About Nordic Ecolabelling for

Furniture and fitments

Generation 6 • 29 October 2025 – 31 December 2029

Nordic Ecolabelling

Contents

Contact information

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

Denmark

Ecolabelling Denmark

www.svanemaerket.dk

Iceland

Ecolabelling Iceland

www.svanurinn.is

Finland

Ecolabelling Finland

https://joutsenmerkki.fi/

Norway

Ecolabelling Norway

www.svanemerket.no

Sweden

Ecolabelling Sweden

www.svanen.se

1 Summary

Nordic Swan Ecolabel criteria for Furniture and fitments have been revised from generation 5 to 6. The environmental impact of furniture is mainly related to the materials included[1]. A Nordic Swan Ecolabelled furniture or fitment therefore meets strict requirements for the constituent materials, and the criteria promote the use of renewable and recycled materials. This helps to reduce both the general environmental impact and the more specific energy and climate impact of the product.

Focus points during the revision from criteria version 5 to 6 have been requirements for quality (O4 and O5) to ensure durable and safe furniture for the user. Therefore, new minimum quality levels have been imposed on specific type of furniture and fitments. There are extensive requirements for the chemicals used in production, added to the materials, or used for surface treatment such as glue, paint and varnish. The requirements for prohibited substances have been clarified to include PFAS as this was potentially unclear in generation 5 of the criteria. It is not permitted to treat the furniture or constituent materials with antibacterial substances.

Emissions of formaldehyde and VOC are required for relevant materials and chemicals. The requirement for emission of formaldehyde has been adjusted to include 2 different loading factors according to EN 16516. Emphasis is placed on the criteria having a circular focus by including requirements for, among other things, warranty, spare parts, circular design of the product with the possibility of replacing parts, instructions for maintenance and assembly / disassembly, as well as general use of recycled and renewable raw materials. This helps to extend product's lifetime and promote circular economy.

1.1 Justification of the product group definition

As in generation 5 of the criteria, both domestic and contract furniture intended for use in residential and commercial environments may be eligible for Nordic Swan Ecolabelling. This means that furniture and fitments regulated and complying with quality standards listed in requirement O4 may be Ecolabelled. Example of regulated furniture are table/desk furniture, seating furniture, sleeping furniture, storage furniture, kitchen- and bathroom furniture, lounge furniture/mattresses, screen and partition walls, writing boards and mobile furniture ensembles and enclosures units/office pods.

Indoor doors and door frames, bathroom furniture with integrated countertop/sink and sound absorption screens designed to be freestanding or mounted on tabletops are also included in the criteria. However, acoustic ceiling and wall panels that are part of the building structure or mounted directly on existing walls or ceilings, are not covered by these criteria. Instead, they fall under the criteria for O10 interior panels.

It has been clarified that individual fittings such as kitchen- and bathroom counter-/worktops, fronts (door and drawer fronts) for kitchens, bath and wardrobes as well as kitchen cabinets may be Nordic Swan Ecolabelled. For guidance on how to market and use the Nordic Swan

[1] Cordella and Hidalgo (2016): Analysis of key environmental areas in the design and labelling of furniture products: Application of a screening approach based on a literature review of LCA studies

logo on furniture and fittings, please refer to the regulations, logo usage rules and guidelines available on the official website. Product systems, e.g. kitchen and wardrobe solutions of which there are numerous variations may also be Ecolabelled. To market the product as a Nordic Swan Ecolabelled kitchen, the license must include all necessary parts to assemble a finished kitchen such as cabinets, mouldings, at least one front (for cabinets or drawers) and at least one worktop.

The main environmental impact of furniture relates to the materials used to make the furniture, see section 3. The criteria cover a wide range of materials including solid wood (including bamboo and cork), wood and paper-based panels/boards, laminate, metal, plastic/rubber, padding materials (such as latex foam, polyurethane foam, down and feathers), paper, linoleum, glass, natural stone, agglomerated stone, textiles, leather and hide and materials for sound absorption.

Up to 5% of the furniture's total weight may consist of materials not covered by the criteria.

Additional products not explicitly listed in the product group definition may be included upon request if they are considered furniture or fittings and are made from materials subject to requirements in the criteria. Nordic Ecolabelling will assess and decide which new products may be added to the product group.

2 Requirements and justification of these

This section presents requirements, and explains the background to the requirements, the chosen requirement levels, and any changes since generation 6. The appendices referred to in the requirements can be found at the end of the criteria document.

2.1 Description of the product

This chapter contains product specifications such as a description of the product, production methods and any treatment techniques.

Background to requirement O1 Description of the product

The material composition and production processes of an item of furniture provide important information for determining whether the furniture is eligible for the Nordic Swan Ecolabel, the requirements that must be met by the furniture, and who (e.g. subcontractors) must document the requirements.

2.2 Product requirements

Nordic Ecolabelling sets a number of principal requirements for products relating to the materials contained in the furniture/fitment, quality, consumer information and circular economy related requirements, such as warranty.

Background to requirement O2 PVC and plastic packaging

A ban on PVC in both products and packaging is a requirement that Nordic Ecolabelling includes in many criteria. The environmental impact of PVC is associated primarily with waste management, the use of additives and dioxin emissions, for example in the manufacture and incineration of PVC. The latest membrane cell technology is considered to be the most environmentally-sound means of production, but the membranes are coated with PFAS and this represents a potential source of PFAS contamination to the environment[2],[3]. The mercury method is still used to produce chlorine at some production facilities.

Plasticisers that have adverse health and environmental effects, such as phthalates, are frequently added to PVC. So-called imitation leather can be coated with plasticised PVC[4]. Some consultative bodies have commented that PVC is necessary for furniture for the health sector. However, there are other consultative bodies that have pointed out that there are alternatives to PVC for furniture for the health sector, such as PU. The ban on PVC is in line with requirements in other type 1 ecolabels such as EU Ecolabel and Blauer Engel in

[2] Chlorine and Building Materials: A Global Inventory of Production Technologies, Markets, and Pollution, Phase 1: Africa, The Americas, and Europe
[3] Chlorine and Building Materials: A Global Inventory of Production Technologies, Markets, and Pollution, Phase 2: Asia, Healthy Building Network, 2019
[4] The Danish Environmental Protection Agency, Green Tips for Furniture: https://mst.dk/kemi/kemikalier/saerligt-for-borgere-om-kemikalier/groenne-tips/hjemmet/moebler-uden-pvc-og-phthalater/ (downloaded 10 October 2019)

Germany. For more information on Nordic Ecolabelling's view on PVC, see www.nordic-swan-ecolabelling.org[5].

In order to align with the EU Packaging and Packaging Waste Regulation (PPWR), plastic used for packaging must be able to be recycled in today's recycling systems.

Background to requirement O3 Biocides during transport

Biocides can be used during transport of the furniture. However, substances that are added during transport were not included in this requirement. It has therefore been removed from the chemical requirements and added as a separate requirement. Dimethyl fumarate (DMF) is a mould and fungus killing agent which was found a few years ago in upholstered furniture, such as sofas and armchairs imported from China[6]. The agent was used during transport of the furniture and was not directly added to the products. The agent can cause serious allergic reactions. It is not approved for use as a biocide in the EU/EEA.

2.2.1 Quality

Background to requirement O4 Performance properties

In generation 6 of the criteria the requirement has been updated according to the newest standards. New minimum performance levels (level 1 or 2) have been introduced for test of various types of furniture. Also, it has been clarified that mobile, self-contained and soundproof furniture ensembles and enclosures is part of the criteria. The requirement and requirement level for performance properties are at the same level as Swedish Möbelfakta[7]. Swedish Möbelfakta is an ecolabel for furniture owned by IVL Swedish Environmental Institute and The Swedish Federation of Wood and Furniture Industry (TMF) operating on the Swedish market. It is important that a Nordic Swan Ecolabelled product is of good quality and is safe to use. This is to contribute to a longer service life for the furniture. In those cases where a product consists of small variations and / or compositions, e.g. different sizes, then the testing can be done on the variant of the furniture which is the "worst case" – it is therefore not necessary to test each individual variant. If this is the case, a description must be submitted to Nordic Ecolabelling which shows how the "worst case" consideration has been made.

Background to requirement O5 Wear resistance of surfaces

The intent of the requirement is to ensure that surfaces that are varnished or have a foil, melamine or laminate finish are of a high quality and have good wear resistance. Furniture with marks or scratches might otherwise be discarded before it is worn out.

In generation 6 of the criteria the requirement has been changed compared to generation 5 of the criteria. 3 new requirement categories and corresponding requirement levels have been introduced to the requirement: impact on surface and edge, steam on edge (door) and

[5] https://www.nordic-swan-ecolabel.org/nordic-ecolabelling/environmental-aspects/circular-economy-and-resource-efficiency/pvc/
[6] https://www.news-medical.net/health/Dimethyl-Fumarate-Allergy.aspx
[7] https://www.mobelfakta.se/Vara-krav.html (visited March 2025)

steam on edge (worktop). The requirement and requirement level for performance properties correspond to Swedish Möbelfakta[8].

Background to requirement O6 Functional properties – mattresses

The requirement for testing according to EN 1957 also existed in previous criteria generation. It has now been supplemented with requirement levels that are harmonized with EU Ecolabel's requirements for mattresses. It is important that a Nordic Swan Ecolabelled mattress has good functional properties and retains its firmness and thickness over time.

2.2.2 Circular requirements

In this chapter, several of the requirements related to circular economy are gathered. However, it is pointed out that there are also several other requirements that are related to this topic, including requirements for the proportion of recycled plastic and requirements for chemicals that reduce the use of harmful substances that thus disappear from the recycling loop.

Background to requirement O7 Warranty and spare parts

A Nordic Swan Ecolabelled product must have a good quality, and together with requirements related to quality, warranty is a factor that signals the product's lifetime and says something about what the customer can expect from the product. However, warranty should not be equated with longevity alone, which is affected by many factors, including how hard and often the product is used. A warranty is something that goes beyond the legal warranty and is an agreement between buyer and seller. The legal warranty is regulated by law in contrast to a warranty. A warranty can be designed in many ways, but Nordic Ecolabelling has set as a minimum requirement that it must go beyond the legal warranty and that it must include replacement/repair if something breaks or does not work properly. The warranty times are based on surveys of what is provided by warranties in the market, consultation comments and regulation of the legal warranty in Europe and the Nordic countries. The legal warranty in the EU is a minimum of 2 years. Some countries, such as Norway, have a legal warranty for 5 years. It is important to emphasize that the warranty must cover more than what is covered by the legal warranty.

Lack of spare parts is highlighted as a hinder to more circularity in the furniture industry[9]. The Nordic Swan Ecolabel can help to influence this in a positive direction by making spare parts available or being able to produce them when needed for at least 10 years after the product has been discontinued.

Requirements for warranty and spare parts can stimulate manufacturers to make good quality products and choose suppliers who also supply high quality materials and parts. This is important for the product to have a long lifetime.

[8] https://www.mobelfakta.se/Vara-krav.html (visited March 2025)
[9] Circular Economy opportunities in the furniture sector, 2017, report from European Environmental Bureau.

Background to requirement O8 Traceability labelling

Labelling the product with the manufacturer's or retailer's name makes it easier for the user to know who to contact for any questions about the product, maintenance, spare parts, etc. It also ensures better traceability if the product changes owner.

Background to requirement O9 Disassembly and separability

Information on disassembly and instructions for this is important in the event of any repair / replacement of parts. If it can be ensured electronically that the information is available for a minimum of 10 years, e.g., by marking with a QR code, this can be approved.

Background to requirement O10 Metal – disassembly

Metal can be used as reinforcement in other types of material, which can destroy the possibility of recycling and can also destroy recycling equipment, e.g., when cutting a plate. It is important to recycle metal as primary production of metal has major climate and environmental impacts.

Background to requirement O11 Maintenance

Proper maintenance is important for a long product life span. If it can be ensured electronically that the information is available for a minimum of 10 years, e.g., by marking with a QR code, this can be approved.

Background to requirement O12 Consumer information

The requirement contains important consumer information such as assembly instructions and possible take-back of the product. Which materials the product is made of is relevant information when the product is to be discarded/recycled to make it easier to sort the materials into the correct fractions.

Background to requirement O13 Removeable covers

It is important that the consumer receives correct information about treatment in order to extend the product life span. Proper treatment helps to maintain quality and the cover can still be used after washing.

Background to requirement O14 Circular design

There are several ways to promote circularity. It can be related to the constituent materials, such as the use of renewable/recycled materials and the use of materials that can be easily recycled or to design the product so that parts can be replaced, the product can be more easily repaired or renovated. As there are a number of different furniture types and fitments that can be Nordic Swan Ecolabelled and there are different prerequisites depending on the type of furniture, different categories have been made; Upholstered furniture, continental beds/frame beds, mattresses and other furniture/fitments.

For textiles, it is specified that the textile must consist of one type of fibre or of cellulose-based fibres. For cellulose-based fibres, a mixture is permitted as technology is now

available to use this in new production of regenerated cellulose. There are constant developments in the field of textile recycling, but at present it is difficult to distinguish different types of fibre that are mixed in a textile product. Therefore, only one type of fibre is required. For padding materials, recycling (post-consumer) is uncommon, but here too there may be new opportunities in the future with the great focus on circularity in society. At present, it is considered that the most important thing is that padding materials such as latex and PUR foam can be sorted into pure fractions and therefore glue is only allowed if the same type of foam is glued together.

2.2.3 Furniture with electrical and electrical components

The requirement in this chapter concerns lamps/light sources that are part of a furniture and requirements for energy consumption in stand-by mode.

Please note that electrical and electronic components such as motors, controls and control boxes are exempt from the general chemical requirements and the relevant material requirements (plastic and metal). However, please note that furniture with electronics must comply with several laws related to these components. Examples of relevant legislation are the RoHS directive, the WEEE directive, the REACH regulation and the ECO design directive (if external power supply is used). Relevant legislation must be complied with for all Nordic Swan Ecolabelled products and the applicant states that all relevant laws and regulations have been complied with when signing the application form.

Lamp as a furniture feature:

The requirement applies to lamps which is built-in or recessed into the furniture, e.g. in a cupboard or in a drawer. Free-standing lamps cannot be labelled.

Background to requirement O15 Lamps / light sources

The requirement concerning the use of LED light sources is to ensure that any lamps that are built-in or recessed into furniture use minimal energy. They also have a long useful life. The ability to change the light source also extends the useful life of the furniture/fitment.

Background to requirement O16 Standby energy consumption

Furniture with electric and electronic components such as height adjustable tables and adjustable beds are often in standby mode around the clock. Therefore, a requirement for a maximum standby consumption of 0.3 W is set to ensure a low energy consumption. The European Commission has prepared a proposal for a revised Ecodesign Directive, where standby is set at 0.3 W and network standby for furniture that has a network function is set at 2 W. Standby consumption is also something that public procurement have on the agenda[10].

[10] https://sparenergi.dk/offentlig-og-erhverv/indkoeb-og-adfaerd/indkoebsanbefalinger/haeve-saenke-borde (tilgjengelig 31.01.2020)

2.3 Chemicals

Nordic Ecolabelling sets requirements for chemicals that are used during the manufacture of the constituent materials, for the manufacture/assembly of the furniture and for surface treatment. The chemical requirements include products such as glue, varnish, staining, primer, filler, oil, soap, joint filler, sealants, colour products, binders, pigments, bleaching chemicals and the like.

Auxiliary substances such as lubricating oil and cleaning detergents are not covered by the requirements.

The chemical requirements do not apply to wires, electric or electronic components such as motors. However, it is important to notice that relevant regulatory requirements, such as the RoHS directive, must always be met. The chemical requirements also do not apply to chemicals used in the production of steel or aluminium or alloys that are included.

The requirements for chemicals are not all found in one chapter but will be specified in the chapter for each individual material, e.g. chemicals that are relevant in the manufacture of wood-based panels will be specified in the chapter for wood-based panels and chemicals used in the production of laminates will be specified in the chapter on laminates. An exception to this is the requirements to surface treatment of wood, wood-based panels and laminate, which are placed together in one chapter.

Much of the production process takes place at the subcontractors these days, but the furniture manufacturers often do some stages of the process, such as assembling the finished piece of furniture, themselves. There are some furniture manufacturers that do more of the production themselves. The criteria for chemicals must be met regardless of whether the chemicals are used at the subcontractors' or the furniture manufacturers' facilities. The chapters that apply to subcontractors/producer of different materials and to the furniture manufacturer or the subcontractor that assembles/produces the finished piece of furniture are given below.

Type of chemical/material	**Chapter in criteria document**
Chemicals used by the furniture manufacturer in its production/assembly of the furniture/fitment (does not apply to chemicals for surface treatment. Chemicals used for surface treatment of wood, wood-based boards and laminate are specified in chapter 4.7.3 or in the respective chapter for the relevant material).	4.3.1
Chemicals used by subcontractors that produce/assemble the finished piece of furniture/fitment (does not apply to chemicals for surface treatment. Chemicals used for surface treatment of wood, wood-based boards and laminate are specified in chapter 4.7.3 or in the respective chapter for the relevant material).	4.3.1
Chemicals for wood-based panels	4.5
Chemicals for paper	4.6
Chemicals for laminate	4.7
Chemicals for surface treatment of wood, wood-based panels and laminate	4.7.3
Chemicals for metallisation and other surface treatment of metal *The chemical requirements do not apply to chemicals used in the production of steel or aluminium or alloys that are included.*	4.8
Chemicals for plastics, rubber and silicone	4.9
Chemicals for textiles	4.10

Chemicals for padding materials	4.12
Chemicals for hide and leather	4.13

Definitions

The following definitions apply to all the requirements for chemicals unless otherwise stated. The requirements apply to all ingoing substances in the chemical product, but not to impurities unless otherwise stated in the specific requirement. Ingoing substances and impurities are defined below.

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, in-situ generated preservatives) are also considered as ingoing substances.

Impurities: Residuals, pollutants, contaminants etc. from production, incl. production of raw materials that remain in the raw material or in chemical product in concentrations less than 1000 ppm (0,1000% by weight, 1000 mg/kg) in the chemical product. Examples of impurities are residues of the following: residues or reagents incl. residues of monomers, catalysts, by-products, scavengers, and detergents for production equipment and carry-over from other or previous production lines.

2.3.1 Chemicals used by furniture manufacturers and subcontractors

The requirements in this chapter apply to chemicals that are added to the furniture/fitment or are used in the production/assembly of the furniture/fitment at the production site of the furniture/fitment or at the subcontractor's facility. A subcontractor can assemble parts of or the entire piece of furniture. Any chemicals used here, e.g. adhesives, must meet the requirements stated in this chapter.

If the furniture/fitment manufacturer itself performs much of the production process, and/or adds chemicals or carries out some of the chemical treatment, e.g. coating, the criteria for chemicals in the respective chapter for the relevant material must be met. It is emphasized that the requirements in this chapter do not apply to the production of various materials such as wood-based panels, metal, or textiles. These are stated in separate chapters, see introductory text in chapter 2.5 Chemicals.

Background to requirement O17 Antibacterial substances

Based on the precautionary principle, Nordic Ecolabelling wants to adopt a restrictive stance on the use of nanoparticles.

Products treated with antibacterial substances are often marketed as preventing bacteria formation, growth, and odours. Antibacterial finishing is usually not needed and must be used with caution, since they may be hazardous to human health and the environment. Also, increased use of biocides can lead to bacteria becoming resistant to antibiotics.

Background to requirement O18 Classification of chemical products

The requirement concerning the classification of chemical products used during the manufacture of furniture/fitments has not been changed. This is a classification that did not

exist when the criteria were previously revised. Nordic Ecolabelling is generally committed to restricting the use of chemicals that are harmful to health and the environment, and the classification requirement prohibits the products of highest concern.

Exemptions apply to adhesives classified with H351 due to isocyanates and adhesives classified with H350 and H341 due to formaldehyde. The furniture manufacturers use adhesives for different purposes. This also means that they use different types of adhesives and two-component adhesives can contain isocyanates and formaldehyde. The exception for adhesives containing formaldehyde is granted only if later requirements for free formaldehyde are met. An adhesive that has a low content of free formaldehyde is both better in terms of working environment and has a lower emission from the finished furniture.

Background to requirement O19 Classification of ingoing substances

The requirement has been made into a separate requirement and a ban on Category 2 substances has also been added. Nordic Ecolabelling would like to restrict the use of substances that are carcinogenic, mutagenic and toxic for reproduction (CMR) to the greatest extent possible. In other words, this requirement represents a further restriction on the classification requirement since it applies to ingoing substances in the chemical product.

Exemptions are given for adhesives that contain isocyanate classified H351 or formaldehyde classified H350 and H341, see more background in the previous requirement. Another common type of adhesive is PVAc adhesive where the polymer polyvinyl acetate is used as a binder. This adhesive may contain residual monomers of vinyl acetate classified H351. An exception of up to 1000 ppm residual monomer has been introduced, which is the same limit value that is found in the Nordic Ecolabel criteria for Chemical building products. Exemptions have also been added for 1,1,1-Trimethylolpropane (TMP, CAS No. 77–99–6). Titanium dioxide is a white pigment used in many different types of products. 1,1,1-Trimethylolpropane (TMP) is used to coat titanium dioxide to make the titanium dioxide particles easier to disperse. About 90% of all titanium dioxide is coated with TMP. There are no substances yet that can replace titanium dioxide and TMP.

Background to requirement O20 Prohibited substances

Substances on the Candidate List, PBT, vPvB and endocrine disruptors

The ban on substances on the Candidate List, substances that are PBT (Persistent, Bioaccumulative and Toxic) and vPvB (very Persistent and very Bioaccumulative) and the ban on substances that are potential endocrine disruptors in category 1 or 2 on the EU's priority list of substances for further evaluation of their role in endocrine disruption are new in this revision. The Candidate List contains substances of very high concern, so-called SVHC substances. SVHCs (Substances of Very High Concern) meet one or more of these criteria:

- Very harmful to health: carcinogenic, mutagenic, Toxic for reproduction (CMR substances, category 1A and 1B), set out in REACH, Article 57 a, b, c
- Very harmful to the environment: persistent, bio-accumulative and toxic (PBT) or very persistent and very bio-accumulative (vPvB), set out in REACH, Article 57 d, e
- Serious effects to human health or the environment on another basis than the groups above, but that give equivalent cause for concern (e.g. endocrine

disruptors and inhaled allergens), set out in REACH, Article 57 f

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). Nordic Ecolabelling prohibits Candidate List substances due to their hazardous properties. Other SVHC substances are addressed via bans on the use of PBT and vPvB substances, and requirements for classification of and ban of endocrine disruptors.

PBT (Persistent, Bioaccumulative and Toxic) and vPvB (very Persistent and very Bioaccumulative) are organic substances that are defined in Annex XIII of REACH and are generally undesirable in Nordic Swan Ecolabelled products.

Endocrine disruptors (EDs) are chemicals that alter the functioning of the endocrine (hormone) system and consequently cause adverse health effects. The term potential EDs is used for chemicals with properties that make them suspected to be EDs. The hormone system regulates many vital processes in living organisms and when normal signalling is disturbed, adverse effects may result. EDs raise high concern for their risk of causing serious negative impact on the environment as well as on human health specifically. Special concern is raised for effects on reproduction and development and about possible links to increases in public health diseases. While effects in wildlife populations have been confirmed, evidence is pointing to effects also in humans.

Harmonised scientific criteria for the identification of EDs are missing across different pieces of EU legislation. Few EDs have been identified in the legislation so far, compared to the numbers of potential EDs. Under these circumstances, the Nordic Swan Ecolabel excludes identified and potential EDs listed by the EU member state initiative “Endocrine Disruptor Lists” at www.edlists.org. The initiative is a voluntary collaboration, compiling and presenting a single repository of information about the current status of substances identified as EDs or being under ED evaluation in the EU.

A substance listed on any of List I; II; and/or III is excluded in the product group. List I contain substances identified as EDs at EU legislative level; List II contains substances under EU legislative ED evaluation; and List III is for substances considered by a national authority to have ED properties. All listed substances are excluded from all raw materials and products unless otherwise specified in the requirement, meaning that substances listed with reference to e.g., the Cosmetics Regulation are not only excluded from cosmetics.

The requirement concerns the main lists (List I-III) and not the corresponding sublists called “Substances no longer on list”. A substance which is transferred to a sublist 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 a regulation or directive which doesn’t have provisions for identifying EDs, e.g., the Cosmetics Regulation. 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 sublist II case-by-case, based on the background information indicated on the sublist.

The lists are dynamic, and the companies are responsible for keeping track of updates, in order to keep labelled products compliant with the requirement throughout the validity of the licences. Nordic Ecolabelling acknowledges the challenges associated with new substances being introduced on particularly List II and III, and in some cases also List I. We will evaluate the circumstances and possibly decide on a transition period on a case-by-case basis.

By excluding both identified and prioritised potential EDs which are under evaluation, the Nordic Swan Ecolabel ensures a restrictive policy on EDs.

3-iodo-2-propynyl butylcarbamate (IPBC): Exempted due to its essential biocidal function as a preservative and film protector. Its use is regulated through specific concentration limits, ensuring controlled application and minimised exposure. The exemption prevents burden shifts by allowing effective preservation within strict limits, reducing the risk of product degradation, microbial growth, and the need for more hazardous or less efficient alternatives.

Perfluorinated and polyfluorinated alkylated substances (PFAS)

Perfluorinated and polyfluorinated alkylated substances (PFAS) are a group of substances with undesirable properties. PFASs are defined as fluorinated substances containing at least one fully fluorinated methyl or methylene carbon atom (without any H / Cl / Br / I atom attached to it), i.e., with a few listed exceptions, all chemicals with at least one perfluorinated methyl group (–CF3) or a perfluorinated the methylene group (–CF2–) is a PFAS as described in OECD 2021.[11] The substances are persistent and are readily absorbed by the body.

PFASs are persistent in the environment and are known to remain in the environment longer than any other artificial substance. This means that as long as PFAS continues to be released into the environment, humans and other species will be exposed to an increasing concentration of PFAS. PFAS substances have often been shown to contaminate groundwater, surface water and soil. Remediation of contaminated sites is both technically difficult and costly. If the release continues, the PFASs will accumulate in the environment, in drinking water and in food.

Halogenated organic compounds

Halogenated organic compounds that contain halogenated compounds such as chlorine, bromine, fluorine or iodine must not be present in ecolabelled furniture and fitments. This includes halogenated flame retardants, chloroparaffins, perfluoroalkyl compounds and certain organic bleaching chemicals. It should be noted that PFOA (perfluoroctanic acid and salts/esters thereof) and PFOS (perfluoro octane sulphonic acid and compounds thereof), which appeared earlier as a separate item, are halogenated organic compounds. These can be used, for example, in paints and varnishes and in agents for waterproofing textiles and leather, which could be relevant to furniture/fitments. Halogenated organic compounds have different properties that are not desirable in Nordic Swan Ecolabelled products. They are harmful to human health and the environment, highly toxic to aquatic organisms, carcinogenic or harmful to health in other ways. The halogenated organic compounds do not

[11] https://www.oecd.org/chemicalsafety/portal-perfluorinated-chemicals/terminology-per-and-polyfluoroalkyl-substances.pdf 2021

break down readily in the environment, which increases the risk of harmful effects from the substances.

The preservatives bronopol, IPBC and CMIT/MIT with specific threshold limit values are exempt from the ban on halogenated compounds. There is also a restriction on isothiazolinone content (described in a separate section). The exemption is the same as in Version 4 for bronopol, isothiazolinones and CMIT/MIT, while IPBC is new to the list. IPBC is a fungicide that is now widely used, primarily in paint products. It is classified as harmful to the environment and allergenic. The threshold limit values are the same as in Nordic Ecolabelling's criteria for chemical building products. Water-based paints and adhesives used in the manufacture of furniture may contain the preservative bronopol and it is difficult to find substitutes. A limited amount of bronopol is therefore permitted although it is classified as a substance of concern and harmful to the environment. Isothiazolinones are used as a preservative in paints, lacquers and many other products, where they act as fungicides, biocides and algal growth inhibitors. They are toxic to aquatic organisms and can cause varying degrees of allergenic reactions. It has proved difficult to avoid the use of these preservatives in water-based products, which is what Nordic Ecolabelling's criteria for chemicals indirectly promote. Preservatives also play an important role in ensuring the shelf-life of the products before they are used. Alternative preservatives to isothiazolinones include formaldehyde and/or formaldehyde-releasing substances, which are carcinogenic. In this respect, isothiazolinone and CMIT/MIT are better, even if they also exhibit hazardous properties. To limit the use of these substances as much as possible, the amount of the substances is restricted. Restrictions on the amounts are the same as in the Nordic Swan Ecolabelling of interior paints and varnishes.

The exception for adhesives with polychloroprene is continued as it is difficult to find good enough alternatives to this adhesive that ensures good enough quality.

BHT

Butylhydroxytoluene (BHT, CAS No. 128–37–0) is new to the list of prohibited substances. BHT does not have an official harmonized classification and is not on the EU list of suspected endocrine disruptors that Nordic Ecolabelling refers to in another section of this requirement. However, BHT is on the Sin-list due to potential endocrine disrupting properties and on the CoRAP-list due to suspicion of endocrine disrupting effect, possible CMR and sensitizing properties. Nordic Ecolabelling places BHT on the list of prohibited substances due to the suspicion of very adverse health effects but introduces an exception for UV curing paints and paints (see chapter 2.10 Surface treatment). BHT has an important function in such products and can be difficult to replace. Nordic Ecolabelling does not want to prohibit the use of UV curing lacquers and paints as they have other positive properties such as low VOC content. If BHT receives a harmonized official classification that is not allowed in these criteria, then the exemption is no longer valid.

Alkylphenols, alkylphenol ethoxylates and/or alkylphenol derivates

Alkylphenol ethoxylates (APEO) and/or alkylphenol derivatives (APD) are a group of non-readily degradable surfactants that are proven endocrine disruptors. APEOs may be present in binding, dispersing and thickening agents, siccatives, foam inhibitors, pigment pastes, wax, etc. Raw materials containing APEOs can be replaced with APEO-free alternatives based on alkyl sulphates, alkyl ether sulphates and alcohol ethoxylates. These are readily biodegradable but also have harmful properties, being toxic to aquatic organisms and some

may be bioaccumulative. However, there is an environmental gain to be made by substitution since they break down rapidly and the degradation product, nonylphenol, with its endocrine-disrupting effects is avoided.

Bisphenol A, S and F

Bisphenol A, CAS No. 80–05–7, is used as a monomer in, inter alia, the following relevant areas and products: Various plastic and epoxy mixes, various building parts, paint, varnish, glue (binding agents, hardeners) and polyol in the production of polyurethane. Bisphenol A can be released into the environment from the production process. Bisphenol A (BPA) is on the Candidate List of substances that may have serious effects on human health and the environment and the goal is to eliminate emissions by 2020.[12] BPA is identified as damaging to the eyes, irritating to the respiratory tract, skin sensitizing and may also affect reproductive performance. The substance may be endocrine disrupting and is toxic to aquatic organisms. Bisphenol F and S can be used as substitutes for bisphenol A. A screening programme conducted to determine the occurrence of environmental toxins in surface water, sediment and biota in Norway found bisphenols A, F and S in the samples that were taken[13]. These are substances with the same properties as bisphenol A26.

Phthalates

The ban on phthalates has not been changed. Many phthalates are harmful to the environment and human health and should not be used in ecolabelled products for a variety of reasons. Some phthalates are on the EU's priority list of substances for further evaluation of their role in endocrine disruption, and some have already been identified as endocrine disruptors. Some phthalate compounds are also on the Candidate List. All are there because they are classified as toxic for reproduction. Some are also regulated in Annex XVII of REACH, and many phthalates are on the Danish Environmental Protection Agency's "List of Undesirable Substances" and on the Norwegian Environment Agency's "List of Priority Substances".

For precautionary reasons, Nordic Ecolabelling has decided to continue to exclude phthalates as a group, since this group contains many different phthalates with various properties.

Aziridine and polyaziridines

Aziridine and polyaziridines is classified H350 (carcinogenic) and H340 (mutagenic) and are thus covered by the ban on CMR substances. They are nevertheless on the list of banned substances to make it clear that they are banned. The substances were also on the list in Generation 4 of the criteria.

Volatile aromatic hydrocarbons (VAH)

The restriction on VAHs has not been changed. Volatile aromatic hydrocarbons (VAH) are volatile organic compounds where one or more benzene rings are contained within the molecule, e.g. toluene, benzene and xylene. VAHs are very stable and have a specific impact on the environment and human health, including damage to DNA[14]. Exposure to

[12] https://tema.miljodirektoratet.no/no/Tema/Kjemikalier/Miljogifter/Bisfenol-A/
[13] Screening programme 2013: New bisphenols, organic peroxides, fluorinated siloxanes, organic UV filters and selected PBT substances, The Norwegian Environment Agency, Report M-176/2014
[14] Environ Health Perspect. 2002 June; 110 (Suppl 3): 451-488.

these products should be minimised. For this reason, no more than 1% by weight is permitted in the chemical product.

Pigments and additives based on lead, tin, cadmium, chromium VI and mercury, and their compounds

Nordic Ecolabelling restricts heavy metals because they are toxic to humans and other organisms, both on land and in the aquatic environment. Mercury, cadmium and lead are toxic to the human nervous system, kidneys and other organs, and the metals can accumulate in living organisms. Chromium (VI) is classified as very toxic, CMR and harmful to the environment.

Background to requirement O21 Nanomaterials

Due to the small size and large surface area of nanoparticles, they are usually more reactive and may have different properties than larger particles of the same material. There is concern among public authorities, researchers, environmental organizations, and others about the lack of knowledge about the potential harmful effects on health and the environment [15],[16],[17],[18],[19],[20]. Coatings and other modifications can also change properties. Nordic Ecolabelling takes the concerns about nanomaterials seriously and uses the precautionary principle to exclude nanomaterials / particles in the products. The European Commission's definition of nanomaterials (2022/C 229/01) is used.

Most nanomaterials on the market today have either been in use for decades or existing materials have recently been manipulated into nanoforms.[21] For example, nanoparticles of carbon black and amorphous silica (SiO_2) have been used in the last century. Titanium

[15] UNEP (2017) Frontiers 2017 Emerging Issues of Environmental Concern. United Nations Environment Programme, Nairobi. https://wedocs.unep.org/bitstream/handle/20.500.11822/22255/Frontiers_2017_EN.pdf?sequence=1&isAllowed=y

[16] Parliamentary Assembly of the Council of Europe (2017 (2013)) Nanotechnology: balancing benefits and risks to public health and the environment. http://semantic-pace.net/tools/pdf.aspx?doc=aHR0cDovL2Fzc2VtYmx5LmNvZS5pbnQvbncveG1sL1hSZWYvWDJlLURXLWV4dHIuYXNwP2ZpbGVpZD0xOTczMCZsYW5nPUVO&xsl=aHR0cDovL3NlbWFudGljcGFjZS5uZXQvWHNsdC9QZGYvWFJlZi1XRC1BVC1YTUwyUERGLnhzbA==&xsltparams=ZmlsZWlkPTE5NzMw

[17] Larsen PB, Mørck TAa, Andersen DN, Hougard KS (2020) A critical review of studies on the reproductive and developmental toxicity of nanomaterials. European Chemicals Agency.

[17] SCCS (Scientific Committee on Consumer Safety) (2019) Guidance on the Safety Assessment of Nanomaterials in Cosmetics. SCCS/1611/19. https://ec.europa.eu/health/sites/health/files/scientific_committees/consumer_safety/docs/sccs_o_233.pdf

[18] Mackevica A, Foss Hansen S (2016) Release of nanomaterials from solid nanocomposites and consumer exposure assessment - a forward-looking review. Nanotoxicology 10(6):641–53. doi: 10.3109/17435390.2015.1132346

[19] BEUC – The European Consumer Organisation et. al (2014) European NGOs position paper on the Regulation of nanomaterials. www.beuc.eu/publications/beuc-x-2014-024_sma_nano_position_paper_caracal_final_clean.pdf

[20] Azolay D and Tuncak B (2014) Managing the unseen – opportunities and challenges with nanotechnology. Swedish Society for Nature Conservation. www.naturskyddsforeningen.se/sites/default/files/dokument-media/rapporter/Rapport-Nano.pdf

[21] EU observatory for nanomaterials and European Chemicals Agency (2019) What are next generation nanomaterials and why are regulators interested in them? Information note. https://euon.echa.europa.eu/documents/23168237/24095696/190919_background_note_next_gen_materials_en.pdf/b9178324-5a69-2e4b-1f2b-aac2c2845f45

dioxide, TiO_2, has long been used as a dye in bulk form, but is now produced as a nanomaterial for other purposes.[22] It is expected that other types of engineered nanomaterials will enter the market in the future.[23]

Within the product group furniture and fitments, nanomaterials are used, among other things, for impregnation or sealing of surfaces such as wood or metal, to create hydrophobic, self-cleaning, rust-resistant and antibacterial surfaces. These effects can be created by e.g. the addition of nanometals such as silver, gold and copper or titanium dioxide. The requirement has the following exceptions:

Pigments

Pigments are finely ground, insoluble particles that are used to give the products a certain colour. There are no substitutes that can perform the function of pigments such as dyes in paints, inks, textile dyes, masterbatch etc. and many pigments consist wholly or partly of nanoparticles. Therefore, nano-sized pigments are excluded. Although no clear conclusions can be drawn about the safety of nanopigments[24], release by weathering of facades is very limited, and the nanoparticles are probably mainly embedded in the paint matrix rather than being released as single nanoparticles[25],[26]. Paint pigments consist of particles of individual crystals up to aggregates of several crystals. It is generally more efficient to use pigments with smaller particles than larger ones to get the same colour. Inorganic pigments used in the paint industry, which can occur in nano-size, include carbon black and iron oxides[27]. Carbon black used in paints is very finely ground and has a particle size of approx. 10–30 nm[28]. Iron oxide pigment may comprise only nanosized particles, or only a fraction of the particles may be nano. Inorganic nano pigments are also added to products for a variety of purposes other than dyeing. Nano-titanium dioxide, for example, is used to provide a self-cleaning effect in paints.

Naturally occurring inorganic filler

Traditional fillers are allowed. Naturally occurring fillers from e.g. chalk, marble, dolomite, and lime are exempted from registration in accordance with Annex V, point 7 of REACH as long as these fillers are only physically processed (painted, sifted, etc.) and not chemically modified. An exemption for inorganic fillers has been added as long as they are covered by Annex V, point 7 of REACH.

[22] European commission, COMMISSION STAFF WORKING PAPER, Types and uses of nanomaterials, including safety aspects, Accompanying the [..] second regulatory review of nanomaterials, SWD(2012) 288 final
[23] EU observatory for nanomaterials and European Chemicals Agency (2019) What are next generation nanomaterials and why are regulators interested in them? Information note. https://euon.echa.europa.eu/documents/23168237/24095696/190919_background_note_next_gen_materials_en.pdf/b9178324-5a69-2e4b-1f2b-aac2c2845f45
[24] Hynes J, Novotný T, Nic M, Kocurkova L, Prichystalová R, Brzicová T, Bernatikova S (2018) Literature study on the uses and risks of nanomaterials as pigments in the European Union. European Chemicals Agency.
[25] Mackevica A, Hansen, SF (2016) Release of nanomaterials from solid nanocomposites and consumer exposure assessment – a forward-looking review. Nanotoxicology, 10(6), 641–653. https://doi.org/10.3109/17435390.2015.1132346
[26] Nowack B, Hincapié I, Sarret G, Larue C, Legros S (2013) Environmental fate of nanoparticles from façade coatings. NanoHouse Dissemination report Nº 2013-03. https:// DOI: 10.13140/2.1.2206.3040
[27] Industrial Organic Pigments; W. Herbst, K. Hunger; Third edition 2004; pp. 120–124
[28] Coatings Handbook; Thomas Brock, Michael Groteklaes, Peter Mischke; 2000; p. 128

Synthetic amorphous silica

Synthetic amorphous silica (SAS) is a produced silica (SiO_2) that has been used in industrial, consumer and pharmaceutical products for decades.[29] SAS is a nanomaterial according to the EU Commission's definition and is exempt from the requirement due to a lack of alternative substances.

Polymer dispersions can technically be considered as nanomaterials: the European Commission's follow-up report to the second "Regulatory Review on Nanomaterials" from 2012[30] states that solid nanomaterials dispersed in a liquid phase (colloid) should be considered as nanomaterials in accordance with the European Commission's recommendation. Polymer dispersions are not exempt from the requirement, as they are not considered relevant for furniture.

Background to requirement O22 VOCs in adhesives

Volatile organic compounds are of particular concern due to their inherent properties. They can be absorbed through the lungs and skin and cause damage to various organs. Prolonged exposure to certain organic solvents can cause chronic damage to the brain and nervous system, while other organic solvents can cause cancer or reproductive damage.[31]

Background to requirement O23 Free formaldehyde

Formaldehyde is a toxic and allergenic substance (H317) that has carcinogenic effects (H351) and should therefore be avoided as far as possible. Formaldehyde is exempted where it appears in the form of impurities and in adhesives where it is difficult to avoid this. The purpose of the requirement is to restrict the content of formaldehyde in products in order to limit formaldehyde emissions. Nordic Ecolabelling does not want to request a specific test for this, because that would be too extensive and costly for each chemical product. However, Nordic Ecolabelling can ask for a test if there is any uncertainty about the declaration.

Most of the formaldehyde present in adhesives occurs as free formaldehyde. However, formaldehyde can also originate from the components in the adhesive (such as preservatives). Adhesives emit formaldehyde during both polymerisation and the hardening phase. Free formaldehyde reacts when the adhesive is applied to wood or other components, and when the adhesive has hardened/dried, formaldehyde can be released through degradation processes. It is possible to control and set requirements to the amount of free formaldehyde in the glue, in the mixture or in dried glue, but not for what occurs when the adhesive is applied to a surface. This is because neither the adhesive manufacturer nor Nordic Ecolabelling are able to control or influence the choice of wood /material to which the adhesive is applied.

The limit values for free formaldehyde have been tightened compared with the previous criterion generation 4. For chemical products other than adhesives, the limit value has been tightened from 0.2 to 0.02% by weight. The formulation of the requirement and limit value

[29] https://www.asasp.eu/images/Publications/Nano_-_SAS_factsheet_-_201209.pdf
[30] Communication from the commission to the european parliament, the council and the european economic and social committee, Second Regulatory Review on Nanomaterials, COM(2012) 572 final
[31] http://www.epa.gov/iaq/voc.html

has been harmonized with the Nordic Ecolabel's house criteria generation 3 and criteria for chemical building products.

The requirement has been clarified after consultation and the exemption for adhesives mixed with hardeners has been removed. Adhesives may contain a maximum of 0.2% by weight of free formaldehyde and the requirement applies to the pure adhesive. This requirement applies to adhesives used in e.g. the final assembly of the furniture. Adhesives used in the manufacture of wood-based panels must meet later chemical requirements where there are no requirements for free formaldehyde but instead formaldehyde emission.

2.4 Solid wood, cork and bamboo

The requirements in Chapter 4.4 apply to solid wood, cork and bamboo. Panels made of wood, cork and bamboo are covered by requirements in section 4.5.

Furniture parts made of reused solid wood, cork or bamboo are exempted from requirements O27 and O28.

Molded veneer sheets are also included in this chapter and the glue used in the molded veneer sheets must meet the chemical requirements in Chapter 4.3.

Background to requirement O24 Chemicals in reused parts

Nordic Ecolabelling wants to promote reuse. This possibility will be relevant for a very small part of the manufacturers on the market, but there may be some cases where this is a possibility. The requirement that the application of use and that the wood must be untreated narrows the opportunities for using such wood. However, Nordic Ecolabelling has decided to be restrictive as it is difficult to know what types of chemicals are used. The requirement makes no distinction between timber used for interior applications and timber used for outdoor applications. However, since it must be untreated, pressure-impregnated timber, creosote, etc. cannot be used.

Background to requirement O25 Tree species with restricted use

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.

2.4.1 Requirement for furniture/fitments containing ≥ 10% wood, bamboo or cork by weight

Background to requirement O26 Traceability and certification

Nordic Ecolabelling's forestry requirement focuses on sustainable forestry and the traceability of the wood raw materials. The requirement also includes willow, bamboo and cork. These materials are used in furniture, although they are not very common. There is, for example, FSC certified bamboo.

The many benefits that sustainably managed forests deliver to society include wood for materials and energy, protection against global warming, homes and livelihoods for local communities and indigenous peoples, support of biodiversity and protection of water and soil from pollution and erosion. By setting a requirement that wood raw materials must originate from certified, responsible managed forests, Nordic Ecolabelling is supporting the move towards more sustainable forestry practices.

Nordic Ecolabelling requires a declaration of the species of wood contained in the Nordic Swan Ecolabelled product. This makes it possible to check the validity of Chain of Custody certificates in the supply chain. The requirement for CoC certification improves the traceability of materials in the supply chain within the guidelines and control systems of the FSC and PEFC. The company's CoC certification proves how certified wood is kept separate from other wood during production, administration and storage and is inspected annually by independent certification bodies. Under this requirement, CoC certification must be held by either the applicant/manufacturer or the supplier of wood raw materials. Nordic Ecolabelling considers it is too strict to require the applicant/furniture manufacturer to hold CoC certification. If the applicant/furniture manufacturer has CoC certification and is able to label the finished product with the FSC/PEFC logo, there is a requirement that the certified wood raw material is allocated i to the Nordic Swan Ecolabelled product. This ensures that FSC/PEFC credits are used for the Nordic Swan Ecolabelled production and that the credits are not sold twice. This will stimulate increased demand for certified wood raw materials because more certified wood raw materials must be purchased if the manufacturer wants to label other products, and not just the Nordic Swan Ecolabelled products, with the FSC/PEFC logo. It also means that a Nordic Swan Ecolabelled product can have both the Nordic Swan Ecolabel logo and the FSC/PEFC logo. However, there is no requirement for the applicant/furniture manufacturer to have CoC certification. If CoC certification is held by the supplier, the applicant/furniture manufacturer must have documentary evidence of purchase of certified raw material in the form of claims on the invoice or delivery note, showing that a minimum of 70% certified wood raw material has been purchased. Please note that Nordic Ecolabelling approves both the percentage system and the credit system for bookkeeping and sales of certified material.

It is also possible to not use a subcontractor that is CoC-certified. This is because the furniture industry often has small, local suppliers that have good control of the wood raw materials that they purchase, even if they do not have chain of custody certification. In such

cases, it should be possible to document that wood raw materials are purchased from certified areas.

The requirement has increased the minimum percentage to 70% for all wood species. Previously, this requirement only applied to pine, fir, birch and tropical wood. Tropical wood is now largely covered by the requirement concerning restricted tree species. Public sector tenders often require a certification percentage of 70%. The remaining percentage of wood raw materials must be FSC Controlled Wood or wood from PEFC Controlled Sources. The minimum requirement set by FSC and PEFC for the use of their logos on products is also 70%.

2.5 Panels made of wood and/or bamboo

The requirements in Chapter 5.5 apply to wood-based panels such as chipboard, fibreboard (including MDF and HDF panels), OSB (Oriented Strand Board), veneer (plywood and parallel-laminated veneer panels) and solid wood panels (corresponding to non-load bearing laminated wood panels or DIY panels). The requirements also cover equivalent products made of bamboo.

Background to requirement O27 Ecolabelled panels

Nordic Swan ecolabelled panels in accordance with criteria for 010 panels and mouldings for interior use, gen. 7 or later, fulfil all requirements in section 2.5 (section 4.5 in the criteria).

Background to requirement O28 Tree species with restricted use

Se background to requirement O25.

2.5.1 Requirements if the panel accounts for more than 5% of the product by weight

Background to requirement O29 Chemicals in wood-based panels with recycled materials

The requirement is made to provide better control over what types of recycled materials are being used and to prevent the use of materials containing substances of concern. The requirement concerning wood-based panels is the same as the requirement made in the EU Ecolabel criteria for furniture. Compliance with this standard is relatively common in the EU but it is important to ensure that production outside the EU also complies with the requirements of the standard. Requirements are imposed on the content of several heavy metals and creosote. If it can be documented that the requirements of the German Waste Wood Ordinance, 2002 or later have been met, this will also be approved as documentation.

Background to requirements O30–O34 Chemical products, Nano and VOC in adhesives

See background text to requirement O18 to O22.

Background to requirement O35 Emission of formaldehyde

In the manufacture of wood-based panels, adhesive systems containing formaldehyde are often used. The development shows reduced emissions of formaldehyde from the finished panel. Formaldehyde is a toxic, sensitizing, and carcinogenic substance that Nordic Ecolabelling wants to limit as far as possible both from a work environment point of view in manufacturing, but also to reduce emissions in the use phase.

Formaldehyde emissions from wood-based panels are communicated in the EU with a classification system, defined in the harmonized standard EN 13986. The current lowest emission class is E1 where the limit values are a maximum of 0.124 mg/m^3 according to test method EN 717–1. Work is underway on a new common statutory lower limit value in the EU. Nordic Ecolabelling monitors this work and will review all criteria with requirements for formaldehyde emissions when the limit value has been decided.

On 1 January 2020, Germany introduced a new legal requirement which means that the reference method for measuring formaldehyde emission has been changed from the previous EN 717–1 to EN 16516. If the method EN 16516 is used, the limit value is the same as that for E1, 0.124 mg/m^3. If, on the other hand, EN 717–1 is used as a method, the panel must meet a limit value of half E1 (0.062 mg/m^3). The method EN 16516 was not included in the requirement in the consultation proposal, but as the new legal requirement in Germany will probably mean that this method will become standard for external testing in Europe, it has been added. Tests according to EN 16516 give a higher result than EN 717–1, but there is no exact correlation between the methods yet.

After the consultation Nordic Ecolabelling has chosen to adjust the requirement due to new accepted correlation factors between EN 717-1 and EN 16516. The limits for test according to EN 717-1 and EN 16516 (loading factor 1.8 m^2/m^3) is unchanged. The use of different test standards in relation to the stated emission value of 0,062 mg of formaldehyde per m^3 (correlation between standards) is still being debated. While EN 717-1 uses fixed testing parameters, the EN 16516 stimulates a model room and defines different testing scenarios and defines so called loading factors respectively. According to Olaf Wilke, Oliver Jann[32] using a loading factor of 1 m^2/m^3 the correlation factor between EN 717-1 and EN 16516 is 1,6, resulting in a limit of 0,099 mg/m^3. The German Chemikalien Verbotsverordning[33] is using a loading scenario of 1,8 m^2/m^3 and derived a correlation factor of 2. This results in a limit for emission of formaldehyde of 0,124 mg/m^3.

2.5.2 Requirement when panels make up more than 10% by weight of the furniture/fitment

Background to requirement O36 Traceability and certification of wood raw materials in panels

See the background to O26.

[32] Comparison of formaldehyde concentrations in emission test chambers using EN 717-1 and EN 16516, Indoor Air Conference 2018, July 22-27, Philadelphia, USA. Olaf Wilke, Oliver Jann.
[33] Comparison of formaldehyde concentrations in emission test chambers using EN 717-1 and EN 16516 according to the German Chemikalien Verbotsverordning published in March 2018.

Background to requirement O37 and O38 Energy and Emissions

On 24 May 2022, a separate requirement limit was also introduced for wood-based panels produced using a wet process. This is relevant to use in doors where the panel has a sound-absorbing function. The requirement limit is based, among other things, on information available in EPDs[34],[35]. The requirement limit is somewhat higher than for other panels produced by dry process, but there is a lower chemical consumption as the binder is lignin from the wood itself. In addition, a requirement for COD emission was introduced, as this is a relevant parameter in the wet process. The requirement limit is corresponding to the requirement in the criteria for Nordic Ecolabelling of building and construction panels.

In order to reduce CO_2 emissions and limit global warming, it is important to reduce energy consumption. The main objective of the Nordic Swan Ecolabel's energy requirement is to help improve energy efficiencies. The requirement therefore applies to energy consumed per kg per panel (MJ/kg per panel). Because the panels are produced in varying thicknesses, using MJ/m^2 as a parameter in an energy requirement for the production of panels does not enable comparison. Further background information can be found in the background document for Nordic Swan Ecolabelled Construction panels, generation 6.

2.6 Paper

Paper can form part of the furniture, e.g. paper braids/cords on chairs. Paper is a renewable material, which Nordic Ecolabelling is positive towards. There are other specific requirements for paper included in laminates such as HPL, see chapter 4.7 Laminate.

The requirements apply if paper accounts for more than 5% of the product by weight.

2.6.1 Wood raw materials in the paper

Background to requirement O39 Tree species with restricted use

See background to O25.

Background to requirement O40 Traceability and certification of wood raw materials

See the background to O26.

2.6.2 Chemicals in the manufacture of pulp and paper

Background to requirement O41 Chemicals in the manufacture of pulp and paper

Nordic Ecolabelling has long experience of setting requirements for paper production. The requirements to be met have recently been revised and the result is the chemical module generation 3 for the production of pulp and paper. The chemical module contains, among other things, requirements for the classification of chemicals, specific requirements for classified residual monomers and a ban on GMO in starch. For more background, please

[34] EPD Huntonitt bygningsplater, 2020 (https://www.epd-norge.no/getfile.php/1316491-1607606494/EPDer/Byggevarer/Bygningsplater/NEPD-2585-1312_Huntonit-bygningsplater.pdf)
[35] EPD, Steico SE: Steico wood fibre insulation boards manufactured in a wet process (2020)

see the background document for the Chemicals module which can be found on the Nordic Ecolabelling website.

Background to requirement O42 Organic fluorine compounds

Nordic Ecolabelling does not have any experience of paper as a material in furniture. However, we know that chemicals can be added to give paper desired characteristics. Organic fluorine compounds are used for many other purposes and are widely used to make products more water resistant. For example, they are used as agents for waterproofing textiles, footwear and food packaging. It is therefore not possible to rule out that such fluorine compounds may be added to the paper to give it such properties. It is known from other criteria that fluorinated substances may also be added during the production of pulp or paper.

Highly fluorinated compounds are persistent and have the ability to bioaccumulate. PFOS (perfluorooctane sulfonate) and PFOA (perfluorooctanoic acid) are the two fluorinated compounds that we know the most about today. They both have serious effects on human health and the environment. Long-chain perfluorocarboxylic acids (C9-PFCA – C14-PFCA) are another type of fluorinated substances that are also persistent, with high potential for bioaccumulation. Knowledge of short-chain perfluorinated compounds has increased, and several of these have been suspected of being as harmful as the long-chain compounds they replace.[36] PFBS is a fluorine compound with a short carbon chain (C4) recently adopted to be listed on the Candidate List.[37]

2.6.3 Surface treatment and additives in paper

Background to requirement O43 Antibacterial substances

See background to O17.

Background to requirements O44–O47

See background to O17–O21.

2.7 Laminate

The requirements in this chapter cover different types of laminate, such as direct pressure laminate (melamine), High Pressure Laminate (HPL), Continuous Pressure Laminate (CPL) and compact laminate. The requirements apply only to the laminate itself, i.e. if a wood-based panel is used as a substrate, the panel must meet the requirements in Chapter 4.5. Melamine can alternative also be declared in Chapter 4.5 when already attached to a panel.

[36] Danish Ministry of the Environment, 2015: Short-chain polyfluoroalkyl substances (PFAS), A literature review of information on human health effects and environmental fate and effect aspects of short-chain PFAS, Environmental project No. 1707, 2015

[37] https://www.miljodirektoratet.no/aktuelt/nyheter/2020/januar-2020/eu-stempler-nytt-perfluorert-stoff-som-miljogift/ (available February 5, 2020)

Adhesives used to secure the laminate to the substrate must meet the requirements in Chapter 4.3.1 Any surface treatment must meet the requirements in Chapter 4.7.3 and edgings of plastic must meet the requirements in Chapter 4.9.

The criteria for chemicals apply to all chemical products used for the manufacture of laminate, for example, resins. However, the criteria do not apply to chemical products used for the manufacture of paper and for printing patterns on decor paper.

Small parts of laminate such as lists are excluded and do not have to meet the requirements of this chapter except for O49 Antibacterial substances.

Background to requirement O48 Nordic Swan Ecolabelled laminate

Nordic Swan Ecolabelled laminate panels in accordance with criteria for 010 panels and mouldings for interior use, gen. 7 or later, fulfil all requirements in section 4.7 (section 4.7 in the criteria document). Examples of laminate are direct-, continuous- and high pressure laminate and compact laminate.

Background to requirement O49 Antibacterial substances

The requirement is new. A requirement is also made that the finished item of furniture must not contain nanoparticles and antibacterial substances. A declaration of compliance with this is required from the furniture manufacturer. To ensure that the laminate manufacturer does not use these substances, the requirement is made here too. Laminate worktops for kitchens and bathrooms can be given an antibacterial finish and are marketed as more hygienic.

Background to requirement O50 Classification of chemical products

It is desirable to set requirements for the chemicals used in the manufacture of laminate, since many chemicals are used and some of them have hazardous properties in their unhardened state. The requirements apply to all chemicals used in the manufacture of laminate. However, the requirements do not apply to chemicals used in the manufacture of paper and to dye or print patterns on decor paper. This production takes place too far off in the supply chain and the steerability for setting requirements is low.

Resins containing phenol, formaldehyde and methanol are used in the production of several types of laminates to waterproof the paper. Since it is not possible to produce laminate without these resins, exemptions are made for these substances. A maximum of 10% by weight of phenol and methanol respectively is permitted in the resins. This threshold limit value is taken from Version 6 of the criteria for Construction and facade panels. To ensure that the resins have hardened properly, a subsequent requirement is made concerning emissions from the laminate in its finished form. In June 2021, an exemption was also introduced for UV-curing products used to impregnate the upper paper layer. UV curing technique is commonly used in e.g., surface treatment of furniture to get a surface with good durability and quality while containing low VOC levels. Exemptions are therefore granted for UV-curing products in surface treatment. As UV-curing products can also be used in the production of the laminate itself, an exemption has been introduced for UV-curing products here as well.

On 28 June 2022 Nordic Ecolabelling decided to make an exemption for the classification prohibitions H351 and H361 for resins with melamine. The exemption is made since melamine has started to be self-classified as H361 (Repr. 2) by several suppliers.

In the end of 2020, the Committee for Risk Assessment (RAC) at ECHA also decided that melamine should get the harmonized classifications H351 (Carc. 2) and H373 (STOT RE 2). These harmonized classifications are obligatory from 23 November 2023. The classification H361 will not be a harmonized classification, but it could be producers who uses this self-classification in addition to the harmonized classifications. Nordic Ecolabelling gives exemptions both for the self-classification and the new harmonized classifications since there is today no chemical substance that could substitute melamine.

Background to requirement O51 Classification of ingoing substances

The requirement was added to the laminate chapter to make it clear that the requirement must be met. For background details, see the general chemical requirements in Chapter 5.3. In this requirement too, there is a need for an exemption for formaldehyde, phenol and melamine that is used in resins. A subsequent requirement is made concerning emissions of formaldehyde from the laminate in its finished form.

Background to requirements O52 Prohibited substances

See requirement O20.

Background to requirement O53 Nanomaterials

See requirement O21.

Background to requirement O54 Emissions

The requirement has been taken from the product group Construction and facade panels, Version 6, where HPL panels and melamine-coated panels can be Nordic Swan Ecolabelled. It is considered relevant to set requirements for emissions to ensure that the resin used to manufacture the laminate has properly hardened.

There are requirements for the amount of VOCs in adhesives for wood-based panels, and for the amount of VOCs in the products that are used or the amount of VOCs applied in the surface treatment of wood-based materials. For laminate there are no requirements to the content of VOC in the chemical products used in the manufacture of laminate. Therefore, this requirement also includes limit values for emissions of TVOC and SVOC. After the consultation it has been made clear that the loading factor for testing according to EN 16516 is $1 m^2/m^3$.

For direct pressure laminate (melamine), there is the option of meeting the formaldehyde emission requirements using a test in compliance with EN 717–1 or EN 16516. Usually, the same manufacturer will make the carrier substrate material, in the form of chipboard or MDF, and impregnate the paper with resin. The manufacturer then laminates the impregnated paper on the panel at the factory using heat and pressure. It is thus not possible to just test the laminate emissions. It is the panel as a finished product that is tested. It is normal to use just one layer of paper when manufacturing direct pressure laminate. This means that it

contains less resin than other types of laminate. It is thus sufficient that direct pressure laminate shows compliance with the formaldehyde emissions requirements.

2.7.1 Requirement when laminates make up more than 10% by weight of the furniture/fitment

Background to requirement O55 Energy consumption in the manufacture of laminate

The requirement was also included in Version 4 of the criteria and the requirement level is unchanged. Previously, there were two requirement levels depending on the thickness of the laminate. One of the requirement levels has been removed because the requirement only has to be met if the content of laminate in the finished item of furniture is more than 10% by weight.

This is the same as the requirement in Version 6 of Construction and facade panels. The requirement's threshold limit value for thicker laminates is still considered to be strict and has therefore not been changed.

2.7.2 Requirement when laminates make up more than 30% by weight of the furniture/fitment

The requirements for paper in this section only apply to kraft paper. It is not necessary for decor paper and any balance paper to meet the requirements.

Nordic Ecolabelling has produced a calculation sheet for requirement O61 (Energy). This can be used to calculate and document the requirement. Pulp that has been inspected in accordance with the Nordic Swan Ecolabel Base Module for paper automatically meets the requirements for pulp in this section. However, it must be shown that the cumulative pulp and paper production also meets the requirements.

Background to requirement O56 Tree species with restricted use

See background to O25.

Background to requirement O57 Wood fibre in paper

The threshold limit value has been raised to 30% by weight of the finished furniture. This was 10% by weight in the previous version of the criteria. In practice, this means that the requirement only must be met for compact laminate which is made of compact layers of impregnated paper. The reason why only compact laminate needs to meet the paper requirements is that the requirements must be documented far back in the supply chain and are most relevant when the laminate is composed of a large amount of paper.

Kraft paper and decorative paper is used to manufacture compact laminate. Only the uppermost layer is made of decorative paper. Since it therefore accounts for a very small percentage of the panel it does not need to meet the requirements for paper. A sheet of balance paper can be used if only one side of a panel is laminated. This balance paper does not need to meet the requirements.
Kraft paper must meet the requirement, and it is relevant to have a requirement for the wood fibre to ensure that it comes from sustainably managed forests or is recycled fibre. Recycled

fibre is environmentally beneficial as it saves virgin raw materials. Moreover, producing paper from new fibres consumes more energy than producing it from recycled fibres.

Background to requirement O58 Emissions of COD from paper and pulp production

All pulp and paper production generate wastewater with organic content expressed as chemical oxygen demand (COD). Microorganisms consume oxygen to break down the organic matter. This may lead to low oxygen concentrations in the water and, in some cases, anaerobic conditions. The Nordic Swan Ecolabel's basic module for paper also contains requirements concerning other emissions, such as emissions of nitrogen and phosphorus. However, requirements are only set for COD. COD emissions also correlate with other emissions. If the emission of COD is low, emissions of other substances to water are thus also expected to be low.

Background to requirement O59 Energy consumption in paper and pulp production

The requirement was also included in Version 4 of the criteria but has been changed to harmonise with the requirement proposed in Nordic Swan Ecolabel's revised basic module for paper Version 3. The calculation in the revised basic module has been reworked, resulting in a change to the requirement level for the total energy score. Details of this can be found in the basic module's background document.

The requirement must be met for compact laminate which consists largely of kraft paper, and where the manufacture of paper accounts for a substantial amount of the energy used in the production of the laminate. It is therefore relevant to set energy consumption requirements for both paper and pulp. A reference value for kraft paper production that is to be used for the calculation was defined when Construction and facade panels Version 6 was revised. This reference value has not been changed, and further details are given in Annex 3.

2.7.3 Surface treatment of wood, wood-based panels and laminate

The requirements in this section relate to surface treatment of wood, bamboo, wood-based panels and laminate.

Background to requirement O60 Antibacterial substances

The requirement is new because there were no requirements for antibacterial substances for surface treatment products in Version 4 of the criteria. Since Nordic Ecolabelling wants to take a restrictive approach to nanoparticles and antibacterial substances, it is relevant to make the requirement for surface treatment products too.

Background to requirement O61 Classification of chemical products

The requirement is changed, as the minimum threshold for when the requirements for surface treatment must be met is changed and the classification H334 (respiratory sensitisation) have been added. Previously, all requirements applied only if the parts that had been surface treated made up more than 5% by weight of the finished furniture. This has been changed. The chemical requirements must now be met irrespective of the percentage of the surface treated parts in the furniture, and the requirements for the amount of hazardous substances and VOCs applied in the surface treatment must be met when the

parts account for more than 5% by weight. Nordic Ecolabelling normally sets requirements for chemicals irrespective of the quantities used, which is why the minimum threshold has been changed.

The classification H334 has been added to the requirement after consultation. By adding this classification to the requirement, the Nordic Swan Ecolabel can be used as a verification for Upphandlingsmyndighetens (public procurement in Sweden) requirements without additional information being required.

Exemption is made for UV curing surface treatment products that are classified as environmentally hazardous. UV products have several advantages as they provide a durable surface and contain a low amount of solvents. Later requirements are placed on the amount of VOC applied, which promotes water-based UV products.

UV products contain acrylates, and more and more acrylates are classified as environmentally hazardous or receive stricter classifications. Acrylates and photo initiators are two important components for UV products to cure. The acrylates change properties in the hardening and bind to the surface coating, so they do not pose an environmental hazard in the finished furniture. To make demands on e.g. the maximum amount of environmentally hazardous substances applied means that only UV products with a lower concentration of acrylates would meet the requirement. This has negative consequences as it leads to longer curing time and more energy-intensive curing. A surface that has not hardened becomes less resistant, which makes the Nordic Ecolabel's requirements for wear resistance of surfaces difficult to meet.

Background to requirement O62 UV curing surface treatment system

There is an exemption for UV curing products in the requirement above that limits the use of chemical products classified as environmentally hazardous. UV curing products are often classified as environmentally hazardous due to the content of acrylates. The acrylates change properties in the hardening and bind to the surface coating, so they do not pose an environmental hazard in the finished furniture. Instead, it is important that no emissions of uncured product that have the environmentally hazardous properties occur. Requirements are therefore set for the application, which must take place during a controlled closed process where no discharges to recipient take place.

Background to requirement O63 Classification of ingoing substances

An exemption applies to photo initiators. They may be present in UV products. They are present in small amounts but are necessary to speed up the hardening process.

Exemptions have also been added for 1,1,1-Trimethylolpropane (TMP, CAS No. 77–99–6), (TMPTA, CAS No. 15625–89–5) and mequinol (CAS No. 150–76–5). Titanium dioxide is a white pigment that is used in many different types of products, including being used in almost all pigmented surface treatments. 1,1,1-Trimethylolpropane (TMP) is used to coat titanium dioxide to make the titanium dioxide particles easier to disperse. About 90% of all titanium dioxide is coated with TMP. Mequinol is used as a diluent in binders for UV surface treatments. Trimethylolpropane triacrylate (TMPTA, CAS No. 15625–89–5) have been reclassified as class 2 carcinogen H351.

All three substances are necessary for use in surface treatment products and have recently been classified as CMR category 2, either as a harmonized classification or self-classification. There are currently no good substitutes and exemptions have therefore been given. Exemptions have also been introduced for the hardener in 2-component UV products if it can be documented that workers are not exposed, and the application takes place in closed systems. After curing, the hardener no longer has these properties. Nordic Ecolabelling generally wants to limit the use of chemicals with these properties as much as possible, but in some cases, it is difficult to find good substitutes. As these are industrial processes that take place under controlled conditions, the consumer will not be exposed to these substances.

Background to requirements O64 Prohibited substances

See requirement O20.

Background to requirement O65 Nanomaterials

See requirement O21.

Background to requirement O66 Free formaldehyde

See requirement O23.

2.7.4 Requirement if surface coated parts make up more than 5% by weight of the furniture/fitment

Background to requirement O67 Quantity applied and application method

It has been made more explicit that the furniture manufacturer must also state the name and manufacturer of the chemical products that are used in each surface treatment system. Information about applied quantities, number of coats and method of application was also a requirement in the previous version of the criteria. This information is required to calculate applied quantities of environmentally hazardous substances and VOCs in subsequent requirements.

Background to requirement O68 Quantity of applied VOC

The reason for this requirement is that VOCs contribute to the formation of ozone and can have adverse health effects in the workplace and indoor climates. Nordic Ecolabelling has decided not to introduce requirements for the testing of VOC emissions from furniture as a finished product, since such tests are expensive and time-consuming, especially for small-scale furniture makers. With a strict requirement for the amount of VOCs in the surface treatment products or the applied amount of VOCs, the emissions from the furniture are expected to be low. If a test has been made of VOC emissions from the finished furniture, this can also be a way of documenting the requirement. The requirement limit for VOC emissions from the finished furniture is similar to the limit set in EU Ecolabel's criteria for furniture.

The threshold limit values are unchanged compared to generation 5. There was a requirement in Version 4 of the criteria that bedroom furniture and living room furniture must

meet the threshold limit value of 10 g/m^2. This has proved problematic when processing an application because normally an item of furniture can be used in several different rooms, and it has been unclear which threshold limit value must be met. The requirement has therefore been changed so that furniture intended for domestic use must meet the 30 g/m^2 requirement. This is the threshold limit value most often used when processing an application and it is considered to be strict. It was also stated in Version 4 of the criteria that the requirement for doors was 10 g/m^2. This threshold limit value has proved too strict to achieve good quality. The threshold limit value has therefore been changed to 30 g/m^2 for doors intended for domestic use and 60 g/m^2 for doors intended for non-domestic use. The requirement threshold of 10 g/m^2 is unchanged for furniture coated with laminate. It is not necessary to surface treat these and if they are treated, they do not require as much coating to achieve a durable finish.

There was also a paragraph in Version 4 of the criteria saying that high-quality furniture must meet the higher threshold limit value of 60 g/m^2. High-quality furniture was considered those which in subsequent requirements for surface strength and durability are at level 5 or above. Level 5 is only relevant for tabletops and worktops and no other types of furniture. All surface treated furniture must meet the relevant requirement level for surface strength and the paragraph about high-quality furniture has therefore been deleted. The furniture that must meet the higher threshold limit value of 60 g/m^2 is furniture intended for use in office or public spaces and in kitchens and bathrooms. The reason for the higher threshold limit value is that these types of fitments can expect more wear and tear and need a higher-quality surface finish for a longer-lasting result.

2.8 Metal – Steel and aluminium

Requirements apply to surface treatment and production of steel and aluminium. The chemical requirements only apply to the chemical products used for the surface treatment and not constituent substances, such as alloying metals, in the metal.

Production requirements for steel and aluminium apply if the metals are included in the product with more than 30% by weight and 10% by weight, respectively. Small parts such as screws, bolts, plugs, fittings, buttons, zippers and so on are excluded from weighing and should not be included in the weight calculation.

Small parts consisting of metal and weighing less than 100 grams are also exempt from all requirements in this chapter except requirement O69.

The requirements of this chapter do not apply to metal that is part of electric or electronic components.

Background to requirement O69 Copper, tin, lead and cadmium

The requirement is set because these substances cause problems during metal recycling[38].

[38] EU-27 Steel Scrap Specification, May 2007: https://www.euric-aisbl.eu/facts-figures/standards-specifications

2.8.1 Surface treatment and metallisation

Metal coating, such as metallisation, powder coating and any other surface treatment must meet the following requirements.

- Coatings with metals (metallisation) must comply with O70
- Other surface treatment must comply with O71–O77.

Background to requirement O70 Chrome, nickel and zinc plating

As before, the use of chromium, nickel and zinc for coating is permitted for some parts and for some types of furniture that are subject to great wear and tear. Metal coatings ensure good wear resistance and potentially extend the useful life. This is important from a circular economy perspective, and it may become even more important in the future as society places an increasing focus on reuse. For example, chairs can be reupholstered if the legs are still in good condition. It is important to point out that the useful life of an item of furniture depends on several factors and furniture is often replaced before it is worn out[39]. Nevertheless, Nordic Ecolabelling is of the opinion that good quality and good resistance to wear will offer the potential for a long useful life. Coating with chromium, nickel and zinc also has no significant impact on the ability to recycle metal.

However, coating with these metals has adverse effects on human health and the environment. The chemicals that are used have a number of classifications, e.g. Chromium VI is classified as H317, H400, H410 and H350. Chromium III does not have these effects[40]. Nickel plating salts e.g. NiCl2, are classified as H350, H341 and H360D. The substances in the finished coating are converted into pure metal layers that are not classified. However, nickel is known to cause allergies as small amounts of nickel are released from the coating upon contact with skin[41]. Emissions to water from facilities is also a relevant parameter.

Therefore, it is only allowed on small parts, such as screws, bolts and mechanisms that are subject to excessive wear, on chair legs and tables/desks for educational institutions and table legs and folding tables that comply with standards for public spaces. This means that it is not allowed on office chairs, for example, because there is more scope to design such furniture to withstand wear and tear, e.g. by using brushed steel on areas particularly subject to high wear.

The requirement has been changed and tightened so that all coating processes must be zero-emission processes. This was also required previously, except for zinc, but the requirement was not very clearly worded. A zero-emission process means that nothing can be discharged to a recipient or municipal wastewater treatment plant. The waste must be collected and sent to an authorised and approved collection facility for hazardous waste. Closed-loop wastewater systems consume more energy because the process water must be distilled/evaporated. Heat exchangers are usually installed to utilise this energy. All new or renovated systems are zero-emission and, according to the Swedish industry association, that will be BAT when the new BAT report is published. There are no major differences in the

[39] Bartlett, 2009. "Reuse of office furniture – incorporation into the 'Quick Wins' criteria: A study of the market potential for reused and remanufactured office furniture in the UK."
[40] http://www.syf.se/Filer/Guide_ytbeh_v0.pdf
[41] Shane Donatello, Hans Moons and Oliver Wolf, Revision of EU Ecolabel criteria for furniture products, final technical report, 2017

Nordic region to indicate that it will be problematic to comply with this according to the Swedish industry association.

2.8.2 Other surface treatment

Background to requirement O71 Classification of chemical products

The requirement remains unchanged except that the classification H334 (Allergenic, Respiratory sensitization) has been added. Background details are given in Chapter 5.3.

Background to requirement O72 Classification of ingoing substances

The requirement is the same as in generation 5 of the criteria. Exemptions have been added for 1,1,1-Trimethylolpropane (TMP, CAS No. 77–99–6). Titanium dioxide is a white pigment that is used in many different types of products and are used in almost all pigmented surface treatments. 1,1,1-Trimethylolpropane (TMP) is used to coat titanium dioxide in order to make the titanium dioxide particles easier to disperse. About 90% of all titanium dioxide is coated with TMP. There are no good substitutes for titanium dioxide and TMP at present and exemptions have been made so that pigmented surface treatments can still be used.

Background to requirement O73 Prohibited substances

See requirement O20.

Background to requirement O74 Nanomaterials

The requirement is unchanged. However, an exemption for aluminium oxide in powder coatings has been introduced. Aluminium oxide is used as a "free flow additive" in powder coatings to improve the performance of the electrostatic powder coating and thus facilitate application. The aluminium oxide can be nano size because the best performance is obtained with very small particles. The coating does not contain any nano-size particles when it has cured, because the particles are bound into the polymer. The powder coating is applied at a factory, and the workers use personal protective equipment. As stated previously, powder coating has environmental benefits, and Nordic Ecolabelling wants to allow this type of coating. An exemption has therefore been made for aluminium oxide. The exemption is also contained in the Nordic Swan Ecolabel’s criteria for Windows and exterior doors.

Background to requirement O75 Free formaldehyde

See requirement O23.

Background to requirement O76 Quantity applied and application method

The reason for this requirement is that VOCs contribute to the formation of ozone and can have adverse health effects in the workplace and indoor climates. Nordic Ecolabelling has decided not to introduce requirements for the testing of VOC emissions from furniture as a finished product, since such tests are expensive and time-consuming, especially for small-

scale furniture makers. With a strict requirement for the amount of VOCs in the surface treatment products or the applied amount of VOCs, the emissions from the furniture are expected to be low. If a test has been made of VOC emissions from the finished furniture, this can also be a way of documenting the requirement. The requirement limit for VOC emissions from the finished furniture is similar to the limit set in EU Ecolabel's criteria for furniture.

The threshold limit values under this requirement have not been changed in generation 6 of the criteria.

Background to requirement O77 Quantity of applied VOC

The requirements for a description of surface treatment systems and the amount of VOCs applied is new for metal. The wording of the requirement is based on that for the requirement concerning VOCs in surface treatment processes for wood. The limit is 30g/m^2 treated surface. Nordic Ecolabelling has not previously had such a requirement and therefore has limited knowledge of VOC content in the products in question. However, the EU Ecolabel, Swedish Möbelfakta and the Swedish National Agency for Public Procurement have requirements for VOCs in wood, metal and plastic surface treatment processes. The EU Ecolabel places a limit of 30 g/m^2 but can allow up to 60 g/m^2 under certain conditions. Möbelfakta places limits of 35 and 60 respectively for domestic and non-domestic environments.

Powder coating is the most common method of surface treatment and does not use VOCs. However, it cannot be ruled out that other methods are used where VOCs might be a factor.

2.8.3 Production of metal

Separate requirements are set for the production of steel and the production of aluminium. The requirements can either be met by having a high proportion of recycled steel or aluminium, or by meeting requirements for virgin steel production and primary aluminium production.

Background to requirement O78 and O79 Production of steel and aluminium

The requirement has been changed by now requiring either a high proportion of recycled or fulfilling requirements for virgin steel production and primary aluminium production. The limit for when the requirement is to be met has been lowered from 50% by weight of metal in the product in the previous generation and from the limit in the consultation document where it was 30% by weight of metal. Now the limits for when the requirements are to be met are 30% by weight for steel and 10% by weight for aluminium in the product. This is because aluminium weighs significantly less than steel.

Using recycled metal significantly reduces the environmental impact and provides a significant climate benefit. Among other things, this is highlighted in the taxonomy work in the EU[42]. Nordic Ecolabelling is aware that the availability of recycled metal and traceability can be a challenge. But in a world with an increasing focus on circular economy, Nordic Ecolabelling believes that there will be an increased focus on this in the future. Traceability

[42] Taxonomy report, technical annex, EU technical expert group on sustainable finance, March 2020.

in the production chain is also a value in itself, and is important for several aspects, e.g. it provides opportunities to select suppliers based on e.g. environmental work, working conditions and quality. Demand for traceability will hopefully contribute to the industry also placing increased focus on this. For Al, Hydro has launched its own traceability certification with a minimum of 75% recycled Al, Hydro Circal.[43] Currently, there is a smaller plant in Luxembourg that can supply this, but from 2020, the Azuqueca plant in Spain will be able to supply Hydro Circal with a production capacity of 25,000 tonnes[44]. The industry average for EU-produced Al is approx. 50% recycled, while for Al outside the EU it is approx. 40%. The big environmental benefit comes from the use of post-consumer recycled aluminium.

The two steel production processes are Basic Oxygen Furnace (BOF) for which the input is iron ore, and Electric Arc Furnace (EAF) for which the input is mainly scrap steel. The current requirement of 20% recycled metal has no significant impact since all steelworks, including the BOF plants, meet this today. It is therefore necessary to raise the requirement to promote the use of recycled steel and traceability. In practice, this means that steel that should contain more than 20% recycled steel must be produced at plants that use EAF technology. There are steel producers using the EAF process across the whole of Europe[45]. According to the World Steel Association[46] the EU produces 58% of steel using BOF and 41% using EAF technology. Globally, approx. 70% is produced using BOF and 30% using EAF technology.

In this version of the criteria, Nordic Ecolabelling has for the first time introduced requirements for virgin steel production and primary aluminium production. Requirements for metal can therefore be met either by including a high proportion of recycled, or that several requirements for primary metal production are met. The requirement model is based on a mandatory requirement to the steel / aluminium producer to have an energy and greenhouse gas calculation with defined reduction targets. Certification with Responsible Steel or ASI is something that Nordic Ecolabelling see as positive initiatives for a more sustainable metal production. These are independent certification systems with a focus on both economic, social, and environmental aspects. For aluminium, the requirement can also be fulfilled by documenting direct emissions of greenhouse gases and energy efficiency in the electrolysis process, where the limits are based on values stated in the EU taxonomy report. Direct emissions are to be calculated according to the methodology used for EU-ETS benchmarks. Please note that these values may change based on the final outcome of the EU taxonomy work. For steel, the requirement can also be met if the steel comes from a manufacturer who has adopted new technologies that significantly reduce the climate impact from production. The technologies are similar to those stated in the EU's technical annex to the taxonomy report[47].

[43] https://www.hydro.com/en/products-and-services/low-carbon-aluminium/hydro-circal-75r/ (available 2019-10-17)
[44] https://www.hydro.com/en/media/news/2018/hydro-to-increase-production-of-post-consumer-recycled-aluminium/
[45] http://www.eurofer.org/About%20us/About%20Steel/EuropeanSteelMap.fhtml
[46] https://www.worldsteel.org/en/dam/jcr:96d7a585-e6b2-4d63-b943-4cd9ab621a91/World%2520Steel%2520in%2520Figures%25202019.pdf
[47] EU technical expert group on sustainable finance, Taxonomy Report: Technical Annex, March 2020: https://ec.europa.eu/info/sites/info/files/business_economy_euro/banking_and_finance/documents/200309-sustainable-finance-teg-final-report-taxonomy-annexes_en.pdf

2.9 Plastic, rubber and silicone

Polymer materials used as padding materials, e.g. polyurethane foam and textiles are not subject to the plastic requirements. For textile requirements, see chapter 4.10 and for padding materials, see chapter 4.11.

Small plastic parts (e.g. screws, staples, and fasteners) weighing less than 100 g are not covered by the requirements of Chapter 4.9. Electrical and electronic components, e.g. cables in height-adjustable tables and adjustable are also not covered by the requirements in chapter 4.9.

2.9.1 General requirements

Background to requirement O80 Types of plastic and reinforcement

The requirement has been changed as plastic, which is mixed with other materials, e.g. wood raw material, so-called wood-plastic composite (WPC) is prohibited. It is also forbidden to reinforce plastic with e.g. carbon fibre due to the higher climate impact related to the production of carbon fibre compared to fibreglass. Wood plastic composite is prohibited because the two constituent materials cannot be separated in a recycling process and the recycling of WPC to new WPC is very limited today. WPC is also not a very common material in furniture / fitments today. Adding fibreglass also presents challenges for recycling, but it is possible to separate plastic and fibreglass even if this does not happen to such an extent. Fibreglass can be important for giving the plastic the necessary strength, especially when using recycled plastic which is required in another requirement. Nordic Ecolabelling therefore finds it difficult to ban glass fibre reinforcement as it gives the plastic an important property that the addition of wood fibre cannot provide to the same extent. A lot is happening in the circular economy, waste management and recycling, and Nordic Ecolabelling is aware that the situation may change in this area within a relatively short time, also for materials such as WPC. Nordic Ecolabelling can therefore change attitudes towards WPC in the future, especially if good recycling schemes are established.

Background to requirement O81 Labelling

The requirement applicable to the labelling of plastic parts is still in place and is aimed at helping with sorting and recycling at end-of-life. In many cases, manual sorting is replaced by a sorting technology using infrared light or sorting by density separation using a float/sink process. Labelling makes the sorting process simpler, however, when materials are sorted manually. It is mainly large parts that are separated out during a manual sorting process. The limit for labelling has therefore been raised from 50 g to 100 g. An exemption applies to plastic in rolls, e.g. edge trim. An exemption may also be made for other plastic parts if it is technically difficult to label them, e.g. because of lack of space or the production method used. In such cases, it must be explained why labelling is not possible.

ISO 11469 is a system for uniform labelling of products made of plastic and generic identification of the plastics is provided by the symbols and abbreviated terms given in ISO 1043.

Background to requirement O82 Bio-based plastic

Biodegradable and compostable plastic cannot be used, as they “pollute” the other plastic streams of recycled plastics in the Nordic region. Theoretically, these plastics can also be recycled, but there are no systems for this today. Bio-based plastic in PET, PE and PP can be recycled in the same stream as fossil-based plastic in PET, PE and PP.

Background to requirement O83 Raw materials for bio-based polymers

The requirement is unchanged. In terms of resources and climate, it is positive to use renewable raw materials instead of fossil fuels. However, it is important that the cultivation of bio-based raw materials is sustainable. Establishment of palm oil plantations is one of the main reasons for deforestation of rainforests, and thus threatens the livelihoods of indigenous peoples, plants and animals. Rainforests are very important for biodiversity and are also important in regulating the climate. Soybeans are grown in areas that are often established at the expense of rainforests and forest waters in South America. Soy production is one of the biggest threats to the rainforest on the American continent, especially in the southern Amazon. Based on this, palm oil, soybean oil and soy flour are banned as raw materials for bio-based polymers.

Sugar cane is a relevant raw material for polymer production. Sugar cane is currently not as strongly associated with problems with deforestation of rainforest as mentioned above for palm and soybean oil, but there may also be challenges associated with this production. As bio-based plastic is still relatively new and the number of producers is relatively small, sugar cane is permitted as a raw material, but it is required that it be certified according to a sustainability standard that meets a number of requirements for e.g. protection of biological diversity. For all certification systems, there is a requirement for traceability at the mass balance level. Book and claim system will not be approved. In addition, there is a requirement that sugarcane, and any other primary raw materials must not be genetically modified. Genetic modification is a debated topic, and several countries have banned the cultivation of GMOs. Topics discussed are food safety, land use, lack of knowledge about effects under local agricultural / forest conditions and the risk of negative environmental and health impacts. Nordic Ecolabelling emphasizes the precautionary principle and regulations that have a holistic approach to GMOs. This means that sustainability, ethics, and societal benefits must be emphasized 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 spread in nature. Nordic Ecolabelling believes that GMOs should be assessed on a case-by-case basis. Research results have not clearly shown that current GMO crops contribute to the development towards sustainable agriculture with less use of pesticides, and there is a lack of research on the long-term effects of genetically modified plants, both environmental consequences and socio-economic consequences. There are possible adverse effects of GMOs along the entire value chain from research and development of the plants, via cultivation, to storage, use and waste management. In several of these phases, there is a lack of scientific studies, and there is a lack of overall assessments.

For other primary raw materials, there is a requirement that the name of the raw material, supplier and origin of the raw material must be stated. The most ideal is to use waste and residual products from other productions, e.g. by-products such as straw from cereal

production and by-products from maize. By using secondary raw materials, parts that are not used as food are utilized. PFAD (Palm Fatty Acid Distillate) from palm oil is not considered a residual raw material and must therefore not be used. PFAD occurs in the production of palm oil for the food industry, and there is rarely traceability in the processes in which PFAD occurs.

Background to requirement O84 Nitrosamines in rubber

The requirement has been changed and harmonized with the level of requirements in the criteria for outdoor furniture, based on consultation responses received. Nitrosamines and nitrosamine-soluble substances are suspected to be carcinogenic. Nitrosamines are by-products formed in the production of rubber. Previously, the requirement was 0.01 mg / kg rubber for nitrosamines and 0.1 mg / kg vulcanised rubber, respectively, which corresponds to the levels in the EU Toys Directive and the safety standard EN 71–12 for toys for children under three years of age, which are intended to be put in his mouth. The requirement levels now equal the limits to the EU Toys Directive and the safety standard EN 71–12 for toys for children over the age of three, which are intended to be put in the mouth. This level is still strict, but more appropriate for the products in these criteria.

2.9.2 Chemicals in plastics

Background to requirement O85 Chemicals in recycled plastic

The requirement has been extended to include more substances in addition to halogenated flame retardants and is harmonised with the requirement in Floor coverings. The requirement applies to chemicals contained in the recycled plastic raw material and not chemicals that are added through regranulation. There are separate requirements for this, see O87. The requirement must be documented with a test report using X-ray fluorescence (XRF) or equivalent methods, or traceability to the source that substantiates that the specified substances are not included. The aim of the requirement is to capture the “worst substances”. Ways of documenting this were assessed during a review of the floor covering criteria and as part of an internal investigation by Nordic Ecolabelling in connection with amendments to the requirement applicable to plastics in Version 4 of Furniture and fitments. The dialogues held with floor covering and furniture manufacturers and suppliers of recycled plastics during this process showed that there are different practices in the industry for testing substances in recycled plastics. Some manufacturers rely on questionnaires/declarations from their subcontractors and follow them up with chemical analyses if it is considered likely that the plastic contains substances of concern. Some manufacturers of recycled plastic have XRF (X-ray fluorescence spectrometer) equipment for testing the plastic to see whether it can meet the given requirement (a level of 100 ppm can be achieved). Although this will entail extra documentation work, it shows that it is possible to set such a requirement. Using recycled plastic is good as it helps reduce resource use and stimulates a circular economy. At the same time, there is no wish to recycle chemicals that are harmful to health and the environment.

Background to requirement O86 Chemicals in re-used plastics

The requirement is new. If the furniture is to contain reused plastic parts (directly reused, not re-granulate), it must be stated what the plastic was previously used for and substantiate that it does not contain halogenated flame retardants. Reusing is good, yet it is important not to recycle chemicals that are harmful to health and the environment. Nordic Ecolabelling does not want to be associated with halogenated flame retardants and has therefore set a requirement for this, even if it can be challenging to confirm that information. Reused plastic parts cannot be used in products aimed at children, as children often come "close" to the products, can eat on them, and are a more vulnerable group to the influence of chemicals. It is also emphasized that chlorinated plastics such as PVC are generally prohibited.

Background to requirement O87 and O88 Additives – CMR

See section 2.3 Chemicals.

2.9.3 Surface treatment of plastic

Surface treatment of plastic edge bands is exempted for the requirements in this chapter (requirement O89–O95).

Background to requirement O89 Surface treatment

Surface treatment of plastic materials may be permitted if documentation can be submitted showing that this does not affect the potential for recycling.

Background to O90 Classification of chemical product

Se requirement O18.

Background to requirement O91 Classification of ingoing substances

Se requirement O19.

Background to requirement O92 Prohibited substances

See requirement O20.

Background to requirement O93 Nanomaterial

See requirement O21.

Background to requirement O94 Free formaldehyde

See requirement O23.

Background to requirement O95 Quantity of applied VOC

The requirement is new. The wording of the requirement is based on that for the requirement concerning VOCs in surface treatment processes for wood. The proposed requirement limit is 30g/m^2 treated surface. Nordic Ecolabelling has not previously had such a requirement

and therefore has limited knowledge of VOC content in the products in question. However, the VOC limit set by Swedish Möbelfakta (the Swedish furniture industry's reference and marking system for furniture) for coatings of wood, metal and plastic is 35 for domestic settings and 60 for office/public/outdoor spaces.

2.9.4 Recycled/biobased plastics

Background to requirement O96 Recycled/biobased plastic

The requirement now applies generally for all types of plastic. The requirement previously specified 50% recycled content for PP, PET and PE and 30% for other types of plastic. PP, PET and PE are the plastics mainly used, and it is very hard to find recycled plastic of other plastic types of a good enough quality. It will also be possible to meet the requirement by using bioplastic. Nordic Ecolabelling wants to stimulate circular material choices by using recycled and bio-based materials. If plastic is included with a larger amount in the product (over 30% by weight), there is also a requirement that a minimum of 20% by weight of the plastic must be post-consumer.

2.10 Textiles

The requirements apply to textiles made of both synthetic and natural fibres with different requirements depending on their quantity and purpose in the product.

– Chapter 4.10.2 – 4.11.2 apply to covers on furniture, such as upholstery on sofas and sofa cushions, chairs, and mattresses. Outer covers on the bed frame and any accessories such as headboards also belong to this category.

– Chapter 4.11.3 apply to other textile parts such as textiles under sofa cushions, textiles on partitions, around the spring mattress on continental beds and around springs in a mattress.

Textiles with the Nordic Swan Ecolabel meet all the requirements in this section.

Textiles with the EU Ecolabel comply all the requirements except those for flame retardants. For approval, documentation must confirm that any added flame retardants meet requirement O103 and are not classified under the hazard classes listed in O105.

Definitions

The following applies in respect of requirements for chemicals:

These requirements apply to all chemicals used during the manufacture of textiles unless otherwise specified in the requirement. This includes bleaching, dyeing, printing, and finishing, such as coating, lamination or gluing. The requirements apply to chemical products used in dyeing plants/-houses.

The requirements do not apply to:

- chemicals used in water treatment plants.
- chemicals used for maintenance of production equipment.
- chemicals used in small quantities, such as levelling agents and de-sizing agents.

The following definition applies:

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, in-situ generated preservatives) are also considered as ingoing substances.

Impurities:

Residuals, pollutants, contaminants etc. from production, incl. production of raw materials that remain in the raw material or in chemical product in concentrations less than 1000 ppm (0,1000% by weight, 1000 mg/kg) in the chemical product. Examples of impurities are residues of the following: residues or reagents incl. residues of monomers, catalysts, by-products, scavengers, and detergents for production equipment and carry-over from other or previous production lines.

2.10.1 Material composition and material limits

A detailed overview must be provided, specifying the textile parts, fibre types, applicable requirements, and suppliers of the various textile components.

Background to requirements O97–O100

The material composition of fibre and textile provide important information in the application process. Textile that is ecolabelled with the Nordic Swan Ecolabel automatically comply with requirements in this chapter. EU ecolabelled textile containing flame retardants needs additional documentation to comply with O103 and O104.

2.10.2 Covers – chemicals

The requirements in this chapter 4.10.2 (chemicals) and in chapter 4.10.3 (production of fibre), apply to:

1. Cover / upholstery on seating furniture (sofas, chairs, benches, etc.)
2. Mattress cover (including intermediate mattress in continental beds)
3. Cover on bed frames and any headboard

Please note that there are quality requirements in chapters 4.10.4–4.10.6 depending on the type of textile and use (seating furniture, coated textile materials and mattress covers).

The requirements apply to the individual textile fibre which constitutes more than 10% by weight in the constituent textile. Many of the requirements in this chapter are harmonized or partially harmonized with the requirements set out in the criteria for Nordic Ecolabelling of textiles, leather and hide. Reference is therefore made to the background document for these criteria for a more general background to the textile requirements.

Background to requirement O101 Oeko-Tex 100 certified textile

The requirement has been added to the criteria after NMN (Nordic Ecolabelling Board) decision to simplify the documentation of the requirement. In previous criteria version all

production chemicals were to be declared by the manufactures of chemicals. This turned out to be very complicated and time consuming. Oeko-Tex 100 class I or II certification ensures that textiles are tested for the content of a wide range of chemicals.

Background to requirement O102 Biocides and antibacterial substances

Biocidal products and antibacterial products are not desirable in ecolabelled products. Frequent use of antibacterial agents in common consumer products can lead to bacteria becoming more resistant and eliminate beneficial bacteria. Two of the antimicrobial agents that are commonly added are silver nanoparticles and copper nanoparticles. There has been particular concern that silver nanoparticles released into effluent and wastewater could eliminate beneficial bacteria and cause resistance in bacteria. Other examples of antibacterial agents that may not be used are organotin compounds, chlorophenols and dimethyl fumarate which are used, for example, as fungicides or pesticides during transport and storage of textiles.

The ban does not apply to in-can preservatives for use in adhesives, coatings, etc. In these cases, the biocide acts as a preservative that protects the chemical product during storage.

Background to requirement O103 Flame retardants

Nordic Ecolabelling wants stringent requirements to apply to flame retardants. However, it does not want to prohibit flame retardation as a function.

Some flame retardants have a number of adverse health and environmental effects. At the same time, flame retardancy can be an important property and documentation about flame retardant properties is often required in public tenders. This makes it important to find a balance between fire safety and the use of chemicals that are harmful to health and the environment. Wool and some other textile fibres have an inherently lower flammability. It is not necessary to add flame retardants to these fibres e.g. if using woollen textiles as sofa covers. Synthetic textiles or a blend of synthetic and natural fibres are frequently used in mattresses. These are more flammable.

Europe does not have a common standard for testing the flammability of furniture, making the use of flame retardants in furniture a complicated issue. Some countries like the UK and Ireland require the flammability of textiles to be tested using the open-flame test method. It has been difficult to perform this test without the use of flame retardants with hazardous properties. SafeFurnitureEurope is working, among other things, to focus on the problematic use of flame retardants in furniture and considers that there is no clear evidence that fire safety increases by requiring such tests[48]. Instead, flame retardants may even make fires more dangerous for firefighters and those being rescued, as flame retardants have very negative impacts on human health and the environment.[49]

Nordic Ecolabelling thus sets a requirement prohibiting the flame retardants that we know are particularly harmful to the environment and/or health. It is not necessary to use these

[48] OPINION of the French Agency for Food, Environmental and Occupational Health & Safety concerning the “request regarding the fire safety of domestic upholstered furniture” , 2015, https://www.anses.fr/en/system/files/CONSO2011sa0132Ra-02EN.pdf

[49] European Social Dialogue Committee for Furniture, Brussels, 21 March 2018: https://docs.wixstatic.com/ugd/a1d93b_80d870dc93bd4585af6d583f4ff3a712.pdf

flame retardants to meet standards stipulated in public sector tenders in the Nordic countries. The ban on halogenated flame retardants is still in place. Furthermore, a ban on organophosphate flame retardants has been introduced. TCEP is a phosphate-based flame retardant with serious impacts on human health and the environment. TCEP could impair fertility and is harmful if swallowed. The substance is also toxic to aquatic life with long lasting effects. TCEP is designated as a substance of very high concern (SVHC) and is on Norway's Priority list of environmentally hazardous substances. Other organophosphorus flame retardants are persistent organic pollutants that last a very long time in the environment and are also bioaccumulative, which means they accumulate inside cells and living organisms.[50] Non-chlorinated organophosphorus flame retardants can also have undesirable properties, such as TPP (triphenylphospine) and TCP Tris (methylphenyl) phosphate[51],[52] ,[53] ,[54].

A study from the USA shows that the amount of phosphorus-based organic flame retardants in the environment is often higher compared to the top exposure levels of PBDE[55]. This indicates both that there is widespread use (which may not be comparable to use in Europe), but also that they are persistent in the environment.

On 15 March 2022, Nordic Ecolabelling decided to approve the use of phosphorus-based flame retardants in certain cases where the regulatory requirements require testing in accordance with EN 597–2 or equivalent ("open-flame test"). Products that contain organic phosphorus-based flame retardants can only be sold as Nordic Swan Ecolabelled for those purposes and in those markets where the regulatory requirements require testing with EN 597–2 or equivalent.

In addition, it is emphasised that any flame retardants must meet the requirement for classification of chemicals.

Background to requirement O104 Coatings, laminates and membranes

The requirement corresponds to the requirement set out in the criteria for Nordic Ecolabelling of textiles. The ban on halogenated polymers means that coatings, laminates and membranes coated with or based on e.g. chlorinated polymers and per- and polyfluorinated compounds are prohibited

Background to requirement O105 Classification of chemical products

The requirement is set for all chemicals used in dyeing plants/-houses. The requirement has been harmonised with the proposed revised criteria for the Nordic Swan Ecolabelling of textiles, hide and leather. Disperse dyes often have poor colour fastness because they are

[50] https://miljostatus.miljodirektoratet.no/tema/miljogifter/prioriterte-miljogifter/fosfororganiske-flammehemmere/
[51] https://toxicfreefuture.org/key-issues/chemicals-of-concern/tpp/
[52] https://echa.europa.eu/brief-profile/-/briefprofile/100.009.124
[53] https://echa.europa.eu/brief-profile/-/briefprofile/100.239.100
[54] Ike van der Veen and Jakob de Boer, 2012: Phosphorus flame retardants: Properties, production, environmental occurrence, toxicity and analysis, Chemosphere, volume 88, Issue 10, August 2012, pages 1119-1153
[55] Ike van der Veen and Jakob de Boer, 2012: Phosphorus flame retardants: Properties, production, environmental occurrence, toxicity and analysis, Chemosphere, volume 88, Issue 10, August 2012, pages 1119-1153

not covalently bound to the textile fibre. It is therefore greater risk of exposure to disperse dyes. Requirements are therefore more stringent for disperse dyes that are classified as allergens[56].

2.10.3 Covers – fibre production

The requirements for fibre apply to the textile fibre with a content in the textile part of more than 10% by weight. This means that e.g. for a blend of 90% cotton and 10% polyester, only the requirements for cotton must be met. The requirements for fibre are new. Some of the requirements are harmonised with requirements in the new criteria for the Nordic Swan Ecolabelling of textiles, hide and leather. Other requirements are based on requirements in the current version of the textile criteria and/or criteria for the Nordic Swan Ecolabelling of Baby products with textiles.

Background to requirement O106 Cotton

The cultivation and harvesting of cotton are associated with serious environmental and health problems. This is mainly caused using pesticides, fertilisers, and other chemicals during cultivation. Other factors, such as water consumption (irrigated or rainwater), monoculture, land use also have significant impacts on the environment[57]. There are several ways to reduce adverse effects on health and the environment in the production of cotton. Integrated Pest Management (IPM) promotes measures such as the use of personal protective equipment, training farmers in the use of pesticides, and improved control of the pesticides used. A reduction in the use of artificial fertiliser and energy is also a requirement.

The environmental impact can also be reduced through organic cultivation and farming that does not use synthetic pesticides or artificial fertilisers and does not allow genetically modified cotton. One of the environmental problems that organic production does not solve is the problem related to artificial irrigation. Organic cultivation today is primarily located in areas where rainwater is the main source of water, which reduces the problems associated with water consumption[58]. Although organic production does not necessarily result in reduced water consumption, the run-off water quality will be significantly better for both humans and nature. It is difficult to say whether there is any difference between cotton yields in conventional and organic production. One of the reasons for this is that yields already differ greatly within individual systems. Various studies suggest that IPM produces the highest yields of the three production methods and that approx. 20% of global cotton production is IPM[59].

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[57] Revision of the European Ecolabel and Green Public Procurement (GPP) Criteria for Textile Products – Technical report and criteria proposal, Working document, European Commission, Joint Research Centre Institute for Prospective Technological Studies (IPTS) 2013.

[58] 28 “The sustainability of cotton – consequences for man and the environment”, Kooistra K., Termorshuizen A and Pyburn R., Wageningen University & Research Center, report no. 223, April 2006

[59] Revision of the European Ecolabel and Green Public Procurement (GPP) Criteria for Textile Products – Technical report and criteria proposal, Working document, European Commission, Joint Research Centre Institute for Prospective Technological Studies (IPTS) 2013.

Background to requirement O107 Flax and other bast fibres

Use of natural fibres in textiles has the advantage of not directly relying on fossil resources. However, it is increasingly relevant to consider whether these natural fibres are sustainably farmed with minimal harm to the environment. For example, ensuring that harmful pesticides that can lead to loss of biodiversity are not used. Only pesticides allowed under the EU Regulation No. 1107/2009 may be used in the cultivation of flax and other bast fibres, such as hemp.

Background to requirement O108 Wool and other keratin fibres

The requirement only allows wool fibres from sheep and other keratin fibres from camels, alpaca and goats. Angora wool from the Angora rabbit is not allowed.

Wool scouring wastewater often contains a high concentration of pesticide residues from the sheep dipping process. Pesticide residues that find their way into natural water bodies can cause toxic impacts. At the same time, organochlorine pesticides that are toxic, non-readily degradable and bioaccumulative will be harmful to the environment while active in the wool. Despite a ban, these types of pesticides are still being used[60]. Wool scourers and wool exporters have the greatest ability to influence the use of ectoparasites (pesticides) by placing absolute requirements on the wool producers (farmers). This requirement can thus be documented by at least 75% of wool farmers declaring that they do not use the ectoparasites specified. Organic wool automatically meets the requirement. According to the International Wool Textile Organization (IWTO), less than 1% of global sheep farming was organic in 2015[61]. It has therefore been adjudged that requiring wool to be organic is too strict.

Background to requirement O109 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.

Background to requirement O110 Synthetic fibres

The requirement is new and is based on requirements in the criteria for the Nordic Swan Ecolabelling of Baby products with textiles.

Recycled textiles

Nordic Ecolabelling wants to support the circular economy through the use of recycled materials instead of virgin materials, which in this case is crude oil. However, fibre to fibre

[60] 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
[61] International Wool Textile Organization (IWTO), “Wool Production”. Viewed September 7, 2017: http://www.iwto.org/wool-production

recycling is still limited for textiles[62] and recycled polymers from other synthetic materials are frequently used today as different plastic materials. The requirement thus accepts both fibre to fibre recycling and polymer fibre recycling. There are reasonable opportunities for using recycled fibre types like polyester and polyamide today. The opportunities for other fibre types are not yet quite the same (August 2019).

The article “Environmental impact of textile reuse and recycling – A review”[63] reports that it is well documented that textile reuse and recycling in general minimises negative impacts on the environment compared with incineration and landfill, and that reuse is more beneficial than recycling.

There is a ban on the use of regranulate that is approved for contact with foods by the EFSA under Regulation No. 282/2008 or FDA in compliance with Code of Federal Regulations Title 21: Food and Drugs, PART 177—INDIRECT FOOD ADDITIVES: POLYMERS. It is considered inappropriate that raw materials which are approved for production of food packaging should be used in the production of textiles. The highest levels of traceability and purity are required for plastic raw materials used in packaging in contact with food. The use of these plastics for anything other than food contact is therefore downcycling.

The requirement stipulates that feedstock used in the recycled raw material must be fully traceable. Without proper traceability, it is difficult to ascertain that the material is actually recycled. Documentation regarding traceability should be available, e.g. a certificate from a third party’s certification of the supply chain, such as Global Recycled Standard. Alternatively, the manufacturer of the recycled raw material can document the traceability by declaring that 100% recycled feedstock has been used.

Acrylic

Acrylic fibres are produced through polymerisation of acrylonitrile (min. 85%) with a comonomer (max. 15%). Acrylonitrile is relatively toxic and classified as carcinogenic.[64] Nordic Ecolabelling therefore sets requirements for residual monomers in the polymer and for emissions of acrylonitrile in the process. Toxic solvents are also used in the spinning process, dimethylformamide (DMF) or N,N-Dimethylacetamide (DMAc). DMAc (CAS No. 127–19–5) is also on the Candidate List. Since it is difficult to find good alternatives, Nordic Ecolabelling allows the use of DMF, but not the use of DMAc in the production of acrylic, as this is on the Candidate List.

Polyamide

The requirement has been harmonised with the requirement set in Version 4 of the Nordic Swan Ecolabelling of Textiles and Version 1 of Baby products with textiles. The requirement concerns emissions of nitrogen dioxide (N2O) gases from the production of monomers in polyamide production.

[62] PULSE OF THE FASHION INDUSTRY, Global Fashion Agenda & The Boston Consulting Group 2017
[63] Sandin, G, Environmental impact of textile reuse and recycling – A review, Journal of Cleaner Production Volume 184, 20 May 2018, Pages 353-365
[64] EU Ecolabel’s background report; “Establishment of ecological criteria for textile products”, final report, April 1998

Polypropylene

The requirement has been harmonised with the requirement set in Version 4 of the Nordic Swan Ecolabelling of Textiles. Inorganic pigments are used to dye the fibre the correct colour. The use of lead-based pigments is therefore prohibited in the production of polypropylene.

Polyester

The production process for PET fibre often uses the catalyst diantimony trioxide (Sb_2O_3). Antimony trioxide (CAS No. 1309–64–4) is mentioned in the 2014[65] report “Everything you (don’t) want to know about plastic” by the Swedish Society for Nature Conservation as carcinogenic and as the key catalyst in PET production. Nordic Ecolabelling wants to limit the content of antimony as it is a substance of very high concern. Polyester usually contains antimony in concentrations of 150–350 ppm (mg/kg).[66]

New alternative test for antimony have been added the requirement. The amount of extractable antimony in the final textile must not exceed 30.0 mg/kg (30 ppm). Extractable antimony must be tested using AAS and ICP spectrometry (identical to requirement in Oeko-Tex 100). Documentation: Test report or Oeko-Tex 100 certificate showing fulfilment of the requirement.

Background to requirement O111 Regenerated cellulose

Cellulose pulp or cellulose fibres must not be bleached using chlorine gas. Chlorine gas is no longer used in Europe, but its use has not ended everywhere in the world. Chlorine gas is an effective bleaching agent, but it causes considerable emissions of organochlorine substances. ECF and TCF are examples of better alternative methods that are used for bleaching cellulose pulp. The requirement aims to reduce emissions of AOX by prohibiting the use of chlorine for bleaching. The manufacture of viscose generates emissions of sulphur and zinc. Therefore, a requirement restricting emissions of these substances has been made.

Background to requirement O112 Tree species with restricted use

See requirement O25.

Background to requirement O113 Traceability and certified raw materials

The requirement for certification applies if the regenerated cellulose content in the textile part is more than 50%. See O26 for more information.

[65] Klar, M., Gunnarsson, D., Prevodnik, A., Hedfors, C. and Dahl, U., “Everything you (don’t) want to know about plastic”, the Swedish Society for Nature Conservation, 2014
[66] The Danish Environmental Protection Agency, Environmental Project No. 892, 2004, Antimon - forbrug, spredning og risiko (Antimony - use, spread and risks)

Background to requirement O114 Recycled fibres

The requirement is new and corresponds to requirements set in the new criteria for Nordic Ecolabelling of textiles and leather. 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[67]. This applies to both fibre recovered from used textiles and fibre recovered from products other than textiles. 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 fibre and may be transferred to the new textile fibre. In the chemical recycling process, some chemical substances remain in the material, and both unproblematic and problematic substances can cause technical interference with the process[68]. It is possible to conduct a spot test for the most relevant substances over a set interval, but since the recycled feedstock may come 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[69].

2.11 Quality requirements textiles – seating furniture and headboards

The quality requirements for textiles apply to the following textile parts:

- The cover/upholstery of seating furniture such as sofas, armchairs, chairs, and office chairs
- The cover on headboards
- Upholstered bed frames.

Not all requirements are relevant for all applications. It can e.g. be that the requirements only apply to fabrics that can be removed for washing, or that it does not apply to white fabrics. This is specified in the requirement.

[67] 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

[68] Nordic Council of Ministers (2016). Gaining benefits from discarded textiles: LCA of different treatment pathways

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

Background to requirement O115 Dimensional changes after washing and drying

The aim of the requirement is to ensure that the textile used in the Nordic Swan Ecolabelled furniture is of high quality. The requirement has changed since the previous version of the criteria and is based on the requirement in the new criteria for the Nordic Swan Ecolabelling of textiles.

Background to requirement O116 Colour fastness to light

The requirement remains unchanged. The aim of the requirement is to ensure that the colours of a dyed or printed textile are resistant to change (fading) on exposure to light and that the product thus retains its colour for a long time. This requirement therefore ensures the textile has a long lifespan. The requirement does not apply to white textiles or mattresses/mattress covers. The requirement refers to the EN ISO 105 B02 standard.

Background to requirement O117 Colour fastness to washing or dry cleaning

The requirement is set to ensure high quality and long lifespan for the products. The requirement refers to the ISO 105 C06 standard: Textiles – Tests for colour fastness – Part C06: Colour fastness to household and industrial washing

Background to requirement O118 Colour fastness to rubbing (wet)

The requirement remains unchanged. The requirement is 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 to control fixing of the dye on the fabric.

The requirement refers to EN ISO 105–X12 Textiles – Tests for colour fastness – Part X12: Colour fastness to rubbing. The scale is given in ISO 105–A03.

This requirement is relevant in relation to the textile’s durability, and also to ensure that the dye does not rub off when the product is used.

Background to requirement O119 Colour fastness to rubbing (dry)

The requirement remains unchanged. The requirement is 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 to control fixing of the dye on the fabric. The requirement refers to EN ISO 105–X12 Textiles – Tests for colour fastness – Part X12: Colour fastness to rubbing. The scale is given in ISO 105–A03.

Background to requirement O120 Wear resistance

The aim of the requirement is to ensure that the textile has high abrasion resistance in relation to wear and tear. The wear resistance is important for the product life span. The requirement is tightened for textiles for domestic use from 20 000 to 30 000, non-domestic use from 40 000 to 50 000. If the furniture is marketed to extra hard/hard use, the

requirement is 90 000. This corresponds to the recommended requirement in public tenders in Denmark.

Background to requirement O121 Pilling

It is relevant to ensure that pilling does not occur easily on upholstery fabrics to give the product as long a useful life as possible.

2.11.1 Quality requirements coated fabrics

The requirement only applies to coated fabrics and are based on the requirements of EU Ecolabel's criteria for furniture. Back coating is not included here unless the fabric is also surface coated.

2.11.2 Quality requirements mattress covers

Background to requirement O122–O124

The requirements for coated materials and quality for mattresses are similar requirements set in the EU Ecolabel's criteria for furniture (2016) and mattresses (2014).

2.11.3 Requirement for other parts of textiles

The requirements for other textile parts are based on testing of the finished textile and essentially correspond to the requirements set in the criteria for Nordic Ecolabelling of baby products with textiles. Several of the requirements can be documented with Oeko-Tex certificate class II, except for requirements for formaldehyde where class I or II is required.

Background to requirement O125 Biocides and antibacterial substances

See requirement O102.

Background to requirement O126 Flame retardants

See requirement O103.

Background to requirement O127 Classification of chemical products

See requirement O105.

Background to requirements O128 Extractable metals and O129 Total metal content

The requirements are made to ensure that the user is not exposed to the effects of hazardous metals from the textile.

Background to requirement O130 Formaldehyde in textile

The limit values for the permitted amount of formaldehyde in the finished textile are harmonized with the limit level for Nordic Swan Ecolabelled textile. Formaldehyde is classified as harmful to health as a carcinogen and irritant to eyes, throat and skin. Residues

of formaldehyde in textiles can often result from post-treatment with anti-curling agents.[70] Oeko-Tex and GOTS have similar requirements for formaldehyde emission. Although test method is different from requirement, certificate from Oeko-Tex Baby and GOTS is accepted as documentation.

Background to requirement O131 PAHs

There are more than 100 PAH compounds. Several of the PAHs are carcinogenic with Carc.1B and genotoxic. The PAHs usually originate from two types of additives, which are plasticising and process oils (extender oils) and carbon black. 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, for example. The requirement is harmonized with the levels in Oeko-Tex 100 standard class II.

Background to requirements O132 Pesticides and O133 Ectoparasiticides in wool

Since it is possible to use a combination of organic, IPM and conventional cotton, or organic or conventional wool, it is assessed that for this product group, where the textile is not washed, it is relevant to ensure a minimum content of pesticides in the finished textile. The requirements are the same as in the criteria for Swan labelling of baby products with textiles.

2.12 Padding materials

Padding material to which requirements are set and can be included in a Nordic Swan Ecolabelled furniture are polyurethane foam (PUR), polyester fibre, synthetic latex, recycled textile waste and natural padding materials, such as natural latex, coir (coconut fibre), straw, down and feathers. The first requirements in the chapter apply to all padding materials. The additional requirements given later in the chapter apply to certain types of padding materials.

Padding materials evaluated for compliance with the Nordic Swan Ecolabel’s criteria for Textiles, hides and leather, generation 5 or later or the EU Ecolabel criteria for Bed mattresses, version 2014 or later already meet the requirements in this section. Only the name, manufacturer and licence number of the licence that includes the padding material need to be submitted.

2.12.1 Material requirements

Background to requirement O134 Recycled padding materials

The requirement is new. Nordic Ecolabelling is positive towards the use of recycled materials. However, Nordic Swan Ecolabelled products should not contain materials with halogenated flame retardants. In addition, the padding material shall be tested for relevant substances specified in Annexes 4 and 5 of the Oeko-Tex 100 standard and meet the limit

[70] Folkehelseinstiuttet, Norwegian Institute of Public Health: http://www.fhi.no/eway/default.aspx?pid=233&trg=MainLeft_6039&MainArea_5661=6039:0:15,4521:1:0:0:::0:0&MainLeft_6039=6041:70095::1:6043:3:::0:0 (available 26.11.2011)

values for class II. Testing requirements are set to limit unwanted chemicals in recycled padding materials.

Background to requirement O135 Renewable padding materials

The requirement is new. Nordic Ecolabelling is positive towards the use of renewable padding materials. However, information about which species are used and where the raw materials originate from is wanted. The renewable raw materials must either be residual products from another production process, e.g. straw from grain production or must meet the relevant requirements for fibre given in the chapter on textiles. This applies to requirements for cotton, linen and other bast fibres, wool and other keratin fibres.

Background to requirement O136 Ethical requirements for feathers and down

This is a new requirement and is the same requirement that is set in the criteria for Textiles, hides/skins and leather Version 5. It is mainly geese that are live plucked for feathers and down, although other species are live plucked too. Plucking feathers and down from live geese is banned in the EU, but an investigation by the European Food and Safety Authority (EFSA) has established that it is possible to pluck down and feathers from live geese during the moulting period. EFSA has recommended setting up a control system for this. Since no such control system is currently in place, Nordic Ecolabelling makes the requirement that plucking down and feathers from live birds is prohibited. A requirement has also been made that force feeding is prohibited.

Textile Exchange has issued a standard for down and feathers. Certification under this standard, the Responsible Down Standard (RDS), is possible. The RDS requires independent, third-party assessments of key aspects of animal rearing and handling and ensures traceability all the way through the supply chain. The goal of the Responsible Down Standard is to ensure that down and feathers do not come from birds that have been subjected to any unnecessary harm. The standard may apply to both blended and 100% certified products. However, final products may only be labelled as RDS certified if the down or feathers in them are 100% certified. The standard certifies that birds have not been force fed nor live plucked. There are many certified providers of down and feathers and these are used for a wide range of products in the market.

Background to requirement O137 Manufacture of polyurethane foam

Polyurethane must not be foamed using CFC, HCFC, HFC or methylene chloride. These substances are stable organic substances that are strong greenhouse gases. CFC and HFC break down the ozone layer and methylene chloride are suspected of being carcinogenic. This requirement remains the same as in Version 5 of the criteria. Manufacturers have phased out the use of these agents as foaming agents, but it is still considered relevant to keep the requirement in order to ensure that they are not used. Foaming agents are only relevant for polyurethane foam because foaming agents are not required to produce latex foam.

Polyurethane is formed through polyaddition between isocyanates and polyol. The isocyanates that are used for the manufacture of polyurethane foam are MDI (CAS No. 101-68-8) and TDI (CAS No. 584-84-9 and 91-08-7). Both these isocyanates are suspected of

causing cancer and may cause sensitisation by inhalation and contact with skin. From an occupational health and safety perspective, MDI is slightly better but gives the foam other technical properties and it is therefore not possible to completely replace TDI with MDI. Among other things, MDI gives the foam a higher density. Polyurethane foam that has completely hardened is harmless, but it is important to limit worker's exposure to it because of the risks of unreacted isocyanates. Production of polyurethane foam does not take place in a closed process and personal protective equipment (respiratory masks and gloves) are only required for certain stages of the process. Closed-loop systems have therefore been removed from the requirement. Instead, a description of the safety measures taken to minimise employee exposure is required, and the hygiene threshold limit values for TDI and MDI must be observed. The threshold limit values set in this requirement are the same as those in the Norwegian Labour Inspection Authority's Regulations on measures and threshold limit values.[71]

Background to requirement O138 Butadiene in synthetic latex

The requirement remains unchanged. Several synthetic latex materials are made of substances that are hazardous to the environment and human health, for example substances that are suspected to cause cancer. One substance that acts as a monomer in the production of latex is 1,3-butadiene (CAS No. 106–99–0) which has H340 and H350 CMR classifications. There is therefore a requirement for content of butadiene to be tested to ensure that the monomer content of the final latex is low.

2.12.2 Chemical requirements – padding materials

Background to requirement O139 Chemicals used in production of padding materials

The requirement was also included in the previous version of the criteria but was then referred to as chemical additives. The requirement has been perceived as unclear concerning which chemical additives are covered by the requirement and how far back in the manufacturing chain the requirement goes. An attempt has therefore been made to clarify that the requirement applies to all chemical products used in the manufacture or treatment of padding materials.

The products that are not chemically hardened and monomers that are used in the manufacture of padding materials can, for example, have classifications that do not meet the requirement that Nordic Ecolabelling normally makes for prohibited classifications. In its finished form, the padding material has other properties, and it has therefore been considered most relevant to make the requirement that a number of specific substances must not be used in the manufacturing or treatment processes.

1,3-butadiene and formaldehyde are exempt from the ban on substances classified in CMR categories 1A/1B provided they meet subsequent requirements concerning residual monomers and emissions respectively. The substances have been exempted as they are necessary for use in the manufacture of certain types of stuffing materials.

The requirement also prohibits substances that are classified CMR category 2, which is new compared to generation 4 of the criteria. The isocyanates methylene diphenyl diisocyanate

[71] https://www.arbeidstilsynet.no/regelverk/forskrifter/forskrift-om-tiltaks--og-grenseverdier/8/1/

(MDI) and toluene diisocyanate (TDI) and tin octoate (CAS No. 301–10–0) are excluded as they are necessary for use in the manufacture of polyurethane foam. MDI and TDI are not specified with CAS numbers as there are several different isomers that have different numbers. All different varieties have the same environmental and health properties and are covered by the exemption. Tin octoate is used as a polymerization catalyst and is the most common catalyst to use. The only alternative available today is organotin compounds, which is also not allowed according to the requirement and is not a better alternative from an environmental and health point of view.

Different types of padding materials may contain halogenated flame retardants. However, as they have limited biodegradability and are associated with adverse effects on the environment and human health, halogenated flame retardants are banned A ban is also placed on organophosphate flame retardants.

Organotin compounds are used as catalysts for the formation of polyurethane foam. Disubstituted organotin compounds are normally used, such as dibutyltin (DBT) and dioctyltin (DOT). These are highly toxic to the environment and a hazard to human health and are considered endocrine disruptors[72].

Background to requirement O140 Dyes

The requirement is the same as in the previous version of the criteria, except that the exemption permitting the use of the dye now only applies for the purpose of distinguishing between different qualities. Previously, an exemption was also made for padding materials that are visible and will be used without a cover. This has been deleted because it is unusual that padding materials are used that way and that this needs to be declared by the furniture manufacturer while other parts of the requirement are declared by the manufacturer of the padding materials.

2.12.3 Requirements for emissions

Background to requirement O141 Emissions – foam padding materials

The previous Version 4 of the criteria made the requirement that the concentration or emission of formaldehyde must be tested if it has been used in the manufacture of the padding material. This has been amended to require testing of emissions for additional substances and substance groups and not just for formaldehyde. Emissions testing must be carried out for foam padding materials, such as polyurethane foam and latex foam. Foam padding materials can contain and emit volatile organic compounds found as residues from the production of polymers. Foam padding materials are frequently used in beds, sofas and other items of furniture that come into close contact with the user. Tests must therefore be carried out to ensure low emissions from the padding materials. Latex foam must also meet subsequent requirements for the content of butadiene and emissions of N-Nitrosamines.

Testing following the standard EN16516 are considered as equivalent to those of the ISO 16000 series of standards.

[72] Tüv Süd, Technical guidance on organotin compounds: https://www.tuvsud.com/en/e-ssentials-newsletter/past-topics/technical-guidance-on-organotin-compounds (downloaded 17 October 2019)

Several other labelling bodies set requirements for emissions of the same substances and substance groups, e.g. Oeko-Tex Standard 100, CertiPUR and the EU Ecolabel criteria for bed mattresses and furniture. To allow greater flexibility in the requirement, certificates from Oeko-Tex or CertiPUR are accepted as documentation. Padding materials that have been inspected in accordance with the EU Ecolabel criteria automatically meet the requirement. Oeko-Tex has the same threshold limit values as in the requirement and the threshold limit values are the same for all the different Oeko-Tex classes. Certificates from all the Oeko-Tex classes (class I, II, III and IV) are therefore accepted as documentation. The threshold limit values are slightly different for CertiPUR, for example, in the case of styrene and aromatic hydrocarbon emissions. Nonetheless, a certificate from CertiPUR has still been considered sufficient to meet the requirement, since their threshold limit values are also low.

Background to requirement O142 N-nitrosamines in latex

The requirement remains unchanged, but the test method has been changed to harmonise with Version 5 of Nordic Swan Ecolabelling of Textiles, hides/skins and leather, and with the EU Ecolabel criteria for furniture.

Accelerators used for vulcanisation of latex can emit nitrosamines during the production process. Several N-nitrosamines tested in animal experiments have been found to be carcinogenic. It is possible to use accelerators that do not form nitrosamines, but the choice of accelerator can be influenced by technical difficulties or cost[73]. If accelerators that form N-nitrosamines are used in the manufacture of latex, an emissions test is required to ensure that the majority emitted during production will not be emitted during use.

2.13 Hide and leather

There are different sets of requirements for hide and leather depending on the amount contained in the product and the function. The most comprehensive requirements are set to hide and leather which are covers, e.g. covers on sofas and chairs. Hide and leather used as such covers are included in a relatively large amount and also come into contact with skin. Hide and leather previously had to comply with all the requirements specified in the criteria for the Nordic Swan Ecolabelling of textiles, hide and leather. Requirements are set for leather and leather that is included with more than 1% by weight in the product.

Many of the requirements in this chapter are harmonized or partially harmonized with the requirements set out in the criteria for Nordic Ecolabelling of textiles, leather and leather. Reference is therefore made to the background document for these criteria for a more general background to the requirements.

[73] European Ecolabel Bed Mattresses, LCA and criteria proposals final report for the EC, accessed 18 June 2019 http://ec.europa.eu/environment/ecolabel/documents/bed_mattresses_report.pdf

2.13.1 Requirements for hide and leather regardless of the amount in the product

Background to requirement O143 Chromium in hide and leather

The requirement is the same as that proposed in the revised criteria for the Nordic Swan Ecolabelling of textiles. The requirement limit of 200 mg / kg mass of chromium (total) / dry weight corresponds to the requirement limit in Blue Angel and EU Ecolabel.

In the EU, there is a REACH restriction that leather parts that come into contact with the skin must not contain chromium (VI) with 3 mg / kg (3 ppm) or more. The standard EN ISO 17075 recommends a detection limit of 3 ppm. The requirement here in the criteria goes beyond legal requirements by requiring and checking the test report.

Release of Cr (VI) compounds is a problem as hexavalent chromium compounds are contact allergens. Cr (VI) is one of the most well-known allergens. Therefore, this requirement is set for all leather and hide that is included to reduce the risk of allergic reactions.

Hexavalent chromium (Cr (VI)) is not used in the tanning industry and has no effect in the tanning process. However, chromium (III) salts can – under certain conditions – be converted to Cr (VI) compounds.[74] The requirement does not exclude chromium tanning (chromium III) but requires a minimum content of extractable total chromium in the finished leather. 80 – 90% of skin and leather production worldwide uses 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 and explains which states this as the reason for the limited substitution of chrome tanning with alternative substances. At the same time, today it is possible to minimize the extractable content of chromium in the finished product.

Regardless of which tanning process is used, it is relevant to ensure that the content of chromium and especially chromium (VI) in the finished leather is documented and low. The requirement must thus be documented regardless of the tanning process. The EU's Best Available Techniques (BAT) reference document for hides and skins[75] does not specify a specific tanning process as BAT. Each process has different important environmental and health aspects, and the choice of tanning technology depends mainly on the properties needed in the finished material, the cost, available production facilities and the type of raw material treated.

Background to requirement O144 Cadmium and lead

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

[74] Investigation and health related assessment (allergy only) of chromium in leather shoes
[75] Best Available Techniques (BAT) Reference Document for the
Tanning of Hides and Skins, JOINT RESEARCH CENTRE 2013

Background to requirement O145 Biocides and antibacterial substances

Biocides may be used in various tanning processes to protect the substrate against microbial attack. The requirement does not include the use of salt as a preservative. See also background to O102.

2.13.2 Requirements for hide and leather – covers

Background to requirement O146 Classification of chemicals

The requirement applies to all chemicals used in the production of hide and leather to ensure there is a focus on this in all processes where chemicals are used. Nordic Ecolabelling seeks to ensure that the health and environmental impacts of the products are as low as possible. Therefore, requirements are set with a ban on e.g. CMR classification. In addition to chemistry for the tanning process itself, chemicals such as dyes, auxiliary chemicals, finishing chemicals, solvents, enzymes, biocides and various inorganic standard chemicals are also used. The amount of chemicals used varies considerably depending on the type of leather product and the process chosen. The commonly used inorganic chemicals are sodium sulphide, calcium hydroxide, acids, carbonates, sulphites, and sulphates. The largest variation is in the amount of tanning agent used.[76]

An exception has been inserted here for biocidal active substances, 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. There is therefore a need for treatment with an antibacterial effect.

Background to requirement O147 Classification of ingoing substances in chemical products

The requirement is new and has been harmonised with the requirements to chemicals in the revised criteria for the Nordic Swan Ecolabelling of textiles, hide and leather. Nordic Ecolabelling seeks to ensure that the health and environmental impacts of the products are as low as possible. A ban on substances with CMR classification has therefore been set as a requirement, which thus excludes some of the substances identified as having serious effects on human health.

Background to requirement O148 Prohibited substances

There used to be a similar requirement for auxiliary chemicals used in dyeing and finishing processes. The requirement now applies to all chemicals. The requirement is harmonised with corresponding requirements in the new criteria for the Nordic Swan Ecolabelling of textiles, hide and leather.

Background to requirement O149 Sources of hides, skins and leather

The requirement is new and is consistent with requirements in the new criteria for the Nordic Swan Ecolabelling of textiles, hide and leather. The aim of the requirement is to ensure that

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

only hides that are a by-product of the meat/dairy/wool industries are used. This mitigates the environmental impact of livestock, and it makes sense from an ethical point of view that the leather and hides produced are derived from a by-product of the meat/dairy/wool industries. Fish skin provided it is not on the IUCN Redlist[77], is now also included in this version of the criteria. Fish skin must comply with the same requirements as other types of skin and leather.

2.13.3 Quality requirements for hide and leather

Background to requirement O150 Tear strength for leather

The requirement has been set to ensure the good quality of the 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 O151 Flexing test

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 O152 Colour fastness to water

The requirement has been set to increase possibility of a long lifetime 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”.

Background to requirement O153 Colour fastness to wear

The requirement has been set to increase possibility of a long lifetime, 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”.

2.14 Materials for sound absorption

Fibre products that are made, for example, from polyester and recycled textile waste and are used as sound absorption material must meet the relevant requirements for padding materials in Chapter 4.12. Textiles that are used to cover the sound absorption material must meet the relevant requirements for textile.

Mineral raw materials that are used for acoustic insulation, for example in a partition wall, and make up more than 5% by weight of the finished furniture product, must meet the requirement in this chapter.

[77] The IUCN Redlist: https://www.iucnredlist.org/

Background to requirement O154 Mineral raw materials for acoustic insulation

Mineral raw materials may be included as a material in furniture, for example, as acoustic insulation material in a partition wall. The requirement is unchanged. It would be complicated to place a requirement for mineral raw materials in the criteria for furniture, so instead there is now a requirement that the raw materials must be inspected in compliance with the Nordic Swan Ecolabel's criteria for panel and moulding for interior use, generation 7. Other soundproofing materials must meet relevant requirements in the chapter on padding materials.

2.15 Glass

The requirements in this section apply to glass that makes up more than 5% by weight in the finished furniture/fitment. The requirements do not apply to smaller parts such as electrical components, displays and fibreglass used as reinforcement for plastic. Requirement O157 for recycled glass applies to glass that is included with more than 30% by weight in the furniture/fitment.

Background to requirement O155 Glass

The requirements for glass were also included in Version 5 of the criteria but have now been merged into one requirement. The requirement has changed as it must be possible to recycle all types of glass used in Nordic Swan Ecolabelled furniture. Previously, the requirement for recycling only applied to laminated glass. It is also now more explicit that the requirement concerning copper applies to the process of plating copper as a coating. A reflective metal coating, usually silver, is used in mirror glass. Silver is applied to the surface of the glass using two different processes, the tin process, or the copper process. Tin is mainly used nowadays, because copper contaminates wastewater and is difficult to remove before being discharged. The copper process is therefore prohibited and must not be used. Lead-based paints are used to protect the silver from corrosion. To limit the lead in paints, lead content must not exceed 0.2% by weight.

Background to requirement O156 Surface treatment of glass

The requirement is new. Glass must not be surface treated with chemicals and nanomaterials that have an antibacterial or disinfectant effect. For more background on antibacterial substances, see O17.

2.15.1 Requirements if glass is included with more than 30% by weight in the furniture/fitment

Background to requirement O157 Recycled glass

Products that contain glass such as kitchen cabinet doors and shower walls/doors can be Nordic Swan Ecolabelled according to the product group definition in the criteria. As the products largely consist of glass, a requirement has been introduced that they to some extent must consist of recycled glass. The requirement applies when glass makes up more than 30% by weight of the product. Glass is recyclable and as long as it is clean enough, the

quality is the same as for glass made from virgin material. Kitchen cabinet doors and shower walls/doors usually consist of tempered glass, and it is also possible to temper recycled glass. The requirement limit is set so that at least 15% of the glass must consist of pre- or post-consumer recycled glass in accordance with definition in ISO 14021. There are glass manufacturers today who use recycled glass in this amount in their production.

2.16 Linoleum

The requirement in this section applies when linoleum makes up more than 5% by weight of the finished furniture.

Background to requirement O158 Linoleum

Linoleum may be included as a material in furniture, for example, as a surface on a table. The requirement was added to version 4 in response to demand for Nordic Swan Ecolabelling of furniture with linoleum. The requirement is unchanged.

2.17 Natural stone and agglomerated stone

Natural stone and agglomerated stone are new materials in these criteria. The requirements are based on the EU's revised criteria for hard coverings, version 2020. Nordic Ecolabelling also sets requirements for general principles and rights for workers.

Background to requirement O159 and O160 Natural- and agglomerated stone

Requirement and documentation according to the EU Ecolabel's criteria for Hard Coverings, version 2021.

The requirement is new and is considered relevant as quarries and further processing can take place in countries outside Europe where workers' rights may be limited.

2.18 Licence maintenance

The purpose of the licence maintenance is to ensure that fundamental quality assurance is dealt with appropriately.

Background to requirement O161 Customer complaints

Nordic Ecolabelling requires that your company has implemented a customer complaint handling system. To document your company’s customer complaint handling, you must upload your company’s routine describing these activities. The routine should be dated and signed and will normally be part of your company’s quality management system.

If your company does not have a routine for customer complaint handling, it is possible to upload a description of how your company perform these activities. During the on-site visit, Nordic Ecolabelling will check that the customer complaint handling is implemented in your company as described. The customer complaints archive will also be checked during the visit.

Background to requirement O162 Traceability

Nordic Ecolabelling requires that your company has implemented a traceability system. To document your company's product traceability, you must upload your company's routine describing these activities. The routine should be dated and signed and will normally be part of your company's quality management system.

If your company does not have a routine for product traceability, it is possible to upload a description of how your company perform these activities. During the on-site visit, Nordic Ecolabelling will check that the product traceability is implemented in your company as described.

3 Environmental impact of furniture and fitments

The relevant environmental impacts throughout the lifecycle of furniture and fitments are set out in a MECO scheme. A MECO scheme highlights the key areas that affect the environment and health throughout the product's lifecycle – focusing on materials/resources consumption (M), energy (E), chemicals (C) and other impact areas (O).

Nordic Ecolabelling sets requirements concerning the topics and processes in the lifecycle that have a significant environmental impact – referred to as hotspots. Based on the MECO analysis, an RPS tool is used to identify where ecolabelling can have the greatest effect. 'R' stands for environmental relevance; 'P' represents the potential to reduce environmental impact, and 'S' refers to the steerability, which determines how compliance with a requirement can be documented and monitored. The criteria focus on those areas of the lifecycle identified as having high RPS, where there is potential to achieve positive environmental gains. For more details on the RPS analysis, please refer to the Nordic website[78].

Furniture and fitments are a very complex product group due to the diversity in products and the materials used. Overall, the life cycle of furniture and fitments can be divided into three main areas: production and supply of materials, products manufacturing and downstream activities (i.e. product distribution, retail, use, maintenance and end of life). A study by study be Cordella and Hidalgo (2016) clearly describes where the main environmental impacts are found: The production and supply of materials have the greatest influence on the environmental profile (average impact ratio of this stage varies from 88% to 98%, depending on the impact category). A secondary role is played by product manufacturing (average ratio of this stage is 2% to 12%), distribution (average ratio of stage is from 6% to 14%) and end of life (average ratio of stage is 1% to 22%)[79]. Overall, the literature study be Cordella and Hidalgo (2016) concludes that;

"the environmental profile of furniture is mainly defined by materials. Environmental impacts could thus be reduced effectively through a careful selection of materials and by increasing the efficiency of use of resources. The durability of products can also have a significant influence on the life cycle impacts, as well as disposal scenarios. The toxicity of substances

[78] https://www.nordic-ecolabel.org/nordic-swan-ecolabel/criteria-process/ (accessed February.2025)
[79] Cordella and Hidalgo (2016): Analysis of key environmental areas in the design and labelling of furniture products: Application of a screening approach based on a literature review of LCA studies

used in furniture is another aspect of potential concern while other aspects appear of secondary importance from a life cycle point of view."

The revision of the EU Green Public Procurement (GPP) criteria for Furniture defines an approach for procurement of new furniture products. This defines other essential parameters to take into account apart from the focus on materials. In the GPP criteria the focus is particularly on the longevity of products via criteria for durable upholstery materials, ease of repair and disassembly, availability of spare parts and the encouragement of longer warranties.[80]

3.1 RPS scheme

Life cycle stages	Area and assessment of R, P, S (high, medium or low)	Comments
Raw materials		
	Wood raw materials: sustainable forestry R: High P: High S: High	Wood raw materials used in furniture have a high RPS. From a lifecycle perspective, forestry plays a key role in the environmental impact of wood products. It is crucial that wood, as a renewable raw material, is grown, harvested and used in a sustainable way. A significant portion of global forest loss is driven by the conversion of natural forest to other land uses, such as cattle farming, palm oil and soy plantations. Deforestation and degradation caused by illegal and unsustainable logging, fires, and fuelwood harvesting can harm wildlife, threaten livelihoods and intensify climate change. Credible forest management certification helps promote a more sustainable wood/timber product industry by creating market conditions that support forest conservation. Requirements for a high share of certified wood raw materials and certified traceability ensure more sustainable forestry.
	Organic cotton R= Medium-high P= medium S= Low	For furniture with a high proportion of cotton textiles, there is medium-high relevance in relation to the use of organic cotton. However, organic cotton still makes up a small proportion of the total cotton production leading to a medium potential due to the availability in the market. Since it is typically not the furniture productions themselves that purchase cotton, the steerability is assessed to be low.
	Chemicals used in textiles and filler material R= High P= High S= Low-Medium	For furniture with a high proportion of textiles, there is high relevance for setting chemical requirements for harmful chemical substances in textiles. The potential is high as alternatives can often be found. However, the information must often be retrieved several links back in the production chain and can therefore be difficult to document/control (low-medium S). It is therefore

[80] Donatello et al. (2017): Revision of the EU Green Public Procurement (GPP) criteria for Furniture

		essential to focus on requirements with the highest RPS.
	Chemicals – additives in plastic R= High P= Medium S= Medium	Problematic additives in plastic parts have high relevance and there is potential for selecting alternative materials. In the production chain leading back to the actual mixing of plastic granules with additives there is often high steerability for the chemical substances used.
	Plastic and metal: Recirculated raw materials R= High P= Medium S= Low-medium	Production of virgin plastic and metals have high climate impact and other environmental impacts (e.g. mining activities and production chemicals). Relevance is high for products with high share of metal or plastic. The potential (availability) of alternative products made of e.g. recycled metal is medium. The possibility to document the environmental performance is possible but often complex due to the lack of good certification schemes. Therefore, steerability is low-medium.
	Energy – material production R= High P= Medium S= Low-medium	Many of the materials used for furniture are highly processed meaning that they are associated with high energy consumption. This means that there is high relevance in relation to the energy use related to material production, including raw material extraction. The potential for minimizing the energy use is considered to medium but the steerability is low as the production chains are often complex and the availability of reliable data is low.
	Energy production related to adhesive/resin R= Medium P= Low-medium S= Low-medium	For furniture with a high share of boards/panels, part of the energy load will come from the production of raw materials for the glue in the boards. However, the potential for energy savings is not clear and data will have to be retrieved several links back in the production chain. Both potential and steerability are considered to be Low-medium.
Production/distribution		
	Energy - production of board and panels R: High P: Medium S: Medium	Board and panel production is relatively energy intensive, meaning that the relevance is high. The energy efficiency of the producers vary but documenting this can be difficult due to the lack of comparable data. Steerability is medium as it is possible to receive reliable data from the producers for gate-to-gate.
	Production chemicals (pigments, VOC, biocides etc.) R: High P: Medium-high S: Medium	High relevance is found for formaldehyde, VOCs, isothiazolinones in binders, use of problematic substances in surface treatments and other chemical products used in furniture production, e.g. VOCs, flame retardants, nanoparticles used in surface treatments and heavy metals in pigments. The potential is medium-high as alternatives can often be found, steerability is good as the products specifically used can be documented.
	Energy for drying processes related to surface treatment R= Medium P= Medium	Energy related to drying processes can be significant depending on the surface treatment system used. There is a potential for energy

	S= Medium	savings of the production systems or changing surface treatment system. The steerability is medium unless the work is done at a sub-supplier.
	Resource efficiency per functional unit – (production) R= High P= medium S= low	Resource efficiency is high relevant for optimizing material use. Since furniture can consist of different types of materials and have very different designs, there is in principle a potential to optimize the design to be more resource-efficient in relation to the furniture's function. However, the designs are typically not defined by the furniture producers leading to a low steerability.
Use phase		
	Quality, warranty and properties R: High P: Heig S: Heig	To ensure a low environmental impact of the product seen over the products lifetime it is essential to ensure high quality. Relevance is high. There is a wide variety of quality on the market, including products with a very low lifetime, therefore high relevance. The steerability is high as there are quality test standards available for the individual types of furniture that are used by the furniture industry.
	Spare parts and disassembly R: High P: Heig S: Heig	Having spare parts available is essential to ensure a long lifetime for the products. Being able to disassemble the products makes recycling and reuse much easier in the future. Relevance, potential and steerability are all considered high.
End of life		
	Furniture recycling R= High P= High S= very low	Relevance and potential are high in relation to energy and resource use. However, there are challenges regarding receiving the needed amounts of materials / products at the right time and there is low possibility to ensure that no harmful substances are present in the recycled materials. Steerability is low.

3.2 MECO scheme

In the following table the background for the identification of the environmental impact of specific materials or chemicals is described further in the background of other relevant criteria documents. This referred to in the following way: “CT”: criteria for textiles, hides/skins and leather, “CP”: criteria for panels and boards. Other relevant studies are referred to in the foot notes.

	Raw material production	**Production**	**Use phase**	**End of life**
Raw materials/materials	Solid wood and wood fibres (renewable) [CP] Adhesives (oil-based/bio-based) [CP] Metal (steel/iron/alu/brass) Plastic[81] Textile (wool/cotton/viscose/synthetics) [CT] Leather (renewable) [CT] Filler materials (oil-based/feather/down) [CT]	Energy raw materials for drying processes for surface treatment, board production [CT, CP] Resource efficiency in terms of material selection and utilisation and furniture design [96 and 82]	Replacement of spare parts, refilling of upholstery [99 and 100]	Recycling of furniture and recycling of materials such as metal, plastic and wood.[CP, 1]
Energy/CO_2 emissions	Energy raw materials for the production of metal[99], plastics[99], and wooden board production[CP] (adhesive raw materials in boards, drying of wood, mechanical work).	Energy raw materials for drying processes for surface treatment, board production[CP]		Energy recovery by incineration.
Chemicals	Red sludge from aluminium production[CT]	Allergenic acrylates in UV varnish.	Emissions of formaldehyde, VOCs in surface treatment and during maintenance[CP].	

[81] Cordella and Hidalgo (2016): Analysis of key environmental areas in the design and labelling of furniture products: Application of a screening approach based on a literature review of LCA studies
[82] Donatello et al. (2017): Revision of the EU Green Public Procurement (GPP) criteria for Furniture

	Antimony from polyester fibre production[CT] Pesticides from forestry (incl. rattan)[CT]	Emission of VOCs and formaldehyde from coatings and adhesives.[CP] Wastewater from e.g. dyeing, tanning processes from leather production[CT] Spray booths with non-biodegradable substances (high COD and BOD[83]) Plastic additives containing problematic substances[84]	Chrome plating of metal. [85] Treatment of textiles with flame retardants, dirt-repellent coatings and biocide (e.g. during freight)[86] [87]	
Other	Sustainable forestry, organic cotton production. [CP] Animal welfare (down/feathers) [CT]		Quality, lifespan, possibility of purchasing spare parts/new cover.	

[83] Mapping of substitution possibilities as well as health and environmental assessment of paint systems for Industrial Surface Treatment of Metal and Wood, MST 2011
[84] United Nations Environment Programme and Secretariat of the Basel, Rotterdam and Stockholm Conventions (2023). Chemicals in plastics: a technical report. Geneva.
[85] MST, Massestrømsanalyse af chrom og chromforbindelser, https://www2.mst.dk/udgiv/publikationer/2002/87-7972-374-8/html/kap03.htm
[86] Hazardous chemicals in textiles, A report from the swedish agency, 2013
[87] Boris Rybin et al., Chemical Safety of Furniture Products, 2019

3.3 Environmental impact of furniture and fitments

The main environmental impact of furniture relates to the materials used to make the furniture, such as wood, plastic, metal and textiles[88],[89],[90]. Relevant environmental impacts are linked to resource use, energy consumption and carbon footprint, biodiversity and chemicals of concern. The environmental impacts during production of the actual furniture are linked to emissions of substances that are harmful to health and the environment in connection with processing the materials, gluing and surface treatment processes, and production and packaging waste. Apart from the actual materials and production process, including chemicals that are used in the furniture, there are other aspects that have effects on the environmental impact. Good quality and a longer product life have direct positive effects on the environmental impact and protect society from exposure to adverse environmental conditions related to production of new furniture. Ensuring there is possible to recycle the furniture at the end of its useful life also minimises negative impacts on the environment when the product has become worn out.

The environmental impacts related to materials, production, energy and carbon, the use phase and circular economy are described in more detail below.

3.3.1 Materials

As explained above, the environmental impact of furniture is greatly affected by the materials used to produce it. The materials and additives themselves have varying environmental properties, e.g. how they are produced, energy consumption during production and what substances they contain. The materials will also affect which environmental impacts occur during the production of the actual item of furniture (e.g. emissions from lacquering/varnishing), the performance of the furniture during use (e.g. emissions from adhesives and varnish), product life span and possibilities for repair and renovation and problems that furniture can give as waste. The choice of materials therefore affects the environmental impacts at all the life-cycle stages of the furniture.

Depending on the design and type of furniture, the amount of different materials and the quantity of materials in furniture can vary greatly. The technical report from the revision of the EU Ecolabel criteria for furniture[91] shows that wood is the most common material in furniture (56%), followed by metal (12%) and plastics (6%). This is much in line with the figures given in the background document for Version 4 of the Nordic Swan Ecolabel's criteria for furniture, which are based on the figures from the Swedish furniture industry; 70% wood materials, 15% padding materials (mostly polyurethane foam and polyester), 10% metals and 5% other materials (plastics, textiles, glass, etc.). This varies considerably, however, from untreated wood furniture, which can consist almost entirely of solid wood, to

[88] Shane Donatello, Hans Moons and Oliver Wolf (JRC): Revision of EU Ecolabel criteria for furniture products, final technical report, 2017
[89] Shane Donatello, Miguel Gama Caldas, Oliver Wolf Revision of the EU Green Public Procurement (GPP) criteria for Furniture, 2017, technical report final version
[90] Background document, Version 4 Furniture and fitments, Nordic Ecolabelling 2011
[91] Shane Donatello, Hans Moons and Oliver Wolf (JRC): Revision of EU Ecolabel criteria for furniture products, final technical report, 2017

complex upholstered furniture and office chairs which can consist of multiple different materials and functions.

Each material can minimise negative environmental impacts in the production process, but it is also relevant to match the environmental impact of different materials against one another. Various factors will also determine a choice of material, depending on the type of furniture being produced. For example, while a shelf can be made of 100% wood, a height adjustable desk has to contain metal in order for it to function as intended. It can be difficult therefore to look at the environmental impacts related to materials without looking at the intended use and purpose of the furniture. Nevertheless, it is possible to make some general considerations about material choices.

An in-depth review carried out through studies and life cycle analyses during the previous revision for furniture shows the following general findings[92]:

- Wood has the lowest environmental impact compared with other materials such as plastic, steel and concrete.
- The total energy consumption (energy consumed in all processes associated with the production of the product) of wood is low compared with plastic and metal. The reason for this is that plastic and metal production are energy-intensive processes.
- The total energy consumed in the production of wood products is closely related to the energy expended in drying the wood.
- The incineration of wood for energy production can be regarded as CO_2 neutral.
- The use of other materials (even in small quantities) in the production of wooden furniture (such as metals, plastics, glue, varnish etc.) dramatically increases the environmental impact of furniture.

The Danish Environmental Protection Agency has published a study that looks at the environmental impact of wood and wooden furniture from an LCA perspective[93]. This study confirms the conclusions drawn above and also notes that the environmental impact of furniture can be reduced significantly if production waste and materials are recycled and/or incinerated to produce energy.

A study of different materials conducted by Bath University[94] shows that metal (aluminium, steel and stainless steel) is more energy and carbon intensive than renewable raw materials like wood, HPL and MDF. Compared with other materials, aluminium's footprint is very large, but stainless steel and steel have a smaller footprint than plastic. The study also shows that energy consumption and carbon emissions vary depending on the type of plastic. Several

[92] Nordic Ecolabelling's background document for Version 4 of the criteria for furniture and fitments, 2011
[93] The Danish Environmental Protection Agency, 2001. http://www.mst.dk/Udgivelser/Publikationer/2001/11/87-7944-909-3.htm
[94] Prof. Geoff Hammond & Craig Jones, Inventory of Carbon & Energy (ICE), Version 2.0. Sustainable Energy Research Team (SERT). Department of Mechanical Engineering. University of Bath, UK, 2011

studies show that using recycled materials, especially metal and plastic, significantly reduces adverse impacts on the environment[95],[96],[97].

Since materials and the chemicals, they contain greatly affect the environmental impact of an item of furniture, it is relevant for Nordic Ecolabelling to examine which requirements can be imposed on the production of the constituent materials in the product, chemicals used and requirements that promote the use of renewable and/or recycled materials.

The main materials most commonly used in the manufacture of furniture are wood and wood-based materials, plastic, metal, padding materials and textiles. A short description of the environmental impacts of each is given here.

Wood and wood-based materials

Wood and wood-based materials, like panels, have a high content of renewable materials. That is positive from an environmental perspective, but it is important to ensure that wood raw materials are sourced in a sustainable way. The many benefits that sustainably managed forests deliver to society include wood for materials and energy, protection against global warming, homes and livelihoods for local communities and indigenous peoples, support of biodiversity and protection of water and soil from pollution and erosion. Recycled materials can be used to minimise adverse environmental effects related to the extraction of virgin raw materials.

Chemicals, e.g. adhesives, are also used in the production of wood-based panels (including paper-based panels and boards). Surface treatment using varnishes or paints is also a relevant environmental aspect. Using chemicals with a low content of substances that are harmful to health and the environment will affect the environmental impact during production and during product use e.g. emissions.

Metal

The production of metal, including mining, is associated with significant environmental impacts relating to raw material extraction, large quantities of waste, energy consumption and emissions from production.[98] Ethical issues such as child labour and working conditions may also present challenges.

The use of recycled materials reduces environmental impacts significantly in all areas.[99] The surface treatment of metal uses numerous chemicals associated with adverse health and environmental effects and therefore also has significant environmental impacts.[100]

[95] Prof. Geoff Hammond & Craig Jones, Inventory of Carbon & Energy (ICE), Version 2.0. Sustainable Energy Research Team (SERT). Department of Mechanical Engineering. University of Bath, UK, 2011
[96] Shane Donatello, Hans Moons and Oliver Wolf (JRC): Revision of EU Ecolabel criteria for furniture products, final technical report, 2017
[97] 13 SHAHZAD AHMAD * et al. ISSN: 2250–3676, INTERNATIONAL JOURNAL OF ENGINEERING SCIENCE & ADVANCED TECHNOLOGY Volume-2, Issue-4, 871 – 875, IJESAT, July-Aug 2012
[98] 12 Environmental challenges of anthropogenic metals flows and cycles. van der Voet, E., Salminen, R., Eckelman, M., Norgate, T., Mudd, G., Hisschier, R., ... de Koning, A.. Environmental challenges of anthropogenic metals flows and cycles. United Nations Environment Programme. 2013
[99] 13 SHAHZAD AHMAD * et al. ISSN: 2250–3676, INTERNATIONAL JOURNAL OF ENGINEERING SCIENCE & ADVANCED TECHNOLOGY Volume-2, Issue-4, 871 – 875, IJESAT, July-Aug 2012
[100] Shane Donatello, Hans Moons and Oliver Wolf (JRC): Revision of EU Ecolabel criteria for furniture products, final technical report, 2017

The process also produces emissions and hazardous waste that must be managed and disposed of in the proper way.

Plastic

Plastics may be fossil-based or bio-based. The plastics used in furniture today are mainly fossil-based. Environmental impacts relating to extraction of fossil raw materials are therefore relevant for plastic as a material. Chemicals which may be harmful to health and the environment are added during the manufacture of plastic to give it different properties. Additives may include antioxidants, flame retardants and plasticisers such as phthalates. Dyes and colourants may also be added. The Danish Environmental Protection Agency has conducted an inventory of chemical substance use within the Danish plastics industry. Of the 1,300 chemical substances, 300 have been identified as chemicals of potential concern due to their effects on the environment and/or health.[101]

Padding materials

The term “padding materials” is used to describe a number of different materials, for example, polyurethane (PUR) foam and latex. These are the most commonly used padding materials today. Polyester or padding made of renewable materials, such as down and feathers, are also used. Production of PUR foam may present potential health and safety hazards due to the use of isocyanates which are classified as CMR (Carcinogenic, Mutagenic and Reprotoxic) and/or allergenic. Padding materials can also produce emissions of VOCs, formaldehyde and other harmful substances. The use of chemicals such as antibacterial additives or flame retardants that are classified as harmful to health and the environment is also relevant to padding materials. The use of natural filling materials may present ethical issues relating to animal welfare.

Textiles

The textile industry is one of the world’s largest industries and also one of its most polluting and resource-consuming industries. The LCA-study “Advancing life cycle assessment of textile products to include textile chemicals”, which includes the environmental impacts of chemicals, states that the greatest environmental impact from textiles is associated with the actual production of the textile. The main impacts come from the use and discharge of hazardous chemicals and the use of water and energy during the textile production process[102]. The Swedish Chemicals Agency has identified 2,450 different chemicals that are used during the textile production process. Of these, 1,150 are identified as hazardous and 368 are functional chemicals, such as dyes, hydrophobic finishing and antibacterial finishing chemicals. These chemicals are incorporated into textiles and may therefore pose a possible risk to users and the environment during the use phase.

Fibre production is also associated with significant environmental challenges. Huge amounts of water are required for all cotton farming and conventional cotton production involves high inputs of chemicals. Environmental impacts and carbon footprint are the same for synthetic fibres as for plastics, since they are based on fossil resources and energy is required to produce polymers. Use of recovered and recycled material will reduce the negative

[101] “Øget videnberedskab om kemiske stoffer i plastindustrien” (Mapping of chemical substances in the Danish Plastics Industry), Working report from the Danish Environmental Protection Agency, No. 5 2008
[102] Advancing life cycle assessment of textile products to include textile chemicals, CHALMERS UNIVERSITY OF TECHNOLOGY 2016

environmental impacts of fibre production. Textile wet processes (bleaching, dyeing and finishing) are often a particularly heavy burden on the environment as they involve a high consumption of water, chemicals and often energy.

3.3.2 Production

The environmental impacts during production of the actual furniture are largely linked to emissions of substances that are harmful to health and the environment in connection with processing the materials (e.g. sanding of wood), gluing and surface treatment processes, and production and packaging waste. In the case of wood-based waste, the energy is generally used for heating the production facilities. Textile waste, padding materials and packaging can account for large amounts of waste produced by furniture manufacturers. However, an analysis conducted by Statistics Norway (SSB)[103] of waste from different industries shows that the furniture industry has relatively little waste compared with other industries. Large volumes of the waste are recycled.

3.3.3 Energy and carbon

All stages of the life cycle involve energy, including greenhouse gas emissions. Since the composition of materials in furniture/fitments varies so much, it is also difficult to draw general conclusions. However, it can generally be said, that the primary production of metals, plastic materials, wood-based panels and the production of raw materials for certain types of adhesive are particularly energy-intensive processes. The energy consumed by furniture manufacturers is less than the energy consumed in the production of the constituent materials, and transport also has a smaller impact. In particular, the significance of energy consumption relating to transport and raw materials varies. For furniture with a relatively high content of metals and plastics, the greatest energy consumption relates to the production of the raw materials[104]. Less than 5% relates to transport. The energy intensity of the materials has greater significance than the energy consumed in transport and production. A life cycle assessment of an item of wooden furniture, by comparison, shows that the energy used to transport raw materials and distribute the furniture accounts for approximately 10% of the energy consumed over the life of the furniture.

There are a number of ways to reduce energy consumption and carbon emissions linked to furniture and fitments. Use of renewable and recycled materials helps reduce energy and carbon footprints. When using renewable raw materials, it is important that they come from sustainable sources. This is important for biological diversity and the climate. Wood raw materials should not be taken from areas that are needed to counter climate change. Recovering and reusing some types of materials, such as aluminium (Al), will greatly help reduce carbon footprints[105]. Conscious choice of design and materials is therefore also a parameter that impacts this.

Focusing on good quality to extend useful life and on design that allows for reuse and replacement of materials will also have a positive impact on energy use and carbon emissions. Obviously, the furniture manufacturer also has opportunities to reduce energy

[103] https://www.ssb.no/322374/avfall-fra-industrien.naeringer.1000-tonn
[104] Background document Version 4, Nordic Ecolabelling
[105] Prof. Geoff Hammond & Craig Jones, Inventory of Carbon & Energy (ICE), Version 2.0. Sustainable Energy Research Team (SERT). Department of Mechanical Engineering. University of Bath, UK, 2011

consumption and be environmentally conscious when choosing energy sources and work on reducing transport and improving the efficiency of vehicles in and out of the factory. However, the greatest impact of the finished furniture on energy consumption and carbon emissions is the production of the constituent materials.

3.3.4 Environmental impact during use

The environmental impact of furniture during use is first and foremost an indoor climate problem. A long useful life is also important. See Chapter 1.5 for details. Wooden surfaces, varnishes, glue, textiles, etc. may release various substances, such as formaldehyde and volatile organic compounds that may cause discomfort or harm the health of sensitive individuals. Here too, the choice of materials and input factors will influence the emissions that are produced and the potential problems they create.

3.3.5 Circular economy

Besides production and materials, other aspects also have effects on the environmental impact. From a circular economy perspective, it is important to look at the design of the furniture in relation to the potential for reuse and replacement of parts, sorting the different materials for recycling at end-of-life, as well as quality and useful life. A longer useful life has direct positive effects on the environmental impact and protects society from exposure to adverse environmental conditions related to production of new furniture. Good quality furniture and fitments can be used for many years. Use of chemicals is a factor more indirectly related to the circular economy. For example, it is not appropriate to use or recycle materials that contain substances that are harmful to health or the environment.

3.3.6 What requirements can Nordic Ecolabelling make?

As explained above, Nordic Ecolabelling uses the term Relevance, Potential and Steerability (RPS) to assess what types of products to develop environmental criteria for and what specific requirements to impose. The possibility for Nordic Ecolabelling of imposing requirements for the different parameters that affect the environmental impact of an item of furniture/fitment varies. The potential and steerability for key areas as materials, energy and carbon, chemicals and circular economy are described below.

Materials

Forestry has a significant bearing on the environmental impacts of wood-based products, and it is important that the renewable raw materials are extracted in a sustainable way in order to reduce the environmental impacts resulting from the cultivation of the raw materials. On this field there is sustainable forestry certification schemes, such as FSC and PEFC with their Chain of Custody systems that Nordic Ecolabelling can lean on. However, it is more difficult to impose requirements for the extraction of raw materials for metal and plastic production, even if this life cycle stage is important to the environmental impact. For example, there are considerable environmental pressures tied to the extraction of bauxite for aluminium production. There are currently no good certification and traceability systems in place for mining. Other ways to reduce the impact of plastics and metals on the environment is to use recycled raw materials and this is where Nordic Ecolabelling can set requirements. Recycled raw materials can also be used in the wood industry to reduce negative environmental impacts.

Chemicals

Nordic Ecolabelling has good experience of setting requirements for chemicals in the production of materials and products. Nordic Ecolabelling generally focuses on restricting the use of chemicals that are harmful to health and the environment as much as possible. Our experience, both in this product group and in other relevant product groups, including floors, construction panels, chemical building products (adhesives, putties, exterior paints and similar products) and interior paints, lacquers and varnishes, shows that Nordic Ecolabelling can set requirements that prohibit and restrict a variety of harmful substances. Nordic Ecolabelling can also set requirements for emissions of substances that are harmful to health. This will mainly be related to the use phase of the furniture. For this, Nordic Ecolabelling can base requirements on standards for measurement of emissions and criteria for emissions.

Energy and carbon

It is difficult to set energy and carbon requirements for the actual production of many of the materials. In order to identify the best production processes, it is necessary to have a comprehensive database of primary data from the specific process, which Nordic Ecolabelling does not have for many materials at this time. This is particularly applicable to production of metal and plastic. Indirectly, energy and climate requirements can be set using recycled material. Nordic Ecolabelling imposes absolute requirements on energy consumption in the production of wood-based panels and paper-based panels, such as HPL. This has been made possible by the availability of data in connection with the development of criteria for construction panels. The criteria place several indirect environmental requirements, such as sustainable extraction of wood raw materials and a ban on the use of tree species which grow in areas that are important for countering climate change. Quality standards that guarantee long life and requirements for e.g. replacement parts are also indirect climate requirements.

Because the amount of energy used in the actual production of the furniture (composition of the product) is small compared with production of the constituent materials, Nordic Ecolabelling has chosen not to set requirements here as there is limited potential for making a difference. Transport also accounts for a small proportion of the energy used related to production of furniture, and it is therefore also less relevant to set requirements for this. Moreover, Nordic Ecolabelling has extremely limited means of controlling and influencing transport.

Circular economy

Circular economy has been one of the areas of focus in this revision. Good quality is important and can contribute to the long useful life of products. This is where Nordic Ecolabelling can set criteria for compliance with quality standards. In this context, it is important to point out that the term “useful life” is a relative concept. A UK study[106] shows that the typical useful life of office furniture in the UK is 9–12 years, but that the furniture is actually designed and produced for a much longer useful life. Although Nordic Ecolabelling is not able to influence consumer behaviour, it can promote a long lifespan for furniture by ensuring they have a good quality. Furthermore, requirements can be set for other circular

[106] Bartlett, 2009. "Reuse of office furniture – incorporation into the 'Quick Wins' criteria: A study of the market potential for reused and remanufactured office furniture in the UK".

processes, e.g. to promote design that allows for recycling and access to replacement parts, offering significant potential to reduce waste and extend the service life of furniture.

Nordic Ecolabelling knows of several projects and enterprises that work with various circular economy business models for the furniture industry. These include for instance renovation of old furniture and leasing of office furniture. In these criteria, Nordic Ecolabelling focuses on the product itself, while circular economy business models are service businesses. They are therefore not covered by these criteria. Under certain conditions, however, it is possible to use reused materials in a Nordic Swan Ecolabelled item of furniture. For example, it is not appropriate to recycle materials that contain substances that are harmful to health or the environment.

4 Changes compared to previous generation

Figure 1 Overview of changes to criteria for furniture and fitments generation 6 compared with previous generation 5.

Requirement generation 5	Requirement generation 6	Same requirement	Change	New requirement	Comments
O1 Product description and production process	O1	x			
O2 PVC and plastic packaging	O2		x		Ban on PVC in packaging + only use of recyclable plastic packaging has been added the requirement (from former req. O18 in gen. 5)
O3 Chemicals during transport	O3	x			
O4–O6 Quality requirements and surface resistance + functional properties mattresses	O4–O6		x		Several standards have been updated, and new test requirements-levels have been added to some furniture types
O7 Marketing			x		Removed from criteria – part of NSE general marketing requirements
O8–O15 Product – circular requirements	O7–O14	x			
O16–O17 Furniture with electric and electronic components	O15–O16				
O18 Packaging			x		Removed from criteria – PVC moved to req. O2
O19–O25 Chemicals	O17–O23	x			O20 Prohibited substances: PFAS added
O26–O28 Solid wood, bamboo and cork	O24–O26	x			
O29–O40 Wood based panels	O27–O38	x			O32 Prohibited substances: PFAS added list.

					O35 Emission, of formaldehyde: new loading factor alternative.
O41–O49 Paper	O39–O47	x			O46 Prohibited substances: PFAS added
O50–O61 Laminate	O48–O59	x			O52 Prohibited substances: PFAS added O54 Emission, of formaldehyde: new loading factor alternative.
O62–O70 Surface treatment of wood, wood-based panels and laminate	O60–O68	x			O64 Prohibited substances: PFAS added O68 Applied VOC: adjusted chamber volume
O71–O81 Metal	O69–O79	x			O73 Prohibited substances: PFAS added
O82–O98 Plastic, rubber and silicone	O80–O96	x			O87 Prohibited substances: PFAS added O92 Prohibited substances: PFAS added
O99–O135 Textile	O97–O133	x			
O136–O144 Padding materials	O134–O142	x			O139 Prohibited substances: PFAS added. O141 Emission: Added ISO 16000 series as a test alternative.
O145–O155 Leather and hide	O143–O153	x			O148 Prohibited substances: PFAS added
O156 Mineral raw materials used for sound absorption	O154	x			
O157–O159 Glass	O155–O157	x			
O160 Linoleum	O158	x			
O161–O162 Natural stone and agglomerated stone	O159–O160	x			
O163–O164 Other requirements	O161–O162	x			

5 Future criteria generation

As part of future evaluation of the criteria, it will be relevant to consider the following:

- Product definition - new types of furniture or fittings
- Raw materials used in furniture, both recycled- and virgin materials
- Use of chemicals
- Quality
- Design/design for re-use and overall recyclability