About Nordic Swan Ecolabelled

Outdoor furniture, playground and park equipment



Generation 5 • 28 October 2026 – 31 October 2031

Nordic Ecolabelling

Contents

1 Summary 4
1.1 Changes compared to previous generation 5
2 Justification of the product group definition 6
3 Requirements and justification of these 6
3.1 Description of the product and the production 6
3.2 Solid wood, wood-based panels, veneers and bamboo 6
3.3 Durability of solid wood 11
3.4 High Pressure Laminate (HPL) panels 12
3.4.1 Requirement where HPL panels are more than 10 w% of the finished product ..12
3.4.2 Requirement where HPL panels are more than 30 w% of the finished product ..14
3.5 Plastic and rubber 15
3.5.1 Requirement when plastic accounts for more than 10 w% of the product 18
3.6 Wood-plastic composite material (WPC) 23
3.7 Metal 25
3.8 Chemical requirements 27
3.8.1 General chemical requirements 27
3.8.2 Surface treatment of wood, wood-based panels and HPL panels 39
3.8.3 Surface treatment of metal 40
3.8.4 Surface treatment of plastic and rubber 42
3.9 Circular economy and functional requirements 43
3.10 Licence maintenance 47
4 Environmental impact of outdoor furniture, playground and park equipment ...48

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

This document may only be copied in its entirety and without any type of change.
It may be quoted from provided that Nordic Ecolabelling is stated as the source.

Finland

Ecolabelling Finland

https://joutsenmerkki.fi/

Norway

Ecolabelling Norway

www.svanemerket.no

Sweden

Ecolabelling Sweden

www.svanen.se

1 Summary

The Nordic Ecolabelling criteria for outdoor furniture, playground and park equipment have been revised to generation 5. Nordic Swan Ecolabelled outdoor furniture, playground and park equipment must comply with strict requirements aimed at reducing environmental and climate impacts throughout the entire life cycle – from raw material extraction and production to use, maintenance and end-of-life.

The criteria focus on sustainable use of resources by promoting a high share of renewable and recycled materials, particularly for wood, plastic and metal. Wood raw materials must be legal, traceable and primarily sourced from certified, sustainably managed forestry, while plastics and metals are required to contain high proportions of recycled or renewable materials where relevant. In this generation, the required minimum content of post-consumer recycled plastic has been increased, and a greater number of chemical substances in recycled plastic, must be tested for. To further reduce environmental impact, strict requirements are imposed on energy use in the production of key materials such as wood-based panels, HPL panels, metals and paper components.

Health and environmental protection are ensured through comprehensive chemical requirements. The criteria restrict the use of hazardous substances throughout the production chain and include bans on substances such as PFAS, halogenated flame retardants, heavy metals and other substances of concern. Requirements also cover emissions to the working environment and limit the use of volatile organic compounds (VOC) in surface treatment processes.

Long service life and circular economy principles are central to the criteria. Nordic Swan Ecolabelled outdoor furniture, playground and park equipment must be designed for durability, safety and reparability. This includes requirements for structural durability, minimum guarantee periods, availability of replacement parts and the ability to separate materials at end of life to facilitate recycling and material recovery.

In addition, the products must comply with relevant European safety, durability and performance standards for their intended area of use, including standards for outdoor furniture, playground equipment, outdoor fitness equipment, multi-sports equipment, climbing parks, outdoor grills and mobile waste bins.

For an overview of the changes in this revised generation 5, see the table in the next section 1.1.

1.1 Changes compared to previous generation

Table A. Overview of changes to criteria for outdoor furniture, playground and park equipment generation 5 compared with previous generation 4.

Req. gen. 5	Req. gen. 4	Same req.	Change	New req.	Comments
O1-O5	O1-O6	x			Editorial changes done. The requirement for formaldehyde emissions from wood-based panels (O5 in gen.4) is removed as the requirement level is at the same level as the new REACH legislation.
O6	O7		x		The requirement is harmonized with the requirements for 086 Biological durable wood for outdoor use. Most importantly, the requirements table has been structured the same way as in 086, with improved readability, and the required durability performance levels have been stated more clearly. Moreover, durability performance NTR B mod has been included in addition to NTR AB mod in Use Class 3 (UC3) for modified wood classified in accordance with NTR, in line with product group 086.
O7-O16	O8-O17	x			Editorial changes done.
O17	O18		x		Strengthened The requirement is made stricter for products with more than 30 w% content of plastic: -by increasing the requirement level for a minimum content of recycled plastics from 50 w% to 75 w%, where 20 w% of this must be post-consumer plastics (increased from 15 w% in gen. 4). An alternative possible way of fulfilling the requirement has also been added. The alternative is to ensure that at least 30 w% of the plastics in the product, is post-consumer recycled plastics.
O18	O19		x		Strengthened The requirement is made stricter by extending the list of prohibited chemicals in recycled plastic.
O19-O28	O20-O29	x			Editorial changes done to clarify and harmonize through the criteria triviality limits for small plastic and metal parts below 100 g.
O29	O30	x			Editorial changes in the text to clearly communicate exclusion of PFAS in the list for prohibited substances.
O30-O41	O31-O42	x			Requirement O43 Packaging in generation 4 is removed in generation 5.
O42-O45	O44-O47	x			Editorial changes done.
O46	O48		x		Test standards are included for outdoor multi-sports equipment, climbing parks, outdoor grills and mobile waste bins to be able to ecolabel these product types. The heading title is changed from "Safety" to "Safety and durability".
O47-O48	O49-O50	x			

2 Justification of the product group definition

Below is a short explanation of why Nordic Ecolabelling has chosen not to include the following materials/products/areas in this generation of the criteria.

- Concrete: Nordic Ecolabelling considers the greatest potential for environmental and climate improvements to lie in setting requirements concerning the materials used to manufacture the product. The use of energy and thus the climate impact from the production of outdoor furniture, playground or park equipment is very small in comparison with the figures for concrete as a material. Unfortunately, there is still little potential to set requirements that involve concrete with a low climate footprint.
- Safety surfacing and surfacing for playgrounds and sports facilities: The basic reason why the criteria do not include outdoor surfacing materials is that Nordic Ecolabelling has found it difficult to determine whether one surfacing option is environmentally better than any other option on the market.

3 Requirements and justification of these

The background to the requirements, the chosen requirement levels and the changes compared with generation 4 of the criteria, is explained in the background texts for the requirements.

Before and during the revision of the criteria, contact has been made with suppliers, manufacturers and other stakeholders to gather opinions, knowledge and experience.

3.1 Description of the product and the production

The outdoor furniture, playground and park equipment and their manufacturing process and the suppliers/production chain must be described to know which requirements apply for the product.

Background to O1 Description of the product

The requirement is important for correct processing of the licence application and assessment of which requirements must be met for the product to be Nordic Swan Ecolabelled.

3.2 Solid wood, wood-based panels, veneers and bamboo

This chapter covers requirements concerning solid wood, wood-based panels, veneers and bamboo. Sheets of high-pressure laminate (HPL) are not covered by this chapter but must instead meet the requirements in the section for High Pressure Laminate (HPL) panels.

The chemicals used/added must comply with the requirements in the section for Chemical requirements.

Small details such as wedges, spacers and so on are exempted from the requirements in this chapter.

Nordic Swan Ecolabelled products automatically meet the requirements. Only the manufacturer, licence number and product name must be stated.

Background to O2 Prohibited and restricted tree species

A number of tree species are restricted or not permitted for use in Nordic Swan Ecolabelled products. The list of prohibited species contains species on CITES list. The restricted tree species origin mostly from tropical forests and the reason for restriction is either that they are endangered, or they are key species in Intact Forest Landscape (IFL) areas. These species can be used in Ecolabelled products, if certain strict condition on origin, certification and traceability is met. The requirement applies only to virgin forest tree species.

Criteria for tree species found in the list are tree species listed on:

a) Tree species listed on CITES Appendices I, II and III.
b) IUCN red list, categorized as critically endangered (CR), endangered (EN) and vulnerable (VU).
c) Regnskogsfondet[1] (Rainforest Foundation Norway) tree list
d) Siberian larch (originated in forests outside the EU)

CITES is an international convention for the control of trade (across borders) of wild fauna and flora. CITES includes around 5600 animal species and around 28.000 plant species wherein a part is relevant timber tree species (mainly tropical species). The tree species is, dependent on how threatened they are, listed in Appendix I, II or III. Species listed in Appendix I, are highly endangered and trade with these species is totally banned. For the remaining tree species, special permits for import and export are required (Appendices II and III). CITES is regulated by EU legislation (Council Regulation (EC) No 338/97) and trees with valid CITES permits are considered to be legally harvested under EUTR (EU Timber Regulation). Nordic Swan Ecolabel's ban on the use of tree species listed in CITES (Appendix I, II or III) goes beyond the EU legislation. CITES regulates trade in endangered species, and there are also challenges with corruption in the trade in wild animals and plants.[2] Therefore, Nordic Ecolabelling does not want to approve species on any of the appendices.

IUCN Red Lists are the world's most comprehensive inventory of the global conservation status of the planet's biological species, including trees. IUCN Red List has established clear criteria to assess the risk of extinction among thousands of species and subspecies according to the origin of the tree species. These criteria cover all countries and all species in the world. Nordic Swan Ecolabelling is aware that the IUCN's red list system only focuses on the extinction risk of species and therefore is not designed for an overall assessment of whether a tree species can be provided with sustainable origin. However, the list is continually being updated and thereby is an important tool to estimate a specific tree

[1] https://www.regnskog.no/no/hva-du-kan-gjore/unnga-tropisk-tommer/tropiske-treslag (visited January 2020)
[2] Addressing corruption in CITES documentation processes Willow Outhwaite, Research and Analysis Senior Programme Officer, TRAFFIC, 2020: https://www.traffic.org/site/assets/files/12675/topic-brief-addressing-corruption-in-cites-documentation-processes.pdf

species' conservation status on a global scale. Nordic Swan Ecolabel wishes to prohibit tree species listed as endangered (categories CR, EN and VU).

Regnskogfondet (Rainforest Foundation Norway) is an NGO in Norway that works to protect the world's remaining rainforests. Currently, Regnskogsfondet does not see any credible certification schemes working in the tropics and therefore recommends full stop of buying tropical timber. Regnskogsfondet has developed a list of tropical tree species based on tree species found on the Norwegian market. This list works as a guide to comply with Norwegian guidelines regarding non-use of tropical wood in public construction. We consider this a pragmatic approach for handling tropical tree species on the Nordic market.

In addition, Siberian larch (originated in forests outside the EU) is on the tree list. Siberian larch is a coveted tree species in the construction industry due to its high quality. The tree species is widespread in the Eurasian northern boreal climate zone, and particularly the species Larix sibirica, Larix gmelinii, Larix cajanderi and Larix sukaczewii are widespread in the large areas of intact forest landscapes (IFL) in Russia. Siberian larch is to be seen as an indicator species for boreal IFL-areas which are important to keep intact.

Exemption from the tree list

Nordic Swan Ecolabelling is aware that tree species originating from b), c) or d) can originate from legal and sustainable forestry. Therefore, it is possible to use tree species listed on b), c) or d) if the applicant/manufacturer/supplier can demonstrate compliance with a number of strict requirements regarding certification and traceability.

Many of the tree species on the list are grown in countries which still have large areas of IFLs. These are important to protect due to biodiversity and climate. Many 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. There are different views on whether certification is good enough to meet the challenges of forest management in land with a high risk of corruption and illegal logging. For instance, relevant challenges related to this have been published by Danwatch in a number of articles in 2018[3,4] and by redd-monitor.org in 2019.[5] Greenpeace International has ended its memberships in FSC on the grounds that the certification body is no longer meeting its aims of protecting forests and human rights.[6] Other environmental organisations like WWF support certification as an important tool for sustainable forestry in these countries. However, due to the uncertainty whether FSC and PEFC certification systems are good enough in protecting important areas of biodiversity and ethical aspects like human rights and land ownership in areas with a high risk of corruption, Nordic Ecolabelling have a precautionary approach and wants further documentation about the tree species and its origin.

In order to document full traceability of the tree species, the applicant/manufacturer/supplier must present a valid FSC/PEFC Chain of Custody certificate that covers the specific tree

[3] https://danwatch.dk/undersoegelse/dokumentfalsk-og-millionboeder-danske-byggemarkeder-saelger-trae-forbundet-til-ulovlig-hugst-i-amazonas/
[4] https://danwatch.dk/undersoegelse/baeredygtighedsmaerke-er-ingen-garanti-for-baeredygtigt-trae/
[5] https://redd-monitor.org/2019/08/29/evicted-for-carbon-credits-new-oakland-institute-report-confirms-forced-evictions-for-green-resources-plantations-in-uganda/
[6] https://www.greenpeace.org/international/press-release/15589/greenpeace-international-to-not-renew-fsc-membership/

species and demonstrate that the tree is controlled as FSC or PEFC 100%, through the FSC transfer method or PEFC physical separation method. This means that Nordic Ecolabelling does not accept the FSC percentage or credit control system as well as PEFC percentage system. Full traceability of the tree species back to the forest/certified forest unit, enables the applicant/manufacturer/supplier to document that the tree species does not come from an area/region where it is IUCN red listed, categorized as CR, EN or VU. Full traceability also makes it possible to document that the tree species does not come from Intact Forest Landscape (IFL), defined by Intactforest.org in 2002.[7] Intact Forest has been monitoring IFL-areas since 2000 and has developed an online up to date mapping tool that shows the extent of IFL back to 2002. The monitoring results show that the world's IFL are being degraded in an alarming speed, and that is the reason for Nordic Ecolabelling referring to 2002.

Plantation: Nordic Ecolabelling believe that responsibly run forest plantations can play a role in preserving natural IFLs by reducing the pressure to harvest the world's remaining natural forests. In order to secure that plantation has not replaced native ecosystems (forest/grasslands) within the last 25 years, tree species must come from FSC or PEFC certified plantations that were established before 1994. 1994 is in line with FSCs international forest management standard (version 5.2), whereas PEFC is working with 2010.

Background to O3 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. 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, sustainably-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

[7] http://www.intactforests.org/world.webmap.html, visited January 2020

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.

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%.

Background to O4 Chemicals in wood-based panels containing 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 O5 Energy requirement - wood-based panels

In the last generation, the requirement was harmonised with the criteria for Nordic Swan Ecolabelled construction and facade panels. New requirement limits concerning energy consumption during the production of wood-based panels were introduced.

There is an absolute requirement for energy use without any weighting for certified and recycled raw materials and fuel sources.

The requirement level is expressed as consumed MJ/kg panels, and thus purely focuses on energy consumption in panel production, incl. manufacture of main raw materials, such as machining and drying of wood, adhesive production, and production of the raw materials in the adhesive. The system limit for the energy requirement for the wood-based panels also includes the production of main raw materials (without raw material extraction).

The reason for this is that for the wood-based panels, there is considered to be RPS (Relevance, Potential and Steerability) in having the energy requirement also include drying of the wood – both at the sawmill and by the panel manufacturer. It is estimated that the steerability is low compared to obtaining specific production data for both the adhesive manufacture and the raw materials in the adhesive. At the same time, it has not been possible to establish any potential in relation to energy efficient adhesive production. The requirement therefore provides an opportunity to use a table value for the adhesive of 15 MJ/kg adhesive.

This ensures that the adhesive is included in the energy calculation of the wood panel, which provides an incentive not to use more adhesive than necessary.

3.3 Durability of solid wood

This chapter relates to solid wood. Wood preservatives must meet the chemical requirements.

Background to O6 Durability and wood protection methods

The durability requirement has been slightly revised in this generation 5. The levels of biological durability performance have been harmonized with the Nordic Swan Ecolabel criteria for biological durable wood for outdoor use, and the durability class NTR B mod has been included for use class 3. NTB B mod is applicable for commodities coated with paint or other coating/protective covering applied prior to exposure in use. NTR B mod was missing in the last generation.

The aim of the requirement is to ensure that Nordic Swan Ecolabelled products with solid wood have good durability against moisture and biological attack, primarily by wood-decay fungi. Durability is closely linked to the lifespan of the products and important in the life cycle assessment.

Structural wood protection must always be considered. Structural wood protection means trying to prevent rot attacks as far as possible through the design of the structure itself. The aim is primarily to avoid sources of moisture traps that expose the wood to high moisture content for a prolonged period. Temporary dampness should dry quickly, and moisture levels should quickly return to normal.

Chemically modified wood and impregnated wood generally have the highest durability and can be used both above ground and in contact with ground. Thermal treatment of wood changes the construction properties and is not recommended for load-bearing structures. Thermally treated wood is not suitable for contact with ground.

In the production phase, thermal modification has significantly higher energy consumption compared with impregnated and chemically modified wood. Chemically modified wood commonly uses wood from e.g. Radiata pine, which grows in New Zealand and Chile, among other places. Thermally treated and traditionally impregnated wood is usually pine from the Nordic countries.

Pine from the Nordic countries requires some form of wood protection. Although impregnation with wood preservatives poses some environmental challenges, it is allowed to

a limited extent for those parts of the product that have a high risk of rot and are most critical for the product durability. Impregnation is allowed because good durability is achieved and the wood becomes maintenance-free or almost maintenance-free. Maintenance usually requires the use of chemical products, often with added biocides. At the same time, impregnation has relatively little leaching of wood preservatives to the environment.[8,9] Not all wood preservatives that are approved according to the legislation can be approved for Nordic Swan Ecolabelled outdoor furniture, playground and park equipment. Wood preservatives that are used must meet the chemical requirements.

3.4 High Pressure Laminate (HPL) panels

This chapter sets requirements on two levels, depending on whether the product contains more than 10 w% or more than 30 w% HPL panels.

Where the product contains more than 10 w% HPL, the chemical requirements must also be fulfilled for all the chemical products used in the manufacture of the HPL.

Nordic Swan Ecolabelled HPL panels automatically meet the requirements. In this case, only the manufacturer, licence number and product name must be stated.

3.4.1 Requirement where HPL panels are more than 10 w% of the finished product

Background to O7 Energy requirement for HPL panel production

The requirement remains unchanged from the previous generation 4.

A wide variation in energy consumption has been detected in panel production. The industry EPD[10] indicates an average variation of 50% among the 10 production systems covered by the EPD. This variation is mainly due to the material efficiency and energy efficiency of the HPL production system, and to different energy sources. At the same time, HPL production is a very homogeneous production type in terms of material composition.

The limited material variation stated in the industry EPD means that the variation in energy consumption in production is mainly due to energy efficiency in the actual panel production. The potential for energy improvements in panel production lies in reducing heat consumption by reusing process heat. Electricity and thermal energy are correlated in HPL production since, for example, a heat pump may use electricity but is capable of reducing heat consumption. A requirement has therefore been set for the total energy consumption, in order to permit flexible interaction between electricity and fuel consumption.

It is possible to make use of self-generated energy in HPL production, for example by collecting VOC emissions and later recovering the energy through combustion. Self-generated energy is not counted in the requirement but must be indicated when

[8] Kängsepp, K. et al. 2011. Leaching of commonly used impregnation agents affected by wood properties.
[9] Morsing et. al. 2010: "Comparison of laboratory and semi-field tests for the estimation of leaching rates from treated wood - part 1: above ground (UC 3). IRG/WP 10-50274.
[10] ICDLI – International Committee of the Decorative Laminates Industry, 2010.

documenting the requirement. The same applies to surplus energy from production which is sold to another user.

Background to O8 Emissions to the work environment from HPL production

In last generation 4 of the criteria, the test methods were updated, and the requirement reformulated for ease of comprehension. The requirement levels remained unchanged.

HPL panels consist of kraft paper and decor paper which are impregnated with phenolic and melamine resin. During the curing, drying and pressing process, methanol, formaldehyde and phenol evaporate from the laminate. These substances are harmful to health and the environment but can be cleaned from the exhaust air using a special incineration technique. It is therefore important to ensure that the emission level at the workplace is low and complies with the recommended limit values described by the Nordic authorities.

The limit value is the average concentration in the air which can be inhaled at the workplace during an eight-hour working day but also includes short-term values. Short-term value means that even if the time-weighted average concentration does not exceed the limit value, the concentration in a time period of maximum 15 minutes must never exceed the limit value by a factor of 2.

In Denmark, the limit value for formaldehyde is also a maximum value and must therefore never be exceeded at any time.[11]

In the Nordic region, there are national emission values for both phenol and formaldehyde. These are either mandatory or, in some countries, advisory, but they may be made mandatory by official order. A limit value for phenol has also been defined in Commission Directive 2009/161/EU. However, this is not necessarily mandatory in all EU countries, and the requirement has therefore been laid down for all manufacture outside the Nordic region to ensure that the level in the EU Directives is satisfied as a minimum for phenol, and that the least stringent level from the Nordic authorities is complied with. The level chosen for the short-term value for formaldehyde, however, is the least stringent level for the Nordic countries that have a short-term level requirement.

Test methods must be in accordance with EN 689, EN 482 or equivalent method. The measurement is to be performed as an exposure measurement, for assessment of the individual employee’s exposure to pollution. When taking these measurements, the sampling must:

- take place in the employee’s inhalation zone
- take place under normal operational conditions, with normal ventilation, and include the stages in the various working processes that are particularly stressful
- be long enough to provide a representative average
- during planning, involve identifying any concentration variations that may occur during a working day/working process.

[11] Arbejdstilsynets bekendtgørelse nr. 655 - 31. maj 2018 "Bilag 2 - Grænseværdier for luftforureninger m.v." https://amid.dk/regler/bekendtgoerelser/graensevaerdier-stoffer-materialer-655/bilag-2/

3.4.2 Requirement where HPL panels are more than 30 w% of the finished product

The requirements below relate only to kraft paper. Decor paper and any balance paper is exempt from the requirements.

Calculation sheet made by Nordic Ecolabelling may be used to calculate energy.

Background to O9 Wood in paper

The requirement was updated in the last generation 4 to include the new forestry requirements made by Nordic Ecolabelling. Introduced in 2015, these include the requirement that a certain amount of wood must be certified, and that certain tree species must not be used in Nordic Swan Ecolabelled products.

Paper, paperboard and pulp are used in HPL panels. It is therefore judged that paper, paperboard and pulp have high environmental relevance for this product group. The environmental relevance is associated with ensuring sustainable cultivation of wood raw materials and with the possibility of using recycled fibre in paper, paperboard and pulp, thus reducing the use of virgin wood fibre. Even though wood fibre is a renewable raw material, it is important to ensure that virgin wood raw material comes from sustainably managed forests, in order to protect forest resources, biodiversity and socio-economic functions, etc. See more under requirement O2 and O3.

Background to O10 COD emissions from paper and pulp production

The requirement remains unchanged from the previous generation. The requirement levels are based on the Best Available Techniques (BAT) Reference Document (BREF) for the Production of Pulp, Paper and Board, as published in 2014, which is the latest edition. Decor paper is exempt since it constitutes a minor part of the board.

The requirement applies to HPL panels that include paperboard or paper. The requirement levels are differentiated, depending on the type of paper or pulp involved, as this ensures greater steerability.

All pulp and paper production generates emissions to water in the form of oxygen-consuming substances (COD). Emissions to water comprise organic material from logs, bark and fibre, along with residues of cooking, bleaching and paper chemicals. The organic substances react with microorganisms as they consume oxygen. In aquatic environments, this can lead to low oxygen availability, and in some cases severely oxygen-poor environments.

Background to O11 Energy requirement for paper and pulp production

The energy requirement in generation 5 is based on Nordic Ecolabelling’s Basic Module for paper products. The requirement was updated in the last generation 4 based on these principles and includes stricter reference values, as well as changes to the calculation of energy points and so total energy points.

In panels where the paper fraction forms a high proportion of the material composition, the paper makes a significant contribution to the panel’s total energy impact. Relevance has therefore been identified for an energy requirement for both pulp and paper production for

paper types present in the panel at more than 30 w%. The energy requirement for paper has been taken from Nordic Ecolabelling's Basic Module for paper products and requires specific data and calculations from the paper manufacturer. Due to the high level of documentation, it has therefore been assessed that the requirement should only come into force for paper proportions above 30 w%. This has been supplemented with a reference value for production of kraft paper in order to adapt the requirement to this product group. Appendix 5 gives a detailed description of the energy calculation.

For HPL panels, around 50-60% kraft paper and 2-15% decor paper is often used.

The principle behind the energy requirement in the Basic Module for paper products is that manufacturers of different pulp and paper types calculate specific values for both the electricity consumption and the fuel used in their production. This is done by totalling the energy consumption for the different subsidiary processes.

The applicable reference values for pulps are based on the values in the Basic Module for paper products, which in turn are based on BAT values from the BREF document. The proposed limit values in this generation are based on Nordic Ecolabelling's own licence data, public data and papers used in Nordic Swan Ecolabelled printing companies. They have then been adjusted to make them better tailored to this product group.

Along with comparison with the reference value, energy use is steered via a points limit. This limit score defines how much the paper's total energy consumption can exceed the optimum ratio. The points limit in generation 3 required that the average total energy consumption of the paper must be no more than 25% higher than when the energy use is at the level of the reference value. The new points limit of 2.5 still means that the score model allows for higher energy consumption in order to give the paper manufacturer flexibility.

3.5 Plastic and rubber

The requirements in this chapter must be fulfilled for the parts of the product that comprise plastic and/or rubber. Small plastic parts such as screws, nails and so on that weigh less than 100 g are not subject to the requirements below. For requirements concerning ingoing substances used as additives in plastic and rubber or for surface treatment, see chemical requirements.

The requirements in this section (O12–O18) do not apply to plastic in wood-plastic composite (WPC) materials. Instead, the requirements in section for WPC must be fulfilled.

Background to O12 Information and labelling

The aim of the labelling is to ensure efficient sorting of the plastic after use and thus increase recycling of plastics. Manual sorting is in many cases replaced by near-infrared sorting (NIR) or sorting based on the plastic's density in flow processes. In cases where manual sorting is still used, labelling will make the sorting process easier. Since manual sorting mainly sorts out large parts, the limit for labelling has been raised from 50 to 100 g.

ISO 11469 is a system for the uniform labelling of plastic products, with plastics generically identified using the symbols and terms in ISO 1043.

Background to O13 Chlorinated plastic

The requirement has been updated and expanded to also include PVDC.

A number of factors feed into the environmental aspect of the requirement, including the chlorine content of the actual PVC molecule, additives that are harmful to health and the environment, and the manufacturing process used. PVC manufacture using the mercury method continues to generate a certain level of mercury emissions to water and air. Many manufacturers balance out too much and too little dichloroethane and vinyl chloride monomers between different manufacturing sites. It is therefore difficult for them to maintain full traceability and guarantee that they do not supply plastic containing PVC and/or PVDC.

Background to O14 Raw materials for bio-based polymers

The requirement was new in the last generation 4 of criteria.

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.[12] On the basis of this, palm oil, soybean oil and soy flour are banned as raw materials for bio-based polymers.

The most ideal is to use waste or residual products from i.e., agriculture, fishing, forestry or processing residual product defined in accordance with (EU) Renewable Energy Directive 2018/2001. By using waste or residual products as raw materials, you use parts that are not used as food. PFAD (Palm Fatty Acid Distillate) from palm oil is not considered a waste or residual product and may 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.

There are requirements for traceability, which shows where the waste or residual products comes from. In EU Directive 2018/2001/EC, “the point of collection” is described as the point where waste or residual product occurs for the first time (i.e., for used cooking oil, the starting point will be the restaurants or production sites that produce the fried food). The traceability of this requirement must start at the point where waste or residual product occurs for the first time.

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 i.e., 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.

[12] http://www.worldwildlife.org/industries/soy, (27.01.2016)

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. Primary raw materials incl. sugar cane 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.

Background O15 Nitrosamines in rubber

The requirement is unchanged in this generation 5. In generation 3, the requirement was 0.01 mg/kg rubber for nitrosamines and 0.1 mg/kg vulcanized 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 the mouth. The requirement level was lowered in generation 4 so that the requirement limits are now equivalent to the EU Toys Directive and the safety standard EN 71-12 for toys for children over the age of three. This level is still seen as strict, but more appropriate for the products in these criteria.

Nitrosamines are suspected of being carcinogenic. Nitrosamines are a by-product formed during the production of rubber. Nordic Ecolabelling wishes to apply the precautionary principle and so sets a requirement limiting the level of nitrosamines in rubber in Nordic Swan Ecolabelled outdoor furniture, playground and park equipment.

Background to O16 PAH in plastic, silicone and rubber

The requirement was introduced in the last generation. It is unchanged in this generation 5.

Several of the PAHs are carcinogenic and classed as Carc.1B. PAHs can be found in plastic and rubber parts in a wide range of consumer products. They are present as impurities in some of the raw materials used to produce such products, namely in plasticising oils and in carbon black. The substances are not intentionally added to the products in question, and they have no specific function as ingoing ingredients of the plastic or rubber parts.

There is a REACH restriction (1272/2013 of 6 December 2013) that applies to products including toys and other items for young children, and this covers the eight PAHs. REACH prohibits the existence of one or more of the eight PAHs in concentrations above 0.5 mg/kg in plastic or rubber parts that a child might come into contact with. Outdoor playground

equipment does not appear to be covered. The requirement in these criteria has the same limit value of 0.5 mg/kg for each of the REACH PAHs, but this requirement also asks for the submission of a test report documenting compliance with the limit level.

3.5.1 Requirement when plastic accounts for more than 10 w% of the product

If the total sum of plastic parts exceeds 10 w% of the product, the following requirement must be fulfilled for the plastic parts.

Background to O17 Recycled and biobased plastics

The requirement is unchanged in this generation 5 for products consisting of more than 10 w% of plastic. For these products, 50 w% of the plastic in the product must be recycled. Alternatively, at least 50 w% of the plastic in the product must be bio-based.

The requirement is made stricter in this generation for products consisting of more than 30 w% of plastic. The required level for content of post-consumer commercially recycled plastic, has been increased. This is done by two alternatives.
Alternative 1 is by increasing the limit from at least 50 w% recycled plastic in the product in last generation to at least 75 w% recycled plastic where 20 w% of this plastic must be post-consumer plastic. This limit for post-consumer recycled plastic is increased from 15 w% in last generation 4 and will result in a total content of 15 w% post-consumer recycled plastic in the product. In the last generation the limit level for post-consumer recycled plastic in the product was 7,5 w%.
The alternative 2 is to ensure that at least 30 w% of the plastic in the product is recycled but that 100% of this is post-consumer recycled plastic. Due to the higher content of post-consumer recycled plastic, alternative 2 is a better environmental option than alternative 1.

The change of limit levels for recycled plastic is based on information from producers of plastic and of outdoor furniture, playground and park equipment.[13] The definition of pre-consumer/commercial and post-consumer/commercial is given in Table 1.

Pre-consumer commercially recycled plastic is allowed here as outdoor furniture, playground and park equipment most often require high-quality plastic in order to have a long service life, which is an important environmental parameter. The quality of the collected household plastic (post-consumer plastic) is often not good enough as it is often too impure in terms of polymer composition. The Nordic suppliers of recycled plastic granules therefore work mainly with pre-consumer/commercially recycled plastic. By allowing pre-consumer/commercial recycled plastic, furniture manufacturers and their suppliers will be open to using plastic fractions other than virgin plastic. If Nordic Ecolabelling can get more manufacturers to work with recycled plastic and make good experiences with this, it is seen as a positive effect even if it is pre-consumer plastic.

As an alternative to recycled plastic, at least 75 w% of the plastic in the product must be bio-based.

[13] "Questionnaire to producers of outdoor furniture, playground and park equipment", Nordic Ecolabelling, February, 2026

With this requirement, Nordic Ecolabelling wants to stimulate circular material choices by using recycled and bio-based materials.

Background to O18 Chemical substances in recycled plastic

The requirement has been updated in this generation 5 with more chemical substances, new maximum limits and new test methods.

It is important to consider the potential exposure to unwanted chemicals from recycled plastics. Recycled plastic may contain residues of harmful additives from previous use or from contamination. It is not possible to test for all possible harmful substances, but the most relevant and important are selected here. These substances do not constitute an exhaustive list of substances that ensure compliance with legislation and safety. The substances to be tested have been chosen based on their proven presence in recycled plastics and toxicological profiles.[14,15,16] But other harmful substances can be found in recycled plastics, and it is always the applicant's responsibility that legislation and safety are met. The requirement has been made with the assistance of external experts.

In mechanical recycling processes, many chemical substances remain in the material and can be transferred to the new products.[17] However, the sources, the sorting and the treatment (e.g. washing) of the plastic will affect the presence of harmful substances in the recycled plastic.

Either the plastic parts of the product that contain recycled plastic or the recycled plastic raw material (granules) must be tested for the substances. Testing of the recycled plastic raw material is worst case regarding concentration of harmful substances compared to testing the plastic parts of the product because of a larger surface of the plastic raw material (granules). If the plastic parts of the product are tested then this must be done before any surface treatments, because the surface treatment may affect the tests. If the product contains several plastic parts with the same amount of recycled plastic from the same batch of recycled plastic raw material, then only one plastic part needs to be tested.

Recycled material from PET bottles originally approved for contact with food can also contain small amounts of unwanted substances such as heavy metals that originate from labels, glues, printing inks and waste from transporting and sorting the plastic. However, measurements have shown that the levels are well below the limits set for heavy metals in packaging materials in Regulation (EU) 2025/40 on Packaging and Packaging Waste,[18] which is below 100 ppm for the sum of lead, cadmium, mercury and chromium VI.

The use of recycled plastic raw material resulting from reprocessing processes that have obtained an approval pursuant to Commission Regulation (EC) No 282/2008[19] or to the

[14] Harmful substances in recycled plastics. Danish Technological Institute 2025. On request from Nordic Ecolabelling.
[15] Udvikling af plastemballager i en cirkulær økonomi - Rette kvalitet til rette anvendelse. Ministry of Environment of Denmark 2024.
[16] Problematic chemicals in recycled plastic intented for cosmetics packaging. Ministry of Environment of Denmark 2023.
[17] Nordisk Ministerråd (2016). Få fordele ved kasserede tekstiler: LCA for forskellige behandlingsveje.
[18] M. Whitt, Survey of heavy metal contamination in recycled polyethylene terephthalate used for food packaging, Journal of Plastic Film & Sheeting 2012.
[19] Commission Regulation (EC) No 282/2008 on recycled plastics materials and articles intended for food contact

Code of Federal Regulations[20]: Food and Drugs is prohibited. These are both approvals for the material to be used for food contact. Plastic materials approved for food packaging require the highest traceability and purity of the plastic raw material, and it will therefore be down cycling to use this plastic for anything other than food contact products.

Testing and fulfilment of the requirement must be documented at the time of application and at a minimum, if any changes occur in the supplier of recycled plastic, sources of recycled plastic or recycling processes (e.g. washing or sorting). To ensure ongoing compliance with the requirement the applicant must have a procedure implemented in the company, which shall include a description of when new tests are assessed as necessary.

Metals

The metals are found relatively often in post-consumer recycled plastic (PCR plastic).[21]

Nordic Ecolabelling restricts metals of concern because they are toxic to humans and other organisms on land and in aquatic environments and may accumulate in living systems.[22] Chromium in particular hexavalent chromium, arsenic, cadmium, mercury and lead have the greatest potential to cause harm on account of their extensive use, their toxicity in certain forms and their widespread distribution in the environment. Antimony is used as a catalyst in the manufacture of PET.

The limits apply to the bioavailable soluble fraction rather than to total elemental content bound in inert minerals. Metals that are tightly bound in an insoluble crystal lattice do not dissolve or migrate under foreseeable use and therefore do not drive exposure. Testing uses acid extraction, preferably using artificial sweat (to mimic skin contact) or an equivalent method.

Phthalates

Phthalates were found in post-consumer recycled plastic (PCR plastic) tested by the Ministry of Environment of Denmark.[23,24]

Phthalates are included in Regulation (EC) No 1907/2006 (REACH) Annex XIV, Annex XVII and the candidate list.[25] The limit individually or in any combination of the phthalates listen in one or more of these lists is set to no more than 0.1 % by weight of the material.

[20] Code of Federal Regulations Title 21: Food and Drugs, Part 177 - Indirect food additives: Polymers.
[21] Indledende sikkerhedsvurdering af genanvendt plast til emballering af kosmetiske produkter. Ministry of Environment of Denmark 2021.
[22] Government official investigations:
https://www.regeringen.se/contentassets/c0f10a5d57534a48b9b8641aba971a1e/bilagorna-6-9/
[23] Indledende sikkerhedsvurdering af genanvendt plast til emballering af kosmetiske produkter. Ministry of Environment of Denmark 2021.
[24] Udvikling af plastemballager i en cirkulær økonomi - Rette kvalitet til rette anvendelse. Ministry of Environment of Denmark 2024.
[25] https://chem.echa.europa.eu/

Polycyclic aromatic hydrocarbons (PAHs)

Several PAHs were found in post-consumer recycled plastic (PCR plastic) tested by the Ministry of Environment of Denmark.[26]

REACH Annex XVII to Regulation (EC) No 1907/2006, entry 50[27] on the restriction of polycyclic aromatic hydrocarbons (PAHs), articles (except toys and childcare articles) must not contain more than 1 mg/kg of any of the listed PAHs for rubber or plastic components that come into direct as well as prolonged or short-term repetitive contact with the human skin or the oral cavity.

Bisphenols

Bisphenols can be found in recycled plastic.[28]

The bisphenols A, B, S, AF and F are selected based on recommendation from Guideline from CosPaTox.[29] The limits set for bisphenol A, B, S, AF and F are the same as in OEKO-TEX Standard 100.[30]

The substances are also covered by a restriction proposal under REACH, but this is at a very early stage and did not provide additional information at the time of drafting the requirements.

Phenolic byproducts

Phenolic byproducts can be found in recycled plastic.[31] One of the substances found was benzophenone (CAS No. 119-61-9) which is classified as Carc. 1B.

The limit set for benzophenone is the same as carcinogenic primary aromatic amines released from azo dyes in textiles. These are limited in REACH Annex XVII to Regulation (EC) No 1907/2006, Entry 43[32] to 30 mg/kg.

[26] Indledende sikkerhedsvurdering af genanvendt plast til emballering af kosmetiske produkter. Ministry of Environment of Denmark 2021.
[27] 4f099937-658f-8b86-2f62-5e767fab4d6e
[28] Samuel S. Núñez, Núria Ortuño, Sabrina Fernández-Durán, Julia Moltó and Juan A. Conesa , Analysis and removal of bisphenols in recycled plastics using polyethylene glycol, Nature 2024, Analysis and removal of bisphenols in recycled plastics using polyethylene glycol (nature.com)
[29] Voluntary Industry Guideline - Safety assessment of recycled plastics in packaging materials for cosmetic products and home care products, CosPaTox 2024, CosPaTox-Guideline-April-2024.pdf
[30] OEKO-TEX® STANDARD 100
[31] Indledende sikkerhedsvurdering af genanvendt plast til emballering af kosmetiske produkter, Miljøprojekt nr. 2174, July 2021, Rapport
[32] Liste over begrænsninger - ECHA (europa.eu)

Flame retardants

Flame retardants can be found in recycled plastic.[33] Especially brominated flame retardants such as polybrominated diphenyl ethers (PBDEs), tetrabromo-bisphenol A (TBBPA), hexabromocyclododecane (HBCD), and polybrominated biphenyls (PBBs).[34]

The limit set of a total of 50 mg/kg for flame retardants is the same as in OEKO-TEX Standard 100[35], however only for the total amount and not each flame retardants, and in addition only for brominated as these are assessed as most relevant.

Note that some substances in this group such as DecaBDE, PentaBDEs and OctaBDEs may have lower individual limits set out in the POP-Regulation or in a REACH restriction.

PFAS (Per- and polyfluoroalkyl substances)

Based on the report “PFAS i nye og eksisterende byggematerialer ved renovering”[36], Nordic Ecolabelling has concluded to require a TF (Total Fluorine) -test for screening of PFAS in recycled plastic as this test is a broad-spectrum detection and captures both known and unknown PFAS. The TF-test is also cost-effective (less expensive than target analysis for large-scale screening of PFASs). The disadvantages with the TF-test are:

- Only gives an indication of PFAS, as organic non-PFAS compounds are also included.
- Cannot distinguish between different PFAS compounds.
- High detection limit of 10 mg/kg (10 ppm) compared to several investigation results that have detected PFAS in the range of µg/kg.

The TF-test must be done according to EN 14582 Combustion Ion Chromatography (CIC) or similar method.

The chosen limit of 50 mg/kg is identical to:

- The limit in the proposed REACH restriction.[37]
- The limit in the PPWR (Regulation (EU) 2025/40)
- The Toy Safety Regulation (Regulation (EU) 2025/2509)
- OEKO-TEX Standard 100.[38]

Note that some substances in this group may have lower individual limits set out in the POP-Regulation or in a REACH restriction.

[33] CosPaTox-Guideline-April-2024.pdf
[34] Harmful substances in recycled plastics. Danish Technological Institute 2025. On request from Nordic Ecolabelling.
[35] OEKO-TEX® STANDARD 100
[36] ”PFAS i nye og eksisterende byggematerialer ved renovering-Teknisk rapport–analyse af byggematerialer”, Teknologisk institutt, September 2025
[37] https://chem.echa.europa.eu/100.308.021/activities/restrictionProcess/90261f0ec4fde13102704a507698a6e6
[38] OEKO-TEX® STANDARD 100

3.6 Wood-plastic composite material (WPC)

Background to O19 Wood fibre and plastic

Wood-plastic composite (WPC) is a new material that has been added to these criteria.

Wood-plastic composite (WPC) is material that combines a plastic matrix with a plant-based filler and has properties that differ from those of the individual materials. The plant material is usually woodmeal, but may also be hemp or flax, for example. The plastic is almost always one of the olefins, polyethylene or polypropylene, or a blend of these. The wood fibre component accounts for a very small part of the environmental impact. What is used is cutter shavings, which is a by-product of planning processes in sawmills.

For the environmental impact of the composite material, the plastic component is crucial. In general, the plastic raw material can be recycled or newly produced. If the plastic raw material is recycled, energy use and climate impact are reduced. But it also has great significance if the recycled raw material is post-consumer or just pre-consumer.

There are different views on whether the WPC has a place in the circular economy or not. WPC can be considered a dead end because plastic and wood are mixed and cannot be separated in the waste phase. WPC can be recycled into a new WPC, but since WPC can be made of many different types of polymeric materials, it requires that the individual product made in WPC returns to the specific manufacturer of that type of WPC, which is not immediately logistically possible to solve. It can therefore be seen as a step in the wrong direction to include a new material such as WPC in the criteria for outdoor furniture.

On the other hand, WPC provides the opportunity to use recycled post-consumer plastic that has been collected from households and that is difficult to find outlets for today.

There are differences in outlet for recycled plastic raw materials depending on whether the source is collected consumer packaging (i.e., post-consumer plastic) or plastic from businesses (trade, industry and agriculture). The latter fraction is called post-commercial or post-industrial. In order for it to be relevant for the Nordic Ecolabel to label a composite material that cannot be separated into its original materials at end-of-life, there is a requirement that the majority (60%) of the plastic used is post-consumer plastic from household-collected plastic i.e., not post-commercial which is usually of higher quality and thus easier to recycle as a plastic product.

The requirement hereby distinguishes between whether the recycled plastic is "pre-" or "post-" and also whether it is "consumer" or "commercial" and is thus specified to a greater extent than in the ISO standard 140221, see in Table 1.

Background to O20 Recycled plastic

The source of the plastic has a major impact on how clean and free from impurities it is. In Nordic Swan Ecolabelled WPC, the plastic must be consumer packaging, packaging from industry/business or plastic wrap. All these plastic products/materials have a short service life, no harmful additives and are therefore well-suited to recycling. They are also covered by the EU Directive on Packaging and Packaging Waste[39] which restricts the content of heavy

[39] Directive 94/62/EC of the European Parliament and of the Council of 20 December 1994 on Packaging and Packaging Waste

metals. In addition, some of it is food packaging, which is subject to its own specific restrictions regarding a number of health and environment harmful substances.[40]

Plastic collected for mechanical recycling must be separated from other materials such as metal and cardboard. There is also a requirement for the plastic material to be separated into different types of plastic (PET, PE, PP, etc.). Further sorting may involve the material being sorted according to colour. A common sorting and separation process in plastic recycling operates as follows:

Near-infrared technology (NIR) and jets of air are used to sort the collected plastic material. Sometimes this step is supplemented with manual sorting. The material is then washed, and further separation takes place in a sink and flow bath. This separation stage makes use of the different densities of different kinds of plastic. Heavier plastic such as ABS, polystyrene and PVC will sink. On the other hand, light types of plastic such as PP, LDPE and HDPE, whose density is lower than water, will float on the surface. Finally, the assorted plastics are shredded into flakes. Sometimes the flakes are melted and passed through a melt filter to form strings, which are then cut into pellets. The melt filter captures plastics with a higher melting point (i.e., PVC) than the material that is meant to pass through.

Nordic Ecolabelling's minimum requirement is for incoming plastic to go through two rounds of NIR sorting and for sink and flow to be used as a separation technique.

Background to O21 Additives

During manufacture, it is common for bonding agents (resins and adhesives) to be sprayed into the structure to bind together the plastic and wood fibre. In addition to these, pigments and UV stabilisers are also added. All the chemicals added during the manufacture of WPC must meet the chemical requirements.

Background to O22 Quality

The requirement was new in last generation 4.

EN 15534-1 deals with test methods for WPC for characterization of compositions and products. The standard describes test methods for i.e., dimension of products and mechanical properties (impact resistance, extreme temperatures, flexibility). Section 8 deals with Durability with several subsections, i.e., 8.5 resistance against biological agents, where i.e., test methods for resistance against attack by fungi are described.

Standard EN 15534-1 is relevant for products or parts that contain WPC regarding durability and overall quality. Requirement O43 also contains guarantee time requirements for parts of WPC.

Background to O23 Other requirements for WPC

These requirements were introduced in the last generation 4 of the criteria. The justification for the requirements was that the material must be resource-efficient and be designed for future material recovery.

[40] Greater plastic recycling potential for selected product groups. Based on economics, supply, climate effect and presence of harmful substances. Report 6844, Swedish Environmental Protection Agency, September 2018.

Since the products have a long service life but have not been on the market for very long, there has been no take-back of end-of-life products on any great scale. Some manufacturers take back returns and incorrect orders and grind the material down to create raw material for the production of new WPC. Theoretically, WPC material can be ground down and made into new planks 4-5 times over. Labelling products with their origin facilitate future recycling.

3.7 Metal

Production requirements for steel and aluminium apply if the metals are included in the product with more than respectively 30 w% and 10 w%. Small metal parts such as screws, nails and so on that weigh less than 100 g are not subject to the requirements below.

Background to O24 Metals that must not be used

The requirement was new in the last generation 4.

The requirement is made as these metals can be harmful to the environment, health and/or create problems in the recycling of steel.[41] Therefore, these metals must not be used as materials in outdoor furniture, playground and park equipment.

Metal alloys i.e., copper alloys, are used in stainless steel and are permitted in the requirement.

Impurities are also permitted as defined in Table 1.

Background to O25 Production of steel

The requirement was changed in the last generation 4 by 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 w% of metal in the product in the previous generation and from the limit in the consultation document where it was 30 w% of metal. Now the limits for when the requirements are to be met are 30 w% for steel and 10 w% 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 in the production chain is also a value, and is important for several aspects i.e., it provides opportunities to select suppliers based on i.e., 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. 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

[41] EU-27 Steel Scrap Specification, May 2007: https://www.euric-aisbl.eu/facts-figures/standards-specifications
[42] Taxonomy report, technical annex, EU technical expert group on sustainable finance, March 2020.

Circal with a production capacity of 25,000 tonnes. The industry average for EU-produced Al is approx. 50% recycled, while for Al outside the EU it is approx. 40%.

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 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.[43]

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.[44] According to the World Steel Association[45] 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.

Background to O26 Production of aluminium

See under requirement O25.

[43] 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
[44] http://www.eurofer.org/About%20us/About%20Steel/EuropeanSteelMap.fhtml
[45] https://www.worldsteel.org/en/dam/jcr:96d7a585-e6b2-4d63-b943-4cd9ab621a91/World%2520Steel%2520in%2520Figures%25202019.pdf

3.8 Chemical requirements

The requirements apply to all chemical products added to the product or material (e.g. in wood-based panels, HPL and WPC). The requirements apply whether the chemical use occurs in the licensee’s own production/assembly process or is accounted for by suppliers.

The requirements apply to chemical products such as adhesives, varnishes, wood preservatives, surface coatings, maintenance products, primers, oils, binders, and other similar products.

The requirements do not cover process or auxiliary chemicals such as lubricant oils and cleaning agents.

Metal plating does not need to meet requirements O27–O32. Instead, it must meet requirement O36.

Plastic and rubber: additives in plastic i.e., pigments, stabilizers, plasticizers and UV hardeners must meet requirements O28 and O29. Surface treatment of plastic and rubber must meet requirements O27-O32 and O39-O41. The requirements do not apply to chemicals and substances used in the production of polymers i.e., monomers.

In addition to the general chemical requirements, chemicals for surface treatment of wood, wood-base panels, HPL, metal, plastic and rubber must comply with additional sections.

Nordic Swan Ecolabelled products and products that carry the EU Ecolabel automatically meet the requirements in this chapter. Only the manufacturer, licence number and product name must be stated. In the case of EU Ecolabelled products, however, documentation must be submitted for requirement O32 concerning nanomaterial.

3.8.1 General chemical requirements

The requirements cover all chemical products that are added to materials (e.g.in wood-based panels, HPL and WPC) that make up more than 5 w% of the product or are used in the manufacture, final assembly or surface treatment of the product. The requirements apply regardless of whether the use of chemicals takes place in the company's own production/assembly or with subcontractors.

Background to O27 Classification of chemical products

Nordic Ecolabelling seeks to ensure that the health and environmental impact of the products is as low as possible. Therefore, requirements are made for the prohibition of specific classifications of the products.

In this generation of the criteria, the requirement has been updated in line with the CLP Regulation 1272/2008, and the section has been expanded to include more chemical products, for example additives in plastic. The wording has also been reformulated, in part to make the exemptions clearer.

The exemption for adhesive products in wood-based panels has been changed from exempting all isocyanates to only exempting methylene diphenyl diisocyanate (MDI).

Preservatives are exempted because they provide effective resistance to fungal growth and thus extend the service life of wood.

The classification H420 (Hazardous to the ozone layer, harms public health) has been added to the requirement.

The classification H334 (Respiratory sensitization) has been added to the requirement but only applies to surface treatment products.

Brief background on adhesives

Outdoor furniture and playground equipment manufacturers use adhesives for various purposes. It may be in building panels or glulam, for lamination or to glue product components together. There are thus also various types of adhesives in use.

This requirement contains an exemption for formaldehyde, which is primarily used in adhesives for wood-based panels and HPL panels. Formaldehyde content is instead dealt with in requirement O8. To ensure that these adhesives do not cause problematic formaldehyde emissions, tough emission requirements have been applied to the finished panel or the production process. Formaldehyde is also subject to requirement O31.

Phenol in resins

Resins for HPL production may contain slightly higher concentrations of phenol, formaldehyde and methanol. These substances are necessary to cure the HPL panels but requirement O8 in the criteria ensures that emissions of formaldehyde and phenol are minimal in the finished panel. Phenol (CAS: 108-95-2) has the classification Muta. 2 H341 and H373; H301/311/314/331. Muta. 2 H341 applies when phenol makes up ≥ 1 w% of the product. Phenol can account for up to 10 w% of resins for HBO production, thus triggering the classification Muta. 2 H341. For HPL products, it is therefore necessary to exempt phenol-containing resins from the ban on products classified as Muta. 2 H341.

Methylene diphenyl diisocyanate (MDI)

Adhesives for wood-based panels often use methylene diphenyl diisocyanate (MDI), but also toluene 2,4-diisocyanate (TDI), which is more volatile than MDI, making exposure more likely. In addition, TDI has greater toxicity on inhalation (H330) and is classified as H351 (May cause cancer) and H412 (environmental hazard: harmful to aquatic life with long-lasting effects).[46] MDI is not classified as an environmental hazard. The memo “Strategy for risk management of certain isocyanates (MDI and TDI)” from the Danish Environmental Protection Agency in 2014 gives substitution of volatile TDI with less volatile MDI as an alternative.

It is therefore necessary to make an exception for the ban on the classification H351, since this classification is triggered if the chemical product exceeds the concentration limit of ≥ 1 w%. The use of adhesive with MDI exceeds this concentration limit. The exemption covers methylene diphenyl diisocyanate (MDI) and the following related compounds: CAS Nos. 101-68-8, 5873-54-1, 2536-05-2, 26447-40-5, 9016-87-9, 17589-24-1, 31107-36-5 and 25686-28-6. MDI reacts as the panel cures, and once this process has been completed, none of the chemical is emitted from the panel during the use phase.

Methanol

It is necessary to make an exception for methanol, since formaldehyde-based adhesives often contain methanol as a stabiliser. Formaldehyde is unstable and in an aqueous solution,

[46] Strategi for risikohåndtering af visse isocyanater (MDI og TDI), Danish Environmental Protection Agency 2014

and the solution therefore contains a stabiliser that reduces the tendency to polymerise. The solution can be stabilised by adding 10-15% methanol.

H334

Prohibition of classification with H334 only applies to surface treatment products. By adding this classification to the requirement, the Nordic Ecolabel can be used as a verification for Upphandlingsmyndigheten's (public procurement in Sweden) requirements without additional information being required.

UV curing surface treatment

Exemption is made for UV curing surface treatment products that are classified as environmentally hazardous if requirement O35 is meet. 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 i.e., 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.

Resins with melamine

On 23 August 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 are today no chemical substance that could substitute melamine.

2-ethylhexanoic acid in wood preservative products

In formulation which have a high pH value (9.5 or higher) most of the 2-ethylhexanoic acid (CAS No. 149-57-5, H360 (Repr. 1)) will be transformed into Ethyl hexanoate (CAS No. 123-66-0), which is not classified according to the requirement.

Background to O28 Classification of ingoing substances

In this generation 5 no changes have been made to this requirement.

The following were changed in the requirement in the last generation 4:

- For carcinogenic substances, category Carc. 2 has been added.

- For mutagenic substances, category Muta. 1A has been added.
- For substances that are toxic for reproduction, categories Repr. 2 and Lact. have been added.

As such, the requirement has been tightened to also include the classifications H350, H351, H340, H341, H360, H361 and H362, and all variants of the classification. For example, H350 also covers classification H350i.

Carcinogenic, mutagenic and reprotoxic (CMR) substances

Substances that may cause cancer, change genetic material or interfere with reproduction (known as CMR substances in categories 1A and 1B) are prioritised substances within the EU's chemical legislation, due to their inherently dangerous properties. It is therefore of central importance to considerably reduce, and in the long term move away entirely from, the use of CMR substances. It is not permitted to use CMR substances in chemical products that are accessible to consumers, but they do occur in other products.

Chemical products must therefore not contain any substances that are carcinogenic, mutagenic or reprotoxic (CMR). Nor may chemical products contain substances that are suspected of being carcinogenic, mutagenic or reprotoxic.

Wood preservatives

Nordic Ecolabelling wishes to minimise the use of substances that are harmful to health and the environment. Wood preservatives contain substances that are harmful to both health and the environment. The requirement in this version has therefore been tightened such that wood preservatives used for impregnation must not contain substances classified as CMR. This means that wood preservatives containing boric acid and chromium (III) oxide, for example, cannot be used.

Exemptions for CMR substances

Glyoxal (CAS No. 107-22-2) is used in paints. Glyoxal is classified as H341, Muta. 2, but when the pH is above 8 in a commonly occurring solution, glyoxal reacts irreversibly to produce glycolic acid (CAS No. 79-14-1). Glycolic acid is not classified as H341, but is classified as H332, H314 and H318.

Titanium dioxide (TiO_2): On 18 February 2020, the decision taken by the European Commission to classify TiO_2 as suspected carcinogen (category 2) upon inhalation was published in accordance with the CLP Regulation. The classification has met with criticism because the risk that gives rise to the hazardous property according to CLP applies to inhalation and powder form and not the chemical substance itself. The classification of titanium dioxide as carcinogenic by inhalation applies only to mixtures in powder form containing at least 1% titanium dioxide particles, which are in the form of or incorporated into particles with an aerodynamic diameter of ≤ 10 µm. This means that if TiO_2 or TiO_2 mixtures do not exist in this specific form, the classification does not apply. The classification means that the use of TiO_2 as a raw material goes against the Ecolabelling's definition of ingoing substances. Liquids and certain solid mixtures are not classified, and this is the reason why Nordic Ecolabelling has made an exception for the use of titanium dioxide in wet and solid products. In August 2025, the EU Court of Justice upheld the annulment of the harmonised Carc. 2 (H351i) classification of TiO_2. Since TiO_2 is no longer CMR classified, the exemption from the requirement is removed, but TiO_2 can still be used in outdoor products.

Mequinol and hardener in 2-component UV products: Mequinol is used as a diluent in binders for UV surface treatments 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.

For other exemptions, see requirement O27.

Background to O29 Excluded substances

Editorial changes have been made in this generation 5 in the text to clearly communicate exclusion of perfluorinated and polyfluorinated alkylated substances (PFAS) in the list for prohibited substances.

The aim of the excluded substances list is to ban the substances that are not excluded in other requirements, but which are associated with environmental and/or health risks. Some substances are included for the sake of clarity, which may cause that some substances appear several places in the list, for example, certain fluorine compounds are on the SVHC list on the EU Candidate List.

SVHC substances on the EU Candidate List

The requirement has been expanded to include a ban on the use of Substances of Very High Concern (SVHC) on the Candidate List in the chemical composition. Article 57 of REACH defines the criteria used for assessing substances as Substances of Very High Concern (SVHC). The link to the list is here: http://echa.europa.eu/sv/candidate-list-table.

PBT substances and vPvB substances

PBT substances and vPvB substances are substances with innate properties which are undesirable in Nordic Swan Ecolabelled products.

PBT substances are persistent, bioaccumulative and toxic.

vPvB substances are very persistent and very bioaccumulative.

Endocrine disrupting chemicals

At present, endocrine disrupting properties are not a hazard classified according to the CLP Regulation. In addition, harmonized scientific criteria for the identification of endocrine disruptors across different parts of EU legislation are lacking. Few endocrine disruptors have been identified in the legislation so far, compared to the number of potential substances with such properties. Under these circumstances, Nordic Ecolabelling excludes identified and potential endocrine disruptors listed on the "Endocrine Disruptor Lists" at www.edlists.org, which is based on the EU member state initiative. A substance listed in List I and/or III is excluded. Licensees are responsible for keeping track of updates on the lists, so that their branded products meet the requirement through the validity of the licence. Nordic

Ecolabelling acknowledges the challenges associated with new substances that are introduced in particularly List II and III. We will evaluate the circumstances and possibly decide on a transition period from case to case.

The requirement concerns the main lists (List I-III) and not the corresponding 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 e.g. the Cosmetics Regulation, which doesn’t have provisions for identifying EDs. Since it’s not within the scope of e.g. this regulation to identify EDs, it’s not clear how the substances will be handled at www.edlists.org once the evaluation (safety assessment of the substances in cosmetics in this case) is finalised. Nordic Ecolabelling will evaluate the circumstances for substances on sublist II case-by-case, based on the background information indicated on the sublist. By excluding both identified and prioritised potential EDs which are under evaluation, the Nordic Swan Ecolabel ensures a restrictive policy on EDs.

For a transition period until October 1st, 2022, a group of 19 substances from List II is introduced in the requirement. They represent those substances on List II which were also on the European Commission’s list of substances to be prioritised for ED evaluation (2007), which was earlier part of the requirement. After the transition period, the full List II is included. The group of 19 specified substances may include some that are excluded also by other requirements, or some that aren’t usually present in the kind of products in question.

IPBC (3-iodo-2-propynyl butylcarbamate) is 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. 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 (compounds of chlorine, bromine, fluorine, or iodine) include many substances that are harmful to health and the environment, very toxic to aquatic life, carcinogenic or harmful to health in other ways. Halogenated organic

compounds are not readily biodegradable, which increases the risk of harmful effects from the substances. Halogenated organic compounds include i.e., chlorinated paraffins, halogenated flame retardants, per- and polyfluorinated compounds (PFC), which must not be included in Nordic Swan Ecolabelled outdoor furniture, playground, and park equipment.

Regarding exemptions:

- Pigments in paint: Halogenated paint pigments are used in the paint industry, and an exemption is made if they meet the Council of Europe's recommendation "Resolution AP (89) 1 on the use of colorants in plastic materials coming into contact with food, point 2.5. PCBs have been found in analyses of paints containing organic pigments. PCBs are not added but can be formed in the production process by reactions between different chlorinated solvents and the organic pigment. Nordic Ecolabelling does not really want to allow PCBs, but since it is not possible to set a zero limit for the pigments, Nordic Ecolabelling has chosen the same level that is approved in food packaging (Resolution 89 point 2.5). This threshold has been set because it is an established method in the industry and the low threshold allowed in food packaging is considered strict enough for indoor surface treatment products. The exemption for these pigments is necessary to enable the manufacturers to make products with good colour fastness and not use pigments that are even more damaging to the environment.
- Epoxy acrylate in UV curing surface treatment products: A side reaction can occur during the manufacture of epoxy acrylate which results in a small amount of chlorine remaining inside the molecule. The chlorine that is bound in the molecule is relatively stable and will not react further while polymerisation continues. The ban on ingoing substances in the form of halogenated organic compounds applies to the chlorine because it becomes part of the molecule. The quantity of oligomers is normally below 1,000 ppm. According to the manufacturers of surface treatment products, however, it is not possible to state an exact quantity. Nordic Ecolabelling does not want to ban epoxy acrylate that is used in UV curing surface treatment products. These surface treatment products have environmental advantages compared with others, one of which is that they substantially minimise the use of solvents. The chlorine in the molecules is not added intentionally for a specific purpose and is therefore exempted. Bisphenol A is also used in the manufacture of epoxy acrylate, and it is clarified that in this case Bisphenol A is exempt from the requirement.

Butyl hydroxytoluene (BHT) and butyl hydroxyanisole (BHA)

BHT and BHA are new to the list of prohibited substances.

BHT and BHA are antioxidants that are used in many different projects to protect materials such as plastics, polymers, paints, adhesives and other coatings. BHA is used i.e., in wood plastic composite (WPC).

BHA do not have an official harmonised classification. BHA are generally self-classified as an environmental hazard in classes H410 and H400, and some are also classed as CMR.

Butylhydroxytoluene (BHT, CAS No. 128-37-0) 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. 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.

Bisphenol A, bisphenol F and bisphenol S

Bisphenol A (BPA) is used, for example, in the following relevant areas and products: various plastic and epoxy mixes, paints, varnishes, adhesives (binder, hardener) and polyol for the production of polyurethane. Bisphenol A may be released into the environment from the production process, and the substance has certain endocrine effects in both fish and snails. The main source of terrestrial exposure is the spreading of sludge from wastewater treatment plants. Since Bisphenol A has certain endocrine disrupting effects in animal trials, the use of this substance is prohibited in these criteria.

This generation of the criteria also includes a ban on bisphenol S (BPS) and bisphenol F (BPF), since studies show that these are just as hormonally active as bisphenol A (BPA) and have endocrine disrupting effects.[47]

Bisphenol A is included as a monomer in all epoxy powder coatings and residues may be above 100 ppm. Epoxy powder coatings do not contain any solvents and there is very little spillage during painting, Nordic Ecolabelling therefore wishes to approve this type of paint and Bisphenol A used in the manufacture of epoxy powder coatings is therefore not covered by the requirement.

Bisphenol A is also used in the manufacture of epoxy acrylate, and it is clarified that Bisphenol A is in this case exempt from the requirement, see more above under "Epoxy acrylate in UV-curing surface treatment products".

Alkylphenol ethoxylates (APEO) and other alkylphenol derivatives

Alkylphenol ethoxylates and alkylphenol derivatives, i.e., substances that release alkylphenols on degradation, must not be used in Nordic Swan Ecolabelled outdoor furniture, playground, and park equipment. APEOs are sometimes found in binders, dispersants, thickeners and so on. APEOs have a number of problematic properties relating to health and the environment.

APEOs are not readily biodegradable, they tend to bioaccumulate, and they are found in high concentrations in wastewater sludge. The degradation products of APEO, alkylphenol and APEO with one or two ethoxy groups are very toxic to aquatic life. Some alkylphenols are suspected of being endocrine disruptors.

[47] Bisphenol S and bisphenol F: A Systematic Review and Comparison of the Hormonal Activity of Bisphenol A Substitutes. Rochester, J.P and Bolden, A.L, Environmental Health Perspectives, 5 March 2015.

Phthalates

Phthalates are mainly used as softeners for PVC, but can also be used as stabilisers, film formers, emulsifiers, lubricants, binders, and many other functions, in which they end up occurring in numerous products such as adhesives, personal care products (i.e., denaturing products for perfume spirit), toys, packaging and much more.

Some phthalates are on the EU's Priority List of substances that require further investigation for endocrine disrupting effects – and some have already been shown to have endocrine disrupting effects. Phthalates have also received huge amounts of media attention and can therefore be undesirable in ecolabelled products for many reasons.

Pigments and additives based on Heavy metals

Heavy metals have a negative impact on the environment. This makes it relevant to ensure that metal raw materials used in the product group do not contain the heavy metals lead, cadmium, chromium (VI) and mercury, and their compounds.

Lead is a toxic heavy metal that is accumulated in nature and in human beings. This means that even small quantities of lead can be harmful to health.

Cadmium and cadmium compounds are acutely and chronically toxic for human beings and animals. Most cadmium compounds are also carcinogenic.

Chromium (III) and chromium (VI) are used for i.e., chrome plating, paints, and pigments. Chromium (III) is essential, since living organisms require chromium. The different types of chromium have different effects. All chromium compounds are toxic. Chromium (VI) has particularly harmful effects, as it is carcinogenic and allergenic.

Mercury occurs as inorganic and organic chemical compounds and is one of the most dangerous environmental toxins. Mercury is a threat to the environment and to human health. Organic mercury compounds are particularly toxic. Mercury compounds are extremely toxic to aquatic life and to mammals.

Tin may occur in organotin compounds which can be found in paints and may have undesirable effects on health and the environment. The most thoroughly investigated organotin compound is tributyltin (TBT), which accumulates in the food chain and has endocrine disrupting effects on marine organisms.

Volatile aromatic hydrocarbons (VAH)

Volatile aromatic hydrocarbons (VAH) have harmful effects on health and the environment and may cause damage to DNA.

Volatile organic compounds in which one or several benzene rings are included are called volatile aromatic hydrocarbons (VAH) and are very stable.

The expression "aromatic hydrocarbons" describes, among other things, benzene, toluene, mixed xylenes, orthoxylene, paraxylene and metaxylene (commonly known as BTX). Benzene is used to make styrene, cumene and cyclohexane. Most toluene is used to make benzene, phenol, and toluene diisocyanate.

Background to O30 Preservatives

The requirement has not been changed in this generation 5.

Wood preservatives are exempted from the requirement concerning preservatives as one of the purposes of the preservative is to prevent fungal growth, thus increasing the product's durability and so its service life.

Preservatives are added to liquid products to prevent bacterial growth in the products, in which case they are known as "in-can preservatives". The composition of the products may also affect the need for preservatives. In some products preservatives are also added as "film preservatives", i.e., so that the final film is not attacked by algal, mould, etc.

Effective preservation often requires a mix of different preservatives.

The limits are based on the fact that although larger amounts of IPBC are required than isothiazolinone to achieve the same preservative effect, IPBC is less allergenic than isothiazolinone. The limit for IPBC is therefore higher than for isothiazolinone.

Background to O31 Free formaldehyde in chemical products

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.

For wood-based panels, the content of free formaldehyde in the employed chemical products will depend on factors such as which adhesive system is being used. Generally speaking, all the adhesives are water-based, rather than solvent-based.

Resins/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.

Resins used for impregnation in HPL and laminate production generally have a high formaldehyde content. Free formaldehyde may be present at around 1 w%. Also, formaldehyde oligomers (synthetic polymer) may be present at a percentage by weight of over 50 w%. Normally the resins are used in open water-based baths, so it has been decided to lay down a specific requirement for emissions from HPL production, see requirement O8.

Background to O32 Nanomaterials in chemical products

Due to their small size and large surface area nanoparticles are usually more reactive and may have other properties compared to larger particles of the same material. There is concern among public authorities, scientists, environmental organisations and others about the lack of knowledge regarding the potential detrimental effects on health and the environment.[48,49,50,51,52,53,54,55,56] Surface coatings and other modifications can also alter their properties. Nordic Ecolabelling takes the concerns about nanomaterials seriously and applies the precautionary principle to exclude nanomaterials/-particles in the products. The European Commission recommendation for a definition of nanomaterials 2022/C 229/01 is used.

Most nanomaterials on the market today have either been in use for decades or are more recently engineered nanoforms of previously existing materials.[57] For example, nanoparticles of carbon black and amorphous silica (SiO_2) have been used for the last century. Titanium dioxide, TiO_2, has long been used as a colourant in the bulk form, but is now manufactured as nanomaterial for other purposes.[58] Other types of engineered nanomaterials are expected to come onto the market in the future.[59]

Within the product group outdoor furniture, playground and park equipment, nanomaterials are among others used for impregnation or sealing of surfaces such as wood or metal, in order to create hydrophobic, self-cleaning, corrosion-resistant and antibacterial/biocidal

[48] UNEP (2017) Frontiers 2017 Emerging Issues of Environmental Concern. United Nations Environment Programme, Nairobi.
[49] 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
[50] 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.
[51] 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
[52] 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
[53] 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
[54] SweNanoSafe. Nationell plattform för nanosäkerhet. (2020-05-06)
[55] BEUC – The European Consumer Organisation. Nanotechnology. www.beuc.eu/safety/nanotechnology (2020-05-06)
[56] 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
[57] EU observatory for nanomaterials and European Chemicals Agency (2019) What are next generation nanomaterials and why are regulators interested in them? Information note.
[58] 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
[59] EU observatory for nanomaterials and European Chemicals Agency (2019) What are next generation nanomaterials and why are regulators interested in them? Information note.

surfaces. These effects can be created by addition of nanometals such as silver and copper, or titanium dioxide.

Polymer dispersions can technically be considered nanomaterials: The EU Commission's follow-up report to the other "Regulatory Review on Nanomaterials" from 2012[60] states that solid nanomaterials dispersed in a liquid phase (colloid) should be considered nanomaterials according to the EU Commission recommendation. Polymer dispersions are not exempt from the requirement as they are not considered relevant for outdoor furniture, playground and park equipment.

The requirement has the following exemptions:

Pigments

Pigments are finely ground, insoluble particles that are used to give products a specific colour. There are no substitutes that can fulfil pigments' function as colourants in paints, ink, textile dye, masterbatch etc. and many pigments consist partly or entirely of nanoparticles. Thus, nano-sized pigments are exempted. Although clear evidence-based conclusions of the safety of nano-pigments cannot be drawn,[61] the release by weathering of facades is very limited, and the nanoparticles are most likely mainly embedded in the paint matrix rather than released as single nanoparticles.[62,63]

Pigments impart colour by selective absorption and scattering of light. Paint pigments consist of particles of individual crystals up to aggregates of multiple crystals.[64] It is generally more efficient to use pigments with smaller particles than larger ones to obtain the same colour.

Inorganic pigments used in the paint industry that may occur in nano-size include carbon black and iron oxides.[65] The carbon black used in paint is very finely ground and has a particle size of around 10–30 nm.[66] Iron oxide pigment may entirely comprise particles of nano size, or only a fraction of the particles may be nano. Inorganic nano pigments are also added to products for a wide range of purposes other than colouring. Nano-titanium dioxide is for example used to impart self-cleaning effect in paints.

Naturally occurring inorganic fillers

Traditional fillers are permitted.

Naturally occurring fillers from for example chalk, marble, dolomite and lime are exempted from registration according to appendix V, point 7 in REACH, see below, as long as these fillers only are physically processed (milled, sieved and so on) and not chemically modified. They are also exempted from registration in the Danish Environmental Protection Agency's

[60] 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
[61] 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.
[62] 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
[63] 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.org/10.13140/2.1.2206.3040
[64] Coatings Handbook; Thomas Brock, Michael Groteklaes, Peter Mischke; 2000
[65] Industrial Organic Pigments; W. Herbst, K. Hunger; Third edition 2004; pp. 120–124
[66] Coatings Handbook; Thomas Brock, Michael Groteklaes, Peter Mischke; 2000; p. 128

draft to the Order on a register of mixtures and articles that contain nanomaterials and the requirement for producers and importers to report to the register.[67]

In REACH directive (1907/2006/EF)[68] it is in article 2, point 2, point 7b:

"The following shall be exempted from Titles II, V and VI:

(Title II covers the registration of substances, Title V covers downstream user and Title VI covers evaluation)

(b) substances covered by Annex V, as registration is deemed inappropriate or unnecessary for these substances and their exemption from these Titles does not prejudice the objectives of this Regulation;"

Annex V Exemptions from the obligation to register in accordance with article 2(7)(b):

"The following substances which occur in nature, if they are not chemically modified.

Minerals, ores, ore concentrates, cement clinker, natural gas, liquefied petroleum gas, natural gas condensate, process gases and components thereof, crude oil, coal, coke."

An exemption has been added for inorganic fillers as long as they are covered by appendix V, point 7 in REACH.

Synthetic amorphous silica

Synthetic amorphous silica (SAS) is an intentionally manufactured silicon dioxide (SiO_2) form that has been used in industrial, consumer and pharmaceutical products for decades.[69] SAS is a nanomaterial, under the European Commission definition[70] and is exempted from the requirement due to a lack of alternative substances.

Aluminium oxide is usually used in powder coating in order to get good fluidisation properties. There Studies have investigated the risks associated with nanoparticles in paint, lacquers, and sealants i.e., the NANOKEM- and NanoHouse projects. The conclusion in both projects was that wear and tear of painting does not lead to release of free nanoparticles, but only particles fixed in a matrix of paint.

3.8.2 Surface treatment of wood, wood-based panels and HPL panels

Chemical products used for surface treatment must also meet the general chemical requirements.

Background to O33 Quantity applied and application method

The requirement remains unchanged in this generation 5.

In last generation 4, a clarification was introduced that the manufacturer must also state the name and producer of the chemical products used in each surface treatment system.

[67] Link to Miljøstyrelsens consultation: http://hoeringsportalen.dk/Hearing/Details/16910 (visited 20/1-14)
[68] Link to REACH-directive: http://eur-lex.europa.eu/LexUriServ/site/en/oj/2006/l_396/l_39620061230en00010849.pdf
[69] https://www.asasp.eu/images/Publications/Nano_-_SAS_factsheet_-_201209.pdf
[70] COMMISSION RECOMMENDATION of 18 October 2011 on the definition of nanomaterial (2011/696/EU)

The other details on amount applied, number of layers and application method were also required in the generation 3 of the criteria and are needed to calculate the applied amount of environmentally hazardous substances and VOC in subsequent requirements.

Background to O34 Added amount of volatile organic compounds (VOC)

The requirement is unchanged in this generation 5.

In the last generation 4 of the criteria, the requirement was amended to harmonise with Nordic Ecolabelling's other product groups, such as Floor coverings, Construction and facade panels and Furniture and fitments.

A new requirements limit was introduced for alternative a). If the total VOC content in all the applied products within a surface treatment system amounts to less than 5 w% VOC, it is not necessary to perform calculations in grams per m^2. This is because products with such a small total content of VOC will meet the set requirements and an exemption from the calculation requirement will not reduce the level of environmental protection. The requirement limit for alternative b) remained unchanged.

The reason for setting VOC requirements is that these compounds contribute to tropospheric (near ground level) ozone, amongst other things. The requirement applies to the surface treatment product when it is applied to outdoor furniture or playground equipment. In order to protect production workers and consumers from substances that are harmful to health, requirements have been set to exclude the use of the most harmful surface treatment products. A significant portion of the environmental impact associated with paints and varnishes comes from VOC emissions.

Background to O35 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.

3.8.3 Surface treatment of metal

All surface treatment of metal must meet requirement O37 and O38 and the general chemical requirements. Metal plating i.e., hot-dip galvanising, is however exempted from requirement O37 and O38 and the general chemical requirements and must instead fulfil requirement O36.

Background to O36 Metal plating

The requirement has not been changed in this generation 5.

The requirement was revised in last generation 4. An expanded ban on surface coatings containing nickel and chromium was introduced. Requirements for Zinc plating was

tightened compared with the previous generation. One stipulation is that the plating plant must be drain free. The purpose of this is to reduce the discharge of undesirable substances to wastewater treatment plants and on to recipient watercourses. A drain free plant often has a combination of different separation methods i.e., ion exchange, batch detoxification and evaporation. The water is recycled, and separated salts are dealt with as liquid and solid waste. Surface plating with zinc is still permitted, since the product is outdoor furniture, playground and park equipment intended for outdoor use and is thus subject to a high degree of wear.

Surface treatment – general

Metals might be given a surface treatment for decorative purposes, to increase their hardness and durability, to prevent corrosion or to improve adhesion, ready for other treatments such as painting. Surface treatment extends the service life of metals, but also has an environmental impact, chiefly in the form of high energy and water use, plus emissions to water. Six metals are of greatest concern due to their impact on health and/or the environment: cadmium, lead, nickel, chromium, copper and zinc.

It is most common to surface treat regular carbon steel, as it needs such treatment to become resistant to corrosion. Aluminium and stainless steel are corrosion resistant even without any surface treatment.[71]

The latest BAT reference document (BREF) for surface treatment of metals is from 2006, with a revision expected in 2020.

Hot-dip galvanisation

The residual products formed are the “ash” (primarily zinc oxide) that forms on the surface of the galvanising bath, and “hard zinc”, iron-zinc particles that are fragments of the reaction product and float on top of the bath. Both these products are dealt with at the hot-dip galvanising plant and sent for recycling.

In the Nordic countries, zinc is used in the galvanizing bath of qualities that contain a maximum of 0.005% lead. In countries outside the Nordic region, lead is actively added, and the lead content is normally 0.6-0.7% and up to 1%. Nickel in the galvanizing bath reduces the Sandelin effect and produces linear growth of the layer thickness curve and the outer zinc layer becomes thicker and the coating shinier.[72]

Emissions of rinsing baths in limited quantities is allowed because the galvanizing plants have slightly different production methods. Only discharges of rinsing water in limited quantities are permitted and only rinsing water diverted to the municipal treatment plant. Before hot-dip galvanizing, the goods undergo degreasing, pickling to remove oxides and fluxing to protect the surface and make it reactive. Between bites and flux you always need to rinse, otherwise the flux will be destroyed. The rinsing water needs to be changed after a while. Some of the water can be used to top up in other process baths, which reduces the wastewater and means that some plants in principle have zero emissions. Some plants also need a rinsing step between degreasing and pickling, for example if you have a lot of processing emulsions on the goods. This is common if you have a robot-based production. There are some chemical manufacturers that sell both degreasing and bites that work

[71] http://www.syf.se/Filer/Guide_ytbeh_v0.pdf
[72] Handbok I varmförzinkning, Nordic galvanizers 2019

together and where rinsing is not needed, but these products are unfortunately not suitable for all hot dip galvanizers.

Surface treatment and material recovery

During the development of the EU Ecolabel's latest criteria for furniture, decision 2016/1332/EU, stakeholders stated that surface treatment of metals was no obstacle to recycling.[73] The smelting works sort the metal into different categories and may specialise in different types of metals that they accept. If it is not possible to use it for other things, it will usually be used in reinforcement steel. Chrome-plated steel is often used to produce stainless steel.

There is, however, something in the phrase "the purer, the better". Extra technology (processing technology), energy and chemical consumption is required if the metal contains a coating/alloys.

Background to O37 Quantity applied and application method

See under requirement O38.

Background to O38 Added amount of volatile organic compounds (VOC)

The requirement is unchanged in this generation 5.

The requirement was new in the last generation of the criteria, with two alternative ways to fulfil the requirement. In alternative a), if the total VOC content in all the applied products within a surface treatment system amounts to less than 5 w% VOC, it is not necessary to perform calculations in grams per m^2. In alternative b), the added amount is calculated in g/m^2. Account is taken here of the efficiency of the application method. This means that if a surface coating (i.e., varnish) is applied using a method with low efficiency that generates more waste, it is permitted to contain only a small level of organic solvent. If the surface coating is applied using a more highly effective method, which generates little or no waste, a higher proportion of organic solvent is permitted. The limit value for the amount added is set at 35 g/m^2, which is the same value as for the surface treatment of wood and wood-based panels.

The reason for setting VOC requirements is that these compounds contribute to tropospheric (near ground level) ozone, amongst other things. The requirement applies to the surface treatment product when it is applied to outdoor furniture or playground equipment. In order to protect production workers and consumers from substances that are harmful to health, requirements have been set to exclude the use of the most harmful surface treatment products. A significant portion of the environmental impact associated with paints and varnishes comes from VOC emissions.

3.8.4 Surface treatment of plastic and rubber

Any surface treatment of plastic and rubber must meet the general chemical requirements.

The requirements apply to surface-treated parts of plastic or rubber that make up more than 5 w% of the product.

[73] http://ec.europa.eu/environment/ecolabel/documents/technical_report_furniture.pdf

Background to O39 Surface treatment of plastic and rubber

The requirement remains unchanged from the previous generation.

The purpose of the requirement is to make the most of this material resource and facilitate the recycling of plastic/rubber based on today's available technologies.

Background to O40 Quantity applied and application method

See under requirement O41.

Background to O41 Added amount of volatile organic compounds (VOC)

The requirement is unchanged in this generation 5.

The requirement was new in the last generation 4 of the criteria, with two alternative ways to fulfil the requirement. In alternative a), if the total VOC content in all the applied products within a surface treatment system amounts to less than 5 w% VOC, it is not necessary to perform calculations in grams per m^2. In alternative b), the added amount is calculated in g/m^2. Account is taken here of the efficacy of the application method. This means that if a surface coating (i.e., varnish) is applied using a method with low efficiency that generates more waste, it is permitted to contain only a small level of organic solvent. If the surface coating is applied using a more highly effective method, which generates little or no waste, a higher proportion of organic solvent is permitted. The limit value for the amount added is set at 35 g/m^2, which is the same value as for the surface treatment of wood and wood-based panels.

The reason for setting VOC requirements is that these compounds contribute to tropospheric (near ground level) ozone, amongst other things. The requirement applies to the surface treatment product when it is applied to outdoor furniture or playground equipment. In order to protect production workers and consumers from substances that are harmful to health, requirements have been set to exclude the use of the most harmful surface treatment products. A significant portion of the environmental impact associated with paints and varnishes comes from VOC emissions.

3.9 Circular economy and functional requirements

Background to O42 Guarantee and product design

The requirement is unchanged in this generation 5.

The requirement was new in the last generation 4 of the criteria. In order to contribute to a circular economy, the Nordic Swan Ecolabelled products must have a long service life.

Products that are firmly anchored, i.e., equipment required to release and move the product is, for example, playground equipment, fitness equipment, park benches and the like. For these products, the load-bearing structural parts (i.e., the parts whose primary task is to carry the product or transfer loads and conduct forces to the ground) must have a guarantee period, which depends on the material, as these parts are more difficult to replace and therefore important for the products total service life. In order to extend the life of the product, there are also requirements that the other parts must be replaceable or have a

minimum guarantee period. Wood has a lower guarantee period than other materials, as they often have a lower durability than i.e., metal. However, as wood is a renewable material and other materials often have higher energy consumption during production, Nordic Ecolabelling wants that wood can be used.

Products that are removable without the need to use equipment to release and move the product, there is a requirement for a minimum 10-year guarantee for the main materials in the product. Main materials are defined as material types (i.e., pine, plastic, steel, HPL sheets) regardless of treatment (i.e., lacquered, painted, galvanized) that make up 30 w% or more of the product. These products often have a more slender construction than firmly anchored products, which can affect the life expectancy of the product. However, for wood parts that are impregnated with heavy metals and/or biocides, other requirements apply, see below.

For all wooden parts, which are impregnated with heavy metals and/or biocides, a minimum 15-year guarantee must be given against rot, however, for load-bearing construction parts a general guarantee period of at least 15 years. This applies regardless of what weight% the parts constitute of the product. Good durability is achieved by using impregnation, see more under requirement O6.

Wood Plastic Composite (WPC) is marketed as maintenance-free, graffiti resistant and does not need to be impregnated or painted. The products are durable. Wood fibre and plastic are tightly bound in the material. According to Nordic manufacturers of WPC, the material after 30 years outdoors as a plank shows no signs of wear or cracking.

Background to O43 Separability

The requirement is unchanged in this generation 5.

The requirement was new in the last generation 4 of the criteria. In order to contribute to a circular economy, the Nordic Swan Ecolabelled products must be recyclable and/or their materials recoverable as far as possible. It is important to lay the foundation for recycling or material recovery right from the design phase. The different constituent materials used in one and the same product must be separable from each other, in order that the materials can be entered into their own material stream for recycling at end-of-life.

In this context, WPC, HPL and wood-based panel are considered a homogeneous material.

Background to O44 Replacement parts

In order to contribute to a circular economy, the Nordic Swan Ecolabelled products must have a long service life. It should be possible to repair them in the event of a fault and if parts break. Access to replacement parts is important with regard to repairs.

Background to O45 Maintenance

The requirement is unchanged in this generation 5.

The requirement was new in the last generation 4 of the criteria. In order to contribute to a circular economy, the Nordic Swan Ecolabelled products must have a long service life, and regular care and maintenance is a key factor in this. It is important to follow the inspection and maintenance instructions as a preventive measure, particularly for products intended for

public use, which are subject to greater use, and thus greater wear, than products used privately. However, the time intervals and the type of maintenance required may vary, depending on the type of product involved and the constituent materials.

Background to O46 Safety and durability

In this generation 5 of the criteria, the requirement has been updated with test standards for outdoor multi-sports equipment, climbing parks, outdoor grills and mobile waste bins.

It is important for Nordic Swan Ecolabelled outdoor furniture, playground and park equipment to have a high standard of safety and durability, strength and stability.

Outdoor furniture

Outdoor furniture for private use must meet the requirement level for private use set out in EN 581-1, EN 581-2 and EN 581-3.

If the product is intended/sold for public use, the product must be tested according to the requirement levels that are relevant for public (contract) use.

The definition of outdoor furniture for contract use is: “outdoor furniture intended for non-private use in places with public access”.

Playground equipment for public playgrounds

Safety and durability can be divided into several factors:

- Construction of the playground equipment.
- Installation in the playground.
- Maintenance, inspection.
- Any necessary supervision during use (i.e., small children must not be allowed to climb too high).

The standard drawn up for playground equipment, EN 1176, contains safety requirements, specific requirements for individual playground equipment and guidelines on assembly, inspection, maintenance, and operation.

Playground equipment for public playgrounds i.e., in parks and schools, must meet the relevant safety levels as set out in the following standards:

Standard	Area
EN 1176-1	General safety requirements
EN 1176-2	Swings
EN 1176-3	Slides
EN 1176-4	Cableways
EN 1176-5	Carousels
EN 1176-6	Rocking equipment
EN 1176-7	Guidance on installation, inspection, maintenance and operation
EN 1176-11	Spatial network

In the previous generation of the criteria, natural playgrounds were subject not only to EN 1176 but also the Danish standard DS 1500 “Naturlegeredskaber – Legepladselementer – Sikkerhedskrav og prøvningsmetoder”. DS 1500 has now been withdrawn and replaced with EN 1176-1.

This generation of the criteria also adds EN 1176-11 “Additional specific safety requirements and test methods for spatial network”.

This generation of the criteria specifies that EN 1176-1 and EN 1176-7 must be complied with, in addition to any EN 1176 standard for the specific type of playground equipment.

Playground equipment for private use

Playground equipment for private use must meet the key requirements in the Toy Safety Directive 2009/48/EC, as amended. This can be achieved by documenting compliance with the harmonised standard EN 71-1 (Mechanical and physical properties).

If the product meets the requirements in a standard other than the above EN standards, an independent test institute must explain how the standard relates to the standard above.

Permanently installed outdoor fitness equipment

The fitness equipment must be permanently installed and must comply with standard EN 16630 “Permanently installed outdoor fitness equipment – Safety requirements and test methods”.

Parkour equipment

Parkour equipment must meet standard EN 16899 “Parkour equipment – Safety requirements and test methods”.

Outdoor multi-sports equipment

In this generation of the criteria, outdoor multi-sports equipment has been included. Outdoor multi-sports equipment are free access multi-sports equipment and combinations intended for permanent installation and include, but not exclusively, equipment for sports such as badminton, basketball, football, handball, hockey, table tennis, tennis and volleyball. The products must meet the standard EN 15312 "Free access multi-sports equipment - Requirements, including safety and test methods".

Climbing parks

In this generation of the criteria, climbing parks have been included. Climbing parks are permanent and mobile ropes courses and their components and must meet the standard EN 15567-1 "Sports and recreational facilities - Ropes courses - Part 1: Construction and safety requirements".

Outdoor grills

In this generation of the criteria, outdoor grills have been included. Outdoor grills must meet the standard EN 1860-1 “Appliances, solid fuels and firelighters for barbecuing – Part 1: Barbecues burning solid fuels – Requirements and test methods.”

Mobile waste bins

In this generation of the criteria, mobile waste bins have been included. Mobile waste bins must meet the standard EN 840-5 "Mobile waste and recycling containers - Part 5: Performance requirements and test methods" and EN 840-6 "Mobile waste and recycling containers - Part 6: Safety and health requirements". The standard gives the requirements for durability (part 5) and safety (part 6) testing of mobile waste bins < 1300 l with 2 or 4 wheels.

3.10 Licence maintenance

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

Background to O47 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 O48 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.

4 Environmental impact of outdoor furniture, playground and park equipment

The relevant environmental impacts found in the life cycle of outdoor furniture, playground and park equipment are set out in a MECO analysis, see below. A MECO describes the key areas that have impact on the environment and health throughout the life cycle of the product – including consumption of materials/resources (M), energy (E), chemicals (C) and other impact areas (O).

Nordic Ecolabelling sets requirements concerning the topics and processes in the life cycle that have a high environmental impact – also called hotspots. Based on the MECO analysis, an RPS tool is used to identify where ecolabelling can have the greatest effect. R represents the environmental relevance, P is the potential to reduce the environmental impact, and S is the steerability on how compliance with a requirement can be documented and followed up. The criteria contain requirements in those areas in the life cycle that have been found to have the highest RPS, since there is potential to achieve reduced environmental impact.

RPS analysis

Table B. RPS analysis for outdoor furniture, playground and park equipment

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 outdoor 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.
	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	Production of virgin plastic and metals have high climate impact and other environmental impacts (e.g. mining activities and production chemicals).

	S: Low-medium	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 (e.g. steel and aluminium) used for outdoor 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 of durable wood R: High P: Low-medium S: Low	Production of thermowood and chemically modified wood is typically energy-intensive. This means that there is high relevance in relation to the energy use related to material production, not including the drying of the wood. These types of treatment are performed by the producer, and they often receive pre-dried wood from another supplier. The potential for minimising the energy use is considered low/medium, as a lot of durable wood production is often similar to each other. To change the production, there is a need to invest in new equipment. Steerability is considered low as changes in the production chains are limited.
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 varies 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 outdoor 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 S: Medium	Energy related to drying processes can be significant depending on the surface treatment system used. There is a potential for energy 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 outdoor 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 outdoor furniture's function. However, the designs are typically not defined by the outdoor furniture producers leading to a low steerability.
	Preservative treatment/impregnation R: High P: Medium S: High	The use of biocides should be limited to a minimum whenever possible to lower the exposure of humans and the environment to harmful substances. Other wood types such as Robinia can be used as an alternative to impregnated wood. In addition, steel, cement or other nonorganic materials can replace the use of impregnated wood when there is e.g. contact with soil. This can however lead to the use of more climate-intensive materials. Overall potential is considered medium. Steerability is high as the specific material used can be documented directly by the producer.
	Metal plating R: High P: Medium S: High	The use of heavy metals such as cadmium, lead, chromium and nickel possesses an environmental risk. High relevance. There is potential to steer towards alternative surface treatments. Steerability is considered high as the purchased product can be documented.
Use phase		
	Quality, warranty and properties R: High P: High S: High	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 outdoor furniture that are used by the outdoor furniture industry.
	Spare parts and disassembly R: High P: High S: Medium	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 and potential are considered high. Steerability at the producer is high but since there is low steerability at the end-user the total steerability is considered medium.
End of life		
	Outdoor furniture recycling R: High P: High S: 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.

MECO analysis

	Raw material	Production	Use	End of life
Material	Raw material extraction of: wood, plastic, metal and HPL. Use of recycled materials which is most relevant for metals and plastic.	Chemical products for surface treatment of metal and wood including metallization. Assembly of products. Traceability, quality assurance and testing of raw materials.	Large product variability which may include several materials. Parts of materials might be replaced or refurbished during lifespan.	Reuse of used outdoor furniture, playground- and park equipment Recycling, reuse, incineration of materials like plastic, metals, wood and HPL. HPL goes in most cases to incineration, but it might be refurbished. Recycling, reuse, incineration of packaging (plastic and paper)
Energy/CO_2	Energy/CO_2 for the production of raw materials[4]. Energy/CO_2 for raw material extraction and production of fuel/electricity. Global average LCA data: **Material** / **Energy [MJ/kg]** / **CO_2-eq [kg/kg]** Primary aluminium 211 21.3 Low-alloy steel 15.6 2.0 HD-PE 78.4 2.84 HPL 72.3 4.19 Imp. Softwood 35.9 3.67 Source: Ecoinvent v3.11, APOS, cumulative LCIA	Assembly of products.	Energy/CO_2 from the use of cleaning and maintenance products. Energy and air emissions from transport.	Energy/CO_2 from incineration and waste handling Energy savings from reuse and recycling.
Chemicals	Emissions from extraction of chemical raw materials. Chemical products might involve emissions to effluent and air from different processes like metallization, surface treatment, and impregnation. Plastic manufacturing may involve chemical additives like phthalates, stabilizers, and flame retardants.	Emissions from production of chemical raw materials. Exposure to environments and societies.	Chemical products used for cleaning and maintenance. Possible exposure to harmful chemicals from impregnation and to environment. Emission of microplastic might occur.	Emissions to air and watste water from incineration and waste handling
Other	Sustainable cultivation of raw materials and water to ensure biodiversity and safeguard natural areas. Land use change and indirect land use change (LUC/ILUC)	Product testing with high quality standards relevant for the product group.	Assuring good quality during products lifespan.	

Sources for MECO

1) 073 Outdoor furniture, playground and park equipment, background document, chapter 1 Environmental impact of outdoor furniture, playground and park equipment, version 4.1, Nordic Ecolabelling, 2021

2) 031 Furniture and fitments, main document for consultation, version 6.0, Nordic Ecolabelling, 2025

3) 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, Mauro Cordellaa and Carme Hidalgob, Joint Research Centre – Circular Economy and Industrial Leadership Unit, C/ Inca Garcilaso, 3, Edificio Expo, 41092 Seville, Spain, 2016

4) Circular Ecology, ICE (Inventory of Carbon & Energy) Material Database V.4.0, John Burrow et al., 2024, https://circularecology.com/