Recycling a Reality for Polyester Textiles, GreenBlue 2018 hentet fra https://greenblue.org/work/chemical-recycling/
[94] http://www.econyl.com/textile-yarn/
[95] https://www.bipiz.org/en/advanced-search/aquafil-econyl-or-how-to-produce-nylon-6-from-100-regenerated-materials.html
[96] ENVIRONMENTAL PRODUCT DECLARATION for ECONYL® POLYMER, Aquafil 2013 and updated 2017.

spandex following the development of new technology. To ensure that the polymer from the waste yarn is dissolved homogeneously, so the recycled spandex can offer the same stability and quality as virgin spandex, an analysis of the recycled fibre is required in order to adjust the purity and viscosity before spinning[97].

Background to requirement O29 Synthetic fibre – bio-based origin

The requirement is new to these criteria and makes it possible to use bio-based polymer fibre. The requirement has been set to ensure that the renewable raw materials used do not originate from agricultural land created from the destruction of rainforest or the clearance of other valuable ecosystems. In terms of resources, the requirement promotes the use of renewable raw materials over virgin fossil materials. It is, however, important that the bio-based raw materials are grown sustainably. Even renewable raw materials may be associated with environmental and social problems.

There are several examples of bio-based polyester on the market, including Virent's BioFormPX paraxylene[98] and Ecodear® PET[99]. However, not all the mentioned bio-based polyester products meet the requirement here for at least 90% biomass in the polymer. It is not clear which biomass is used for these particular fibres but starch and sugar from sugar cane, sugar beet and maize are often used for the production of bio-based polymers. Starch currently accounts for 80% of the feedstock for biopolymers[100]. Castor oil, or oils such as soya or palm oil tend to be used to produce bio-based polyamide.

The establishment of palm oil plantations is one of the main causes of rainforest destruction, which threatens the existence of indigenous peoples, plants, and animals. Rainforests are particularly important for biodiversity, as they are the most species-rich ecosystems on the planet[101]. Soya beans are grown on land that is often established in the place of rainforest and savannah in South America. Soya production is one of the greatest threats to the rainforest on the American continent, particularly in the southern Amazon[102].

GMO

The requirement is new, as bio-based polymer fibre was not previously covered by the criteria. The requirement prohibits the use of genetically modified agricultural raw materials in bio-based polymer fibre. Process chemicals and raw materials, e.g., proteins, which are produced by the use of genetically modified microorganisms in closed systems, are not themselves GMOs or genetically modified, and Nordic Swan Ecolabeling do not consider such production as problematic.

GMO (genetically modified organisms) is a highly debated topic, and several countries have banned GMO cultivation. Topics discussed are food safety, land use, lack of knowledge of impacts under local agriculture/forest conditions and risk of adverse environmental and health impacts. Nordic Ecolabelling emphasizes the

[97] Spandex gets recycled certification, https://www.ecotextile.com/2017110723070/labels-legislation-news/spandex-gets-recycled-certification.html (accessed 26.02.2019)
[98] http://www.virent.com/news/virent-bioformpx-paraxylene-used-to-produce-worlds-first-100-plant-based-polyester-shirts/ accessed 20.02.2019.
[99] https://www.toray.com/products/fibers/fib_0131.html accessed 20.02.2019.
[100] https://aboutbiosynthetics.org/feedstock-to-fashion/ accessed 20.02.2019.
[101] OLSEN LJ, FENGER NA & GRAVERSEN J 2011. Palm oil – Denmark's role in the global production of palm oil. WWF Report DK. WWF World Wide Fund for Nature, Denmark.
[102] http://www.worldwildlife.org/industries/soy, (27.01.2016).

precautionary principle and is based on regulations that have a holistic approach to GMO, where sustainability, ethics and social benefits must be emphasized together with health and the environment. It is important to stress that Nordic Ecolabelling is not opposed to the technology itself but is concerned about the consequences of GM plants spreading in nature.

Research results have not clearly shown that today's GMO crops contributes to development towards sustainable agriculture with less use of pesticides. At the same time research on long-term effects of genetically modified plants, both environmental and socio-economic consequences, is lacking. There are potential adverse effects of GMOs along the entire value chain from research and development of plants, through cultivation, to storage, use and waste management[103],[104],[105]. In several of these stages, there is a lack of scientific studies, and a lack of assessment of the overall picture[106]. Today's GMOs are also adapted to industrial agriculture with companies that have obtained a monopoly-like position, and Nordic Ecolabelling wants to help limit the negative consequences of this.

5.7.6 Recycled fibres

Background to requirement O30 Recycled fibres/raw materials, test for environmentally harmful substances

The requirement is new in this generation of the criteria, which now contains a requirement, for example, that synthetic fibre must use recycled material as the constituent raw material. It is important to consider the potential exposure of the user and the environment to undesirable chemicals from recycled material. The requirement covers the chemical substances and substance groups that are at greatest risk of being present in recycled fibre for textile production. Recycled fibre may contain residues of additives from previously used dyes, pesticides from cultivation, biocides used during transport, and so on[107]. This applies to both fibres recovered from used textiles and fibre recovered from products other than textiles e.g., plastic products. Even if the textile is washed several times, unwanted chemicals may still be present in the recycled fibre. In mechanical recycling processes, all the chemical substances remain in the material and may be transferred to the new textile fibre[108]. In chemical recycling processes such as pyrolysis and gasification - the plastic as well as most of their additives and any contaminants are converted into basic chemicals. For other recycling processes such as depolymerization, where the chemical structures are preserved, it can not necessarily be ensured that no harmful additives and contaminants from the incoming plastic waste are included. It is possible to conduct a spot test for the most relevant substances over a set interval, but since the recycled feedstock may come

[103] Catacora-Vargas G (2011): ”Genetically Modified Organisms – A Summary of Potential Adverse Effects Relevant to Sustainable Development. Biosafety Report 2011/02, GenØk – Centre for Biosafety.
[104] Fischer et al. (2015) Fischer et al. (2015): Social impacts of GM crops in agriculture: a systematic literature review. Sustainability 7:7.
[105] Catacora-Vargas G et al. (2018): Socio-economic research on genetically modified crops: a study of the literature. Agriculture and Human Values 35:2.
[106] Kolseth et al (2015) Influence of genetically modified organisms on agro-ecosystem processes. Agriculture, Ecosystems and Environment. 214 (2015) 96–106.
[107] IKEA and H&M analyze the content of recycled fabrics, article 29-10-2019 on Treehugger.com https://www.treehugger.com/sustainable-fashion/ikea-and-hm-analyze-content-recycled-fabrics.html?utm_source=TreeHugger+Newsletters&utm_campaign=9cd1c025b2-EMAIL_CAMPAIGN_11_16_2018_COPY_01&utm_medium=email&utm_term=0_32de41485d-9cd1c025b2-243762625
[108] Nordic Council of Ministers (2016). Gaining benefits from discarded textiles: LCA of different treatment pathways.

from multiple sources and can therefore vary a great deal, it is not possible to implement the testing required to identify all the potential “old additives”.

Recycled fibre from PET bottles may also contain small amounts of undesirable substances such as antimony and heavy metals, which are derived from labels, adhesives, printing inks and waste from the transport and sorting of the plastic. However, measurements have established that the levels fall well below the limits set for heavy metals in packaging materials in California’s Toxics in Packaging Prevention Act of 2006[109].

5.7.7 Additives and fibre treatment

The requirement relates to any additives and coatings applied to the fibre. The requirement concerns all fibre types.

Background to requirement O31 Treatment and coating of fibre

This generation of the criteria contains a separate requirement concerning additives, treatment and coatings of the fibre. This to make it clear that these chemicals are subject to certain requirements. The requirement has been set to avoid the addition of harmful substances to the fibre or to be used in the treatment of the fibre. This applies to chemicals used in treating the fibre, such as chlorine treatment of wool fibre or softeners, and to substances that are present in chemicals used to coat the fibre.

Silicone

Many of the chemicals used as softeners or fibre and yarn coatings are based on silicone. The production of these chemicals makes use of the cyclic siloxanes D4, D5 and D6. These cyclic siloxanes are included in the EU’s Candidate List, as they are persistent, bio accumulative and toxic (PBT/vPvB substances). If silicone is used for coating Nordic Ecolabelling sets a requirement in O41 that residual levels of D4, D5 or D6 in the silicone mix must not exceed 0.1 weight% (1000 ppm) of each. This limit value has been chosen to correspond with the threshold for mandatory inclusion of information on the substances on a safety data sheet.

Treatment of wool

A large proportion of the wool used for clothing today is treated to withstand machine washing without shrinkage and not to scratch when used. The Nordic Swan Ecolabel criteria do not allow the use of chlorinated wool, such as the anti-shrink treatment, chlorine-Hercosett process. When wool is chlorinated, absorbable organic halogens (AOXs) are formed which are discharged together with the wastewater. The chlorinated organic compounds are undesirable in the environment. Carbon filters can be used to reduce the emission of AOX compounds, but not completely eliminate the emission to wastewater. At the same time, there will be a risk of discharging AOX compounds in subsequent dying processes. There are alternative treatments for wool fibres, such as plasma treatment and enzyme treatment, that do not lead to the release of environmentally harmful chlorine compounds. In addition, the two alternative treatment methods mentioned may provide the desired effect without coating with non-biodegradable polymer.

[109] M. Whitt, Survey of heavy metal contamination in recycled polyethylene terephthalate used for food packaging, Journal of Plastic Film & Sheeting 2012.

5.8 Chemicals used in textile production

General background to the new chemical requirements in generation 5

The structure of the chemical requirements has been changed in this generation of the criteria, and the requirements have been tightened. There is now a requirement that excludes certain classifications of both chemicals and ingoing substances, irrespective of the type of chemical concerned. There is also a requirement concerning prohibited substances that similarly covers all production chemicals. The requirements in the previous generation of the criteria focused more on specific processes and chemical types, such as classification requirements for dyes, colourants and pigments, chemicals for finishing and softeners and solvents. The advantage of these requirements now being set for all production chemicals is that it facilitates clearer communication of what Nordic Swan Ecolabelling of textiles means and makes sure there are no loopholes that allow problematic textile chemicals to fall outside the remit of the set requirements. The various treatments and processes may take place at different stages of textile production, and it is therefore important that the requirement is clear no matter where in the production process the chemical is used.

It is also now clarified that the 11 groups of substances from Greenpeace's Detox My Fashion campaign[110] are prohibited in the production of Nordic Swan Ecolabelled textiles (see requirement O35 Prohibited substances). In addition, Nordic Ecolabelling has a stricter limit value than many other ecolabelling schemes that require these substance groups not to be present in the products. This is because, within its process, Nordic Ecolabelling besides checking all the safety data sheets for chemicals used also has a further dialogue with the chemical manufacturers. The chemical manufacturers are required, for example, to declare the absence of the prohibited substances. This means that they are not added to or present (0 ppm) in the chemicals. Nordic Ecolabelling's definition of an ingoing substance can be found in chapter 5.2, which also defines examples of impurities (in amounts below 100 ppm).

These include residues of monomers, catalysts, by-products, cleaning agents for production equipment and carry-over from other/previous production lines.

There are still additional requirements concerning specific process chemicals, such as the requirement addressing biodegradable detergents and sizing preparations, where it is necessary to have requirements that are relevant only to these processes.

The requirements in this section apply to all chemicals used in the production of textiles, unless otherwise is specified in the requirement. Examples of chemicals include softeners, bleaching agents, pigments and dyes, stabilisers, dispersants, sizing agents, enzymes, and other auxiliary chemicals. The chemicals are used in a variety process in textile production, including carding, spinning, weaving, knitting, washing, bleaching, dyeing, printing, and finishing. The requirements apply irrespective of whether the textile producer or their supplier uses the chemicals.

Chemicals used in water treatment plants or for the maintenance of production equipment are exempted from the requirements.

[110] Destination Zero: Seven Years of Detoxing the Clothing Industry, https://storage.googleapis.com/planet4-international-stateless/2018/07/destination_zero_report_july_2018.pdf accessed 07.08.2019.

5.8.1 General chemical requirements

Background to requirement O32 Overview of chemicals

To gain an overview of which chemicals are used in the various processes in the textile production after fibre production, the criteria require the submission of a list of all the chemicals used.

Background to requirement O33 Classification of chemical products

The requirement has been significantly tightened since the previous generation of the criteria, since it now covers all chemical products used in the textile production, where the requirement previously covered chemicals for specific functions such as dyes and pigments, finishing products and softeners and solvents in coatings. In addition, the requirement has been expanded to also exclude classification as H370 (Causes damage to organs) and H372 (Causes damage to organs through prolonged or repeated exposure). There is an additional requirement that excludes disperse dyes and other chemicals that are classified as H334 (May cause allergy or asthma symptoms or breathing difficulties if inhaled) and H317 (May cause an allergic skin reaction). Similar prohibitions existed in the previous generation of criteria. Since disperse dyes are not covalently bonded to the textile fibre, their colour fastness will often be lower. There is therefore assessed to be a greater risk of exposure to disperse dyes. As a consequence, stricter requirements are set for disperse dyes that are classified as allergenic[111].

In generation 4 of the criteria, requirement O31 (Dyes, colourants, and pigments) excluded 30 specific dyes. These dyes are either CMR or potentially allergenic.

Seven dyes have a harmonised classification in ECHA as CMR substances and a further two have a CMR self-classification. These nine dyes will thus now be excluded under the CMR ban in this requirement. The remaining are dispersing dyes, the majority of which are classified as H317 (self-classification).

These are therefore also excluded in this requirement. It should also be noted that several of these dyes are no longer in use.

Background to requirement O34 Prohibition of CMR substances

The requirement excludes all constituent CMR substances to an absolute level of 0 ppm. There is thus no triviality limit for ingoing substances. Ingoing substances are defined as all substances, whatever their concentration, in a used chemical (e.g., pigment or bleaching agent) or blend of chemicals (e.g., printing paste, coating), including additives (e.g., preservatives and stabilisers). Known products released from ingoing substances (e.g., formaldehyde, arylamine and in-situ generated preservatives) are also considered to be constituent. Impurities are defined as residual substances from production, including raw material production, that are present in a used chemical or blend of chemicals in concentrations of ≤100 ppm (≤0.0100 weight%, ≤100 mg/kg).

[111] JRC Technical Reports, Revision of the European Ecolabel and Green Public Procurement (GPP) Criteria for Textile Products, Nov 2013, page 304: http://ec.europa.eu/environment/ecolabel/documents/140124%20Ecolabel%20Textiles_Technical%20report%20final.pdf

The requirement has been changed since the previous generation of the criteria. The prohibition of all ingoing CMR substances in categories 1A, 1B and 2 now has its own separate requirement. Nordic Ecolabelling strives to ensure that the health and environmental impacts of the products are as low as possible. Therefore, there is a requirement prohibiting specific CMR classification, which thereby excludes some of the, in health terms, most problematic classifications of substances. The requirement covers all chemicals used in the textile production, to ensure a focus on this in all processes that make use of chemicals.

After consultation, an exception has been made for titanium dioxide which is added in powder form during raw material production. On February 18, 2020, the European Commission published the decision that titanium dioxide will be classified as a suspected carcinogen (Category 2, H351) upon inhalation under the CLP Regulation. The classification provision has been debated, as the risk that gives rise to the hazard classification applies to inhalation of powder, and not the chemical substance itself. Liquid and certain solid mixtures of titanium dioxide are not classified. It can be difficult to find replacements in the short term, which is why Nordic Ecolabelling has made an exception for the use of titanium dioxide in powder form. In August 2025, the EU Court of Justice annulled the harmonised Carc. 2 (H351i) classification of TiO2. Since TiO_2 is no longer CMR classified, the exemption from the requirement is removed, but TiO_2 can still be used in textiles.

Background to requirement O35 Prohibited substances

The list of prohibited substances has been expanded in comparison with the previous generation of the criteria, with the requirement now covering the 11 substance groups that the textile industry widely agrees are relevant for phasing out. The list of the 11 substance groups derives from the “Detox My Fashion” initiative that Greenpeace launched in 2011. Other initiatives such as Detox to Zero by Oeko-Tex and ZDHC also refer to this list of substances. The previous generation of the criteria included most of these substance groups in separate requirements. The decision has now been taken to gather them all together here, with the prohibition list covering all chemicals used in the textile production.

Under this requirement, Nordic Swan Ecolabelled textiles are subject to a prohibition list that covers, with third-party audits, all 11 substance groups on Greenpeace’s Detox List in the production of textiles. Nordic Ecolabelling defines “prohibition” as follows: The prohibition of specific ingoing substances encompasses all substances, whatever their concentration in a used chemical or chemical blend, including additives and known products released from ingoing substances. Impurities cannot, however, always be completely avoided. The only permitted impurities are residual products from production, including raw material production, that can be found in a used chemical in concentrations below 100 ppm. Such impurities may be reagents such as monomers, catalysts, by-products or carry-over from previous production lines. See the precise definition of ingoing substances and impurities in section 5.2.

Some of the substance groups and substances in the requirement may already have their use restricted in the EU. It is however still considered relevant to exclude these and require documentation confirming their absence, not least because many textiles are produced outside the EU. In comparison with the earlier generation of the criteria, this requirement has been expanded to include flame retardants and azo dyes, amongst other things. Both groups were previously prohibited, but the requirement was worded differently.

Candidate List and Substances of Very High Concern (SVHC)

Substances of Very High Concern (SVHC) is a term describing substances that fulfil the criteria in Article 57 of the REACH regulation, which are defined as: substances that are CMR (category 1A and 1B under the CLP Regulation), PBT substances, vPvB substances (see section below) and substances that have endocrine disruptive properties or are environmentally harmful without meeting the criteria for PBT or vPvB. SVHC may be included on the Candidate List with a view to later inclusion on the Authorisation List. This means that the substance becomes regulated (ban, phasing out or some other form of restriction). Due to these undesirable properties, substances on the Candidate List cannot be Nordic Swan Ecolabelled. Other SVHC substances are dealt with through a ban on PBT and vPvB substances and through requirements concerning classification and a ban on endocrine disruptive substances.

PBT and vPvB

PBT (Persistent, Bioaccumulative and Toxic) and vPvB (very Persistent and very Bioaccumulative) are organic compounds defined in Annex XIII of REACH (Regulation (EC) No 1907/2006). Nordic Ecolabelling generally does not want such substances to be included in the products.

Potential endocrine disruptors

Potential endocrine disruptors are substances that may affect the hormone balance in humans and animals. Hormones control a number of vital processes in the body and are particularly important for development and growth in humans, animals and plants. Changes in the hormone balance can have unwanted effects and here there is an extra focus on hormones that affect sexual development and reproduction. Several studies have shown effects on animals that have been traced to changes in hormone balance. Emissions to the aquatic environment are one of the greatest sources for the spread of endocrine disruptors[112]. Nordic Ecolabelling excludes identified and potential endocrine disruptors listed on the "Endocrine Disruptor Lists" at www.edlists.org, which is based on the EU member state initiative. A substance listed in List I, II and/or III is excluded. Licencees are responsible for keeping track of updates of the lists, so that their ecolabelled products meet the requirement through the validity of the licence. Nordic Ecolabelling acknowledges the challenges associated with new substances that are introduced in List II and III. We will evaluate the circumstances and possibly decide on a transition period from case to case.

The requirement concerns the main lists (List I-III) and not the corresponding sub lists called “Substances no longer on list”. A substance which is transferred to a sub list is thus no longer excluded unless it also appears on any of the other main lists I-III. However, special attention is needed concerning those List II substances which are evaluated under e.g., the Cosmetics Regulation, which doesn’t have provisions for identifying EDs. Since it’s not within the scope of e.g., this regulation to identify EDs, it’s not clear how the substances will be handled at www.edlists.org once the evaluation (safety assessment of the substances in cosmetics in this case) is finalised. Nordic Ecolabelling will evaluate the circumstances for substances on sub list II case-by-case, based on the background information indicated on the sub list.

By excluding both identified and prioritised potential EDs which are under evaluation, Nordic Ecolabelling ensures a restrictive policy on endocrine disruptors.

[112] Miljøstatus i Norge (2008): Hormonforstyrrende Stoffer. http://www.miljostatus.no/Tema/Kjemikalier/Noen-farlige-kjemikalier/Hormonforstyrrende-stoffer/#D (dated 26.02.2009)

Flame retardants

Flame retardants come in several different types. For example, brominated flame retardants, chlorinated or phosphorous flame retardants. Flame retardants are suspected of contributing to a number of unwanted health effects. Several of the substances are suspected of causing birth defects, cancer, and endocrine disrupting effects. The flame retardants HBCDD, short chain chloro-paraffins, TCEP, boric acid (and certain salts thereof), boron oxide and certain borax compounds (sodium tetraborate decahydrate and sodium tetraborate pentahydrate) are on the EU candidate list under REACH.

Many brominated flame retardants (BFR) are persistent and bio accumulative chemicals that can now be found dispersed in nature. Polybrominated diphenylethers (PBDE) are one of the most common groups of BFR and they have been used as flame retardants on a wide range of materials, including textiles. There are, for instance, examples of hexabromocyclododecane (HBCDD) and tetrabromobisphenol A (TBBPA) being used on fabrics for cars. Other relevant textiles that may have been treated with flame retardants include bed linen in the healthcare sector (hospitals, care homes and nursing homes) and workwear[113]. The focus on phasing out brominated flame retardants has led to the use of alternatives such as phosphorus and nitrogen-based flame retardants.

Per- and polyfluoroalkylsubstances (PFAs), e.g. , PFOAand PFOS

Fluorosurfactants and other per- and polyfluoroalkyl substances (PFASs) constitute a group of substances that have harmful properties. Certain per- and polyfluorinated compounds can degrade to the very stable PFOS (perfluorooctane sulphonate) and PFOA (perfluorooctanoic acid) and similar substances. These substances are extremely persistent and are easily absorbed by the body[114]. The substances are found all over the globe, from the large oceans to the Arctic. PFOS have also been found in birds and fish and in their eggs. The substances in this group impact on the biological processes of the body and are suspected to be endocrine disruptors, carcinogenic and to have a negative impact on the human immune system[115]. PFOA, APFO (ammonium pentadecene fluoro octanoate) and certain fluoride acids are on the Candidate List due to their reprotoxicity, as well as PBT. There are new research results showing that shorter chains (2-6 carbon atoms) have been discovered in nature[116].

Chlorinated compounds such as PVC

PVC (polyvinylchloride) may contain hazardous phthalates and since they are not chemically bonded to the plastic, they can leak out of the products[117]. In addition, soft

[113] Survey, health, and environmental assessment of flame retardants in textiles, Danish Environmental Protection Agency, 2014
[114] Borg, D., Tissue Distribution Studies And Risk Assessment Of Perfluoroalkylated And Polyfluoroalkylated Substances (PFASS), Doctoral Thesis, Institute Of Environmental Medicine (IMM) Karolinska Institute, Stockholm, Sweden 2013
http://publications.ki.se/xmlui/bitstream/handle/10616/41507/Thesis_Daniel_Borg.pdf?sequence=1
[115] E.g., Heilmann, C. et al, Persistente fluorbindelser reducerer immunfunktionen, Ugeskr Læger 177/7, 30.3.2015 OSPAR 2005: Hazardous Substances Series, Perfluorooctane Sulphonate (PFOS), OSPAR Commission, 2005 (2006 Update), MST, 2005b: Miljøprojekt nr. 1013, 2005, More Environmentally Friendly Alternatives to PFOS-compounds and PFOA, Danish Environmental Protection Agency, 2005.
[116] Perkola, Noora, Fate of artificial sweeteners and perfluoroalkyl acids in aquatic environment, Doctoral dissertation Department of Environmental Sciences, Faculty of Biological and Environmental Sciences, University of Helsinki, Finland 12.12.2014,
https://helda.helsinki.fi/bitstream/handle/10138/136494/fateofar.pdf?sequence=1
[117] Miljøstatus i Norge: http://www.miljostatus.no/no/Tema/Kjemikalier/Noen-farlige- kjemikalier/Ftalater/ (accessed 04.12. 2011).

PVC coating on the textile is not desirable in the waste stage, where it can be problematic either in incineration facilities or when the textile fibre is recycled.

Nanoparticles

Nanoparticles are not desirable in ecolabelled products. These include nanometals such as nano silver, nanogold and nano copper. Nanometals such as nano silver and nano copper are a particular problem as they are present in many products for their antibacterial effect. See more information in the background text to the requirement “Biocides and antibacterial substances”.

The criteria specify that polymer emulsions are not considered to be nanomaterial and set out exemptions from the requirement. A nanomaterial is a natural, incidental, or purposely manufactured material containing particles, in an unbound state or as an aggregate or as an agglomerate and where, for at least 50% of the particles in the number size distribution, one or more external dimensions is in the size range 1-100 nm*.

It should be noted that Nordic Ecolabelling does not require a test for all raw materials in terms of nanoparticles. The requirement needs a declaration from the raw material supplier for raw materials that are not covered by the exemption. The declaration must state that the raw material does not contain nanomaterial, as defined in the requirement.

Heavy metals

The requirement covers all chemicals in the textile production and prohibits the use of the following heavy metals: antimony, arsenic, cadmium, chromium, lead, mercury, zinc, copper, nickel, tin, barium, cobalt, iron, manganese, selenium, and silver.

Heavy metals such as cadmium, lead and mercury may be found as impurities in certain dyes and pigments used for textiles. These metals can accumulate in the body over time and are highly toxic with irreversible effects, including damage to the nervous system (lead and mercury) or kidneys (cadmium). Cadmium is also known to cause cancer. Cadmium is classified as carcinogenic, mutagenic, reprotoxic, toxic and toxic for aquatic organisms. Chromium is allergenic, carcinogenic, and toxic for aquatic organisms. The use of cadmium, mercury and lead has become very limited in textiles, but controlling for them remains relevant[118].

Azo dyes

The requirement has been moved to this requirement containing the prohibition list in this generation of the criteria. Aromatic amines released by azo dyes may be carcinogenic, allergenic, irritating, and toxic.

In relation to the previous version of the criteria, the requirement has been extended to include 12 substances described in the report "Toxics in Carpets in the European Union". These 12 aromatic amines have been identified as degradation products from azo dyes used in carpets and are also considered to be relevant for textiles. All the carcinogenic aromatic amines covered by the Nordic Ecolabel requirement are listed in appendix 2. The 12 new substances in this criteria version are listed at the bottom.

[118] Investigation of chemical substances in consumer products, Danish Environmental Protection Agency 2011.

Some of the substances in appendix 2 are excluded through REACH (Regulation No. 1907/2006) Annex XVII No 43 if they are included in quantities exceeding 30 mg/kg.

Note that Nordic Ecolabelling's requirements go further than REACH, by entirely prohibiting the use of azo dyes that may release any of the carcinogenic aromatic amines.

Phthalates

The requirement excludes the presence of phthalates on the Candidate List and other phthalates. A number of phthalates, including the phthalates on the Candidate List in REACH, are considered problematic. The phthalates on the Candidate List, for example, interfere with reproduction and are classified as reprotoxic. When the phthalates are used as softeners in plastic products, the phthalates are not bound in the material, and so will slowly be released during use of the product[119]. Phthalates are often used as a softener in polyvinyl chloride (PVC). In the textile industry, they are used in the print on textiles, waterproof fabrics, artificial leather, rubber, as a softener in PVC, and in some dyes.

Chlorinated solvents, including chlorophenols and chlorobenzenes

Chlorinated solvents – such as trichloroethane (TCE) – are used by textile producers to dissolve other substances during manufacture and to clean textiles. TCE is an ozone depleting substance that is persistent in the environment. It is also known to affect the central nervous system, liver, and kidneys. Since 2008, the EU has severely restricted the use of TCE. Chlorinated carriers may be used for the colouring of synthetic fibre and fabric or blends of polyester and wool.

Chlorobenzenes are persistent and bio accumulative chemicals that have been used as solvents and biocides in the production of dyes and as auxiliary chemicals. The effect of exposure depends on the type of chlorobenzene; however, they tend to affect the liver, thyroid, and central nervous system. Hexachlorobenzene (HCB) is the most toxic and persistent chemical in this group, as well as being an endocrine disruptor.

Chlorophenols

Chlorophenols are a group of substances that are often used as biocides in a wide range of products. Pentachlorophenol (PCP) and its derivatives are, for example, used as biocides in the textile industry. PCP is highly toxic to humans and can affect the body's organs. It is also highly toxic for aquatic organisms. The EU prohibited the manufacture of products that contained PCP in 1991 and now also severely restricts the sale and use of all goods that contain the chemical.

Imported products containing PCP are the most significant remaining sources of potential PCP emissions and exposure. It may, for example, be present in leather and textiles to protect against mould. Chlorophenols may also be present as impurities from the raw materials used in the production of dyes. Furthermore, PCP and tetrachlorophenol (TeCP) may be used as preservatives in printing paste for textiles[120].

Alkylphenols ethoxylates and other alkylphenol derivatives

[119] Guidance to businesses on phthalates, Danish Environmental Protection Agency 2013.
[120] Roadmap to zero https://www.roadmaptozero.com/fileadmin/layout/media/downloads/en/Chlorophenols.pdf accessed 02.08.2019.

Alkylphenol ethoxylates (APEO) and/or alkylphenol derivatives (APD) are a group of non-readily degradable surfactants that are proven endocrine disruptors. The alkylphenol compounds most often used in textiles are nonylphenols (NP) and octylphenols and their ethoxylates, particularly nonylphenol ethoxylates. The textile industry uses NPs in its washing and dyeing processes. They are toxic for aquatic organisms, persistent in the environment and can accumulate in body tissue and be biomagnified (increase in concentration through the food chain). Their similarity to natural oestrogen hormones can disrupt the sexual development of some organisms[121].

Organotin compounds

Organotin compounds are used in biocides and as fungicides in a wide range of consumer products. In the textile industry, they can be found in products such as socks, shoes, and sportswear to prevent odours caused by the breakdown of perspiration. One of the most common organotin compounds is tributyltin (TBT). Several of the tin-organic compounds are banned for selected areas of use through Reach Annex XVII entry 20 and the following three; TBTO, DBTC and DOTE are on the EU Candidate List[122].

Linear alkylbenzene sulphonates (LAS)

LAS is an active ingredient in detergents and cleaning agents that may be used in washing processes during textile production. LAS is, as a tenside, highly toxic and can be absolutely lethal to aquatic organisms such as fish, crustaceans and algae. The toxic effect is due to surfactants dissolving fat and proteins and thus also the living organism's cells and their cell membranes. In addition, LAS is not degraded anaerobically and will thus end up in the sludge in treatment plants where the substance is potentially harmful due to its toxicity to aquatic organisms. Therefore, LAS is excluded.

Quaternary ammonium compounds such as DTDMAC, DSDMAC and DHTDMAC

The cationic detergents distearyl dimethyl ammonium chloride (DSDMAC), dihydrogenated tallow alkyl dimethyl ammonium chloride (DTDMAC) and dihydrogenated tallow dimethyl ammonium chloride (DHTDMAC) are substances with toxic and persistent properties.

Their emissions to water have been significantly reduced in recent times. Concern remains, however, over their use in softeners, through which they can reach surface water via direct discharges, sewerage systems or wastewater treatment plants. These three surfactants have been phased out in many countries, in line with the PARCOM Recommendation 93/4 on the Phasing Out of Cationic Detergents DTDMAC, DSDMAC and DHTDMAC in Fabric Softeners. Since they might possibly still be used in some countries, their exclusion remains relevant[123].

EDTA

EDTA (ethylenediaminetetraacetic acid) and its salts are not readily degradable and the EU's risk assessment states that under the conditions at municipal water

[121] Eleven hazardous chemicals which should be eliminated, https://www.greenpeace.org/archive-international/en/campaigns/detox/fashion/about/eleven-flagship-hazardous-chemicals/ accessed 02.08.2019.
[122] https://miljostatus.miljodirektoratet.no/tema/miljogifter/prioriterte-miljogifter/tbt-og-andre-organiske-tinnforbindelser/) besøgt 8 august 2019.
[123] JRC Technical Reports: Revision of the European Ecolabel and Green Public Procurement (GPP) Criteria for Textile Products 2013.

treatment plants EDTA is either not broken down or only breaks down to a slight degree (CEFIC, 2009). Today there are more environmentally aware alternatives that are degradable and able to replace EDTA in chemical products. These include MGDA (methylglycinediacetic acid). EU is also actively working to limit EDTA in the paper industry (Official Journal of the European Union, 2006/C 90/04). EDTA is used as a complexing agent in the production of many chemical products for technical use.

5.8.2 Specific chemical requirements

Background to requirement O36 Specific chemical requirements

Biocidal products and antibacterial products are not desirable in Nordic Swan Ecolabelled products and the requirement excludes both chemical and physical treatments. Frequent use of antibacterial substances in ordinary consumer products may contribute to increased resistance in bacteria and the eradication of necessary bacteria, and Nordic Ecolabelling does not wish to contribute to this. Tests carried out by Swedish water company Svensk Vatten on sportswear treated with nano silver show that, after 10 machine washes, 31-90% of the nano silver had been washed out of the textile. Nano silver is harmful for the aquatic environment[124]. These substances are increasingly being added to consumer products – everything from textiles to kitchen equipment. One of the substances often being added is nano silver. Particular attention is being paid to nanometals such as nano silver and nano copper since they occur in many products.

These nanomaterials are added to achieve an antibacterial effect. There has been particular concern that emissions of nano silver into wastewater and other dispersal could eliminate desirable bacteria and cause resistance in bacteria. Another example of antibacterial substances that must not be used are organotin compounds and chlorophenols, which are used, for example, during the transport and storage of textiles.

Preservatives used in chemical raw materials (“in can” preservatives), for example in adhesives or surface treatments, are not subject to this prohibition. Here, the purpose of the biocide is to preserve the chemical product during storage. Naturally occurring antibacterial effects in materials (for example bamboo) are also not subject to the prohibition.

The requirement is a combination of requirements O27 and O67 from the previous generation of the criteria. For communication purposes, requirement O35 also specifies that organotin compounds are not permitted, since they are one of the 11 substance groups highlighted by Greenpeace in its “Detox My Fashion” campaign from 2011.

Because of the open structure of knitting wool products they are more exposed to moth attacks, therefore there are an exception where treatment against moth attacks are allowed, if the substances fulfill the chemical requirements in O33, O34 and O35 and the biocide are approved under the EU Biocidal Products Regulation (EU) No 528/2012 for use on textiles.

Background to requirement O37 Metal complex dyes and pigments

Metal complex dyes are problematic because they contain undesirable heavy metals. The requirement prohibits the use of metal complex dyes and pigments containing, for example, chromium, cobalt, and nickel. It also restricts the scope to use copper,

[124] Silverläckan, En rapport om silver i sportkläder 2018, Svenskt Vatten
file:///C:/Users/hbb/Downloads/Silverrapport%20Svenskt%20Vatten%2020181022C.pdf

which occurs widely in metal complex dyes. Copper should be avoided in the aquatic environment, but it is not harmful to health unless ingested. Because of its high fixation ratio and colour fastness, copper in metal complex dyes is acceptable in small quantities (max. 5 weight% in the dye).

In general terms, metal complex dyes have a high fixation ratio (85-98%) and good fade resistance. The good fade resistance may help to give the textile a long life[125].

Parts of the industry state that it is possible to phase out metal complex dyes even for the dark colours and still produce textiles of good quality that the market wants. Other businesses believe that the restrictions being introduced make it more difficult for them to produce all the types of goods that the market demands. It is, however, worth considering whether customers would demand these colours, if they knew that there were less environmentally harmful alternatives.

Background to requirement O38 Degradability of detergents, softeners, and complexing agents

Detergents, softeners, and complexing agents are used in large quantities in the wet processes of textile production. It is therefore relevant to set a requirement that these chemicals must be readily degradable or inherently degradable, in order to reduce the environmental impact of these chemicals. The requirement has been reworded and tightened since the previous generation of the criteria. The wording now specifically states that the requirement applies to all chemicals used for their function as a detergent, softener, or complexing agent. Chelating agents and sequestering agents are synonymous with complexing agents and are therefore also covered by the requirement.

The requirement has been tightened such that the chemicals can no longer be “eliminable in the wastewater treatment plant”, as this could lead to sludge used for soil improvement containing undesirable chemicals. The requirement is no longer identical to the corresponding requirement for the EU-Ecolabel.

Background to requirement O39 Sizing agents

This requirement only applies to weaving units. Sizing agents are added to protect the yarn during the weaving process. This results in greater abrasion resistance and prevents wear of the yarn during weaving. The requirement is a reworking of the requirement from the previous generation of the criteria.

It is now clear that the requirement also permits recovery of sizing agents as an alternative. Recovering chemicals can save on resources and energy, and thus make a positive contribution to a circular economy.

Background to requirement O40 Bleaching agents

The requirement is identical to the requirement from the previous generation of the criteria. However, in this generation of the criteria, the requirement has been split up, so that the prohibition of chlorine treatment of the wool fibre is found in requirement O31.

Chlorinated bleaching agents are environmentally hazardous and are therefore not permitted. The use of chlorinated bleaching agents has been reduced in the industry

[125] Brancheorientering for tekstilfarvning og –tryk, Orientering fra Miljøstyrelsen Nr. 7 2010.

and alternatives are available, such as hydrogen peroxide (H2O2)[126]. Requirement O24 sets out provisions concerning bleaching agents for regenerated cellulose fibre.

Background to requirement O41 Chemicals that contain silicone

Siloxanes D4, D5 and D6 are included on the Candidate List of Substances of Very High Concern in REACH, and so these substances are prohibited through requirement O35. However, a specific requirement has been included for these siloxanes to make it clear that documentation is required to confirm that the content is below the stated limit value in any silicone used. This is considered relevant because much of the textile production takes place in countries that are not covered by REACH.

It is possible to find chemicals containing silicone in use throughout the production chain, for example as softeners. The requirement has thus been reworded since the previous generation of the criteria because it used to only cover finishing, membranes, and laminates.

Background to requirement O42 VOC in printing paste

Volatile organic compounds are undesirable, because they tend to be harmful to health, poorly degradable in an aquatic environment and have a negative impact on the ozone layer. Printing paste often contains volatile organic compounds, which is why there are requirements limiting the use of such substances.

The requirement remains unchanged from the previous generation of the criteria. The documentation requirement has been updated, to make it clear that the supplier or producer of the printing paste must declare fulfilment of the requirement.

5.9 Coatings, laminates, and membranes

Background to requirement O43 Textiles as substrate (e.g., in laminates)

Textiles used as carrier materials/substrates for lamination or onto which a coating or membrane is applied must meet the same requirements as other fabrics that are used in Nordic Swan Ecolabelled textiles. The requirement is new and has been inserted to show that both fibre requirements and chemical requirements (if relevant) apply to fabrics used in conjunction with coatings, laminates, and membranes for textiles.

Background to requirement O44 Raw material in the polymer

For part A see background to requirement O28. For part B see background to requirement O29.

Background to requirement O45 Chemicals in impregnation, coatings, laminates, and membranes

The requirement remains unchanged from generation 4 of the criteria. The requirement Coatings, laminates and membranes coated with or based on per- and polyfluorinated compounds, for example, are not permitted. These substances are excluded from use in requirement O35 Prohibited substances.

[126] The EU Ecolabel's background document, 2007.

Fluorinated polymers are widely used as coatings, laminates and in membranes, to achieve a product with breathable properties, while also being water resistant, for example in outdoor wear.

Fluorinated polymers such as perfluoroalkyl substances are highly persistent (stable) and non-degradable. The compounds are not soluble in water and fat and accumulates particles or tissue. They are bound to proteins and can be found with a high content in top predators. In a Nordic screening survey, PFAS compounds were found in all the sample types investigated, and the highest level was found in marine mammals. The report concluded that PFAS are found in significant concentrations in the Nordic environment. The greatest focus is on the PFAS compound perfluorooctane sulphonate (PFOS), which is toxic for aquatic organisms, birds, and bees.[127]

The greatest emissions of organic fluorinated substances occur during production of the clothing, but the substances are also dispersed into nature through use, washing and finally disposal of the clothing. There are alternatives to organic fluorinated substances, for both membranes and surface treatment. The 2015 report "Alternatives to perfluoroalkyl and polyfluororalkyl substances (PFAS) in textiles" from the Danish Environmental Protection Agency names paraffin oils and wax, silicone, polyurethane, and dendrimer-based substances as non-fluorinated alternatives for the surface treatment of textiles. Fluorinated membranes may be made from either polyester (see e.g. https://www.klattermusen.com/en/fabrics/190_cutan/), a blend of polyester and polyethylene (see e.g. https://en.wikipedia.org/wiki/SympaTex) or from polyurethane (see e.g. https://www.hellyhansen.com/about-us/manufacturing/).

In its report "Chemistry for any weather" from 2012, Greenpeace concludes that it is possible to produce wind- and waterproof outdoor clothing without using organic fluorinated substances. They refer to a study conducted by the Berlin University of Applied Science (HTW)[128], where three fluorine-free coatings and a fluorine-free membrane were tested in the laboratory and compared with the properties of conventional fluorinated products. The tests examined properties such as water repellency, oil repellency, waterproofing, wind proofing, breathability, and abrasion resistance. The results showed that the properties of the fluorine-free alternatives matched those of the fluorinated products in the areas that are of most importance to the ordinary consumer, namely wind- and waterproofing, breathability and abrasion resistance. Oil repellency was the only property for which the fluorinated products achieved better results than the fluorine-free alternatives.

5.10 Specific chemical requirement for adhesives

Background to requirement O46 Adhesives

The requirement has been tightened compared with generation 4. The area of use is clarified and there is a specification that requirements O33 Classification of chemical products, O34 Prohibition of CMR substances and O35 Prohibited substances apply to all adhesives, with the exception of adhesive used for small info labels.

Polyurethane (PUR) hot-melt adhesive is used to glue one sheet of cotton to one sheet of polyurethane (laminate) to make water-proof bed sheets. Isocyanate (methylene diphenyl diisocyanate, MDI) is a necessary component in the production

[127] Norwegian Pollution Control Authority (2005) Monitoring of air and precipitation transported over long distances.
[128] Marijke Schöttmer, Master's thesis: Investigation of Alternatives to Fluorocarbon Finishes for Textiles.

of the PUR adhesive. MDI is classified with H317 and H334 (allergic reactions) and H351 (suspected of causing cancer). The isocyanate make cross-linking of isocyanates at the ends of the polyurethane polymer possible after the adhesive is applied. This cross-linking makes the adhesive harden so it cannot melt again. Once it has cross-linked after the adhesive process, the glue becomes solid, and it does not release particles during use. However, there is a health risk for the employees at the adhesive process during the manufacturing of the sheets, Therefore, employees must be protected during the application of the adhesive and automatic dosing system must be used.

5.11 Discharges from wet processes

Background to requirement O47 COD, temperature, and pH in wastewater from wet processes
The requirement has been changed from generation 4 of the criteria. In this generation COD must be measured in relation to water consumption and not in relation to the amount of textile produced. The requirement level for COD is set on the basis of the various government requirements in Asia, which are between 150 and 250 mg/L. Blaue Engel (version 1.4, 2017) has a corresponding limit of 160 mg/L, while ZDHC Guidelines (version 1.1, July 2019) have 150 mg/L as the "Foundational limit".

Measurement of PCOD, TOC or BOD can also be used if a correlation to COD is shown. Alternative test methods for ISO 6060 are, for example, GB/T 11914 (China), US EPA 410.4 and APHA 5220D.

High levels of COD in the wastewater can lead to oxygen depletion of the aquatic environment and thereby harmful effects on flora and fauna.

There is also a requirement that the temperature of the wastewater shall be lower than 40°C (unless the recipient's temperature is higher) and that the pH shall be between 6 and 9 (unless the recipient's value lies outside this interval).

It has been specified that the calculations must have been completed in at least 3 of the last 12 months, and a requirement has been set for a routine for annual self-inspection of the requirement. Examples of alternative test methods for ISO 6060: GB / T 11914 (China), US EPA 410.4 and APHA 5220D.

5.12 Energy and water consumption

Background to requirement O48 Implementation of BAT for energy and water consumption
The requirement concerning energy and water consumption has been expanded to include a requirement on implementation of a minimum of BAT techniques to reduce energy and water consumption. It is assessed not possible to set an absolute requirement limit for energy and water consumption, since production of the individual fabrics can vary a great deal, depending on the function of the finished fabric. There is a requirement, instead, that the individual production facility must implement a minimum of BAT techniques for water and energy efficiency. BAT techniques are taken from the Reference Document on Best Available Techniques for the Textiles Industry, European Commission July 2003[129] and compared with the

[129] Reference Document on Best Available Techniques for the Textiles Industry, European Commission July 2003.

requirements for BAT techniques in the EU Ecolabel criteria for textile products from 2014.

Here we have been looking into whether it would be possible to use a PEF (product environmental footprint) analysis or EPD (environmental product declaration) as a basis for a specific CO_2 or energy requirement.

However, it is considered very difficult to impose an absolute quantitative requirement for either energy consumption or CO_2 impact, which is relevant for all textiles in this product group. This product group includes many different textiles products with different functions. An overall requirement (or differentiated for a few different subcategories) with a maximum benchmark value for either energy consumption or climate impact in the form of CO_2 equivalents would be directed towards specific fibre types and specific textile types. An overall requirement would not be relevant for all textile products in the product group.

5.13 Fillings, stuffing materials, and padding

The following requirements concern fillings, stuffing materials, and padding that individually account for more than 1 weight% of the total filling, stuffing material or padding in the final product.

Background to requirement O49 Fibres in filling and stuffing materials
The requirement has been set to ensure that the environmental impact from raw material production is also addressed for products where filling and stuffing materials are of great relative importance compared to the other materials in the product. Reference is made to the background texts for the individual fibre requirements. Any finishing or coating of the fibres must meet requirement O31.

Background to requirement O50 Feathers and down – ethical requirements
Geese are the main target of feather and down plucking from live birds, but the method may also be applied to other duck species. Plucking feathers from live geese for down production is prohibited within the EU, although down and feathers may be "harvested" during the moulting period. The European Food Safety Authority (EFSA) has investigated the issue and concluded that it is possible to pluck down and feathers from live geese without causing pain, as long as it takes place during the moulting period[130]. The problem is that this is not taken into consideration in commercial operations and there are cases where the law is not complied with in all EU member states. The recommendation from EFSA is that goose down and feathers should only be plucked during the moulting period, and that control systems should be created for this. No such control system is in place yet, however, and Nordic Ecolabelling has therefore set a requirement prohibiting the use of down and feathers plucked from live birds. Forced feeding is also not permitted.

Textile Exchange has published a certifiable standard for down and feathers – **the Responsible Down Standard (RDS**). RDS ensures an independent third-party assessment of the key aspects of breeding and handling the animals and ensures traceability all the way back along the supplier chain. The purpose of the standard is to improve the welfare of the birds, and to provide greater reassurance to retailers and consumers with regard to the purchase of sustainable materials. The aim of the Responsible Down Standard is to ensure that down and feathers do not come from birds that have suffered unnecessary harm. The standard can be applied to both

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

mixed and 100% certified products. However, the end-product can only be labelled as RDS-certified if the down or feathers in the product are 100% certified. The certification ensures, for example, that forced feeding is prohibited and that down and feathers are not plucked from live birds. It also ensures that the birds are not kept in cages and have space to express their natural behaviours. This includes the requirement that there must be nesting areas for female birds[131]. There is a long list of certified down and feather suppliers, which can be found here: http://responsibledown.org/for-business/find-certified-companies/all-companies-certified-to-the-responsible-down-standard/. These feathers and down are used in various products on the market, such as clothing, duvets, and other textile products with fillings.

Background to requirement O51 Feathers and down – microbial cleanliness

The standard EN 12935 “Feather and down – Hygiene and cleanliness requirements” sets requirements for the microbial cleanliness of feathers and down as a filling material. It gives the oxygen index number as an indicator of the material’s cleanliness. The standard states that an oxygen index number of less than 20 for the filling material is considered hygienically acceptable and so no further analysis of microbial activity in the material is necessary. The Nordic Swan Ecolabel criteria require an oxygen index number of max. 10, representing high microbial cleanliness. EN 12935 refers to EN 1162 “Feathers and down. Test methods – Determination of the oxygen index number” and EN 1163 Feather and down – Test methods – Determination of the oil and fat content.

Background to requirement O52 Feather and down – labelling of filling materials

This requirement is new. Standard EN 12934 contains provisions on information about the composition of feather and down filling materials and sets out guidelines on the label on the finished goods.

Background to requirement O53 Additives and treatments

In this product group, filling and stuffing materials will often be in close contact with the user of the product, as the materials lies just below the textile. This makes it highly relevant to address potential exposure to hazardous chemicals from filling and stuffing materials. The background text for requirement O35 contains a background text for all substance groups on the list. The following provides more specific background for filling and stuffing materials.

Fluorinated organic compounds are used for e.g. impregnation of down and other filling materials.

Chlorinated paraffins may be used as flame retardants and as softeners, thus substitution of chlorinated paraffins will depend on the effect to be achieved.

Organotin compounds: Polyurethane foam (PU) may contain organotin compounds such as dibutyltin (DBT) and tributyltin (TBT) which can, for example, be applied as an antibacterial treatment[132].

Halogenated flame retardants

[131] http://responsibledown.org/wp-content/uploads/2015/07/TE-Responsible-Down-Standard-2.0-opt.pdf accessed 07.06.2016
[132] Survey, emissions and health assessment of chemical substances in baby products, Danish Environmental Protection Agency, 2008.

Halogenated organic compounds such as chlorinated paraffins or brominated compounds can, for example, be used as flame retardants in foam materials and polystyrene balls[133].

The Danish Environmental Protection Agency has placed the flame retardant tris(2-chloro-1-methyl)phosphate (TCPP), which is mainly used in polyurethane foam (PU foam), on the LOUS list as a consequence of the Danish Environmental Protection Agency's self-classification (based on QSAR predictions) of the substance as Muta 2, H341 (Suspected of causing genetic effects) and Repr 2, H 361 (Suspected of damaging fertility or the unborn child). On the basis of analogies drawn with tris(2-chloroethyl)phosphate (TCEP), TCPP is also classified as Carc. 2; H451. Tris(1,3-dichlor-2-propyl)phosphate (TDCP) is mutagenic in vitro, but not in vivo, and is also classified as Carc 2, H451.[134]

Brominated flame retardants such as hexabromocyclododecane, CAS no. 25637-99-4, (HBCD) are used extensively, especially in Europe. HBCD may, for example, be used in extruded and expanded polystyrene foam.

Substances were found in polystyrene balls in two nursing pillows investigated in the Danish Environmental Protection Agency's analysis from 2008[135].

Background to requirement O54 Emission requirements for foamed synthetic materials

Filling and stuffing materials can include hazardous chemicals, either as residue from polymer production, or additives in the material. For example, polyurethane (PU) foam and polystyrene balls may contain and emit volatile organic compounds which may be hazardous to health[136]. As the user will be in close contact with these materials, and be exposed to any emissions, a requirement has been set for the most important substances. Several certification schemes have the same emission requirements for these filling and stuffing materials and here a requirement has therefore been set, which can be documented with commonly used certification schemes. According to Europur, up to 80% of the cups in bras are made of polyurethane foam. PU foam is also used in shoulder pads and other elements of textile products[137].

There are small differences, for example that CertiPUR has a threshold value for aromatic hydrocarbons of 0.5 mg/m^3 instead of 0.3. It is, however, still considered appropriate to document the requirement with a CertiPUR certificate.

Background to requirement O55 Polycyclic aromatic hydrocarbons (PAHs)

There are more than 100 PAH compounds. Several of the PAHs are carcinogenic and classed as Carc.1B and genotoxic.

The PAHs usually originate from two types of additives, which are plasticising and process oils (extender oils) and carbon black, which is found in rubber and plastic

[133] Survey, emissions and health assessment of chemical substances in baby products, Danish Environmental Protection Agency, 2008.
[134] Chemical substances in child car seats and other products with textile for children, Danish Environmental Protection Agency, 2015.
[135] Survey, emissions, and health assessment of chemical substances in baby products, Danish Environmental Protection Agency, 2008.
[136] Survey, emissions, and health assessment of chemical substances in baby products, Danish Environmental Protection Agency, 2008.
[137] Europur – the European organisation for manufacturers of foam products, https://www.europur.org/applications/consumer-goods (accessed 20.08.2019)

products, and which is known to contain PAHs. Plasticising and process oil is a mineral oil product which originates from crude oil (petrogenic PAHs), while carbon black is a product that is produced by incomplete incineration or thermal degradation processes for heavy oils such as coal tar (primarily pyrogenic PAHs). Carbon black is used as a dye, amongst other things. PAHs have been found in expanded polystyrene[138] and PU foam[139] for consumer products, which makes this requirement relevant here.

The eight PAHs in the table are restricted in REACH and must thus not exceed 1 mg/kg of each. Clothes, shoes, and gloves are some of the consumer products covered by this REACH limitation[140]. The criteria requirement goes further than REACH, as it sets a maximum level of 0.5 mg/kg for each PAH.

Background to requirement O56 Polyurethane foam (PU foam)

Blowing agents

Halogenated organic compounds may not be used as blowing agents or auxiliaries for these. Historically, CFC, HCFC and HFC have been used in the production of PU foam, and it is generally known that these substances are harmful to the environment, especially as greenhouse gases and as ozone depleting substances. The requirement prohibits the use of halogenated organic compounds that are used as blowing agents or auxiliaries for these. Many producers of PU foam have replaced CFC and HCFC with carbon dioxide but ensuring that they are not used is still considered relevant.

Blowing agents are only relevant for PU foam, as the production of latex foam does not require blowing agents. Expanded polystyrene uses water or pentane as a blowing agent.

CertiPUR prohibits the use of CFC, HCFC and dichloromethane (methylene chloride), but does not set requirements concerning isocyanates.

Background to requirement O57 Latex

1,3-butadiene

Several synthetic latex materials contain substances that are harmful to health and the environment, including substances that are (suspected) carcinogens, such as 1,3 butadiene, CAS no. 106-99-0, in SBR rubber, which has the following classification: H340: May cause genetic defects and H350: May cause cancer. Butadiene functions as a monomer in the production of latex and the requirement aims to ensure that work is conducted to achieve the lowest possible monomer content in the final product.

Nitrosamines

Substances that are harmful to health, such as nitrosamines, can be formed during the vulcanisation process. Latex is an elastomer which, on vulcanisation, can be changed so that the material is virtually insoluble in a solvent at boiling point

[138] Si-Qi Li, PAHs in polystyrene food contact materials: An unintended consequence, Science of The Total Environment, Volume 609, 31 December 2017, Pages 1126-1131.
[139] Survey and risk assessment of chemical substances in bicycle helmets, The Danish Environmental Protection Agency 2018.
[140] Guideline on the scope of restriction entry 50 of Annex XVII to REACH: Polycyclic aromatic hydrocarbons in articles supplied to the general public, European Chemical Agency 2018.

5.14 Hides/skins and leather

The section for hides/skins and leather includes both tanning with chromium III salts, aldehydes, as well as vegetable or mineral tanning processes if the requirements are met. The definition of “leather” in this section follows the standard EN15987.

Synthetic leather also called "vegan leather" is not covered by this requirement section but is included in the textile section of the criteria if both requirements for the fibre and chemicals incl. polymer for coating as well as quality requirements for textiles can be complied with.

Background to requirement O58 Origin of hides/skins, and leather

The requirement has been set to ensure the use of only raw skins and hides that are a by-product of meat/milk/wool production or originates from free-living non-endangered species in the Nordic countries. This reduces the environmental impact of livestock farming and ethically it also makes good sense that the leather and hides/skins produced make use of raw hides that are by-products of meat/milk/wool production. In this generation of the criteria, the requirement now also permits fish skin, if it does not come from red-listed endangered species. Fish skin shall meet the same requirements as other types of hide/skin and leather. Synthetic leather also called "vegan leather" is not covered by this requirement section but is included in the textile section of the criteria if both requirements for the fibre and chemicals incl. polymer for coating as well as quality requirements for textiles can be complied with.

Background to requirement O59 Chromium content in leather and hides/skins

The requirement has been tightened to also include a requirement on extractable total chromium, which shall be less than 200 mg/kg (mass of chromium per total dry weight of leather or hide/skin). With this, the requirement is harmonized with requirements for leather at Blue Engel and EU-Ecolabel.

The requirement that no chromium (VI) shall be present was also part of the previous generation 4. In the EU, there is a REACH restriction stating that leather parts that come into contact with the skin must not contain chromium (VI) with 3 mg/kg (3 ppm) or more[141].

The EN ISO 17075 standard recommends a detection limit of 3 ppm. The requirement here in these criteria goes further than the EU legislation by requiring that the test is submitted for verification.

Hexavalent chromium (Cr (VI)) is not used in the tanning industry and has no purpose in the tanning process. Chromium (III) salts may, however – under certain conditions – be converted into Cr (VI) compounds[142]. Leather products can release Cr (VI) compounds, which is a problem because hexavalent chromium compounds are contact allergens. Cr (VI) is considered one of the most widely known allergens.

The requirement does not exclude chrome tanning (chrome III) but requires a minimum content of extractable total chromium in the finished leather. 80 - 90% of skin and leather production globally use chromium (III) salts in their tanning processes and there are qualities that cannot be achieved with alternative tanning agents. This is described in the EU's Best Available Techniques (BAT) reference document for skins and leather. The reference document explains that this is the

[141] Entry 47, Chromium VI compounds https://echa.europa.eu/documents/10162/1f775bd4-b1b0-4847-937f-d6a37e2c0c98
[142] Survey and health assessment (allergies only) of chromium in leather shoes.

reason for the limited substitution of chrome tanning with alternative tanning agents. At the same time, it is today possible to minimize the extractable content of chromium (total) in the finished product as well as in the wastewater discharged to the aquatic environment.

Whichever tanning process is used, it is relevant to ensure a low level of chromium and particularly chromium (VI) in the finished leather. The requirement must thus be documented regardless of the tanning process. Standard ISO EN 15987 defines different types of tanning and for “chromium-free tanning” permits up to 0.1% total chromium in the finished leather. “Vegetable tanning” is permitted up to a total of 0.3% tanning metals (Cr, Al, Ti, Zr, Fe) in the leather.

The rest of the leather industry, which do not use chromium III salts, tends to use a vegetable, aldehyde, or other mineral tanning process. Each process has different important environmental and health aspects. EU Best Available Techniques (BAT) reference document for hides and skins does not specify a specific tanning process as BAT.[143] The choice of tanning technology depends largely on the properties required in the finished material, cost, the production facilities available and the type of raw material being processed. Because of its particular properties vegetable tanned leather is often used for shoe soles and other hard leather products. According to the EU's Best Available Techniques document for leather, vegetable tanned leather does not have the same properties as chrome tanned leather such as the same flexibility.

Background to requirement O60 Cadmium and lead

The requirement is set to ensure that there is no cadmium and lead in the finished hides/skins or leather. Lead occurs most often due to contaminants in the chromate during chromium tanning.

Background to requirement O61 Chemical overview for leather, and hides/skin production

To gain an overview of which chemicals are used in the various processes for the production of hides/skins and leather, the criteria require the submission of a list of all the chemicals used.

Background to requirement O62 Classification of chemical products

Nordic Ecolabelling strives to ensure that the health and environmental impacts of the products are as low as possible. Therefore, there is a requirement prohibiting, for example, CMR classification, which thereby excludes some of the, in health terms, most problematic classifications of substances. The requirement covers all chemicals used in the production of hides/skins and leather, to ensure a focus on this in all processes that make use of chemicals.

In addition to chemicals for the tanning process itself, chemicals such as dyes, auxiliary chemicals, finishing chemicals, solvents, enzymes, biocides, and various inorganic standard chemicals are also used. There is a significant variation in the amount of chemicals used, depending on the type of leather product and the chosen process. The most widely used inorganic chemicals are sodium sulphide, calcium

[143] Best Available Techniques (BAT) Reference Document for the Tanning of Hides and Skins, JOINT RESEARCH CENTRE 2013, Available at: https://publications.jrc.ec.europa.eu/repository/bitstream/JRC83005/tan_published_def.pdf

hydroxide, acids, carbonates, sulphites, and sulphates. The greatest variation can be found in the number of tanning agents used[144].

An exception has been made in this requirement for biocidal products, which are permitted for skins and leather in EU Regulation (EU) No 528/2012, as the very purpose of tanning is to prevent skins and leather from rotting due to microbial infestation. Here is a need for treatment with an antibacterial effect. In the EU's Best Available Techniques (BAT) reference document, it is BAT to use only biocidal products approved in accordance with EU Regulation No. 528/2012 to minimize the emissions of biocides in wastewater.

Background to requirement O63 Classification of ingoing substances in chemical products

The requirement is new in this generation of the criteria. The requirement excludes all constituent CMR substances to an absolute level of 0 ppm. There is thus no triviality limit for ingoing substances. Ingoing substances are defined as all substances, whatever their concentration, in a used chemical (e.g., pigment or bleaching agent) or blend of chemicals (e.g., printing paste, coating), including additives (e.g., preservatives and stabilisers). Known products released from ingoing substances (e.g., formaldehyde, arylamine and in-situ generated preservatives) are also considered to be constituent. Impurities are defined as residual substances from production, including raw material production, that are present in a used chemical or blend of chemicals in concentrations of ≤100.0 ppm (≤0.01000 weight%, ≤100.0 mg/kg).

The prohibition of all constituent CMR substances in categories 1A, 1B and 2 now has its own separate requirement. Nordic Ecolabelling strives to ensure that the health and environmental impacts of the products are as low as possible. Therefore, there is a requirement prohibiting specific CMR classification, which thereby excludes some of the, in health terms, most problematic classifications of substances. The requirement covers all chemicals used in the production of hides/skins and leather, to ensure a focus on this in all processes that make use of chemicals.

After consultation an exception has been made for titanium dioxide which is added in powder form during raw material production. On February 18, 2020, the European Commission published the decision that titanium dioxide will be classified as a suspected carcinogen (Category 2, H351) upon inhalation under the CLP Regulation. The classification provision has been debated, as the risk that gives rise to the hazard classification applies to inhalation of powder, and not the chemical substance itself. Liquid and certain solid mixtures are not classified. It can be difficult to find replacements in the short term, which is why Nordic Ecolabelling has made an exception for the use of titanium dioxide in powder form. In August 2025, the EU Court of Justice annulled the harmonised Carc. 2 (H351i) classification of TiO2. Since TiO_2 is no longer CMR classified, the exemption from the requirement is removed, but TiO_2 can still be used in textiles.

Background to requirement O64 Prohibited substances

The requirement is new, bringing together several requirements from the previous generation of the criteria (requirements O41, O44, O45, O46 and O47). The requirement now covers more substance groups.

[144] Best Available Techniques (BAT) Reference Document for the Tanning of Hides and Skins, JOINT RESEARCH CENTRE 2013.

In addition to chemicals for the tanning process itself, chemicals such as dyes, auxiliary chemicals, finishing chemicals, solvents, cross-linking agents, enzymes, biocides, and various inorganic standard chemicals are also used. Cross-linking agents may be used in the finishing stage. The following are sometimes used, for example: polyisocyanates, carbodiimides and aziridines.

Aziridines are highly toxic, and for this reason they have been replaced by **polyaziridines**, which are less toxic and can be used for base garments and outerwear. Ethylenimine-based cross-linking agents are used for the top finish. Ethylenimine is toxic and carcinogenic.

Per- and polyfluoroalkyl substances are sometimes used in leather production as water repellent, oil repellent and dirt repellent agents.

Flame retardants are only used on leather in certain specific contexts. These include aircraft and train seats and furnishings for public buildings. In addition, **phthalates** may be used in softeners and **azo dyes** often used in dyeing. Abrasives may be used on vegetable tanned leather to even out the colour of the substrate before the dyeing operation. This action is performed more rarely on chromium tanned leather. The chemicals used in this process are salts that release sulphur dioxide, oxalic acid, **EDTA**, bleaching syntans and so on[145]. See also the background text for requirement O35.

Background to requirement O65 Biocides and antibacterial substances

See background to requirement O36.

Biocides may be used in various tanning processes to protect the substrate against microbial attack.

Background to requirement O66 Discharges to wastewater

Chromium

The most significant source of chromium is wastewater from the tanning process, but wastewater from post-tanning processes may also contain chromium, if chromium is used in post-tanning. Small quantities of chromium may also be flushed out during the wet process steps that follow chromium tanning or post-tanning. The requirement level for chromium in wastewater remains unchanged from the previous generation of the criteria. The EU Ecolabel criteria for footwear and Blaue Engel have the same requirement concerning the chromium content of wastewater.

COD (chemical oxygen demand)

The requirement is now harmonized with similar requirements in EU-Ecolabel's criteria for footwear as well as Blue Angel's criteria for leather. The requirement now provides an exemption for wastewater that is discharged to municipal or other regional treatment. Here, the tannery does not have the opportunity to influence the effect and what else is led to the plant. This is the same way the criteria set COD requirements for both wool washing and textile production.

COD content in the wastewater is a parameter that has a high RPS. Organic compounds that use up the oxygen in the aquatic environment during decomposition can be a major problem if good treatment plants are not available. This is something

[145] Best Available Techniques (BAT) Reference Document for the Tanning of Hides and Skins, JOINT RESEARCH CENTRE 2013.

that tanneries are actively working to reduce. Nordic Ecolabelling therefore set requirements to limit COD emissions.

Background to requirement O67 Water consumption for hides/skins, and letaher

Reducing water consumption is considered an important element of environmental work. According to the IPPC's draft from 2011[146], normal water consumption at modern tanneries can be cut from 40-50 m^3/tonne of raw hide to 12-30 m^3/tonne of bovine/cattle hide if the tannery has effective control over its process. According to the draft, there are tanneries in Germany that consume 15-20 m^3/tonne and one tannery reports 9 m^3/tonne. A tannery in the Netherlands states that it consumes around 20 m^3/tonne of fresh bovine hides. Tanning calfskin requires more water – about 40 m^3/tonne.

The conclusion in the draft is that BAT for water consumption for bovine hides ranges from 16-28 m^3/tonne of raw hide. Based on this information, Nordic Ecolabelling has chosen to set the requirement at 25 m^3 water/tonne of hide/skin/leather that is processed.

The requirement level of 25 m^3 water/tonne of raw hide remains unchanged from generation 4 of the criteria. However, for vegetable tanning, calf and goatskin, pigskin and sheepskin, specific requirement level has been set in this generation of the criteria. Note that the unit for the sheepskin requirement is l/skin, not m^3/tonne[147].

However, it is uncertain whether it is possible to tan sheepskin without the use of organic chlorine compounds, which are excluded here in the criteria. The requirement is then harmonized with Blue Angel's criteria for leather.

Background to requirement O68 Energy consumption

The requirement remains unchanged from generation 4 of the criteria. The greatest energy consumption relates to the thermal energy used to heat process water and to dry and heat the premises. It is necessary for data to be compared for the same phases in the leather production process. Ideally, energy consumption should be considered and reported separately for each stage of the process, and it is known that some of the most energy-efficient tanneries do this. Where more detailed data about energy consumption is available, it is important that comparisons between tanneries are based on the same underlying data. For example, "wastewater treatment" may possibly not include biological treatment, which can account for more than 50% of the total energy consumed in the treatment of a tannery's wastewater.

5.15 Quality and performance requirements

Nordic Ecolabelling sets requirements concerning the performance and durability of textiles, hides/skins, and leather.

These requirements are important, since a Nordic Swan Ecolabelled product must offer good quality and seen from an environmental and resource perspective,

[146] Best Available Techniques (BAT) Reference Document for the Tanning of Hides and Skin, Joint Research Centre 2013.
[147] Stefan Ryden, personal comments, March and December 2011.

products must be usable for a certain length of time before they wear out and a new replacement is required.

If the Nordic Swan Ecolabelled product is not in production at the time of application, the quality requirements may be documented with tests of a similar textile product. In such cases, this must be described.

5.15.1 Quality and performance requirements for textiles

Background to requirement O69 Formaldehyde emissions from textiles

The requirement has been tightened from 20 ppm to 16 ppm since the previous generation of the criteria.

Formaldehyde is classified as hazardous to health, due to being carcinogenic and irritating to the eyes, throat, and skin. Formaldehyde residues in textiles can often originate from finishing with anti-crease agents. A certificate for Oeko-Tex 100 class I Baby (>16 mg/kg) and for GOTS (>16 mg/kg) may be used as documentation, even though Oeko-Tex uses the test standard Japanese Law 112. Oeko-Tex, GOTS and the EU-Ecolabel accept higher formaldehyde emissions for certain types of textiles. The EU-Ecolabel has a requirement level of max. 16 ppm for products aimed at children under 3 years old and products in direct contact with the skin. For garments with limited skin contact and home furnishings, the EU-Ecolabel has a limit of max. 75 ppm. Oeko-Tex 100 has requirement levels of 16, 75, 150 and 300 ppm, depending on the exposure scenario.

Background to requirement O70 Loss of fibre fragments from textiles

Loss of fibre fragments from washing of textiles is an area of great focus in relation to potential microplastic contamination of the aquatic environment. However, it is only right now that recognized standardized test methods have been developed for determining the loss of fibre fragments when washing textiles in household washing machines. Although, these test systems are not ready to define specific limit values, Nordic Ecolabelling considers it important to start testing. Later, when enough knowledge and data are collected, limit values can be inserted in the requirement. At the same time, a test for loss of fibre fragments will already today provide manufacturers with information about their textiles, as well as provide data for the work of developing a rating system. Nordic Ecolabelling encourages test results to be shared with, for example, TMC (The Microfiber Consortium), which needs this data to be able to develop a rating system.

These test methods today do not distinguish between natural and synthetic fibres. As there is a particular need to obtain knowledge about the extent of the synthetic fibre fragment loss from different textile types, it is chosen to focus on fabric with a minimum of 90% by weight of synthetic.

Background to requirement O71 Dimensional changes during washing and drying

The requirement has been set to ensure the high quality of the Nordic Swan Ecolabelled textile. The requirement has been amended since the previous generation of the criteria. There is now a specific requirement for bed linen. At the same time, it is now required for 100% wool knitwear for clothing to be washed 10 times before the final measurement. This is to ensure that the anti-felt treatment of the wool fibre also has effect after several washes. 10 times washing is not required for wool textiles for furniture. See additional background text on wool treatment in requirement O31.

Background to requirement O72 Tear Strength

The requirement refers to the test standard ISO 13937-1 Textile testing - Determination of tear strength - Part 1: Elmendorf method.

This standard describes the determination of tear strength with a pendulum apparatus, which defines the required tear force to cause a single tear of defined length from a cut in a fabric when a sudden force is applied.

The requirement is new and has been inserted to provide a long lifetime for the textile. The test must be performed on the outer fabric and thus does not include any inner lining in the product.

Background to requirement O73 Tensile strength

The requirement refers to the test standard ISO 13934-2 Textiles - Textile tensile strength - Part 2: Determination of maximum strength (grab method). The test method is mainly applicable to woven fabrics. The method specifies the determination of the maximum strength of test samples in equilibrium with the standard atmosphere for testing and of test samples in the wet state. 1 daN is equal to approx. 1 kg power.

The requirement is new and has been inserted to provide a long lifetime for the textile. The test must be performed on the outer fabric and thus does not include any inner lining in the product.

Background to requirement O74 Seam strength – woven fabrics

The requirement is new and is set to ensure high seam strength for the finished textile and thus to provide a long lifetime for the textile. The requirement refers to ISO 13935-2 Textiles - Textile seam strength - Part 2: Determination of maximum seam strength (grab method). The method can be used mainly on woven fabrics, including fabrics with stretch.

Background to requirement O75 Seam slippage resistance – woven fabrics

The requirement is new is set to ensure high slippage resistance of yarns at a seam in woven fabrics. This is to ensure that the fabric can achieve a long lifetime and not be discarded prematurely. The requirement makes it possible to choose between the test methods in the standards EN-ISO 13936-1 or EN-ISO 13936-2, both of which include determination of the slippage resistance of yarns at a seam in woven fabrics.

Background to requirement O76 Colour fastness to light

The requirement has been set in order to ensure that a dyed or printed textile can resist colour changes (fading) due to the influence of light, so that the product retains its desired colour over a long period of time. The requirement thus helps to ensure that the textile has a long life.

The requirement in this generation of the criteria has been expanded to also include textiles for outerwear, swimwear, and UV protective clothing, which has to survive prolonged exposure to sunlight. The requirement does not apply to white textiles. In the standard ISO 105-B02 the scale goes from 1-8 where 8 is best.

Fade resistance expresses how quickly the colour disappears under the influence of light. A high degree of fade resistance is desirable, and this can primarily be achieved by using the appropriate choice of dye, while the actual dyeing process also has an influence. The requirement refers to the EN ISO 105 B02 standard: “Textiles

– Testing of colour fastness – Part B02: Colour fastness to artificial light: xenon blue as light source". The artificial light represents daylight. Oeko-Tex 100 do not set requirements to colour fastness to light.

Background to requirement O77 Color fastness to wash and dry cleaning

The requirement has been set to ensure high quality and a long lifetime for the products. The requirement refers to the ISO 105 C06 standard: "Textiles – Testing of colour fastness – Part B02: Colour fastness to domestic and commercial laundering". The GOTS standard also tests to ISO 105-C06 and sets the same requirement level. A GOTS transaction certificate is therefore acceptable as documentation.

The requirement is set to ensure high quality and long lifetime for the products. The requirement has been tightened to now also include textiles that according to the care label can be dry cleaned. The requirement therefore now refers to both the standard ISO 105 D01 and ISO 105 C06. The level itself remains at 3-4, as the Nordic Ecolabelling experience that a mandatory requirement of 3-4 for all coloured textiles is a strict requirement. The GOTS standard also tests according to ISO 105-C06 and sets the same requirements level for textiles according to care label can be washed.

The Oeko-Tex 100 standard tests to ISO 105-E01. ISO 105 Part E01 describes methods for determining how resistant the colour is to all forms of exposure to water, but not washing.

Background to requirement O78 Colour fastness to perspiration and saliva

The requirement is new and has been set to ensure high quality and a long lifetime for the products. The requirement includes testing of products that are most often exposed to either perspiration/sweat or saliva.

Background to requirement O79 Colour fastness to rubbing (wet)

The requirement has been set to ensure that the dye is well fixed in the textile. If the colour fastness to wet rubbing is good, the other characteristics, such as wash resistance and durability, will automatically also be good, since wet rubbing in accordance with ISO 105 X12 is a standardised method of checking the fixing of the dye on the fabric. The requirement has an exemption for denim indigo dye. Without finishing, it is not possible to achieve strong colour fastness for denim indigo dye. Chemicals are often used to fix the dye in raw denim to avoid the dye cross-staining. These chemicals tend to be harmful to health and the environment, and so will not comply with Nordic Ecolabelling's chemical requirements for finishing. Finishing is therefore not considered a good environmental solution.

The requirement refers to EN ISO 105-X12 "Textiles – Testing of colour fastness – Part X12: Colour fastness to rubbing". The scale is described in ISO 105-A03.

Textiles in dark colours are defined here as Munsell value of 0, 1 or 2. Value, or lightness, varies from black (value 0) to white (value 10)[148].

This requirement is relevant in relation to the textile's durability, and to ensure that the dye does not cause cross-staining when the product is used. A GOTS or Oeko-

[148] https://munsell.com/

Tex certificate cannot be used as documentation of the requirement, as these schemes have lower levels.

Background to requirement O80 Colour fastness to rubbing (dry)

The requirement has been set to ensure that the dye is well fixed in the textile. If the colour fastness to dry rubbing is good, the other characteristics, such as wash resistance and durability, will automatically also be good, since dry rubbing in accordance with ISO 105 X12 is a standardised method of checking the fixing of the dye on the fabric. The requirement refers to EN ISO 105-X12 “Textiles – Testing of colour fastness – Part X12: Colour fastness to rubbing”. The scale is described in ISO 105-A03.

The overall requirement is unchanged since the previous generation of the criteria, as the requirement is still considered to be ambitious. EURATEX (the European Apparel and Textile Confederation) also recommends level 4. Oeko-Tex 100 sets the same requirements for colour fastness to dry rubbing.

Background to requirement O81 Ban on fabricated fabric holes

The requirement is to ensure, that the fabric is not manufactured with a design with fabricated "wear" holes. Fabricated "wear" holes will greatly reduce the wear resistance of the fabric and will significantly shorten the lifetime of the fabric. To stimulate a more circular economy in relation to the consumption of textiles, it is important to ensure design for longevity in order to keep the textile in use for as long as possible.

Background to requirement O82 Abrasion resistance

The requirement has been set to ensure that the textile is hard-wearing in terms of its resistance to abrasion. Abrasion resistance corresponds to the number of abrasions needed for two threads on a woven piece of textile to be worn through. The requirement is divided into textile products for professionals and private individuals as well as different types of textiles. Here, the abrasion resistance has been set at levels that are relevant for the specific textile product. When determining levels, the levels at Svensk Møbelfakta, Norsk Møbelfakta and Euratex have been looked into[149]. For upholstery, the abrasion resistance can vary from 20,000 up to 120,000. Here it is relevant to take into account whether the upholstery is used for domestic or professional use. Norsk Møbelfakta has levels of both 50,000 for furniture textiles for professional use and 80,000 for extra hard professional use. For Nordic Ecolabelled textiles, a distinction is only made between private and professional use, as it is not possible to control an even more specific use of the textile in connection with the certification itself. Textiles with very high abrasion resistance are often used to reinforce the knees of trousers, for example. This very high abrasion resistance may be achieved by using two or three layers of special fabric.

Background to requirement O83 Pilling

The requirement has been tightened since the previous generation 4 of the criteria. Textiles for clothing are now also covered by the requirement. A specification is added with a new requirement level for wool or wool blend upholstery fabrics, as wool fabrics often have a natural pilling in the beginning when the fabric is used. For textiles it is relevant to ensure that the fabric does not pill easily, in order to give the product as long a lifetime as possible. When determining the requirement levels, the

[149] EURATEX Recommendations Concerning Characteristics and Faults in Fabrics to be Used for Clothing.

levels of Svensk Møbelfakta, Norsk Møbelfakta and Euratex in relation to clothing have been looked into[150].

5.15.2 Quality and performance requirements for hides/skins and leather

Background to requirement O84 Formaldehyde

The requirement has been set to limit exposure to formaldehyde, which is classified as carcinogenic. The content of formaldehyde in the finished leather must not exceed 20 ppm in hides/skins and leather in products for children, and 75 ppm in other products. The requirement levels are identical with the formaldehyde requirements for the EU Ecolabel for Footwear and the Japanese label Japan Eco Leather.

The requirement has been tightened since the previous generation of the criteria, with the introduction of a separate requirement level for products for children.

Background to requirement O85 Tear strength for skin and leather

The requirement has been set to ensure the good quality of the skin and leather, in terms of strength. The requirement refers to the standard ISO 3377-1 “Leather – Physical and mechanical tests – Determination of tear load – Part 1: Single edge tear”. The requirement remains unchanged from the previous generation.

Background to requirement O86 Flexing test for leather

The requirement has been set to ensure the good quality of the leather, in terms of its flexing resistance and how the surface finish is affected. The requirement refers to the standard ISO 5402 “Determination of flex resistance”.

Background to requirement O87 Colour fastness to water - leather

The requirement has been set to ensure as long a lifetime as possible for the leather, by requiring that dyed or finished leather has high colour fastness and low cross-staining when wet. The requirement refers to the standard ISO 11642 “Leather – Tests for colour fastness – Colour fastness to water”. Leather that has not been dyed or given a surface finish is exempted from the requirement.

Background to requirement O88 Colour fastness to wear - leather

The requirement has been set to ensure as long a lifetime as possible for the leather, by requiring that dyed or finished leather has high colour fastness during wear. The test describes how the surface of the leather is affected by dry and wet rubbing. ISO 11640: “Leather – Tests for colour fastness – Colour fastness to cycles of to-and-fro rubbing”.

5.15.3 Unsold textiles, skins, and leather

Background to requirement O89 Unsold textiles, skins, and leather

The requirement has been set to ensure that unsold textiles, skins and leather and nonconformity productions are used in the redesign of new products, sent for recycling, or donated to a charity. The aim of this is to achieve as great an environmental benefit as possible, despite the textiles not being sold for their

[150] EURATEX Recommendations Concerning Characteristics and Faults in Fabrics to be Used for Clothing.

intended purpose. The requirement also seeks to increase the focus on producing the “right” quantities and so avoiding overproduction.

In cases where contamination of the textile is detected, which is either harmful to the environment or health, the textile is exempt from this requirement. It must be possible to document the contamination by a test report, which is archived at the company and thus accessible by inspection from Nordic Ecolabelling.

For the manufacturing licence, the requirement covers the company's Nordic Ecolabelled production until it is sold on to the next link in the value chain.

5.16 Packaging, storage, and transport

Background to requirement O90 Chlorophenols, PCB and organotin compounds during transport and storage

The requirement that chlorophenols, PCB and organotin compounds must not be used during transport or storage includes the textile both before and after any finishing. These chemicals are sometimes used to prevent the textiles from being attacked by moths and other insects during storage and transport.

They are all chemicals that are harmful to health and the environment and are therefore not permitted.

Chlorophenols and salts and esters of chlorophenol are seldom used, but are considered to remain relevant, as certain suppliers may still use these biocides during transport and storage. Their use is not permitted in the EU, but they could still be applied to raw materials originating from outside the EU.

GOTS version 4 and the version 5 set the following requirement for storage and transport: “In cases where pesticides/biocides must be used in storerooms/transport means, they have to comply with the applicable international or national organic production standard.” It is unclear, however, what this entails and how it is controlled. Textiles with GOTS certification must therefore also document this requirement.

Background to requirement O91 Prohibition of PVC

Soft PVC (polyvinyl chloride) may contain softeners such as phthalates that may be reprotoxic or harmful to the environment. In addition to the risk of phthalates in soft PVC, the waste treatment of PVC is particularly problematic. This is due to the fact that incinerating 1 kg of PVC generates 0.4-1.7 kg flue gas treatment residues, which are sent to landfill. The volume depends on the type of incineration process used[151]. In Denmark, for example, attempts have been made to develop methods to process these flue gas treatment residues in order to recover the salts, particularly CaCl2, but this has not proven financially viable, according to ARC (Amager Resource Centre) in Denmark, which also reports that the hydrochloric acid formed on the combustion of the chlorine in PVC can corrode the installations and the chlorine can lead to the formation of dioxins and furans. Besides the waste phase, PVC is also environmentally problematic in other areas. PVC consists of approximately 57% industrially produced chlorine and approximately 43% fossil coal from oil or gas. The electrolysis process in PVC production, for example, releases toxic chlorine gas (Cl2). In Plastic Europe’s Cl2 Eco-profile, dioxin/furan emissions are stated as less than 1 mg for the production of 1 kg of chlorine. This is an average figure, however,

[151] Memo: Ole Hjelmar, DHI – Institute for Water and the Environment in 2002 Memo on mass flows on incineration of PVC.

so there is a risk of PVC/chlorine gas production with higher dioxin emissions than are stated here.

Background to requirement O92 Recyclable packaging material

Recyclability is an important step in the transition to a circular economy. This provides an opportunity for materials to stay in the resource eco cycle, thereby reducing the use of virgin resources. The extent to which a material is recycled depends on many factors, such as the sorting options in each country or local authority, and how the consumer ultimately sorts the waste. However, Nordic Ecolabelling has an opportunity to promote the recycling of packaging by setting design requirements that support this process.

The main material in the packaging must be recyclable. The EU's action plan for a circular economy focuses on recovery and reuse, particularly with regard to packaging materials. Waste collection can either lead to a high level of material recycling, where valuable materials are returned to the economy, or to an inefficient system where recyclable waste largely ends up in landfill or is sent for incineration. The EU has drawn up a plastics strategy, which includes focusing on making the recycling of plastic more financially viable and working towards global solutions and standards that promote plastics recycling[152].

Oxo-degradable and biodegradable plastics must not be used since they "contaminate" the other recycled plastics streams in the Nordic region. Bio-based plastic in PET, PE and PP can be recycled in the same way as fossil-based plastic in PET, PE, and PP.

Background to requirement O93 Design of recyclable packaging

The requirement has been set to enable the best possible recycling of the material in the primary packaging.

In physical stores, textiles are usually sold without any primary packaging. However, this does not always mean that the product had no primary packaging during its distribution to the store. With online retailers, the product often remains in its primary packaging when dispatched to the store or the customer. The requirement is therefore not to encourage the use of packaging if it is not necessary. But primary packaging for textile products can ensure that the product is not damaged in transit, for example due to moisture, dirt, or cross-staining from other products. In relation to removing the primary packaging Patagonia has seen that polybags are critical to ensuring, that the garments stay clean from the finished goods factory through the transport to the consumer. Patagonia describes that if they eliminate the use of polybags, garments would be damaged, resulting in much higher environmental costs than the one from the polybag[153].

The best way to ensure high quality recycling is to design the whole packaging in one material, so that individual parts of the packaging do not need to be separated out in the recycling process. Colour affects the recyclability of the packaging. Non-coloured or clear plastic packaging is preferred, because it has a wider range of recycling

[152] Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions, Closing the loop – An EU action plan for the Circular Economy, COM(2015) 614 final, http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A52015DC0614

[153] Patagonia's Plastic Packaging: A Study on the Challenges of Garment Delivery https://www.patagonia.com/stories/patagonias-plastic-packaging-a-study-on-the-challenges-of-garment-delivery/story-17927.html

options than strongly coloured plastic. Colourless plastic has the highest recycling value. Dark colours result in darker recycled granules, which is not the preferred choice, and carbon black creates problems in most automated sorting systems, as the NIR (near infra-red reflectance) detector cannot identify dark colours produced using carbon black. Only colourless plastic is accepted unless it makes use of recycled plastic. If at least 50% by weight of the plastic packaging is recycled material, colouring is permitted.

Typical contaminants that affect the recyclability of the plastic foil materials (like a polybag) would be paper labels[154], adhesives and non-polyolefin plastics. This leads to contamination and to a limitation of the recyclability of the plastic[155]. Requirements for labels, however, have a low RPS, as soft plastic from packaging makes up a smaller proportion of the overall environmental impact from textiles. Therefore, there are no requirements for labels on packaging.

Biodegradable plastic is not suitable for today's recycling systems and can cause problems in the material recovery process for the recyclable types of plastic.

Background to requirement O94 Informationi on recycling

To stimulate the sorting of packaging for recycling, a new requirement has been added concerning the provision of guidance on the packaging about how it should be sorted for recycling. The waste stage is affected by many factors, such as the sorting options in each country or local authority, and how the consumer ultimately sorts the waste. However, Nordic Ecolabelling can generally encourage greater recycling of packaging by setting requirements that support recycling options.

5.17 Social and ethical requirements

Background to requirement O95 Mechanical and chemical distressing of denim

The requirement excludes the use of the treatments to achieve a pre-worn denim look that are most harmful to human health. The requirement is set to protect the health of the worker in the denim production.

Sandblasting and sanding

Both manual sandblasting and mechanical sandblasting can have major health impacts, since inhaling the sand (silica dust) can cause serious respiratory problems for workers; in cases of intense or prolonged exposure, it can lead to life-threatening illnesses such as lung cancer. Denim is sandblasted in order to achieve a pre-worn denim look.

Although several brands have promised to boycott sandblasting, studies such as those conducted for the report "Breathless for Blue Jeans: Health hazards in China's denim factories" by The Clean Clothes Campaign in 2013 have shown that the denim industry in China and Bangladesh continues to use sandblasting. Manual or mechanical sanding is used as an alternative to sandblasting. There has not yet been any study into the long-term effects of sanding denim, but the processes also cause

[154] https://fashionforgood.com/wp-content/uploads/2019/12/FashionforGood_Polybags_in_the_Fashion_Industry_Whitepaper-1.pdf
[155] Verification and examination of recyclability 2017 https://sharepoint.nordicecolabel.org/ProductDevelopment/horizontalthemes/Shared%20Documents/Recyclability_certification_EU_2017.pdf

the air to be filled with dust from the denim fabric at levels that exceed recommended limits.

Potassium permanganate

Other methods of achieving a worn look include laser effects, stone washing, water-based treatments, dye application and spraying with chemicals such as potassium permanganate. Potassium permanganate (also known as PP spray) is mainly used to lighten denim. The process involves spraying the chemical onto the denim fabric and then washing it off, leaving the treated area a lighter colour than the surrounding fabric. Workers spray the chemical onto the denim fabric with a hose or sometimes use a brush. The process exposes the worker to harmful inhalation of chemical vapour. The recommended method usually involves spraying the denim fabric in a closed and ventilated cubicle[156]. Potassium permanganate has been placed on the European Union's Community Rolling Action Plan (CoRAP) list of substances[157]. A CoRAP report in 2018 concluded that the harmonised classification should be updated in 2020 to: Acute Tox 4* classification – H302; Skin Corr. 1C – H314; STOT RE 2 – H373 (brain). The chemical therefore cannot be accepted used in an open process.

5.17.1 Fundamental principles and rights at work

Background to requirement O96 Fundamental principles and rights at work

The requirement refers to the UN's Universal Declaration of Human Rights[158], which deals with respect for and the upholding of human rights, and the International Labour Organisation's (ILO) Conventions on relevant rights at work and OECD Due Diligence Guidance for Responsible Business Conduct. These are recognised and widely used frames of reference for businesses in their work on human rights and workers' rights, and they underpin most of the systems and guidelines that address human rights, such as the OECD, ISO 26000, SA8000, the UN Global Compact, the UN Guiding Principles, and the Ethical Trading Initiative.

A new report from April 2019, compiled by Human Rights Watch[159], shows that low purchase prices and shorter lead times for textiles, combined with unfair sanctions and poor terms of payment, increase the risk of occupational accidents in textile factories. The severe financial pressure that many textile brands are putting their suppliers under gives those suppliers powerful incentives to cut costs in ways that worsen working conditions.

Many brands demand that their suppliers uphold key workers' rights, while at the same time pressuring and encouraging them to do the opposite. It is therefore considered relevant to expand the current requirement to include at least four new areas that are subject to ILO Conventions: "No violent treatment", "Workplace health and safety" (ILO Convention No. 155 and ILO Recommendation No. 164), Fair pay (ILO Convention No. 131) and Working hours (ILO Conventions Nos.1 and 14).

[156] Breathless for Blue Jeans: Health hazards in China's denim factories, The Clean Clothes Campaign 2013 http://www.setem.org/media/pdfs/Breathless.pdf
[157] SUBSTANCE EVALUATION CONCLUSION as required by REACH Article 48 and EVALUATION REPORT for Potassium permanganate 2018 https://echa.europa.eu/documents/10162/f91eb21d-12bb-7a7a-9708-9534f87c3440
[158] https://www.un.org/en/universal-declaration-human-rights/index.html
[159] "Paying for a Bus Ticket and Expecting to Fly" How Apparel Brand Purchasing Practices Drive Labor Abuses, 2019 https://www.hrw.org/sites/default/files/report_pdf/wrd0419.pdf

An SA8000 certificate with, for example, a BSCI audit report covers the ILO Conventions contained in the requirement[160]. A BSCI audit report may therefore be used as documentation for the requirement.

5.17.2 Mutual Human Rights Due Diligence obligations for Product Licensee and Manufacturing Licensee

The requirements in this section are meant to prevent and address adverse impacts across the value chain of licensed products. The requirements are grounded in the authoritative international standards on human rights due diligence adopted by the UN and the OECD. These soft law standards are referenced in the draft EU directive on due diligence[161].

The requirements are also in step with existing practice in the sector, including the risk-based approach to tackle the most salient human rights issues. Licensees are given a broad range of approaches to manage risk, and for the Nordic Ecolabelling to assess compliance, rather than a heavy reliance on contractual assurances and audits/verifications.

In the case of that there is only one licensee who covers both product and manufacturing, then the requirements decribed for both the Product licensee and the Manufacturing licensee must be fulfilled. In this case the ”Manufacturing licensee” decribed in the requirements shall be interpreted as the ”manufacturing site(s)” and the ”Product licensee” as the ”licensee”.

Background to requirement O97 Human Rights Due Diligence process

The due diligence requirement is supported by requirement O1, which asks for verified value chain mapping in production (dyeing plants and cut-make-trim (CMT) factories) and to connect the product with the actual raw material used.

The Nordic Ecolabeling aims to harmonise the social requirements in the criteria set with those of other ecolabelling schemes and proposed legislation in the internal market, see references below.

International human rights standards and the shift from soft law to regulations

The human rights due diligence process requirement is aligned with the UN Guiding Principles, and in extension the OECD’s Guidelines for Multinational Enterprises. The OECD Guidelines are clarified in plain-language explanations in the OECD Due Diligence Guidance for Responsible Business Conduct[162] to help promote a common understanding on due diligence compliant with that of the UN Guiding Principles.

The Guiding Principles were unanimously adopted by the UN Human Rights Council in June 2011. In line with the Guiding Principles, companies have a responsibility to undertake due diligence in their value chains to ensure respect for human rights. The human rights benchmarks are expressed in the International Bill of Human Rights and the ILO Declaration on Fundamental Principles and Rights at Work (which sets

[160] amfori BSCI Code of Conduct, https://www.bsci-intl.org/sites/default/files/amfori%20BSCI%20COC%20UK_0.pdf?_ga=2.176261411.72067964.1557828371-2066962727.1556691248 accessed 14.05.2019.
[161] https://commission.europa.eu/business-economy-euro/doing-business-eu/corporate-sustainability-due-diligence_en
[162] OECD Due Diligence Guidance for Responsible Business Conduct (“OECD Due Diligence Guidance”), 2018, see https://www.oecd.org/investment/due-diligence-guidance-for-responsible-business-conduct.htm

out the ILO core conventions). Companies are asked to employ ongoing risk-based due diligence to identify, prevent, and mitigate actual and potential adverse impacts on human rights based on its own activities, and those which may be directly linked to its operations, products, or services by its business relations. The UN Guiding Principles expect companies to prioritize attention to the likely risk of severe harm (salient risks), to make it manageable.

In practice, some human rights may be at greater risk than others. Based on a risk approach and steerability (i.e., whether the Nordic Swan Ecolabel is the right instrument to tackle the issue), the Nordic Ecolabelling requires Licensees to be able to verify compliance with the ILO core labour standards at dyeing plants, tanneries, and cut-make-trim sites:

- 029 Forced Labour
- 087 Freedom of Association and Protection of the Right to Organise
- 098 Right to Organise and Collective Bargaining
- 100 Equal Remuneration
- 105 Abolition of Forced Labour
- 111 Discrimination (Employmenty and Occupation)
- 155 Occupational Safety and Health
- 138 Minimum Age Convention
- 183 Worst Forms of Child Labour

The EU Ecolabel asks for verification of the same ILO core labour standards at cut-make-trim sites[163].

The verification requirement, further detailed in O100, means that in practice its only allowed to source licensed products from countries or regions where it is possible to assess and monitor for respect for human rights, including labour rights. This excludes countries and regions where international bodies (including the EU), report to have high human rights risks (especially forced labour), and where social audits and assessments of sites are impossible or difficult.

The EU Commission's proposal for a Corporate Sustainability Due Diligence Directive (CSDDD)[164] references the UN Guiding Principles and the OECD guidance. The CSDDD takes a comprehensive approach and ties social aspects in the value chain with delivering on the EU's Green Deal[165]. The Directive aims to ensure coherence for companies and avoid fragmentation of due diligence requirements in the EU single market resulting from EU member states "acting on their own"[166]. It is meant to ensure a level playing field through a common set of rules in the internal market.

[163] EU Ecolabel on Clothing and Textile Products, Commission Decision (EU) 2014/350 of 5 June 2014, see https://environment.ec.europa.eu/topics/circular-economy/eu-ecolabel-home/product-groups-and-criteria/clothing-and-textiles_en
[164] Proposal for a Directive on Corporate Sustainability Due Diligence and Amending Directive (EU) 2019/1937, see https://eur-lex.europa.eu/resource.html?uri=cellar:bc4dcea4-9584-11ec-b4e4-01aa75ed71a1.0001.02/DOC_1&format=PDF
[165] Communication from the Commission to the European Parliament the European Council, the Council, the European Economic and Social Committee and the Committee of the Region "The European Green Deal" (COM/2019/640 final), see https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=COM%3A2019%3A640%3AFIN
[166] Proposal for a Directive on Corporate Sustainability Due Diligence and Amending Directive (EU) 2019/1937, see https://eur-lex.europa.eu/resource.html?uri=cellar:bc4dcea4-9584-11ec-b4e4-01aa75ed71a1.0001.02/DOC_1&format=PDF, see Explanatory Memorandum p. 3.

The threshold criteria for the CSDDD[167] remain a topic of discussion between the EU Parliament and the Council. While many companies will find themselves exempt from the Directive due to their size, their interactions with companies covered by the Directive will still have consequences; companies in-scope will pass the requirements throughout their value chains.

The performance documentation requirement during the license period

Reasonable assistance may include the need for the Licensee to either guide the supplier to trainings in how to improve, encourage the supplier to recognise and engage positively with trade unions or workers committees in social dialogue, and/or engage other buyers from the site to increase leverage to influence improvements in labour conditions, and/or improve the Licensees own purchasing practises so that e.g., last minute order modifications do not cause excessive work hours.

Human rights due diligence may include establishing, influencing and/or overseeing an existing or agreed-upon remediation plan that the Licensees put in place either at the outset or shortly after signing.

Scope of requirements limited by the public procurement directives

In accordance with the use of ecolabels in public procurement, the requirements cannot cover corporate policies in general that do not concern the product that's purchased.[168] The requirements are therefore formulated to the specific product and relevant to the subject of the contract.

Companies may, however, have difficulty in meeting the Nordic Swan Ecolabel requirements without these internal general policies and processes in place. Nordic Ecolabelling has therefore provided an extensive overview of useful resources and guidance for companies considering applying for a license in Appendix 4: Due Diligence Policy resources.

Background to requirement O98 Communicate and align on responsible business conduct

See Appendix 4 in the criteria document.

Background to requirement O99 Preventive safety measure

The International Accord for Health and Safety in the Textile and Garment Industry is currently active in Bangladesh and, since 2023, Pakistan under the name 'Pakistan Accord'.[169] Originally established as the 'Accord on Fire and Building Safety' in Bangladesh in 2013, this initiative works with the safety of production sites. Visit the Accord's website to check the safety status of these sites for free.

The catalyst for creating this Accord was the Rana Plaza building collapse in 2012, which highlighted the need for buyers to verify the safety of the buildings where their products are made. Assessing structural safety can be costly and generally falls outside the scope of social labour standard audits. The Accord emerged as a collaborative effort, sharing assessment costs among multiple buyers and suppliers.

[167] Proposal for a Directive on Corporate Sustainability Due Diligence and Amending Directive (EU) 2019/1937, see https://eur-lex.europa.eu/resource.html?uri=cellar:bc4dcea4-9584-11ec-b4e4-01aa75ed71a1.0001.02/DOC_1&format=PDF, see p. 46.
[168] Directive 2014/24/EU of the European Parliament and of the Council of 26 February 2014 on public procurement, see https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex%3A32014L0024 Article 43.
[169] See https://internationalaccord.org/

This initiative, led by trade unions alongside buyers, empowers workers to address safety concerns, especially when new heavy machinery is introduced, or safety conditions change.

5.17.3 Human Rights Due Diligence obligations specific to the Product Licence

In the case of that there is only one licensee who covers both product and manufacturing, see section 5.17.2.

Background to requirement O100 Assessment of safety and labour conditions

The Licensee should assess their own potential contributions to adverse impacts, such as their purchasing practices, and determine whether there are sufficient incentives for suppliers to share, rather than hide, human rights issues.

Salient risks at sites before production is initiated

If any salient human rights issues were found (child labour, forced labour indicators, coercion and harassment, discrimination, blocks on rights to freedom of association, serious health and safety issues, subcontracting, lack of transparency to auditors, no one day rest in seven, unpaid wages, no proper work hours/wages tracking, basic legal minimum wage not paid) by any of the baseline risk assessments, then the Licensee must influence improvement / remediation for workers/affected persons, and then verify claimed improvements in follow-up audits. Until salient risks are verified remediated, the Licensee should not initiate production of Licensed product(s) with the Manufacturer or site.

5.17.4 Human Rights Due Diligence obligations specific to the Manufacturing License

In the case of that there is only one licensee who covers both product and manufacturing, see section 5.17.2.

Background to requirement O101 Transparency and disclosure

The Manufacturing Licensee shall ensure that all of its agents, subcontractors, consultants and any other personnel providing staffing for the production of licensed product(s) promptly and accurately disclose information relevant to the human rights due diligence process, as outlined in O97.

Background to requirement O102 Collaborative initiatives

See Appendix 7 in the criteria document.

Background to requirement O103 Processes to enable remediation

It must be demonstrated that the employees have access to an appropriate operational-level grievance mechanism.

5.18 Quality and regulatory requirements

Quality and regulatory requirements are general requirements that are always included in Nordic Ecolabelling’s product criteria. The purpose of these is to ensure

that fundamental quality assurance and applicable environmental requirements from the authorities are dealt with appropriately. They also ensure compliance with Nordic Ecolabelling's requirements for the product throughout the period of validity of the licence.

These requirements have been expanded in this generation 4 with a new requirement regarding "Control and assessment of supplier".

Background to requirement O104 Control and assessment of suppliers

The requirement has been set to ensure that licence is in compliance with the actual production of the Nordic Swan Ecolabelled textile, skin and leather.

6 Changes compared to previous generation

The requirements in generation 4 for the production of virgin synthetic fibres such as acrylic polyester, elastane, polyamide and polypropylene are not included in generation 5 of the criteria. Instead, new requirements have been inserted stating that synthetic fibres must either be based on recycled or bio-based material. At the time environmental requirements are set for the biomass.

Overview of changes to criteria Nordic Swan Ecolabelled Textiles, hides/skins, and leather generation 5 compared with previous generation 4.

Requirement generation 5	Requirement generation 4	Same requirement	New requirement	Change
O1 Brand owner traceability			X	New requirement for brand owner - to achieve traceability of the Nordic Ecolabelled products on the market.
O2 Unsold textiles			X	New requirement for brand owner. Same requirement is set for the manufacturing licence.
O3 Information on reduced washing			X	New requirements for brand owner for encouraging consumers to reduce climate impact by washing only when necessary.
O4 Primary textile packaging			X	If the brand owner is responsible for the primary textile packaging, then refer to the requirements O84, O85, O86 and O87.
O8 Material limits	O2 Description and composition of the product	X	X	New requirement for embroidery thread. The previous requirement O2 is now divided into requirement O6, O8, O9, O10 and O11. See updated requirements for coatings and membranes (O43, O44 and O45).
O9 Smaller textile elements	O2 Description and composition of the product	X	X	For Oeko-Tex, a supplementary declaration of absence of fluorinated substances is now required. The previous requirement O2 is now divided into requirements O6, O8, O9, O10 and O11.
O12 Zippers, buttons, velcro, reflectors and other details	O23 Zippers, buttons, reflectors and other details	X		The requirement is tightened with a ban of details/accessories without practical function such as sequins, rivets, glitter.

O13 Re-design of re-used textiles, hides/skins, leather			X	New requirement that enables re-design. However, with restrictions on in which product types or requirements for previous certification.
Fibre requirements				
O14 Cotton fibre	O3 Cotton and other natural cellulose seed fibres	X		Cotton must be 100% organic or recycled. Only for selected textiles for professionals, alternative 100% certified fibres are accepted according to either BCI (Better Cotton Initiative), Fairtrade cotton or CMiA (Cotton Made in Africa).
O23-O27 Regenerated cellulose fibre		X		Regenerated cellulosic fibres must be based on recycled or FSC or PEFC certified fibres and the fibre production must be with "closed loop" technology if more than 30% by weight of fibre content in the fabric is cellulosic fibres. At less than 30%, there are strict requirements for emissions from the process.
O28 Synthetic fibre – fossil origin			X	Synthetic fibres must be based on either recycled or bio-based material. See detail in the requirement.
O29 Synthetic fibre – bio-based origin			X	Synthetic fibres must be based on either recycled or bio-based material. Also, requirements for the biomass material.
O30 Recycled fibres, test for harmful substances			X	New test requirements for specific unwanted chemicals in the recycled fibre.
O31 Treatment and coating of fibre and yarn			X	New requirement stating all requirements for treatment of fibres.
Chemicals used in textile production				
O33 Classification of chemical products	O31 Dyes, colorants, and pigments	X		The requirement has been tightened and now covers all chemicals used in textile production.
O34 Prohibition of CMR substances			X	The requirement has been tightened and now covers all chemicals used in textile production.
O35 Prohibited substances	O26 Forbidden substances and O25 Substances on the Reach candidate list	X		The requirement has been tightened and now covers all chemicals used in textile production. The two requirements are combined, and the list is updated with several extra substances.
O44 Raw material in the polymer (coatings/laminates/membranes)			X	The limitation on proportion of coating/laminate has been removed. Instead, the polymer (>5% by weight in textile product) must comply with requirements for either recycled or bio-based raw material.
O48 Implementation of BAT for energy efficiency and water savings	O63 Energy and water consumption	X		The requirement for energy and water consumption has been expanded with requirements for implementation of a minimum of BAT techniques to reduce energy and water consumption. This means that textile production must

				be water and energy efficient and thus achieve reduced CO2 emissions.
O49 Fibres in filling and stuffing materials			X	New requirements. Filling, stuffing material and fibre inserts are now covered by the same fibre requirements as the textile fabric.
Skins and leather				
O59 Chromium content in leather and hides/skins	O42 Chromium (VI)	X		The requirement has been extended to also include total chromium, with a requirement stating that the extractable chromium content in the finished skin or leather (incl. finishing) must be less than 200 mg / kg.
O62 Classification of chemical products	O45 Dyes and pigments for dyeing	X		The requirement has been extended to include all chemical products used in the production of hides and skins.
O63 Classification of ingoing substances in chemical products – skins and leather			X	New requirement for CMR classification at substance level.
O64 Prohibited substances– skins and leather	O41 Substances on the Reach candidate list and O44 Alkyl phenol ethoxylates and organic fluorine compounds	X		The two requirements have been merged. The requirement has been extended to include all chemical products used in the production of hides and skins and more substances are included of the list.
Quality and performance				
O69- O82 Quality and performance requirements for textiles	O68-O74 Quality and performance requirements for textiles	X	X	Here, both the existing requirements have been tightened and several new requirements have been introduced. For example, requirements on the textile's tear strength, seam strength, abrasion resistance and peeling. As well as a ban on fabricated holes.
Recyclable packaging				
O91 Recyclable packaging material			X	New requirement stating that the main material in the primary packaging must be recyclable in the existing waste and resource systems in the Nordic region today.
O92 Design of recyclable packaging			X	New requirements for packaging design – e.g., material separation and type of label material for the best possible recycling.
Social and ethical requirements				
O94 Mechanical and chemical distressing of denim			X	New requirement that prohibits the use of manual and mechanical sandblasting or sanding of denim.
O95 Fundamental principles and rights at work	O84 Working conditions	X		The requirement now includes several extra ILO conventions and has a stricter requirement for ensuring the implementation at the company and the supply chain.