Nordic Ecolabelling for

Paints and varnishes

Consultation document for version 4.0 • 30 November 2022 – 08 February 2023

Nordic Ecolabelling

Content

This document is the original document. In case of dispute in other languages, the original document should be taken as authoritative.

Addresses

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

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1 Summary

Nordic Swan Ecolabelling of paints and varnishes is highly relevant. Sustainable coatings concepts have evolved significantly since they were introduced decades ago. Almost every business operation today considers sustainability aspects, often on a daily basis. In addition to reducing volatile organic compounds (VOCs), the focus has expanded to include energy conservation, waste minimization, process efficiency enhancement, and the use of renewable materials. Additionally, companies consider the social impacts of their activities throughout the value chain.

Updated chemical requirements

Ingoing substances that are classified as environmental hazardous have been tightened in this version of the criteria. Furthermore, the limit for preservatives for outdoor paints and varnishes has also been tightened.

As in the previous generation of the criteria, the chemical requirements in the new generation use a definition of ingoing substances that entails a ban on specific ingoing substances down to 0 ppm. As such, a safety data sheet alone is not enough to meet the documentation requirement. Further information about the chemicals will always be needed. Other certifications that do not require chemical documentation down to the same level will therefore not be permissible as documentation for these requirements.

The requirement for formaldehyde, VOCs, and Semi-Volatile Organic Compounds (SVOC) has been updated with emission testing to better protect the consumer from exposure.

Nordic Ecolabel has introduced a new dynamic criterion for endocrine disrupters that are identified or suspected as endocrine disruptors across different legislations or national evaluations.

Requirements for energy and CO_2-reduction

The criteria have been expanded with requirements focused on reducing the climate impact of raw material production with energy efficiency requirements and promotion of alternative fuels and renewable energy.

Requirements for renewable raw materials

The criteria have introduced a policy requirement for the manufacturer to document environmental work within the company by including strategic goals to increase the purchase of polymers made from renewable raw materials.

Paints and circular economy

The criteria have introduced several requirements for packaging to promote circular economy. This includes use of recycled material in packaging and making it more clear to consumer how to recycle the packaging at the end of life.

2 Environmental impact of paints and varnishes

The criteria for Nordic Swan Ecolabel paints and varnishes are based on the principles of life cycle assessment and RPS[1] (Relevance, Potential and Steerability) analysis. Additionally, the European Commission product environmental footprint (PEF) pilot for paints[2] has been used as a reference when developing the RPS in order to better identify the major impacts of paints and varnishes during the entire lifecycle.

2.1 RPS-analysis

The following table shows the major impacts identified for the RPS-analysis, where it is concluded if Nordic Swan Ecolabel can set requirements to maximise the total environmental benefit of the criteria.

Raw material stage	RPS level (high-medium-low)	Comment
Titanium dioxide	R = High P = High S = High	Titanium dioxide has one of the greatest overall environmental impacts for paints, while being an important part for the performance of the paint formulation. There is a high energy demand[3] to produce titanium dioxide and it is characterized by intensively consumption of resources and use of coal or electrical energy and is accompanied by a large amount of waste, chemical[4] and energy emissions. The potential lies in different manufacturing processes and energy efficient measures to reduce the energy demand, where the steerability can ensure that titanium dioxide is produced with the least waste generation and environmental impacts[5]. Nordic Ecolabel sets requirements to reduce waste produced from the production of titanium dioxide. Furthermore, requirement focuses on certification of manufacturing plants that work extensively with energy reduction and energy efficient measures in order to reduce their overall climate impact from the production of titanium dioxide.
Acrylate resins: Feedstock in polymer production	R = High P = High S = High	Traditional paints are derived from fossil fuels, and as the production of paints are increasing, so does the demand for petrochemicals and results in depletion of finite resources. Furthermore, fossil fuels are a contributor to local air pollution, which have both a negative environmental and health impact. Also, the manufacture of biobased polymers is of high relevance[6,7]. Various bioplastics are made from sugars and starches harvested from crops that would otherwise be grown for food. By decreasing the amount of available land for food production, the bioplastics industry can lead to an increase in the cutting down of forested areas for arable land. Cutting down forests decreases carbon dioxide uptake and biodiversity and increases risks of erosion and flooding. The potential here lies in promoting the use of more renewable materials and biobased materials[8,9], to lower the effects that would have risen from binders made from petrochemicals.

[1] https://www.nordic-ecolabel.org/nordic-swan-ecolabel/criteria-process/rps-tool/
[2] https://ec.europa.eu/environment/eussd/smgp/documents/PEFCR_Decorative%20Paints_Feb%202020.pdf
[3] https://iopscience.iop.org/article/10.1088/1757-899X/678/1/012113/pdf
[4] Environmental Impact of Coated Exterior Wooden Cladding - Hakkinen et al, VTT Building Technology, 1999
[5] Middlemas, S., Fang, Z. Z., & Fan, P. (2015). Life cycle assessment comparison of emerging and traditional Titanium dioxide manufacturing processes. Journal of Cleaner Production, 89, 137-147.
[6] Michel Biron, in Thermoplastics and Thermoplastic Composites (Third Edition), 2018
[7] https://www.european-bioplastics.org/how-much-land-do-we-really-need-to-produce-bio-based-plastics/
[8] https://www.pcimag.com/articles/109592-teknos-joins-project-to-develop-bio-based-binders-and-coatings#
[9] https://www.pcimag.com/articles/103863-biobased-polymers-for-sustainable-coatings

		Nordic Ecolabel sets requirement for manufacturers of paint to have routines for working continuously with strategic goals to increase their use of resins made from renewable raw materials. The requirement sets a pathway that can help promote saving fossil fuels and reduce greenhouse gas emissions. There is also steerability in setting requirements for waste or residues as preferred renewable material to avoid compete with food feedstock[10] by using certified renewable materials in accordance with Certification by Renewable Energy Directive of the EU Commission, which are subject to strict criteria regarding emission savings and being sustainable.
Acrylate resins: Energy demand in polymer production	R = High P = Medium S = Low	There is a high energy demand for polymer production as the conversion of basic raw materials to final polymers requires high amounts of electrical power for thermal energy. Furthermore, the source for the energy is mainly from conventional fossil carbon-based resources such as coal, petrol or natural gas, which results in the emissions of greenhouse gases. The potential for improvement relies on reducing the energy demand, introducing energy efficient measures and increase the use of renewable energy in order to meet the objective of a climate neutral Europe. For a requirement to be introduced for Nordic Ecolabel Paints, there are steerability issues regarding energy demand as it depends on variables such as energy infrastructure, climate zone and ambient temperature[11] which can differ depending on production site location throughout Europe. Hence, there is no requirement on this topic.
Alkyd reins	R = High P = High S = Medium	There is a relevance for the cultivation of alkyds derived from vegetable oil, as it is directly related to land use, land transformation and biodiversity. There are environmental impacts when burning the biomass in connection to the land transformation with reduction in carbon stored in forests, plants and soil and followed by the release of carbon from combustion. In general, vegetable oil can be converted into alkyd resin, however each raw material should be studied separately. The raw materials to produce alkyd resins are also used as food ingredients, so it is necessary to seek out alternative plants that are not in competition with land-use and food producers[12]. The potential here lies in promoting the use of alkyds derived from non-food competing vegetable oils, such as tall oil fatty acids which do not contribute to increased land use and reduction of carbon stored as the potential lies in promoting the use of waste products. As with acrylic resins the general environmental benefit of bio-based plastics come from the shift from fossil feedstock to bio-based feedstock. Therefore, fatty acids and polyols in alkyd resin binders used in Nordic Swan Ecolabelled paints and varnishes must be made from renewable raw materials and the renewable raw materials must comply with EU's Renewable Energy Directive (2018/2001/EC). This ensures that the feedstock is both responsibly sourced and certified responsibly by independent third-party certification bodies recognized by the European Commission.
Cement and alternative hydraulic binders	R = High P = High S = Medium	Portland cement being the key ingredient in cement-based paints, is also one of the major sources of greenhouse gases. Portland Cement accounts for 5% of carbon dioxide emissions[13], which is due to inputs of high amounts of energy to heat the kilns, with indirect emissions from the energy and direct emissions from the production. Nordic Ecolabel sets out requirements to restrict the GWP on the cement/hydraulic binder to limit the anthropogenic emissions of CO_2.
Feedstock for packaging	R = High P = Medium	There is a relevance for plastic material used as packaging as they are produced from fossil feedstock. Furthermore, left-over paint residue

[10] https://www.johannebergsciencepark.com/sites/default/files/Final%20report%20-%20Value%20chain%20adhesives%20and%20paint.pdf
[11] Khripko, D., et al (2016) Energy demand and efficiency measures in polymer processing: comparison between temperate and Mediterranean operating plants.
[12] Eco-friendly Alkyd Resins Based on Vegetable Oil: Review
[13] The Cement Sustainability Initiative: https://docs.wbcsd.org/2016/12/GNR.pdf (visited 2022-05-30)

	S = High	from incorrectly disposed paint can make the packaging difficult to recycle. Nordic Ecolabel sets out requirements to encourage the use of recycled plastic in packaging to reduce the dependency of fossil feedstock and to promote circular economy.
Production	**RPS level (high-medium-low)**	**Comment**
Chemicals that are harmful to the health and environment	R = High P = High S = High	Chemicals used on the manufacturing plant and for the production of paints and varnished contain many difference substances and raw materials with many different harmful effects on the environment and health. Nordic Ecolabel sets requirements to produce paints to protect the worker and to limit the use of harmful substances during production. Furthermore, Nordic Ecolabel sets requirements for the production of paints to protect the worker in the working environment to reduce exposure to dust and to promote good working conditions.
Emissions & Energy use	R = Medium P = High S = Medium	There is a relevance for the production of paints regarding indirect and direct emissions which are related to energy use. Indirect emissions being emissions from the combustion of fossilised fuels from another entity to power the electrical grid used for the processes at the manufacturing plant. These emissions occur because of the activities used for the manufacturing of the paint, i.e., emissions from consumption of a purchased electricity, heat, or steam. Energy use in paint manufacturing consists of among others heating, ventilation and air conditioning (HVAC), local exhaust ventilation (LEV), electricity to power the processes, mechanical or wet grinding and mixing to create homogenous dispersions. When blending paint ingredients, several milling steps may be needed due to re-work in order to achieve proper homogenous dispersion. There are several ways to increase energy efficiency in paint manufacturing, examples such as making the milling step more energy efficient, replacing old equipment or identifying locations with high energy use. It is unclear how significant the impact of paint manufacturing is compared to the overall impact of the paint. However, since the major environmental impact of the paint is within the supply chain of the paint manufacturer, requirements are prioritized there rather at the paint manufacturer.
Use	**RPS (high-medium-low)**	**Comment**
Exposure to chemicals that are harmful to the environment	R = High P = High S = High	Since consumers in the use phase are normally less protected and less knowledgeable about hazards than employees in the production phase, it is relevant to set strict requirements to limit the exposure to consumers of harmful chemicals, via inhalation or skin contact. Nordic Ecolabel sets strict requirements regarding ingoing substances, with a zero-tolerance policy. Furthermore, by updating the requirement for endocrine disruptors, Nordic Ecolabel can ensure that a strict policy is applied to protect consumers from endocrine disruptors. Additionally, good indoor quality is required for the consumer to be protected from emissions of volatile and semi-volatile organic compounds after the paint is applied.
Preservatives and environmental harmful substances	R = High P = High S = High	There is relevance to substances that are harmful to the environment, including biocides which are also harmful to the health while still maintaining acceptable levels to efficiently preserve the paint and prolong its shelf-life. Nordic Ecolabel sets strict requirements to environmentally harmful substances as there are issues with unused paint is properly disposed of. The purpose of restricting environmentally harmful substances is to reduce the ability for such substances to intentionally or unintentionally be emitted to water, for example when washing brushes and tools.
Microplastics	R = High P = Medium S = Low	There is a relevance to primary and secondary microplastic discharge, as the DIY-business may contribute to primary microplastic sources by rinsing tools and brushes in water and contribute to secondary microplastic from fragmentation and particle release.

		There is a potential and some steerability to include requirements on labelling to instruct the consumer on how to properly wash tools and brushes and dispose of paints that are fragmented or sanded. While biobased polymers can reduce the overall environmental footprints of paints, they do not contribute to the microplastic reduction as they are still synthetic polymers. A requirement for primary microplastic emissions at the production plant shows low steerability as the paint manufacturer must send all processing water in accordance with legislation to an environmental and recycling company for remediation of the water before it enters the municipal waste system. Additionally, more clarifying labelling will be required for packaging to inform the consumer on how to properly dispose of unused paints as to not contribute to microplastic spread. Secondary microplastic may be difficult to introduce a requirement for as the final coating applied may have microplastic emissions spread out over its lifetime for many years. Nordic Ecolabel instead sets out requirement for more longer durable paints, as durability is considered one of the most promising paint characteristics to reduce microplastic emissions.[14]
Performance	R = High P = High S = High	There is a high relevance to paint performance as during use-phase its application affects the amount of paint needed to cover a surface, or its durability before the next repainting period. Nordic Ecolabelling sets strict quality requirements for high performing paints in order to increase the repainting period of paints. By doing this, the resource use of paints decreases as the substrate does not have to be repainted so often, and less frequent repaints results in a lower overall environmental impact.
Waste		
	R = Medium P = Medium S = Low	It is common to both recycle and reuse building materials. This is, however, governed by the building material itself and not the surface treatment of paint or varnish. The building material may comprise a number of different materials. It is therefore not practical to consider whether the paint or varnish is recycled or reused, since it is the building material itself that steers the whole recycling process. This phase is therefore extremely difficult to assess and thus the relevance of setting direct requirements for this waste phase is low. Nordic Ecolabelling's requirements to ingoing substances and their classifications steer the products toward it being more likely to recycle/reuse them. It is, however, relevant to consider the residues that remain in tins/packs of used paints and varnish. These can vary in quantity and content, depending on how they are used.

[14] Faber et al. (2021) Paints and microplastics Exploring recent developments to minimise the use and release of microplastics in the Dutch paint value chain. RIVM report 2021-0037

2.2 UN's Sustainable Development Goals

The UN Sustainable Development Goals (SDGs, Global Goals) are a universal call to action to fight poverty and inequalities, protect the planet and tackle climate change by 2030. The Nordic Swan Ecolabel is a powerful tool for securing a sustainable future. The Nordic Swan Ecolabel actively contributes to reach goal 12: responsible consumption and production. Nordic Swan Ecolabelled paints and varnishes have reduced environmental impact from production and use, and the requirements ensure high quality products that are long-lasting, durable and in a life cycle perspective reduce paint.

Nordic Swan Ecolabel paints and varnishes contributes to Goal 12 as follows:

- **Strict requirements for chemicals and emissions** limit the release of harmful substances to air and water and improve indoor air quality. Thus, the Nordic Swan Ecolabel contributes to the phasing out of substances that are harmful to health and the environment. This helps to prevent both users and factory workers from being exposed to harmful chemicals – and to reduce contamination of air, water and soil.

- There are requirements for **recycled** materials in packaging and instructions on the labels to **reduce waste generation**. This supports circular economy.

- A focus on increased use of raw materials that are both sustainable and renewable, such as bio-based feedstock, monomers and binders, contributes to **sustainable management and efficient use of natural resources**.

Nordic Swan Ecolabelled paints and varnishes contribute to other goals than 12 as follows:

Reduces the use of substances that are hazardous to health and the environment

- Strict requirements on chemicals
- Limits on indoor emissions improve indoor air quality

Limits emissions of hazardous chemicals and contributes to better water quality

- Strict requirements on chemicals

Requires efficient use of resources and reduces greenhouse gas emissions

- Production of titanium dioxide pigments focuses on energy savings, energy efficiency and use of renewable energy
- Production of cement and/or hydraulic binders focuses on CO2-reduction, energy savings and utilization of waste products from other industries

Prevents water pollution

- Strict requirements on chemicals reduces the release of harmful substances to the environment.

Protects biodiversity on land

- Strict requirements on chemicals reduces the release of harmful substances to the environment.

2.3 Microplastics and paints and varnishes

Paint consists of 37% of plastic polymers on average.[15] In general, plastic paints are dominant because they are inexpensive, they are easy to use, they fit all surfaces, are available in many colors and are very durable and protect for a long time.

Microplastics can be divided into primary and secondary microplastics. Certain paint products contain microspheres, i.e., microbeads or microfibers, to enhance their properties. Water-based paints additionally contain a potentially much larger source of primary microplastics including dispersed polymer particles. They act as a binder in cured paint layers, but remain primary microplastics when paints are disposed inadequately, for example when fluid is poured down the drain. The dissolved polymers in solvent-based paints are, however, not considered microplastics as they are not solid polymer particles. Secondary microplastics are formed by the fragmentation of macroplastics (>5 mm) by processes such as weathering of plastic litter and paint layers. Secondary microplastics consist of the entire paint matrix, including the binder polymers.

Microplastic can be harmful to health and the environment. Microplastics may pose acute and (sub) chronic toxicity, carcinogenicity, and developmental toxicity[16].

Estimates of the different sources vary. According to a recent report from EA-Environmental Action, paint is the sector with the largest emissions of microplastic to ocean and waterways, larger than tyres and textiles.[14] While the

[15] Paruta P, Pucino M, Boucher J (2022) Plastic Paints the Environment. EA-Environmental Action. https://www.e-a.earth/plasticpaintstheenvironment
[16] Yuan Z et al. (2022) Human health concerns regarding microplastics in the aquatic environment - From marine to food systems Science of The Total Environment, Volume 823, 1 June 2022 https://www.sciencedirect.com/science/article/pii/S0048969722008221

leakage from architectural, automotive, and industrial wood paints, is mostly distributed to land, 90% of the leakage from marine paint is distributed to ocean and waterways. For the general industrial and road markings sectors, the split is roughly 50-50. In terms of absolute leakage, a large fraction of leakage occurs in lower income countries in the Asia Pacific region (54% of total leakage), with the second largest contributor being lower income countries from the Middle East and Africa region (12%). Its high leakage rate is mostly linked to mismanagement of waste.[14]

The sources of plastic leakage are multiple but result mainly from two mechanisms: the leakage of macroplastics primarily stemming from mismanaged waste[17] and the leakage of primary microplastics, predominantly originating from abrasion mechanisms as well as voluntary/involuntary spills.

The Nordic Swan Ecolabel takes concerns about microplastics seriously and wants to limit emissions of microplastics from products when possible.

Banning the use of plastic in Nordic Swan Ecolabelled paint and varnishes will mean that the Nordic Swan Ecolabel is not relevant for large parts of the market. There are still only a few paint products available without polymers. These are not (yet) suitable for all paint applications.[18] The Nordic Ecolabel believes that it has a greater environmental effect to set requirements that can contribute to the paint on the market having less impact on the environment. Here, the overall requirements for chemicals, resource use and climate impact are important. Plastic increases the service life and durability of the paint. We do not want to reduce these qualities.

We suggest including information on recommended use on the paint can, such as specifying the amount of paint to be used, measures to prevent spillage and how to prevent spillage when washing of equipment after use. This will probably reduce the amount of paint used, spills during use and emissions from washing brushes/rolls.

3 Other labels

EU Ecolabel

The EU Ecolabel is a voluntary ecolabel which is supported by all Member States of the EU. The Nordic Ecolabel and the EU Ecolabel now have the same product types in their respective criteria. As opposed to the previous generation of Nordic Ecolabel paints, where the criteria for outdoor paints and varnishes were in Nordic Ecolabel Chemical building products.

17 Jambeck, J R, (2015) Plastic waste inputs from land into the ocean. Science, 347(6223), 768-771.
18 Faber et al. (2021) Paints and microplastics Exploring recent developments to minimise the use and release of microplastics in the Dutch paint value chain. RIVM report 2021-0037

Asthma and Allergy Associations

In Sweden[19], Norway[20], Denmark[21] and Finland[22] the respective Asthma and Allergy Associations offer a label for products that meet their criteria, with a focus on asthma and allergies. When it comes to paints, their criteria focus on emissions (e.g., after 4 days, but it may vary from country to country).

Environmental Product Declarations

Environmental product declarations (EPDs) give detailed environmental information without setting specific requirements for the products. The benefit of the declarations depends entirely on the purchaser's knowledge of the environmental conditions surrounding the product they are buying. At this moment there are several national systems for environmental product declarations, which all are based on the same main standard for EPD, EN 15804. There is no international system for environmental product declarations yet, but work on this is underway. In order to create an environmental product declaration, relevant product category rules must first be drawn up/agreed. Although EPDs are quite common within the construction industry generally, a search for EPDs on the website where all issued EPDs are listed (www.environdec.com) shows that EPDs are not as common for indoor paints[23].

Der Blaue Engel/The Blue Angel

The Blue Angel[24] is an ecolabel owned by The Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety in Germany. Amongst products that can be awarded with The Blue Angel is low-emission interior wall paints and low-emission and low-pollutant varnishes.

4 Justification of the requirements

This chapter presents new and revised requirements, explains the background to them, the chosen requirement levels and any changes compared with previous generation for indoor paints and varnishes and chemical building products (outdoor and industrial paints and varnishes). The appendices referred to are those that appear in the criteria document.

4.1 Definition of the product group

For the purpose of this product document and any extensions of the product group, the definition and what can be Nordic Swan Ecolabelled is defined by the definition e.g., *Paint, Varnish*, *Lasure, Wood stain, Powder coating, Masonry coating, UV-curable paint system* and *Primers,* products intended for use by consumers and professional users falling under the scope of Directive 2004/42/CE and paints and varnished manufactured for industrial applications under the scope of Directive 2010/75/EU. Nordic Ecolabel may include other types of products by request after assessment has been done for inclusion in the criteria.

[19] Astma och Allergiförbundet Sverige: www.astmaallegiforbundet.se (visited 2022-05-18)
[20] Norges Astma- og Allergiforbund: www.naaf.no (visited 2022-05-18)
[21] Astma-allergi Forbundet DK: www.astma-allergi.dk (visited 2022-05-18)
[22] Allergia-ja Astmaliitto (Fi): www.allergia.fi (visited 2022-05-18)
[23] The International EPD® System: https://www.environdec.com/library (visited 2022-05-18)
[24] The Blue Angel: https://www.blauer-engel.de/en/certification/basic-award-criteria (visited: 2022-05-18)

4.2 Definitions

For the purpose of this document, the following definitions shall apply, partly from EN ISO 4618 and article 2 in the EU-Ecolabel criteria document[25].

Definition	Description
Paint	Pigmented coating material, supplied in a liquid, paste or powder form, which, when applied to a *substrate*, forms an opaque dried *film* having protective, decorative or specific technical properties and after application dries to a solid, adherent, and protective coating.
Varnish	*Coating material* which when applied to a *substrate* forms a solid transparent *film* having protective, decorative or specific technical properties.
Ingoing substances	All substances in the Nordic Swan Ecolabelled product regardless of amount, including additives (e.g., preservatives and stabilizers) in the raw materials. Substances known to be released from ingoing substances (e.g., formaldehyde, arylamine, in situ-generated preservatives) are also regarded as ingoing substances.
Impurities	Residuals, pollutants, contaminants etc. from production, incl. production of raw materials, that remain in the Nordic Swan Ecolabelled product in concentrations less than 100 ppm (0.0100 w%). Impurities in the raw materials exceeding concentrations of 1000 ppm (0.1000 w%) are always regarded as ingoing substances, regardless of the concentration in the Nordic Swan Ecolabelled product. Examples of impurities are residues of the following: residues or reagents incl. residues of monomers, catalysts, by-products, scavengers, and detergents for production equipment and carry-over from other or previous production lines. The impurity limit of 100 ppm (0.0100 w%) applies to each individual substance that is excluded, i.e., Impurities with the same classification in different raw materials shall not be summed up to comply with the limit. The same contaminants in different raw materials also do not need to be summed.
Wood preservative	Product containing a *biocide* with primary purpose intended to inhibit the development of wood-destroying and/or wood-staining organisms in the wood to which it is applied.
Wood stain	Penetrating composition containing a *dyestuff* that changes the *colour* of a wood surface, usually transparent and leaving no surface *film*, the *solvent* which may be oil, denaturized alcohol, or water.
Lasure	*Coating material,* solvent- or water-based, containing small amounts of a suitable *pigment* and/or *extender* and used to form a transparent or semi-transparent *film* for decoration and/or protection of the *substrate.*
Powder coating	*Coating material* in powder form which, after fusing and possibly *curing*, gives a continuous *film.*
Tinting system	Method for preparing coloured paints by mixing a base with coloured tints.
Masonry coating	*Coating material* that produces a decorative and protective film for use on concrete, paintable brickwork, blockwork, rendering, calcium silicate board or fibre-reinforced cement.
Binding primers	*Coating* designed to stabilise loose substrate particles or impact hydrophobic properties.

[25] https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32021D1871&qid=1665411241922

UV curable paint system	Hardening of *coating material* by exposure to artificial ultra-violet radiation.
Alkyd resin (binder)	*Synthetic resin* resulting from the polycondensation of fatty acids (or oils) and carbonic acids with polyols.
Acrylic resin (binder)	*Synthetic resin* resulting from the polymerization or copolymerization of acrylic and/or methacrylic monomers, frequently together with other monomers.
Hydraulic binder	The chemical combination of lime, burnt clay or other pozzolanic material and water to form a stable compound as a result of hydration.
Anti-foaming agent	*Additive* that prevents foaming or reduces the foaming tendency of a *coating material.*
Anti-skinning agent	*Additive* that is added to the coating material to prevent skinning during production or storage of the coating material.
Preservative / Biocide	Additive added to a *coating material* to prevent organisms responsible for microbiological degradation from attacking a substrate, a *coating material,* or a *film* thereof.
In-can preservatives	*Biocide* used to prevent growth of microorganisms during storage of a water-based *coating material* or stock solution.
Dry-film preservatives	Products used for the preservation of films or coatings by the control of microbial deterioration or algal growth in order to protect the initial properties of the surface of materials or objects.
White and light coloured	Paints are those with a tri-stimulus (Y-value) > 70%.
Gloss paints	Are those which at an angle of incidence of 60° show a reflectance of ≥ 60.
Mid sheen paints	(Also referred to as semi-gloss, satin, semi matt) are those which at an angle of incidence of 60° or at 85° show a reflectance of < 60 and ≥ 10.
Matt paints	Are those which at an angle of incidence of 85° show a reflectance of < 10.
Dead matt paints	Are those which at an angle of incidence of 85° show a reflectance of < 5.
Transparent	And 'semi-transparent' means a film with a contrast ratio of < 98% at 120µ wet film thickness.
Opaque	Means a film with a contrast ratio of > 98% at 120µ wet film thickness.
Spreading rate	Surface area that can be covered by a given quantity of *coating material* to give a dried *film* of requisite thickness.
Blistering	*Convex* deformation in a *film*, arising from local detachment of one or more of the constituent *coats.*
Cracking	Rupturing of a dry *film* or *coat.*
Chalking	*Appearance* of a loosely adherent powder on the surface of a *film* or *coat* arising from the degradation of one or more of its constituents.
Flaking	Detachment of small parts of a *coating* due to loss of *adhesion*.
Nanomaterial	A nanomaterial is a natural, incidental, or purposely manufactured material containing particles, in an unbound state or as an aggregate or as an agglomerate and where, for at least 50% of the particles in the number size distribution, one or more external dimensions is in the size range 1-100 nm.
Volatile organic compound	Volatile organic compound (VOC) means any organic compound having an initial boiling point less than or equal to 250°C measured at a standard pressure of 101,3 kPa.

Semi volatile organic compound	Semi volatile organic compound (SVOC) means any organic compound having a boiling point greater than 250 °C and less than 370 °C measured at a standard pressure of 101,3 kPa.
Identity preserved	Certified product(s) from a certified site is kept separate from other sources throughout supply chain.
Segregated	Certified product from different certified sources is kept physically separate from non-certified product through each stage of the supply chain.
Mass balance	Certified physical product is not separated from and may be mixed with non-certified physical product at any stage in the production process, provided that the quantities are controlled.
Book & Claim	Certified products are completely decoupled from sustainability data.

4.3 General requirements

O1 Information about the product

The applicant must give detailed information on the indoor or outdoor paint and varnish product to which the application relates. The following information is required:

- Describe the product and its application method with subcategory denotation according to Directive 2004/42/EC.
- If the product forms part of a component system that jointly ensures the functioning of the product, the entire product must be Nordic Ecolabelled and not simply parts of it (e.g., a tinting system comprising a base and coloured tints or two-component varnishes comprising a base and a hardener). The requirement thus refers to the individual product and not to products in the same range (a range is here e.g., systems for exterior painting comprising primer, undercoat, and paint).
- Formulation detailing complete composition with a specification of all ingoing substances (see definition of raw materials and ingoing substances in Chapter 4.4). The description must include:
    - The trade name of the raw materials
    - Type of binder
    - The function of each raw material
    - Specification for product type of preservative, e.g. in-can or film preservative.
    - The chemical name and CAS no. (if possible) of the ingoing substances
    - Content in % per ingoing substance in the product

✉ Description of the product in accordance with the definition of what may be Nordic Ecolabelled.

✉ Description of how the product is to be used to achieve functionality, and what application method it is intended for.

✉ Formulation detailing complete composition with a specification of all raw materials and ingoing substances, as set out in Appendix 3.

Background to requirement O1

The purpose of this requirement is to give an overview of the paint that is to be certified with the Nordic Swan Ecolabel and that the product falls within the product definition. In cases of a tinting system comprising a base and coloured tints, both the base and the coloured tints must fulfil the requirements as the base is only functional with the coloured tints.

4.4 Chemical requirements

The requirements in the criteria document and accompanying appendices apply to all ingoing substances in the Nordic Swan Ecolabelled product. Impurities are not regarded as ingoing substances and are exempt from the requirements. Ingoing substances and impurities are defined below, unless stated otherwise in the requirements.

Ingoing substances: all substances in the Nordic Swan Ecolabelled product regardless of amount, including additives (e.g., preservatives and stabilizers) in the raw materials. Substances known to be released from ingoing substances (e.g., formaldehyde, arylamine, in situ-generated preservatives) are also regarded as ingoing substances.

Impurities: residuals, pollutants, contaminants etc. from production, incl. production of raw materials, that remain in the Nordic Swan Ecolabelled product in concentrations less than 100 ppm (0.0100 w%).

Impurities in the raw materials exceeding concentrations of 1000 ppm (0.1000 w%) are always regarded as ingoing substances, regardless of the concentration in the Nordic Swan Ecolabelled product.

Examples of impurities are residues of the following: residues or reagents incl. residues of monomers, catalysts, by-products, scavengers, and detergents for production equipment and carry-over from other or previous production lines.

The impurity limit of 100 ppm (0.0100 w%) applies to each individual substance that is excluded, i.e., Impurities with the same classification in different raw materials shall not be summed up to comply with the limit. The same contaminants in different raw materials also do not need to be summed.

O2 Classification of the product

The final product must not be classified and labelled according to Table 1.

Table 1 Classification of the product

Classification of chemical products CLP Regulation 1272/2008:		
Classification	**Hazard class and category**	**Hazard code**
Hazardous to the aquatic environment	Aquatic Acute 1 Aquatic Chronic 1 Aquatic Chronic 2 Aquatic Chronic 3 Aquatic Chronic 4	H400 H410 H411 H412 H413
Hazardous to the ozone layer	Ozone	H420
Acute toxicity	Acute Tox. 1 or 2 Acute Tox. 1 or 2 Acute Tox. 1 or 2 Acute Tox. 3	H300 H310 H330 H301

Classification of chemical products CLP Regulation 1272/2008:		
Classification	**Hazard class and category**	**Hazard code**
	Acute Tox. 3 Acute Tox. 3 Acute Tox. 4 Acute Tox. 4 Acute Tox. 4	H311 H331 H302 H312 H332
Specific target organ toxicity: single or repeated exposure	STOT SE 1 or 2 STOT SE 1 or 2 STOT RE 1 or 2 STOT RE 1 or 2	H370 H371 H372 H373
Skin corrosion/irritation	Skin Corr. 1A, 1B or 1C	H314
Aspiration hazard	Asp. Tox. 1	H304
Skin sensitisation	Skin Sens. 1, 1A or 1B	H317
Respiratory sensitisation	Resp. Sens. 1, 1A or 1B	H334
Carcinogenicity	Carc. 1A or 1B Carc. 2	H350 H351
Germ cell mutagenicity	Muta. 1A or 1B Muta. 2	H340 H341
Reproductive toxicity	Repr. 1A or 1B Repr. 2 Lact.	H360 H361 H362
Explosives	Unst. Expl. Expl. 1.1 Expl. 1.2 Expl. 1.3 Expl. 1.4 Expl. 1.5 Expl. 1.6	H200 H201 H202 H203 H204 H205 H206
Oxidizing liquids and solids	Ox. Liq. 1 to 3 Ox. Sol. 1 to 3	H271 H272
Organic peroxides and self-reactive substances and mixtures	Org. Perox. A to EF Org. Perox. A to EF Org. Perox. A to EF	H240 H241 H242
Extremely flammable aerosol and liquids	Aerosol 1 Flam. Liq. 1	H222 H224

Exemptions:

- H317 for outdoor paints and varnishes and industrial paints if the classification is due to the content of dry film preservatives.
- H412 for outdoor paints and varnishes and industrial paints if the classification is due to the content of preservatives.
- H400, H410 and H411 if the classification is due to metallic zinc in two-component products in anti-corrosion paints for industry and infrastructure.

Note that the responsibility for correct classification lies with the manufacturer.

✉ Safety data sheet in accordance with Annex II of REACH (Regulation 1907/2006) for each product in the application.

Background to requirement O2

Nordic Ecolabelling strives to ensure that the health and environmental impact of the products are as low as possible. The requirements therefore make it clear that products classified as harmful, very toxic, toxic, harmful to health, corrosive,

sensitizing, carcinogenic, mutagenic, toxic for reproduction, explosive, oxidising, and/or highly flammable cannot be ecolabelled. The criteria have however a few exemptions to allow some type of substances which results in product classification that goes against the criteria. It has been deemed necessary to exempt these due to the significant advantage they give to the product shelf-life and lifetime, therefore increasing the quality of the finished coating and resulting in a lower environmental impact. This is due to savings gained from not having to extract new raw materials and produce new products, and the effect relates to the entire life cycle.

Exempting environmental hazardous classification for anti-corrosion paints goes against Nordic Ecolabelling environmental toxins policy, but in this case, it can be justified by the fact that large commissioners, such as national transport agencies, hydropower industries, paper and pulp industry, the building sector and the offshore industry often require that anti-corrosion paints contain zinc. As an example, the following requirements are documented from the respective industry, SIS-TS 44, AMA Anläggning, Painting instructions for hydropower stations, SSG 1012 and EN ISO 12944-9. The fact that the requirements of these industries look the way they do is because paints with zinc-rich content usually provides a much more durable coating. Zinc greatly reduces corrosion on steel, either through active cathodic protection or by forming anti-corrosive zinc salts. Zinc is not toxic to humans but can, however, damage aquatic organisms, therefore it is important to reduce zinc leaching where there is a risk that the zinc contaminates sensitive recipients. Compared to hot dip galvanized steel, anti-corrosion paints leach less zinc.

An example is zinc silicate paints which provides a slower leaching if the zinc pigment has been passivated by chemically bounding to the silicate. Zinc in the form of zinc silicate has a relatively low solubility, which can reduce zinc leakage in environments with high corrosivity. Traditional epoxy and polyurethane anti-corrosion paints contain less zinc, since the zinc in this type of paint is also encapsulated by topcoats, and they also probably leak less zinc compared to zinc-plated steel. However, these types of paints involve risks related to CMR-classified substances, such as volatile aromatic hydrocarbons (VAH) and allergens. Traditional anti-corrosion paints also have an impact on the environment in the form of leaching of other toxic substances, leeching of microplastics to the marine environment and emissions of volatile organic compounds (VOC) and formation of ground-level ozone. Although zinc leaching occurs from these anti-corrosion paints, it is a better alternative from a life cycle perspective to exempt zinc than to allow VOC, VAH, allergens, and CMR-substances. Furthermore, resources are saved by using products with a long durability, which results in the repainting periods being in longer intervals and the consumption of resources and the risks of use are reduced.

O3 Classification of ingoing substances

The product must not contain ingoing substances that are classified according to the Table 2.

Table 2 Classification of ingoing substances

Classification of ingoing substances CLP Regulation 1272/2008:		
Classification	**Hazard class and category**	**Hazard code**
Carcinogenicity	Carc. 1A or 1B Carc. 2	H350, H350i H351

Germ cell mutagenicity	Muta. 1A or 1B Muta. 2	H340 H341
Reproductive toxicity	Repr. 1A or 1B Repr. 2 Lact.	H360 H361 H362
Respiratory sensitisation	Resp. Sens. 1, 1A or 1B	H334
Specific target organ toxicity: single exposure or repeated exposure	STOT SE 1 STOT RE 1	H370 H372

Exemptions:

- Preservatives classified as H370 and H372.
- Formaldehyde (CAS no. 50-00-0) as an impurity, see separate requirements O6.
- Respirable crystalline silica/quartz classified as H372 with a maximum content of 1% in raw materials, see separate requirement O10.
- Glyoxal (CAS no. 107-22-2) if the pH in the final product is above 8.
- Trimethylolpropane (TMP) (CAS no. 77-99-6), maximum content of 1% in pigments. Time-limited exemption valid until 2025-05-31.
- Titanium dioxide (CAS no. 13463-67-7).
- Bisphenol A (CAS no. 67-56-1) up to 5 ppm in epoxy paints.

✉ Declaration in line with Appendices 1 and 2 from the manufacturer of the product and the manufacturer of each raw material. Documentation of exemptions for each substance is done in appendix 1 and 2, together with a statement as to why the substance is present in the product/raw material and other documentation if appropriate.

✉ Safety data sheet for all raw materials in line with Annex II to REACH (Regulation (EC) No 1907/2006).

Background to requirement O3

For the same reasons described under requirement O2, there is a requirement that none of the ingoing substances are classified as carcinogenic, mutagenic, or toxic for reproduction as these have inherently dangerous properties. Same reasoning applies regarding exemptions of a few substances as O2 which are deemed necessary to improve the quality and lifetime of the product, which in overall would result in lower exposure as repainting periods are reduced.

O4 Environmentally harmful substances

Ingoing substances classified as environmentally harmful with hazard phases H410, H411 and/or H412, according to CLP Regulation (1272/2008), are limited in the product according to the following formula.

M*100*H410 + 10*H411 + H412 ≤ 6%

Where:

H410 is the concentration of substances classified with H410 in percent

H411 is the concentration of substances classified with H411 in percent

H412 is the concentration of substances classified with H412 in percent

Where M is the multiplying factor for H410 as stated in CLP.

If information about a substance's harmfulness to the environment (in the form of data concerning toxicity and degradability or toxicity and bioaccumulation) is

not available, the substance is treated as environmentally harmful – H410, and multiplication factor 1000.

For tinting systems, a worst-case calculation is done with the colour with most tinting paste and the base paint with most environmentally hazardous substances.

Exemptions:

- Preservatives are exempted from the requirement, however, requirement O2 and O5 must still be fulfilled.
- Zinc oxide used as stabilizer for preservatives may be exempted in maximum 400 ppm in the final product. Any amount above 400 ppm will be added to the calculation in reference to the above formula.
- Metallic zinc is exempted in two-component products in anti-corrosion paints for industry and infrastructure.

✉ Declaration in line with Appendices 1 and 2 from the manufacturer of the product and the manufacturer of each raw material.

✉ Safety data sheet for all constituent substances in line with Annex II to REACH (Regulation (EC) No 1907/2006).

✉ Calculation clearly showing that the requirement is fulfilled.

Background to requirement O4

Environmentally harmful substances that are classified as toxic to aquatic organisms are restricted and can only appear in small quantities. The purpose of restricting these substances is to reduce the ability for such substances to be emitted to water by incorrectly rinsing equipment, e.g., when washing brushes and tools. Preservatives are however exempted from the requirement because they are limited in O5.

The limit for environmental hazardous substances has been lowered and combined with indoor and outdoor paints based on licensing data of previous versions.

Zinc oxide (ZnO) has been added as an exemption from the calculation up to 400 ppm as paints containing BIT as preservative may benefit from a stabilizing effect provided by ZnO. Without ZnO the paint lifetime would be reduced to a few weeks, also reducing its shelf life. Other alternatives to boosters would include use of more preservatives, such as formaldehyde releasing agents which have unwanted properties. This exemption is similar to EU-Ecolabels derogation for ZnO used as a stabilizer, however, with the exclusion of zinc pyrithione (ZPT) for the Nordic Swan as ZPT is not allowed due to its classification.

Metallic zinc in two-component products for anti-corrosion paint for industry and infrastructure is exempted from the requirement because zinc is necessary in order to achieve anti-corrosion properties. Additionally, zinc leeching to the environment is significantly reduced due to zinc being inhibited by silicate in e.g., two-component zinc silicate coatings compared to traditional galvanised steel and steel coated with thermally sprayed zinc. As only professionals are allowed to use the products, the risk of incorrect handling is minimal. Furthermore, when using two-component products, left-over zinc is recycled and there is minimal spill.

O5 Preservatives

- Only preservatives compliant with product-type 6 and product-type 7 according to Regulation (EU)528/2012 (The Biocidal Products Regulation) can be used.
- The amount of preservative/combination of preservatives is limited in the final product including tinting paste according to the tables 3 and 4 and the final classification of the product according to O2 and classification of constituent substances according to O3.

The amount of preservatives may be reported in one of the following ways:

- The amount of preservatives must not exceed the maximum theoretical amount at the time of the production. The limit value in the tables below and the amount shall be calculated based on the added preservatives and the maximum amount in the raw materials.
- Alternatively, the amount of preservatives can be measured analytically by high-performance liquid chromatography (HPLC) or similar methods and shall be based on the maximum amount in the final paint with the same limit values as the tables below.

For tinting systems, a worst-case calculation must be performed for the colour with most tinting paste and the base paint with highest content of preservative and isothiazolinone compounds.

Table 3 Concentration limits for preservatives in indoor paints and varnishes in the final product.

Indoor paints and varnishes		
Product type	**Isothiazolinones**	**Preservatives total**
Indoor paints and varnishes* Wet room paints*)**	600 ppm (0.0500% w/w) 600 ppm (0.0500% w/w)	900 ppm (0.0900% w/w) 1600 ppm (0.1600% w/w)

Note that Dithio-2,2'-bis-benzmethylamide (DTBMA) is to be included in the total amount of isothiazolinones.

* *Paints, varnishes, base paints with tinting paste etc.*

***Indoor paints intended for use in areas with high humidity, including kitchens and bathrooms.*

Table 4 Concentration limits for preservatives in indoor/outdoor industrial paints and varnishes and outdoor paints and varnishes.

Industrial and outdoor paints and varnishes		
Product type	**Isothiazolinones***	**Preservatives total**
Indoor industrial paint and varnish	600 ppm (0.0500% w/w)	1500 ppm (0.1500% w/w)
Outdoor industrial paint and varnish	1500 ppm (0.1500% w/w)	4500 ppm (0.4500% w/w)
Outdoor paint and varnish	1500 ppm (0.1500% w/w)	4500 ppm (0.4500% w/w)
Anti-corrosion paint for industry and infrastructure	100 ppm (0.0100% w/w)	200 ppm (0.0200% w/w)

Note that Dithio-2,2'-bis-benzmethylamide (DTBMA) is to be included in the total amount of isothiazolinones.

* *Reaction mass of 5-chloro-2-methyl-1,2-thiazol-3(2H)-one and 2-methyl-1,2-thiazol-3(2H)-one; [CMIT/MIT] (CAS no. 55965-84-9), 2-methyl-2H-isothiazol-3-one; [MIT] (CAS no. 2682-20-4), 2-methyl-1,2-benzothiazol-3(2H)-one; [MBIT] (CAS no. 2527-66-4) are limited to 15 ppm each.*

✉ Declaration in line with Appendices 1 and 2 from the manufacturer of the product and the manufacturer of each raw material.

☒ Report of results from analysis by HPLC or similar method showing that the requirement concerning preservatives is fulfilled.

☒ Calculation clearly showing that the requirement concerning preservatives is fulfilled.

Background to requirement O5

Preservatives are added to liquid products to prevent bacterial growth in the product (in-can) or on the surface with the use of dry-film preservative.

Paints and varnishes have a long shelf life at the store and at the consumer. Preservatives are needed in paint and varnishes because e.g., filling raw materials may have contaminants that can result in microbial growth and deterioration of the products.

Painting exterior wood is of great importance considering the large scale of wooden house buildings and wooden structures in the Nordic region. When moisture penetrates the wood, microorganisms such as algae and mould form and the wood quickly become black-spotted from growth. Effective protection in the form of film preservation is essential. Without film preservation, the protection provided by the covering paint layer weakens, giving rise to mould and algae attack, and the wood becomes ugly and eventually weakens. The consequence is that the repainting periods come in shorter intervals, consumers/professionals buy more paint and the material and resource consumption to produce the outdoor paints increases. In addition, the use of algae detergents is increasing, as is the replacement of wood.

The limit for preservatives for outdoor paints and varnishes and industrial paints has been lowered compared to the previous version based on licensing data. The new requirement also allows the use of encapsulated biocides. For the calculation only the content of free actives is ecotoxicologically relevant and is subject to the classification of mixtures regarding environmental hazardous properties. Therefore, Nordic Ecolabel accepts calculations of total preservatives based on free actives as stated in the safety data sheet from the biocidal manufacturer.

Encapsulated biocides have a controlled release of active substance, meaning that the mechanisms maintain a minimum biocide concentration in the coating interface over an extended period, preventing fungal growth[26]. Porous encapsulation controls the diffusion coefficient of the biocides, leaving a smaller amount of fungicide in the aqueous phase, and improving the ecotoxicological classification of the coating, enabling a less stringent labelling requirement. The encapsulation extends the useful life of the coating while also reducing the impact of biocides on the environment and improving handling safety[27]. This results in longer lifetime of the coating, less biocide is used and less biocides are leeched to the environment[28].

[26] Alexander, D. Sustainable global biocide solutions, (2015).
[27] Vermeirssen, et al., (2018). Ecotoxicological assessment of immersion samples from façade render containing free or encapsulated biocides
[28] Enhanced Dry-Film Coating Performance Through Controlled-Release IPBC – Paints and Coatings Industry (2011)

O6 Formaldehyde

Indoor paints and varnishes:

- The emissions of formaldehyde of the final product must not exceed 0.06 mg/m^3 measured in the air of a test chamber according to EN 16516.

Outdoor paints and varnishes and industrial paints:

The level of free formaldehyde in the final product must not exceed 25 ppm (0.0025% by weight, 25 mg/kg) measured by HPLC or similar methods*.

** The Merckoquant method can also be used, but the level must then be max 20 ppm.*

For tinting systems, the colour with the tinting paste and the base paint predicted to contain the highest theoretical amount of formaldehyde (worst case) shall also be determined and measured.

✉ Declaration in line with Appendices 1 and 2 from the manufacturer of the product and the manufacturer of each raw material.

✉ Test report according to EPA 8315A, VdL-RL03, Merckoquant method, HPLC, EN 16516 or other equivalent test method for the products showing that requirement is met.

✉ Documentation showing that the test laboratory fulfils the requirement in appendix 4.

Background to requirement O6

Formaldehyde is a toxic and allergenic substance that has carcinogenic effects and should therefore be avoided as far as possible.

In this generation of the criteria, the requirement has been updated to separate indoor paints and varnishes from outdoor paints and varnishes and industrial paints.

For indoor paints and varnishes, the focus is on maintaining a good indoor air climate, while staying in compliance with the EU Taxonomy and legislation regarding exposure to formaldehyde. The requirement for indoor paints and varnishes allows the measurement of formaldehyde by emission of building materials in compliance with Annex 1 of the EU Taxonomy Climate Delegated Act of 21 April 2021 or later, as it is relevant form of testing to protect users from exposure.

For outdoor paints and industrial paints, the requirement is similar as to the previous generation of Indoor Paints and Chemical Building Products.

The Merckoquant method is a colorimetric test which do not include analytical results, and the strips are limited within specific ranges of formaldehyde in mg/l. The previous 25 mg/l limit would fall between 20 mg/l or 40 mg/l, meaning there is a risk that the product could contain more than the allowed limit as it is a colorimetric test. Therefore, for the Merckoquant method, the maximum allowed limit has been lowered to 20 mg/kg to be within the colorimetric range, while all other analytical methods of determination maintain the 25 mg/l limit.

To minimising the costs to applicants the formaldehyde content or emission shall be determined for the white base or transparent tinting base predicted to contain

the highest theoretical amount of formaldehyde. The content of the colour tint which is predicted to contain the highest theoretical amount of formaldehyde (worst case) shall also be determined.

O7 Residual monomers in polymers

For each polymer present in the product >1% the quantity of residual monomers and its classifications must be stated. There cannot be more than 100 ppm of each classification in Table 5.

For tinting systems, a worst-case calculation is done with the colour with the most tinting paste and the base paint with most residual monomers.

Table 5 Classification of residual monomers

Classification according to CLP Regulation 1272/2008:		
Classification	**Hazard class and category**	**Hazard code**
Carcinogenicity	Carc. 1A or 1B Carc. 2	H350, H350i H351
Mutagenic	Muta. 1A or 1B Muta. 2	H340 H341
Germ cell mutagenicity	Repr. 1A or 1B Repr. 2 Lact.	H360 H361 H362
Respiratory sensitisation	Resp. Sens. 1, 1A or 1B	H334
Specific target organ toxicity: single exposure or repeated exposure	STOT SE 1 or 2 STOT SE 1 or 2 STOT RE 1 or 2 STOT RE 1 or 2	H370 H371 H372 H373

The quantity of residual monomers is to be stated for newly produced polymers.

Exemptions:

- Vinyl acetate (CAS no. 108-05-4) as residual monomer in polymers up to 500 ppm.

✉ Declaration in line with Appendix 2 from the manufacturer of each raw material.

Background to requirement O7

Residual monomers in polymers can cause negative health effects, for example due to the allergic and carcinogenic properties of the monomers. This risk is considered so great that it necessitates a separate requirement to limit the level of residual monomers in the polymer. Monomers tend to reduce over time, as many monomers are volatile compounds. The requirement relates to the newly produced polymer since it is important to reduce the impact at source and to this end it is most practical for the polymer manufacturer to perform the analysis. The limit of 100 ppm of residual monomers in polymers with classification according to Table 6 is based on licensing data.

Vinyl acetate is used in polymer dispersions in paints. In the previous version, the classification of Carc. 2 H351 was relatively new in relation to the publication of the criteria, and a limit of 1000 ppm was exempted as there was not much focus in reducing the monomer in polymers. As a result, it was difficult to obtain polymers containing less than 100 ppm of vinyl acetate. Steps have been taken to reduce vinyl acetate in polymers. However, according to our licensing data, the

general limit of 100 ppm is still too strict. Therefore, vinyl acetate is exempt up to 500 ppm.

O8 Heavy metals

The following heavy metals or heavy metal compounds must not be present in the product or in its raw materials:

- Cadmium
- Lead
- Chromium VI
- Mercury
- Arsenic
- Barium
- Selenium
- Antimony

Traces of the above-mentioned metals from residuals can be included up to 100 ppm (100 mg/kg, 0.0100% by weight) per single metal in the raw material.

Exemptions:

- Barium sulphate and other equally insoluble barium compounds.
- Antimony in pigments contained in a TiO_2 rutile lattice on the following terms: test results must prove that the molecular structure is inert, and that the environmental and health effects of the pigment are on the same level as, or better than, the results for C.I Pigment Brown 24 CAS no. 68186-90-3 and C.I Pigment Yellow 53 CAS no. 8007-18-9 in the report: UNEF Publications, OECD SIDS Initial Assessment Profile (www.inchem.org).

✉ Declaration in line with Appendices 1 and 2 from the manufacturer of the product and the manufacturer of the raw material.

✉ For pigment that contains antimony integrated into a TiO_2 rutile lattice, documentation must be submitted to show that the molecular structure is inert, and that the environmental and health effects of the pigment are on the same level as, or better than, the results for C.I Pigment Brown 24 CAS no. 68186-90-3 and C.I Pigment Yellow 53 CAS no. 8007-18-9 in the report: UNEF Publications, OECD SIDS Initial Assessment Profile (www.inchem.org).

Background requirement to O8

Nordic Ecolabelling restricts heavy metals ("heavy metals" refers in this case to heavy and particularly environmentally harmful metals as specified in the text) because they are toxic to people and other organisms, both on land and in the aquatic environment. On forested land, metals can end up in microorganisms in such way that the degradation of dead organic material and thus the release of nutrients are slowed[29].
On agricultural land, metals can disrupt the organisms in the soil, or have a directly toxic effect on plants. Metals on agricultural land can also be taken up by crops to varying degrees, leading to human exposure[30]. Mercury, cadmium, arsenic and lead are toxic to the human nervous system and kidneys, amongst other things, and the metals can

[29] Government official investigations: https://www.regeringen.se/49bbb3/contentassets/c0f10a5d57534a48b9b8641aba971a1e/bilagorna-6-9 (visited 2022-06-01)
[30] Government official investigations: https://www.regeringen.se/49bbb3/contentassets/c0f10a5d57534a48b9b8641aba971a1e/bilagorna-6-9 (visited 2022-06-01)

accumulate in living organisms[31]. Chromium VI is classified as: very toxic, CMR and harmful to the environment.

The metals and their compounds – cadmium, lead, chromium VI, mercury, arsenic, barium (except for barium sulphate, and other equally insoluble barium compounds), selenium and antimony – must therefore not be included in the product or in its ingoing substances. It is, however, accepted that ingoing substances may contain traces of the substances in the form of residuals. Trace amounts of each heavy metal must not exceed 100 ppm in the raw material. This means that the requirement is stricter than the general limit for residuals specified in section "5.4 Chemical requirements". It is relevant to set a stricter requirement to residuals of heavy metals since they are included in the raw materials in paints as sand, gravel etc. The requirement has been set by the Nordic Ecolabel to steer toward natural raw materials with lower amounts of residuals.

Barium sulphate (and other equally insoluble barium compounds) are used as fillers in paints and are exempted from this requirement since there are not many other alternatives available with the same function.

Note that selenium is not a metal, but it interacts with many metals and behaves in the same way in the environment and has therefore been included in the requirement. Arsenic is included in the requirement due to its status as a semi-metal.

O9 Titanium dioxide

The following applies if the product contains more than 3.0% by weight of titanium dioxide (TiO_2) (CAS no. 13463-67-7):

- Energy consumption:

The raw material manufacturer must fulfil requirement a) concerning overall energy consumption to produce TiO_2 pigments based on the specific process used at the manufacturing plant. If both chloride and sulphate processes are used to manufacture the pigments for the Nordic Swan Ecolabelled paint or varnish, the energy consumption for both processes shall be fulfilled in accordance with the requirement. The raw material manufacturer must also fulfil either requirement b) or c), in conjunction with requirement a).

a) The overall energy demand to produce TiO_2 pigments at the manufacturing plant, which include ore preparation to calcination, finishing and effluent treatment with the use of externally purchased electricity, steam and gas and heavy fuel oils and coal must not exceed the values below:

Table 6 Maximum energy demand for the different processes to produce TiO_2 pigments

Overall energy consumption expressed as giga joules per tonne TIO2-pigments	
Manufacturing process	**Limit**
Sulphate process	20 GJ/t
Chloride process	15 GJ/t

b) The manufacturing plant has its own renewable electricity production from solar PV panels that is planned to cover at least 20% of the total yearly electricity demand* or,

c) Implementation of energy management system for the manufacturing plant in accordance with ISO 50001 or performed an energy audit in accordance with ISO 50002 or EN 16247-1. Based on the analysis, the

[31] Toxicity, mechanism and health effects of some heavy metals: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4427717/ (visited 2022-06-01)

company must present an action plan to reduce energy consumption (ISO 50002 or EN 16247-1).

* *Based on the average electricity use over the last 3 years.*

- Emissions:

Emissions from the production of TiO_2 shall not exceed the values given in Table 7 and 8 for the sulphate process and the chloride process, respectively.[32]

Table 7 Emission limits from the production of TiO_2 using the sulphate process.

Emission limits from the production of TiO_2	
Sulphate process	**Limit**
SOx expressed as SO_2: Sulphate waste:	7.0 kg/tonne TiO_2 500 kg/tonne TiO_2

Table 8 Emission limits from the production of TiO_2 using the chloride process.

Emission limits from the production of TiO_2	
Chloride process	**Limit**
When using natural ore: When using synthetic ore: When using slag ore:	103 kg chloride waste/tonne TiO_2 179 kg chloride waste/tonne TiO_2 329 kg chloride was/tonne TiO_2

If more than one type of ore is used, the values apply proportionately to the ore type used.

- Occupational exposure:

The raw material manufacturer must meet the requirements for powder handling according to O10.

☒ Declaration, see Appendices 1 and 2, from the manufacturer of the product and the manufacturer of each raw material.

☒ Energy report containing total energy consumption per tonne of titanium dioxide produced on annual basis. . An energy report prepared for other purposes such as internal, external, or corporate reporting requirements will also be accepted.

☒ Documentation detailing the planned renewable electricity production in relation to total electricity use.

☒ ISO 50001 certificate for the manufacturing plant or documentation showing energy-assessments according to ISO 50002 or 16247-1.

☒ A description and calculation from the titanium dioxide-manufacturer showing that the requirement for emissions is fulfilled.

☒ Description of how powdered raw materials are handled during the production process.

Background requirement to O9

Titanium dioxide is a significant contributor to the environmental impact of paint[33], however it is important in enhancing the performance of the paint. A carefully balanced approach is needed in order to ensure that high quality paints

[32] Derived from the Best Available Techniques for the Production of Basic Inorganic Chemicals (BREF) (August 2007).

[33] https://ec.europa.eu/environment/eussd/smgp/documents/PEFCR_Decorative%20Paints_Feb%202020.pdf, accessed on 2022-11-09

are produced, whilst minimising the impact to the environment. It is difficult to steer towards a specific manufacturing process for TiO_2 pigments, as it is heavily reliant on geographical location of the manufacturing plant, local policies and ore supply. This need to be considered to determine the best processing option with the least environmental impact[34].

Both the sulphate and the chloride processes are considered very energy intensive and results in both direct and indirect CO_2 emissions. Direct emissions occur because of the chemical reactions in the processes at the manufacturing plant while indirect emissions are the emissions generated along the energy supply chain up to the point of operation. A requirement has been introduced for the overall energy demand to produce TiO_2-pigments for the traditional sulphate and chloride processes, with overall energy used per site derived from best available technique reference document for large volume inorganic chemicals[35]. The overall energy consumption is based on the three major sections, including ore preparation to calcination, finishing and effluent treatment for electricity use, steam, gas and heavy fuel oils and coal. Reporting values for the total energy consumption can be complicated, as titanium dioxide is synthesized by a number of processes using a variety of starting materials. Another complexity occurs when different energy reports consider different system boundaries[36]. Furthermore, an increase of energy required in the finishing operations is foreseen if customer specifications call for finer particle size[37]. Due to lack of steerability from the Nordic Swan Ecolabel's part, only average feed to gate energy consumption is included in the requirement.

Nordic Ecolabelling actively promotes the shift from fossil fuels to sustainable renewable energy. The world's combined energy consumption has major consequences. According to the International Energy Agency[38], electricity, and heat generation, together with transport, account for over two thirds of the global CO_2 emissions. An optional requirement has been included to promote the shift towards sustainable renewable energy, where 20% of the electricity demand on a yearly basis must be based on solar photovoltaic (PV) panels. The requirement is based on dialog with industry stakeholders.

An optional requirement has been introduced to reduce the energy demand to produce TiO_2-pigments with certified energy management systems and proved energy reduction commitments. By requiring certification of the manufacturing plant in accordance with e.g., ISO 50001, the plant is recognized as working with international climate goals to reduce their energy demand and/or implement energy efficient measures by introducing operational changes, such as those implemented under the ISO 50001 certification.

[34] Middlemas et al., (2015) Life cycle assessment comparison of emerging and traditional Titanium dioxide manufacturing processes
[35] https://eippcb.jrc.ec.europa.eu/sites/default/files/2019-11/lvic-s_bref_0907.pdf
[36] Middlemas (2014). Energy-conscious production of titania and titanium powders from Slag. https://core.ac.uk/download/276265554.pdf
[37] https://eippcb.jrc.ec.europa.eu/sites/default/files/2019-11/lvic-s_bref_0907.pdf
[38] https://www.iea.org/ (Visited: 2022-07-08)

The production of titanium dioxide is also associated with emissions of sulphates, SO_2 and chloride[39]. The requirement level has been calculated based on the 38 g TiO_2/m^2 with 98% opacity on a standard reference surface.

O10 Powdered raw materials

Raw materials in powder form must be added in a closed system, in a suspension or by means of a method that promotes a “low-dust” working environment e.g., using protective equipment which heavily reduce the dust or completely remove the dust from the raw materials (e.g., exhaust ventilation, personal protective equipment and clear safety instructions).

✉ Description of how powdered raw materials are handled during the production process.

Background requirement to O10

The aim of the requirement is to ensure that the working environment is as dust-free as possible to secure a good working environment for those involved in manufacturing the indoor paint and varnishes.

Respirable crystalline silica/quartz is present as an impurity in most mineral fillers and is therefore commonly used in paints. It is classified as STOT RE 1 (see O3), but when it is mixed into the wet paint it binds to larger particles and is therefore no longer "respirable". To protect the people working in the production the requirement for constituent powdered substances is important for raw materials containing respirable silica, which is in powder.

Titanium dioxide has been included in this requirement due to the inherent classification of titanium dioxide as suspected carcinogen through inhalation. Therefore, to ensure that the TiO_2 risks that give rise to its classification are controlled, an assessment of the process and procedures on the handling and conditions of TiO_2 in powder form in regard to the occupational safety and health needs to be documented by the raw material producer to reduce worker exposure to dust.

Compliance with the requirement must include general information on how powdered raw material is dosed, with what types of equipment, if any air extraction system is used and how it is being monitored to determine if the systems are operating and functioning properly, how employees are trained regarding risks of powder handling, protective equipment used and how dust exposure is controlled towards legislation to make sure that the workers are not overly exposed to dust.

O11 Nanomaterials/-particles

- Nanomaterials/-particles must not be added or be present in the product.

Nanomaterials/-particles are defined according to the EU Commission Recommendation on the Definition of Nanomaterial (2022/C 229/01)::

‘Nanomaterial' means a natural, incidental, or manufactured material consisting of solid particles that are present, either on their own or as identifiable

[39] Best Available Techniques for the Production of Basic Inorganic Chemicals (BREF) (August 2007).

constituent particles in aggregates or agglomerates, and where 50 % or more of these particles in the number-based size distribution fulfil at least one of the following conditions:

(a) one or more external dimensions of the particle are in the size range 1 nm to 100 nm;

(b) the particle has an elongated shape, such as a rod, fibre or tube, where two external dimensions are smaller than 1 nm and the other dimension is larger than 100 nm;

(c) the particle has a plate-like shape, where one external dimension is smaller than 1 nm and the other dimensions are larger than 100 nm.

Exemptions:

- Pigments. Nano-TiO_2 is not considered a pigment.
- Naturally occurring inorganic fillers in accordance with annex V point 7 in REACH.
- Synthetic amorphous silica (SAS). This exemption applies to non-modified SAS. Chemically modified colloidal silica can be included in the products if the silica particles form aggregates in the final product. Any surface treatment of nanoparticles must fulfil requirement O3 (Classification of constituent chemical substances) and requirement O12 (Prohibited substances).
- Unmodified calcium carbonate (grounded calcium carbonate, GCC) and precipitated calcium carbonate (PCC).
- Polymer dispersions.

✉ Declaration in line with Appendices 1 and 2 from the manufacturer of the product and the manufacturer of each raw material.

Background requirement to O11

Nanomaterials are a diverse group of materials which are often more reactive and can have altered properties compared to their bulk counterparts. Further, different sizes, shapes, surface modifications and coatings can also change their physical and chemical properties, which complicates the risk assessment. There is concern among regulators, scientists, environmental organisations, and others

about the insufficient scientific knowledge regarding the potential detrimental effects on health and the environment.[40,41,42,43,44,45,46,47,48]

Nanomaterials can cause increased or unwanted effects in humans or the environment since nano particles can cross biological membranes and thus be taken up by cells and organs. One of the main concerns are linked to free nanoparticles, as some of these – when inhaled – can reach deep into the lungs, where the uptake into the blood is more likely. Inhalation studies in rats have shown that nanoparticles may induce more irreversible inflammation and result in more tumours than an equal mass of larger particles.[49]

Although concerns about nanomaterials have emerged over the last 30 years, not all nanomaterials are new. Most nanomaterials on the market today have either been in use for decades or are more recently engineered nanoforms of previously existing materials.[50] 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.[51] In the future, other types of engineered nanomaterials are expected to come onto the market.[52]

In the product group of paints and varnishes it is hard to formulate requirements to the content of nano particles. Paints and varnish products consist of many ingoing substances, and it is difficult to keep an overview of all ingoing components and the size distributions of them. Many of the traditional raw materials used in paints and varnishes consists of particles in nano size which are referred to as nano materials according to the EU commission's definition.

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[40] UNEP (2017) Frontiers 2017 Emerging Issues of Environmental Concern. United Nations Environment Programme, Nairobi. https://wedocs.unep.org/bitstream/handle/20.500.11822/22255/Frontiers_2017_EN.pdf?sequence=1&isAllowed=y
[41] 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=aHR0cDovL2Fzc2VtYmx5LmNvZS5pbnQvbncveG1sL1hSZWYvWDJILURXLWV4dHIuYXNwP2ZpbGVpZD0xOTczMCZsYW5nPUVO&xsl=aHR0cDovL3NlbWFudGljcGFjZS5uZXQvWHNsdC9QZGYvWFJlZi1XRC1BVC1YTUwyUERGLnhzbA==&xsltparams=ZmlsZWlkPTE5NzMw
[42] 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.
[43] 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
[44] 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
[45] 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
[46] SweNanoSafe. Nationell plattform för nanosäkerhet. https://swenanosafe.se/ (visited 2022-06-07)
[47] BEUC – The European Consumer Organisation. Nanotechnology. www.beuc.eu/safety/nanotechnology (visited 2022-06-07)
[48] 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
[49] EU observatory for nanomaterials Risk assessment of nanomaterials – further considerations https://euon.echa.europa.eu/documents/23168237/24095644/nano_in_brief_en.pdf/295c5f46-0f1e-4ad5-72a5-81c44b45bdd5
[50] EU observatory for nanomaterials and European Chemicals Agency (2019) What are next generation nanomaterials and why are regulators interested in them? Information note. https://euon.echa.europa.eu/documents/23168237/24095696/190919_background_note_next_gen_materials_en.pdf/b9178324-5a69-2e4b-1f2b-aac2c2845f45
[51] 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
[52] EU observatory for nanomaterials and European Chemicals Agency (2019) What are next generation nanomaterials and why are regulators interested in them? Information note. https://euon.echa.europa.eu/documents/23168237/24095696/190919_background_note_next_gen_materials_en.pdf/b9178324-5a69-2e4b-1f2b-aac2c2845f45

There are also examples of traditional raw materials containing a small fraction of nanoparticles that are produced with an even larger fraction of ultrafine particles than earlier and that the particles in many cases have a surface treatment. As a starting point, we prohibit new nano materials based on the precautionary principle. Several nano-sized traditional paint raw materials are accepted, as described in the exemptions.

Nano-TiO_2 as a coating on windows has shown that the photocatalytic effect is reduced and that TiO_2 is released from the surface into the environment when subjected to ageing tests (water, salt, UV light)[53]. It is, however, not entirely clear whether it is nano- TiO_2 that is released or larger TiO_2 particles. The study shows that the photocatalytic effect is reduced by ageing without being concluded with what the cause is. Nano-TiO_2 is not considered a pigment, but a new nanomaterial that is added to give the products new properties, such as a self-cleaning effect in paints. These are not exempted from the requirement and therefore must not be used in Nordic Ecolabelled paint and varnishes.

Pigments are exempted from the requirements concerning nanoparticles, since they are necessary in indoor paint and no other suitable replacement is available to fulfil their function.

Synthetic amorphous silica is considered a traditional raw material in paint. Since amorphous silica is a nanomaterial, under the European Commission definition, synthetic amorphous silica is exempted from the requirement concerning nanomaterials.

Ground Calcium Carbonate (GCC) is formed directly from the grinding of limestone to a powder. GCC can be produced using two different processing methods that are dry or wet. Each method produces different finishing products that suit different applications.Precipitated Calcium Carbonate (PCC) is produced chemically and precipitated as a powder. PCC is produced through a carbonation process between fast lime and carbon dioxide. PCC is a synthetic mineral that allows more flexibility in adapting its size, shape, particle size distribution compared to GCC. Therefore, the complexity of processing for PCC is one of the main reasons for a higher production cost compared to GCC. The chemical composition of GCC and PCC is the same. GCC can be seen as naturally occurring. Although PCC is chemically manufactured, there is no indication that unmodified PCC would have a higher toxicity than GCC.

Polymer dispersions have also been exempted from the requirement. In the follow up report from the EU Commission[54] to the second "Regulatory Review on Nanomaterials" from 2012[55] it is stated that the solid nanomaterials dispersed in a liquid phase (colloidal) shall be considered as nanomaterials according to the EU Commissions recommendation. Nano emulsions are however not covered by the definition. Polymers/monomers can occur in different phases and sizes and it

[53] J. Olabarrieta et al, Aging of photocatalytic coatings under a water flow: Long run performance and TiO2 nanoparticles release, Applied Catalysis B: Environmental, Volumes 123–124, 23 July 2012
[54] 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
[55] 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

is therefore chosen to explicitly mention that polymers are exempted from the definition in paint and varnishes.

O12 Prohibited substances

The product must not contain ingoing substances that are:

- Substances categorised as Substances of Very High Concern (SVHC) and included on the EU Candidate List.
- Substances evaluated by the EU to be persistent, bioaccumulative, and toxic (PBT) or very persistent and very bioaccumulative (vPvB), in accordance with the criteria in Annex XIII of REACH and substances that have not yet been investigated, but which meet these criteria.
- Endocrine disruptors: Substances on the EU member state initiative "Endocrine Disruptor Lists", List I, II and III, see the following links:
    - https://edlists.org/the-ed-lists/list-i-substances-identified-as-endocrine-disruptors-by-the-eu
    - https://edlists.org/the-ed-lists/list-ii-substances-under-eu-investigation-endocrine-disruption

      2,2-dibromo-2-cyanoacetamide (DBNPA) used for disinfecting washing water in the supply chain and production of the paint or varnish is exempted from the requirement as it is not constituent or part of the manufacturing of the ecolabelled product.
    - https://edlists.org/the-ed-lists/list-iii-substances-identified-as-endocrine-disruptors-by-participating-national-authorities

A substance which is transferred to one of the corresponding sublists called "Substances no longer on list", and no longer appears on any of List I-III, is no longer excluded. The exception is those substances on sublist II which were evaluated under a regulation or directive which doesn't have provisions for identifying EDs (e.g., the Cosmetics Regulation, etc.). For those substances, ED properties may still have been confirmed or suspected. Nordic Ecolabelling will evaluate the circumstances case-by-case, based on the background information indicated on sublist II."

- Organotin compounds.
- Phthalates *(Esters of phthalic acid (orthophthalic acid / phthalic acid /1,2- benzene dicarboxylic acid).*
- 34 bisphenols[56] that have been identified by ECHA for further EU regulatory risk management that are known or potential endocrine disruptors for the environment or for human health, or that can be identified as toxic for reproduction.
- Alkylphenols, alkylphenol ethoxylates (APEO) and other alkylphenol derivates (APD).
- Halogenated organic compounds. Exemptions for:
    - Preservatives that fulfil O5.

[56] EC/List No. 201-245-8 (BPA), 201-025-1 (BPB), 401-720-1 (4,4'-Isobutylethylidenediphenol), 216-036-7 (BPAF) and its 8 salts (278-305-5; 425-060-9; 443-330-4; 468-740-0; 469-080-6; 479-100-5; 943-265-6; 947-368-7), 201-250-5 (BPS), 201-240-0 (BPC), 204-279-1 (TBMD), 201-618-5 (6,6'-di-tert-butyl-4,4'-butylidenedi-m-cresol), 242-895-2, 248-607-1, 405-520-5 (D8), 217-121-1 (DAB), 227-033-5 (TMBPA), 210-658-2 (BPF), 411-570-9, 277-962-5 (contains BPS, 500-086-4 (contains BPA), 500-263-6 (contains BPA), 500-607-5 (contains BPA), 701-362-9, 904-653-0 (contains BPA), 908-912-9 (contains BPF), 926-571-4 (contains BPA), 931-252-8 (contains BPA), 941-992-3 (contains BPS), 943-503-9 (contains BPA).

  - Paint pigments that meet the EU's requirement concerning colourants in food packaging under Resolution AP (89) point 2.5.
  - Driers in oxidative drying paints, see also O3 regarding classifications.
- Isocyanates. Exemption for water-borne polyisocyantates with a chain length of more than 10, where the concentration of isocyanates with a chain length of less than 10 as an impurity is documented.
- Fragrances.

✉ Declaration in line with Appendices 1 and 2 from the manufacturer of the product and the manufacturer of each raw material.

✉ If halogenated organic pigments are used, a declaration is required from the pigment supplier confirming that the pigment meets the EU's requirement concerning colourants in food packaging under Resolution AP (89) point 2.5.

✉ If water-borne polyisocyanates with a chain length of more than 10, where the concentration of isocyanates with a chain length of less than 10 as an impurity are used, send documentation showing this.

Background requirement to O12

There are several requirements here about substances that the product must not contain. The reason/background for this is stated below in each case:

The Candidate List identifies substances of very high concern which fulfil the criteria in article 57 of the REACH Regulation (EC 1907/2006). The list includes carcinogenic; mutagenic; and reprotoxic substances (CMR, categories 1A and 1B in accordance with the CLP Regulation); and PBT (persistent, bioaccumulative and toxic) and vPvB (very persistent and very bioaccumulative) substances (as defined in REACH Annex XIII). In addition, two more substance groups are included if they are of equivalent level of concern (ELoC) as the ones previously mentioned. These are endocrine disruptors and substances which are environmentally hazardous without fulfilling the requirements for PBT or vPvB. Based on these adverse characteristics, Nordic Ecolabelling prohibits substances on the Candidate List. This means that we take action ahead of the legislation and ban the substances before they are subject to authorisation and restriction in accordance with REACH.

PBT and vPvB are abbreviations for substances that are persistent, bioaccumulative and toxic, and very persistent and very bioaccumulative, respectively, in accordance with REACH Annex XIII. This means that they are not biodegradable and that they accumulate in living organisms. Based on these adverse characteristics they pose a threat to the environment and human health. They are prohibited in all Nordic Swan Ecolabel products.

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

increases in public health diseases. While effects in wildlife populations have been confirmed, evidence is pointing to effects also in humans.

Currently, endocrine disrupting properties is not a hazard that is classified according to the CLP regulation. Also, harmonised scientific criteria for the identification of EDs are missing across different pieces of EU legislation. Few EDs have been identified in the legislation so far, compared to the numbers of potential EDs. Under these circumstances, the Nordic Swan Ecolabel excludes identified and potential EDs listed by the EU member state initiative "Endocrine Disruptor Lists" at www.edlists.org. The initiative is a voluntary collaboration, compiling and presenting a single repository of information about the current status of substances identified as EDs or being under ED evaluation in the EU.

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

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

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

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

Organotin compounds are used as a catalyst that harden through cross-linking. The level of tin catalyst depends on the cross-linking system, and the quantity of silicone or polymer. Organotin compounds were on the Danish Environmental Protection Agency's list of undesirable substances[57], but were subsequently removed since they are used in quantities of less than 100 tonnes per year. They have several inherent properties that are not desirable in Nordic Ecolabelled

[57] http://www2.mst.dk/udgiv/publikationer/2010/978-87-92617-15-6/pdf/978-87-92617-16-3.pdf

paints and varnishes products, such as endocrine disrupting and environmentally hazardous, see more below.

Several phthalates are identified as endocrine disruptors and some of them are classified as reprotoxic. For these reasons several phthalates are included in the Candidate list. Based on their hazardous properties phthalates pose a threat to the environment and human health and there is a ban on this group of substances. The exclusion of phthalates covers esters of phthalic acid (orthophthalic acid / phthalic acid /1,2- benzene dicarboxylic acid or commonly known as ortho-phthalates. The exclusion does not cover tera-phthalates or cyclic phthalates.

Several bisphenols with the general bisphenol structure and 'bisphenol derivatives' which have constituents with structural properties common to bisphenols are now prohibited. Based on the potential for widespread use and available information on potential endocrine disruptors, reproductive toxicity and PBT/vPvB properties, 34[58] substances were identified in need for further regulatory risk management in EU[59].

The non-ionic APEO group of surfactants are produced in large volumes and their uses lead to widespread release to the aquatic environment. APEOs are highly toxic to aquatic organisms and degrade to more environmentally persistent compounds (alkylphenols). Ethoxylated nonylphenol and several other alkylphenols are included in the Candidate List due to endocrine disrupting properties.

Halogenated organic substances whereas organic substances that contain halogenated substances such as chlorine, bromine, fluorine, or iodine must not appear in Nordic ecolabelled paints and varnishes. Halogenated organic substances include many substances that are harmful to health and the environment, in that they are very toxic to aquatic organisms, carcinogenic or harmful to health in some other way. Halogenated organic substances persist in the environment, which means they pose a risk of having harmful effects. There is therefore a requirement that halogenated organic compounds must not appear in indoor paint and varnishes. This means that substances such as brominated flame retardants, chlorinated paraffins, perfluoroalkyl compounds and certain plasticisers are not permitted in Nordic Ecolabelled indoor paint and varnishes.

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.[60] The substances are persistent and are readily absorbed by the body.

[58] Assessment of regulatory needs: Bisphenols. ECHA – 16 December 2021: Section 2.1: Bisphenols for which further EU RRM is proposed – restriction https://echa.europa.eu/documents/10162/c2a8b29d-0e2d-7df8-dac1-2433e2477b02
[59] Annex XV restriction report https://echa.europa.eu/documents/10162/450ca46b-493f-fd0c-afec-c3aea39de487
[60] https://www.oecd.org/chemicalsafety/portal-perfluorinated-chemicals/terminology-per-and-polyfluoroalkyl-substances.pdf 2021

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.

There are also halogenated pigments used in the paint industry. There is an exemption of the preservatives that fulfil O5 and for pigments fulfilling the EU requirements for pigments in food packaging according to Resolution AP (89) point 2.5. The reason for including a requirement that pigments need to fulfil Resolution AP (89) is that the Nordic Ecolabelling does not wish to allow PCBs at all but since it is not possible to set a zero limit for pigments, the Nordic Ecolabelling has chosen to use the same limit as in food packaging (Resolution AP (89) point 2.5). This level has been chosen since it is a well-known method in the industry and the low level used in food packaging is considered strict enough for indoor paint and varnishes. The exemption for these halogenated pigments is needed to make it possible to produce products with good colourfastness without choosing pigments with even worse environmental profile.

Isocyanates cause allergies and asthma and some, including TDI (toluene diisocyanate), are also suspected carcinogens. Any Occupational Exposure Limit, for occupational diisocyanate exposure, derived from the exposure-excess risk relation, will be associated with a residual excess risk for developing occupational asthma. The lower the exposure the lower the risk for developing asthma[61]. Nordic Ecolabelling has chosen to exclude the use of isocyanates, based on their problematic properties. Nordic Ecolabelling has chosen to do an exception for water-borne polyisocyanates with a chain length of more than 10, since they are used in water-based paints, for example in binders. These long chain polyisocyanates are considered non-reactive since they are fully polymerised, which means fully reacted and stable. They are therefore unlikely to react and release isocyanates when used, for example when paint is applied.

Fragrances must not be present in Nordic Ecolabelled paints and varnishes. Nordic Ecolabelling is not aware of any fragrances being used in paints and varnishes but, since fragrances are gaining a foothold in many products, Nordic Ecolabelling wishes to prevent future use of fragrances in the product group.

O13 Emissions of Volatile and Semi-Volatile Organic Compounds in indoor paints and varnishes

For Indoor paints and varnishes, the emissions of carcinogenic VOC, Total Volatile Organic Compounds (TVOCs) and Total Semi-Volatile Organic Compounds (SVOCs) must not exceed limits given in Table 9.

Test method: Emission testing after 28-days according to EN 16516 or EN 16402 or other equivalent test methods.

[61] RAC Opinion on scientific evaliatopm pf pccupatopmaø exposure løimits for Diisocyanates. 11 June 2020. https://echa.europa.eu/documents/10162/4ea3b5ee-141b-63c9-8ffd-1c268dda95e9 (Accessed on 2022-11-15).

For tinting systems, the emissions of VOCs and SVOCs shall be determined for the colour with most tinting paste and the base paint with highest theoretical amount of VOC and SVOC from the contribution of raw materials.

The test laboratory must fulfil the requirements in appendix 5.

Table 9 Emission limits for the final product for indoor paints and varnishes

Emission limits for the final product for indoor paints and varnishes after 28 days			
Product description (with subcategory denotation according to Directive 2004/42/EC)	**1A and 1B carcinogenic VOC***	**TVOC**	**TSVOC**
a. b. d. e. f. g. h. i. j. l. All indoor products	≤ 0,001 mg/m^3	≤ 0,3 mg/m^3	≤ 0,1 mg/m^3

* *Carcinogenic 1A and 1B VOCs listed in Annex H of EN 16516.*

✉ Test report in accordance with EN 16516, EN 16402 or other equivalent standardised test conditions and determination methods.

✉ Documentation showing that the test laboratory fulfils the requirements in appendix 5.

O14 Content of Volatile and Semi-volatile Organic Compounds in outdoor paints and varnishes and industrial paints

For outdoor paints and varnishes and industrial paints, the content of VOC and SVOC must:

- not exceed the limits given in Table 10 and Table 11.

For tinting systems, the content of VOCs and SVOCs shall be determined for the colour with most tinting paste and the base paint with highest content of VOC and SVOC.

The VOC and SVOC content for outdoor paints and varnishes and industrial paints shall be determined either by testing the final product or by calculation based on the raw materials in accordance with test methods given in ISO 11890-2.

The test laboratory must fulfil the requirements in appendix 5.

Products with the Nordic Swan Ecolabel may display the text 'reduced VOC content' and the VOC content in g/l next to the Ecolabel if they wish.

Table 10 VOC and SVOC content limits in its ready-to-use form for outdoor paints

VOC and SVOC content limits in its ready-to-use form		
Product description (with subcategory denotation according to Directive 2004/42/EC)	**VOC limits (g/L ready to use)**	**SVOC limits (g/l ready to use)**
c. Exterior walls of mineral substrate	25	40
d. Exterior trim and cladding paints for wood and metal	75	60
e. Exterior trim varnishes and wood stains, including opaque wood stains	65	60
f. Exterior minimal build wood stains	50	40
g. Primers	10	40
h. Binding primers	10	40
i. On pack performance coatings	80	60
j. Two-pack reactive performance coatings for specific end use such as floors	65	60

Table 11 VOC content limits in its ready-to-use form for industrial paints

VOC and SVOC content limits in its ready-to-use form for industrial products		
Industrial products falling under the scope of directive 2010/75/EU	**VOC limits (g/L ready to use)**	**SVOC limits (g/l ready to use)**
Industrial paints and varnishes*	75	-
Industrial paints and varnishes for outdoor use*	75	-
Anti-corrosion paints	0	-

* Industrial powder paints and powder varnishes are exempted from the requirement.

✉ Declaration in line with Appendices 1 or 2 from the manufacturer of the product or the manufacturer of each raw material, respectively.

✉ Test report or calculation showing that the content level of VOC and SVOC in the final product in table 10 and table 11 is fulfilled, based on the test of the final product or on all ingoing raw materials using test methods given in ISO 11890-2.

✉ Documentation showing that the test laboratory fulfils the requirements in appendix 5.

Background to requirement O13 and O14

Volatile Organic Compounds (VOCs) are used as solvents within paints to help keep it stable prior to use and aid in spreading and delivery of the paint to the substrate. VOCs generally evaporate or sublimate from the paint during and after application. The release of these emissions can cause eye, nose, and throat irritation along with headaches and loss of coordination. Due to the wide diversity of compounds encompassed by this classification, more extreme reactions can also present, in particular: damage to liver, kidney, and central nervous system and some are suspected or known to cause cancer in humans[62].

The current requirement for VOC and Semi Volatile Organic Compounds (SVOC) has been reworked to introduce emission test requirement for indoor paints and varnishes, as well as a requirement for the ready-to-use SVOC in outdoor paints and varnishes. The requirement for VOC for outdoor paints has been kept from previous criteria generation as the standard EN 16516 is a method for determination in indoor air.

For Indoor Paints and Varnishes: It has been concluded that a requirement for the emission of paints and varnishes is needed as indoor paints and varnishes may contain various VOCs that can be released to the indoor environment. Building materials emit chemical emissions into the indoor environment, which can affect the health of occupants. These emissions have therefore raised awareness about how the chemicals affect the human health[63,64]. As people spend more time in indoor environments, it is necessary to measure and quantify indoor VOC emissions to prevent possible adverse health effects of indoor air pollution

[62] http://www.epa.gov/iaq/voc.html
[63] Swedish Chemicals Agency (Kemi). Action plan for an non-toxic everyday 2015–2020 – protect the children (in Swedish). Report 5. Kemi, Sundbyberg, 2014.
[64] Sundell J. (2004) On the history of indoor air quality and health.

due to the toxic nature of many VOCs[65]. Furthermore, there is long-lasting persistence of many SVOCs indoors, even after removing their primary source. Indoors, SVOCs may persist for hundreds of hours or even for several years[66].

The requirements for emission are derived from the EU-Taxonomy as well as the Norwegian environmental certification for buildings BREEAM-NOR[67]. Carcinogenic VOCs has been included in the requirement to be in line with the EU-Taxonomy.

For Outdoor Paints and varnishes: The decline in use of VOCs has led to an increase in the use of SVOCs. Construction and building products are a major source of SVOCs and the Construction Products Directive[68] has an optional criterion[69] that SVOCs need to be avoided within the sector[70]. Indoor SVOCs originate from indoor and outdoor sources. The major issue is that SVOCs can partition themselves among different phases and available surfaces[71], such as paints and onto other surfaces which increases their residence time indoors to several years. SVOCs may also react with indoor oxidants, such as hydroxyl radicals (OH), nitrate radicals (NO_3), and ozone, as such, they can be inhaled and ingested and pose a risk to health and environment[72]. Therefore, a requirement for SVOC for outdoor paints is justified due to their mobility to travel indoors as some SVOCs can cause adverse effects, as well as limiting their mobility in the biosphere[73].

The limit value for industrial paints falling outside the scope of 2004/42/EC has been adjusted from the previous value of 130 g/L for all products. The new value, 75 g/l is representative for the products intended use with similar products in accordance with 2004/42/EC and based on licensing data to better represent industrial paints on the market.

For anti-corrosion paint for industry and infrastructure, there is a steerability to minimize the emissions of VOCs. In a report on life cycle analysis of rust protection on bridges[74], it is concluded that solvent-based anti-corrosion paints have the largest climate impact with regards to formation of ground-level ozone. Aromatic solvents are also a health risk for the worker. These substance groups are prohibited, but with the definition of constituent substances residues of contaminants allowed of maximum 100 ppm.

[65] Morin, J., Gandolfo, A., Temime-Roussel, B., Strekowski, R., Brochard, G., Bergé, V., ... & Wortham, H. (2019). Application of a mineral binder to reduce VOC emissions from indoor photocatalytic paints. Building and Environment, 156, 225-232.
[66] Weschler, C. J., & Nazaroff, W. W. (2008). Semivolatile organic compounds in indoor environments. Atmospheric environment, 42(40), 9018-9040.
[67] https://byggalliansen.no/wp-content/uploads/2022/03/BREEAM-NOR-v6.0_NOR.pdf (visited: 2022-08-30)
[68] Council Directive 89/106/EEC
[69] European Collaborative Action. Urban air, indoor environment, and human exposure. Report No 27; Harmonisation framework for indoor material labelling schemes in the EU (2010)
[70] CEN/TC 351 Construction products: Assessment of the release of dangerous substances.
[71] Wei, W et al., (2017). Reactivity of semivolatile organic compounds with hydroxyl radicals, nitrate radicals, and ozone in indoor air. International Journal of Chemical Kinetics, 49(7), 506-521.
[72] Salthammer, T et al., (2009) Occurrence, Dynamics, and Reactions of Organic Pollutants in the Indoor Environment
[73] Harkov, R. (1989). Semivolatile Organic Compounds in the Atmosphere. In Air Pollution (pp. 39-68). Springer, Berlin, Heidelberg.
[74] Life cycle analysis of anti-corrosion paints - bridges, Sweria IVF 2018

O15 Volatile Aromatic Compounds

Volatile aromatic compounds (VAC) must not be actively added to the product but may occur as residuals to a total maximum of 100 ppm (0.01% w/w, 100 mg/kg) in the final product.

Volatile aromatic compounds are volatile organic compounds where one or more benzene rings are contained within the molecule.

☒ Declaration in line with Appendices 1 and 2 from the manufacturer of the product and the manufacturer of each raw material.

☒ Calculation of the level of volatile aromatic compounds in the product (based on data for all ingoing raw materials).

Background to requirement O15

VACs have specific environmental and human health impacts including DNA damage[75]. Exposure to these products should be minimised and any way to mandate a reduction in their use encouraged. The current criterion prevents their addition but allows their presence from residuals.

4.5 Binder requirements

The requirements in this section goal is to promote raw materials with less climate impact, reduced energy consumption, energy efficiency, transition from fossil to sustainable raw materials, renewable energy – and subsequently, reduced emissions of greenhouse gases. The requirement is divided in three parts, as there are different binders that can be used for indoor and outdoor paints and varnishes, where the specific binder type in question must fulfil the requirement where relevant below. Description by chemical type of binder shall be derived from that component of the binder which is decisive for the characteristic properties of the final coating system.

O16 Acrylic resins (binders)

The following requirements must be fulfilled if the product contains acrylic resins:

1. The licence holder shall have procedures showing how it works with strategic goals to increase their purchase and use of acrylic resins made from renewable raw materials used in Nordic Swan Ecolabelled paints and varnishes. The goals must be quantitative and time-based, and they shall be determined by the company's management. The strategic goals must be assessed at least once a year by management.
2. The licence holder shall inform Nordic Ecolabelling on:
   - Proportion of acrylic resins made from renewable raw materials used in Nordic Swan Ecolabelled paints and varnishes.
3. If renewable raw materials (or feedstock) are used in acrylic resins, they must guarantee legal compliance with certification requirements for the sustainable production of biomass in accordance with EU´s Renewable Energy Directive (2018/2001/EC) known as EU REDII[76]. Renewable raw materials from palm oil must not be used in the acrylic resin. The requirement also includes by-products, residues, and waste fractions from

[75] Environ Health Perspect. 2002 June; 110(Suppl 3): 451–488.
[76] https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=uriserv:OJ.L_.2018.328.01.0082.01.ENG&toc=OJ:L:2018:328:TOC (visited June 2022)

palm oil industries, such as palm fatty acid distillate and palm effluent sludge.

4. Information on:
   - Type of renewable raw material used in the acrylic resins (e.g., crops, sugarcane, source of bio-naphtha),
   - Whether the renewable raw materials are derived from primary feedstock or residue or waste,
   - Whether the renewable raw materials are certified according to any sustainability standards,
   - Level of traceability (*Identity Preserved*, *Segregated*, *Mass Balance*, *Book & Claim*) as defined in section 4.2 on both the renewable raw materials used in the production of acrylic monomers and the acrylic resin itself.

Doc 1 and 2 must be documented by the license holder:

✉ **Doc 1:** Enclosed procedures for policy or equivalent documentation of the license holders work with environmental goals, showing fulfilment of the requirement. Minutes from the management's annual assessment on complying with strategic goals.

✉ **Doc 2:** Information on the proportion of acrylic resins made from renewable raw materials used in the Nordic Swan Ecolabelled paints and varnishes.

Doc 3 and 4 must be documented by the manufacturer of the acrylic resin binders.

✉ **Doc 3:** Documentation such as valid certificates or certificate identifier on the safety data sheet showing that the renewable raw materials used in acrylic resins comply with EU´s Renewable Energy Directive (EU REDII).

✉ **Doc 4:** Declaration in line with Appendix 4 signed by the manufacturer of the acrylic resins.

Background to requirement O16

This is a new requirement in generation 4 of the criteria. It is required that the manufacture of indoor or outdoor paints and varnishes have routines for working continuously with strategic goals to increase their purchase and use of acrylic resins made from renewable raw materials. The goals must be quantitative and time-based, and they shall be determined by the management. It is not an absolute requirement for the company to meet its goals, but the requirement ensures that the company management must assess its strategic goals on an annual basis at least. This way, the concrete environmental work in the company can be documented and thereby lead to real environmental gains.

The general environmental benefit of bio-based plastics comes from the shift from fossil feedstock to bio-based feedstock. Traditionally acrylic resins are fossil-based but there is a shift in the industry towards the use of bio-based polymers for coatings. Although a full shift is deemed too early due to supply and demand issues of biobased naphtha and 1st generation feedstock, there are environmental gains that can be made by setting a requirement to encourage the use of biobased material to reduce greenhouse gas emissions, while maintaining the same product quality in order to make sure the product has a long lifetime.

If renewable raw materials are used in acrylic resins, they must comply with EU´s Renewable Energy Directive (2018/2001/EC). This ensures that the feedstock is both responsibly sourced and certified responsibly by independent third-party certification bodies recognized by the European Commission. Additionally, the manufacture of acrylic resins must provide Nordic Ecolabelling with information on type and status (primary feedstock, waste or residue) of renewable raw materials and level/description of traceability used on both raw materials and the acrylic resin itself. Palm oil is prohibited in acrylic resins as with increasing production and demand, the potential for producing all palm oil sustainably is limited. For that reason, palm oil should only be used in products where a sustainable alternative is difficult to find.

O17 Alkyd resins

Fatty acids and polyols in alkyd resins used in Nordic Swan Ecolabelled paints and varnishes must be;

a) Made from renewable raw materials and,

b) Documented of type of renewable raw material used in the alkyd resins (e.g., castor oil, soybean oil, tall oil, rapeseed oil, source of methanol/acetaldehyde) and,

c) Renewable raw materials (or feedstock) used in alkyd resins must guarantee legal compliance with certification requirements for the sustainable production of biomass in accordance with EU REDII. Renewable raw materials from palm oil must not be used in the Nordic Swan Ecolabelled paints and varnishes. The requirement also includes by-products, residues, and waste fractions from palm oil industries, such as palm fatty acid distillate and palm effluent sludge.

To determine the share of renewable raw materials in alkyd polymers, mass balance-based traceability according to EU´s Renewable Energy Directive (EU REDII) is accepted – however, not the use of trade in certificates, so called "Book and claim".

If imported renewable feedstocks are used, they must be certified by one of the European Commission's approved voluntary certification schemes for documentation of the EU's sustainability criteria under the Renewable Energy Directive (2018/2001/EC).

If nationally produced renewable feedstocks are used, they must comply with the official regulations of each Nordic country for documentation of the EU's sustainability criteria under the Renewable Energy Directive (2018/2001/EC).

✉ Documentation showing that the fatty acids and polyols in alkyd polymers are made from renewable raw materials.

✉ Documentation such as valid certificates showing that the renewable raw materials comply with EU´s Renewable Energy Directive (EU REDII).

✉ Declaration in line with Appendix 4 signed by the manufacturer of the alkyd polymer.

Background to requirement O17

This is a new requirement in generation 4 of the criteria. Alkyd resins are oil-based polyesters consisting of dibasic acid, polyols, and fatty acids. The fatty acid content and polyol of alkyd resins are compared to dibasic acids often derived from renewable raw materials (animal or vegetable oils). As with acrylic resins the general environmental benefit of bio-based plastics come from the shift from

fossil feedstock to bio-based feedstock. Therefore, fatty acids and polyols in alkyd polymers used in Nordic Swan Ecolabelled paints and varnishes must be made from renewable raw materials and the renewable raw materials must comply with EU's Renewable Energy Directive (2018/2001/EC). This ensures that the feedstock is both responsibly sourced and certified responsibly by independent third-party certification bodies recognized by the European Commission.

To determine the share of renewable raw materials in alkyd polymers, mass balance-based traceability according to EU's Renewable Energy Directive (EU REDII) is accepted – however, not the use of trade in certificates, so called "*Book and claim*."

Alkyd polymer production is based on the use of vegetable oil, where advantages of the oil include the use of a renewable raw material which is sustainable and being environmentally friendly[77]. Vegetable oil can be derived from many different raw materials, but it is important to determine the potential for each raw material and find the most sustainable ones, as alkyds can be derived from anywhere from palm oil to tall oil. However, not all raw materials are sustainable. There are several factors that influence the sustainability of bio-based products. For example, the agricultural process has a large impact on the sustainability of vegetable oils[78]. The environmental impact of raw materials can be reduced if vegetable oils are produced on plantations managed sustainably, so that pesticides and unsustainable crop overexploitation are avoided.

Furthermore, there is incentive to utilize oils based on co-products from other industries, like pulp and paper or used cooking oils, as it is advised to avoid a burden shift of food-competing crops, because they could create a strong competition for land and water used for food production. With an increase in competition of land and water use, so does risk of deforestation and destruction of ecosystems increase due to urbanization and plant expansion. Palm oil is prohibited in alkyd resins as with increasing production and demand, the potential for producing all palm oil sustainably is limited. For that reason, palm oil should only be used in products where a sustainable alternative is difficult to find.

Polyols is another major constituent used in the production of alkyd resins, and they are traditionally always derived from fossilized raw materials. However, polyols can be produced either mass-balanced or based on renewable content, while still maintaining same quality as fossilized polyol and reducing the greenhouse gas emissions.

O18 Cement/Hydraulic binder

If the paint contains cement according to EN 197-1 or EN 14647 or EN 998-1 or whitewash containing other hydraulic binders, the producer of cement clinker or alternative hydraulic binder must fulfil the following requirements.

- The total global warming potential (GWP) from cradle-to-gate shall not exceed the values given below.

[77] Amelia, Okta, et al. (2021) Eco-friendly Alkyd Resins Based on Vegetable Oil. Jurnal Rekayasa Proses.
[78] Alcock. Thomas et al. (2022): More sustainable vegetable oil: Balancing productivity with carbon storage opportunities

Table 12 Cement and alternative hydraulic binder specific CO2-emissions.

Product specific GWPtot for the system boundaries cradle to gate, A1-A3	
Cement/hydraulic binder type	**GWP**
White cement clinker	0.973tCO_2e/tonne white cement clinker
Grey cement clinker	0.722tCO_2e/tonne grey cement clinker
Lime	0.746tCO_2e/tonne lime

☒ Product-Specific Type III EPD in accordance with ISO 21930, ISO 14025, ISO 14040, and ISO 14044 showing that the GWP limit is met.

☒ Documentation from the license holder showing that the specific cement or hydraulic binder is used in the product.

Background to requirement O18

A typical cement-based paint contains with a vast majority Portland cement, hydrated lime, and calcium carbonate. Portland cement being the key ingredient, is one of the major sources of greenhouse gases globally, and accounts for 5% of carbon dioxide emissions[79]. According to estimates, 900 grams of CO_2 emerge from the manufacturing of 1000 grams of cement, resulting in 3.24 billion tons of CO_2 being generated annually[80]. Therefore, requirements are set out to reduce the energy demand, to limit the anthropogenic emissions of CO_2[81].

The specific limits for the different types of cement and hydraulic binders are derived from the average value of the top 10% of installations based on the data collected in the context of establishing the EU Emissions Trading System (EU ETS) industrial benchmarks for the period of 2021-2026 and calculated in accordance with the methodology for setting the benchmarks set out in Directive 2003/87/EC of the European Parliament and of the Council of 13 October 2003 establishing a scheme for greenhouse gas emission allowance trading within the Community and amending Council Directive 96/61/EC[82].

4.6 Quality requirements

For quality requirements for different paints and varnishes, an overview of the tests required per type of paint and/or varnish has been added, as viewed in Table 13. For full information regarding each quality requirement and paint type, see the specific requirements in the sections starting from 4.8.

For all the following tests all test laboratories must fulfil the general requirements according to standard EN ISO/IEC 17025 or be an official GLP approved laboratory. Alternatively, the companies own laboratory can work as a test laboratory if the laboratory is included by the company quality system, see appendix 5.

[79] The Cement Sustainability Initiative: https://docs.wbcsd.org/2016/12/GNR.pdf (visited 2022-05-30)
[80] Hendriks, C. A., Worrell, E., De Jager, D., Blok, K., & Riemer, P. (1998, August). Emission reduction of greenhouse gases from the cement industry. In Proceedings of the fourth international conference on greenhouse gas control technologies (pp. 939-944). IEA GHG R&D Programme Interlaken, Austria.
[81] Antunes, M., Santos, R. L., Pereira, J., Rocha, P., Horta, R. B., & Colaço, R. (2021). Alternative Clinker Technologies for Reducing Carbon Emissions in Cement Industry: A Critical Review. Materials, 15(1), 209.
[82] https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32021R0447&rid=1

Table 13 Performance requirements for different types of paints and varnishes (industrial not included)

Performance requirements for different types of paints and varnishes with subcategory denotation according to Directive 2004/42/EC								
Requirement	**Indoor paint (a, b)**	**Outdoor paint (c)**	**Trim and cladding (d)**	**Thick decorative coating indoor and outdoor (l)**	**Varnish and woodstain (e, f)**	**One and two pack performance and floor covering paint (i, j)**	**Primer (g)**	**Undercoat and primer (h)**
O21 Spreading rate *(only for white and light-coloured paints, including the white base paint used in tinting systems) – ISO 6504/1. Not applicable to varnishes, lasures, transparent adhesion primers or any other transparent coating.*	8 m^2/L 4 m^2/L (elastomeric paint)	-	Indoor products 8 m^2/L	1 m^2/L	-	Indoor products 8 m^2/L	6 m^2/L (without having specific properties) 8 m^2/L (with opacity)	6 m^2/L (without specific properties) 8 m^2/L (with opacity)
O22 Resistance to water – ISO 2812-3	-	-	-	-	Resistant to water	Resistant to water	-	-
O23 Adhesion – EN ISO 4624 and EN ISO 2409	-	-	-	-	-	Score 2	1,5 MPa (masonry paint) Score 2 (transparent, metal and wood primers	1,5 MPa (masonry paint) Score 2 (transparent, metal and wood primers)
O24 Abrasion – EN ISO	-	-	-	-	-	70 mg weight loss	-	-
O25 Weathering – EN 16473-3/EN 927-6	-	1 000 h 2 000 h (wood paint)	1 000 h (outdoor)	1 000 h (outdoor)	1 000 h (outdoor) 2 000 h (wood stain and wood varnish)	1 000 h (outdoor)	-	-
O25 Water vapour permeability ([1]) – EN ISO 7783	-	Class II or better (masonry or concrete)	-	Class II or better (masonry or concrete)	-	-	-	-
O25 Liquid water permeability ([1]) EN 1062-3	Where claims are made Class III (masonry and concrete) All other products Class II or better (masonry and concrete)	-	Class II or better (masonry or concrete)	-	-	-	-	-

Performance requirements for different types of paints and varnishes with subcategory denotation according to Directive 2004/42/EC								
Requirement	**Indoor paint (a, b)**	**Outdoor paint (c)**	**Trim and cladding (d)**	**Thick decorative coating indoor and outdoor (l)**	**Varnish and woodstain (e, f)**	**One and two pack performance and floor covering paint (i, j)**	**Primer (g)**	**Undercoat and primer (h)**
O25 Fungal growth – EN 927, ISO 15457, EN ISO 4628-1	-	Class 0 (wood paints) Class 2 or lower (masonry paints)	Class 0 (outdoor wood products)	Class 1 or lower (outdoor)	-	-	-	-

4.7 Quality requirements for indoor paints and varnishes

O19 White pigment content

Indoor wall and ceiling paints for which Class 1 and 2 wet scrub resistance* claims are made shall have a white pigment content (white inorganic pigments with a refractive index higher than 1.8) per m^2 of dry film equal to or lower than that described in Table 13, with 98 % opacity.

All other paints shall have a white pigment content (white inorganic pigments with a refractive index higher than 1.8) per m^2 of dry film equal to or lower than that described in Table 14, with 98 % opacity.

For tinting systems this requirement only applies to the base paint with the highest white pigment content or for the paint in a paint series with the highest white pigment content.

* *Wet scrub resistance is here defined in accordance with EN 13300 and EN ISO 11998, see requirement O19.*

Table 14 Relationship between wet scrub resistance and TiO_2 content for indoor wall and ceiling paints with claims of wet scrub resistance.

White pigment content	
Wet scrub resistance	**Indoor limit (g/m^2)**
Class I	40
Class 2	36

Table 15 Limits for white pigment content for products not covered by Table 13.

White pigment content	
Type of paint	**Indoor limit (g/m^2) with 98% opacity**
Wall paints	25
Other paints (including ceiling paints)	36

✉ The applicant shall provide documentation showing that the content of white pigments is compliant with this requirement.

✉ For ceiling paints and indoor wall paints, the labelling for the packaging, including the accompanying text, shall be provided as evidence regarding claims of wet scrub resistance.

Background to requirement O19

Pigments and titanium dioxide are significant contributors to the environmental impact of paints. Pigments are important in enhancing the performance of the paints. To minimize the impact on the environment but still maintain a high performing paint, limits have been set on the amounts of white pigments.

Pigments have effect on the opacity of paint, therefore any reduction in use must be balanced against a reduction in the performance. Paint spreading performance is defined within the Spreading Rate criterion (EU Ecolabel 3a[83], here requirement O21) and is directly linked to the amount of pigment added to the paint.

The definition of white inorganic pigment pigments with a refractive index higher than 1.8 is taken from the EU Ecolabel. This means that if the refractive index is below 1.8, they are not covered by this requirement.

O20 Claims of Wet Scrub Resistance

Only Wet Scrub Resistance class 1 and 2 ecolabelled paints may claim wet scrub resistance on the label or other marketing documentation.

All wall and ceiling paints for which claims of class 1 or 2 in wet scrub is made shall achieve the claimed class according to class 1 or class 2 in wet scrub resistance (WSR) according to EN 13300 and EN ISO 11998. This requirement only applies to tinting bases (base paints).

The test laboratory must fulfil the requirements in appendix 5.

For tinting systems or a paint series with different colours this requirement only has to be demonstrated for one of the paints.

✉ The applicant shall provide a test report according to EN 13300 using the method EN ISO 11998 (Test for cleanability and scrub resistance). For ceiling paints and indoor wall paints the labelling for the packaging, including the accompanying text, shall be provided as evidence regarding claims of wet scrub resistance.

✉ Documentation showing that the test laboratory fulfils the requirements in appendix 5.

Background to requirement O20

Wet scrub is only relevant for products in these criteria which are wall or ceiling paints. Nordic Ecolabelling finds it important that claims made on Nordic Ecolabelled products are supported by evidence of the claims. Therefore, it is relevant to prove claims on wet scrub by tests. This is important for the final consumer of the product who uses the paint and wants to be able to rely on the fact that Nordic Swan Ecolabelled products are good quality products and still have a low environmental impact.

O21 Spreading rate

The spreading rate should be at least at the levels presented in Table 15 below.

This requirement does not apply to varnishes, wood stains (lasures), transparent adhesion primers or any other transparent coatings.

[83] Commision decision of 28 May 2014. https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:02014D0312-20211026&from=EN

- For paint series that are available in more colours the spreading rate shall apply to the lightest colour.
- For tinting systems, this requirement applies only to the white base (the base containing the most TiO_2). In cases where the white base is unable to achieve this requirement, the requirement shall be met after tinting the white base to produce the standard colour RAL 9010.
- For paints that are a part of a tinting system, the applicant must advise the end-user on the product packaging and at the Point of Sale which shade or primer/undercoat (if possible, bearing the Nordic Ecolabel/EU Ecolabel) should be used as a basecoat before applying the darker shade.
- The test laboratory must fulfil the requirements in appendix 5.

Table 16 Spreading rate

Spreading rate		
Type	**Opacity/hiding power**	**Spreading rate of at least the following**
White paints and light-coloured paints (tri-stimulus (Y-value) > 70%) (including finishes and intermediates) *, **	Hiding power 98%	8 m^2 per litre of product indoor paints 6m^2 per litre of product outdoor paints
Semi-transparent primers	Without opacity or having specific properties *** With opacity	6 m^2 per litre of product 8 m^2 per litre of product
Thick decorative coatings (paints that are specially designed to give a three-dimensional decorative effect and are therefore characterised by a very thick coat)	Not relevant	1 m^2 per kg of product
Opaque elastomeric paints	Opaque	4 m^2 per litre of product

** Base paints to be used with a tinting system.*

*** Products marketed for both — indoor and outdoor shall have a spreading rate (at a hiding power of 98 %) of at least 8 m^2 per litre.*

**** Opaque primers with specific blocking/sealing, penetrating/binding properties.*

✉ The applicant shall provide a test report using one of the following:

- The method ISO 6504/1 (Paints and varnishes — determination of hiding power — Part 1: Kubelka-Munk method for white and light-coloured paints) or
- ISO 6504/3 (Part 3: determination of contrast ratio (opacity) of light-coloured paints at a fixed spreading rate) or
- For paints specially designed to give a three-dimensional decorative effect and characterised by a very thick coat the method NF T 30 073.

✉ For bases used to produce tinted products not evaluated according to the abovementioned requirements, the applicant shall produce evidence of how the end-user will be advised to use a primer and/or grey (or other relevant shade) of undercoat before application of the product.

✉ Documentation showing that the test laboratory fulfils the requirements in appendix 5.

Background to requirement O21

A key environmental consideration is the amount of paint used during application. Minimising the amount of paint used, whilst achieving a high-quality finish can result in significant environmental savings. The most appropriate criterion by which this can be monitored is through the paints spreading rate. The requirement is intended to recognise products that are more efficient. The requirement therefore varies according to the opacity of primers (and therefore also hiding power).

To encourage the correct usage of the products the applicant shall advice the end user of tinting systems on how to obtain the optimal result by using the correct shade or primer as a first layer before applying the darker shade, by information on the packaging and at the place where the product is sold (Point of Sale).

O22 Resistance to water

All varnishes, floor coatings and floor paints shall have resistance to water, as determined by ISO 2812-3 such that after 24 hours' exposure and 16 hours' recovery no change of gloss or of colour occurs.

✉ The applicant shall provide a test report using the method ISO 2812-3.

✉ Documentation showing that the test laboratory fulfils the requirement in appendix 5.

Background to requirement O22

This test is important to show that water resistant paints have the claimed functions. In addition to being resistant to abrasion, paints used on floors must also be resistant to water. Water resistance is tested in accordance with the method ISO 2812-3 Part 3: Method using an absorbent medium.

The current test protocol is the latest available version available. In the previous version of the criteria, only floor varnishes, floor coatings and floor paints shall have resistance to water. With the revision of ISO 2812-3 from the previous version, the criteria have been clarified to include all varnishes and wood stains.

O23 Adhesion

- Pigmented masonry primers shall score a pass in the EN ISO 4624 pull-off test where the cohesive strength of the substrate is less than the adhesive strength of the paint, otherwise the adhesion of the paint must be in excess of a pass value of 1.5 MPa.
- Floor coatings, floor paints, floor primers, masonry primers, transparent primers, metal, and wood primers shall score 2 or less in the EN ISO 2409 test for adhesion.

The test laboratory must fulfil the requirements in appendix 5.

The applicant shall evaluate the primer and/or finish alone or both applied together. When testing the finish alone, this shall be considered the worst-case scenario concerning adhesion.

✉ The applicant shall provide a test report using the method EN ISO 2409 or EN ISO 4624.

Background to requirement O23

Adhesion is an important parameter for paints which shows that the products (primers, one-pack performance, and floor coatings) have good adhesion to the substrate/paint as a quality check of the product.

For primers for interior walls good adhesion properties (e.g., on plaster) are the main attribute of these products and something that the consumer will find very important when using the product.

According to the EN ISO 2409 best result is 0 and worst is 5.

O24 Abrasion

- Floor coatings and floor paints shall have an abrasion resistance not exceeding 70 mg weight loss after 1000 test cycles with a 1000 g load and a CS10 wheel according to EN ISO 7784-2.
- Alternatively, a test according to ISO 5470-1 with 1000 test cycles with 1000 gram load and the H22 wheel where the weight loss is maximum 3000 mg.

The test laboratory must fulfil the requirements in appendix 4.

✉ The applicant shall provide a test report showing compliance with this requirement using the method EN ISO 7784-2 or ISO 5470-1.

✉ Documentation showing that the test laboratory fulfils the requirements in appendix 4.

Background to requirement O24

Surfaces subject to heavy wear, e.g., floors, need to be painted/coated with paints or varnishes that are highly resistant to abrasion to give the floor coating a longer life span. One way of testing wear resistance of paints is by performing an abrasion resistance test according to EN ISO 7784-2.

If a product (paint or varnish) fulfils the requirement of abrasion it needs to have an abrasion resistance not exceeding 70 mg weight loss after 1000 test cycles with a 1000 g load and a CS10 wheel.

4.8 Quality requirements for outdoor paints and varnishes

O25 Quality requirements for Outdoor paints and varnishes

If there is no relevant quality test for a specific product mentioned below, Nordic Ecolabelling can extend the requirements for quality tests during the validity of the criteria to include other relevant tests.

1. Weathering test: Products shall be exposed to artificial weathering in special apparatus including UV fluorescent lamps and condensation or water spray according to the respective tests mentioned.

- Masonry paints shall be exposed to test conditions for 1000 hours (6 weeks) (UVA 4h/60ºC + humidity 4h/50ºC) according to ISO 16474-3.
- Metal finishes shall be exposed to test conditions for 500 hours (6 weeks) (UVA 4h/60ºC + humidity 4h/50ºC) according to ISO 16474-3.
- Wood paints, wood stains and wood varnishes shall be exposed to test conditions for 2000 hours (12 weeks) according to EN 927-6.

2. The following results of the weathering test are also to be reported:

- Flaking (according to ISO 4628-5). Product is to have a flake density of 2 or less, and a flake size of 2 or less.
- Cracking (according to ISO 4628-4). The product is to have a crack quantity of 2 or less and a crack size of 3 or less.
- Blistering (according to ISO 4628-2). The product is to have a blister quantity of 3 or less and a blister size of 3 or less.
- The colour change (according to ISO 7724-2 or ISO 11664-4/6) shall not exceed $\Delta E^*=4$ with respect to the initial value.
- Decrease in gloss (according to EN ISO 2813) shall not be greater than 30% of initial value – matte paints and varnishes with an initial gloss value less than 60% at 60° angle of incident are exempted from the requirement.
- Chalking (according to EN ISO 4628-6) for masonry paints and metal finishes. The product shall achieve at least 1.5 or more, i.e., 0.5 or 1.0. In the standard there are pictorial reference standards.
- General appearance (according to EN ISO 4628-1).

If an entire paint system is ecolabelled, all bases and colours must fulfil the requirements. This can be documented by testing at least three representative products – at least one white, one intermediate colour and one dark colour – to show fulfilment of the quality requirement.

✉ Test report from a laboratory in line with Appendix 5 which clearly shows that the requirement is fulfilled.

3. Water vapour permeability, Class II: If masonry and concrete paints are marketed as water vapour permeable or similar claims are made, the paints are to be classified as Class II, i.e., with average water vapour permeability or better according to test method EN ISO 7783-2 and classified according to EN 1062-1 or EN 1504-2*. Due to large numbers of possible tinting colours, this criterion will be restricted to testing of the base paint. This method is not applicable for transparent primers.

** Facade paints tested according to EN1504-2 must fulfil class I.*

✉ Test report from a laboratory in line with Appendix 5 which clearly shows that the requirement is fulfilled.

4. Liquid water permeability, Class III: If masonry and concrete paints are marketed as water repellent/hydrophobic or similar claims are made, the paints are to be classified as Class III, i.e., with low liquid water permeability according to DIN EN 1062-3. Due to large numbers of possible tinting colours, this criterion will be restricted to testing of the base paint.

✉ Test report from a laboratory in line with Appendix 5 which clearly shows that the requirement is fulfilled.

5. Fungal growth: If the product contains dry film preservatives which have anti-fungal and algal properties the product must pass the relevant fungal growth test, see right below.

Products intended for mineral substrates must achieve a score of 2 (under 10% fungal growth) or better, as established in BS 3900:G6 or equivalent.

Products intended for wood are to be tested according to EN-927-3 or equivalent. No detectable defects (class 0) and no defects visible under 10 times magnification (class 0) according to EN ISO 4628-1.

If an equivalent method is used, for example PREN 15457, the applicant must document that the test is equivalent to the tests specified in the criteria document.

Due to large numbers of possible tinting colours, this criterion will be restricted to testing of the base paint.

✉ Test report from a laboratory in line with Appendix 5 which clearly shows that the requirement is fulfilled.

6. Powder paints: Powder paints for outdoor use must meet the quality requirements in Qualicoat or in the GSB standard GSB AL 631 (Aluminium) or GSB ST 663 (Steel and Galvanised steel).

✉ Certificate from Qualicoat or GSB showing that the product meets the requirements applicable to the product.

7. Cement-based masonry paints: The following alternative tests are accepted for cement-based masonry paints:

Water vapour resistance:

EN ISO 12572 "Hygrothermal performance of building materials and products - Determination of water vapour transmission properties", resistance against water vapour is measured.

Driving rain:

The method NBI-29/1983 "Mortars, resistance against driving rain", resistance against water penetration during driving rain is measured.

Weathering:

The method NBI-83 / 1983 with 28 days exposure time in climate carousel, equivalent to 1,5 years in real conditions. Colour change, bond strength and lime precipitation are measured as parameters for weathering resistance.

✉ Test report from a laboratory in line with Appendix 5 which clearly shows that the requirement is fulfilled.

Background to requirement O25

The quality requirements for outdoor paints and varnishes are based on the requirements set out in the EU Ecolabel criteria for outdoor paints and varnishes[84]. There are, however, certain differences.

In the Nordic region, it is rare for outdoor floors, masonry, or concrete to be painted, compared with practices in the rest of Europe. It is therefore not considered relevant to have a compulsory requirement concerning adhesion of these products in the Nordic region, although such a requirement can be found in the EU Ecolabel criteria for outdoor paints and varnishes.

The requirement concerning weathering tests is the same as the stipulations in the EU Ecolabel criteria for outdoor paints and varnishes, since these tests are conducted to establish the effects of the weather on the product. The stated laboratory methods do not generate absolute figures or results for the product in the way that natural weather exposure would. However, they are a good indication of how the product will weather and of compliance with the requirements concerning flaking, cracking, and blistering. When it comes to

[84] Commision decision of 28 May 2014. https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:02014D0312-20211026&from=EN

products in a system the tests are to be performed on the complete system, i.e., with recommended film thickness etc.

If the product is marketed as breathable (water vapour permeable), water repellent (low liquid water permeability), resistant to fungal growth or similar, this is to be documented via a performance test. The requirement in the EU Ecolabel criteria for outdoor paints and varnishes has been implemented with a few minor modifications. For example, there is the addition that an "equivalent test" may be used, which allows the applicant to use a different test for this on condition that the test is equivalent to what is required in the criteria document and that the requirement level is fulfilled.

Water vapour permeability for concrete has been according to method ISO 7783. In that method the evaluation of the test has been done according to EN 1062-1 with three different classes. EN 1062-1 includes products for mineral surfaces and cement. There is another standard, EN 1504-2, which is also used to evaluate into three classes. It is mainly for surface treatment/protection of cement. The limits of the two standards, water vapour diffusion, are numerically different:

EN 1062-1
Class I sD <0.14 m, class II 0.14 m ≤ sD < 1.4 m and class III sD > 1.4 m

EN 1504-2
Class I sD <5 m, class II 5 m ≤ sD < 50 m and class III sD > 50 m.

Both methods are considered as comparable, but if the EN1504-2 is to be used for façade paint class I needs to be fulfilled otherwise the requirement will be too tough. For other types of paint class II is to be fulfilled.

Powder paints for outdoor use must meet the quality requirements stated in the GSP standard or in Qualicoat. The two systems are considered equivalent, meaning that a certificate showing compliance with one of the standards is sufficient to prove the quality of the product.

4.9 Quality requirements for industrial paints and varnishes

Industrial paints and varnishes are applied to furniture, wall panels, floors and similar or used within infrastructure. The quality of these products is to be tested according to the methods that are relevant for the purpose of the paint/varnish as follows:

- Industrial paints and varnishes for exterior use has to fulfil the relevant parts of O26 or,
- Furniture – O27 ("möbelfakta") or,
- Panels, UV-cured floors and similar – O28 (scratch resistance)
- Paints and varnishes for painting/coating floors, including UV-cured floors – O29 and O30 (Abrasion/wear and water resistance)
- Anti-corrosion paints for industry and infrastructure – O31

If there is no relevant quality test for a specific product mentioned above, Nordic Ecolabelling can extend the requirements for quality tests during the validity of the criteria to include other relevant tests.

O26 Quality requirements for industrial paints and varnishes for furniture

Industrial paints and varnishes for furniture must fulfil the requirements as set out in the Tables 16 and 17 below.

Table 17 Requirement levels for varnished surfaces in different furniture groups.

Requirement levels and furniture group for industrial paints and varnishes		
Furniture group	**Area**	**Requirement**
Seating	Seat and armrest	Requirement level 2
Storage units	External horizontal surfaces (up to 1.25 m), shelves and bases	Requirement level 3
Tables	Private use and normal public use	Requirement level 4
	Intensive public use (restaurant/café)	Requirement level 5
Kitchen	Internal surfaces, including drawer bottoms, excluding shelves and bases	Requirement level 1
	External horizontal surfaces, shelves, and bases	Requirement level 3
	Worktops (tabletops)	Requirement level 6

Table 18 Test methods and requirement levels for furniture tests

Test methods and requirements for industrial paints and varnishes for furniture							
Requirement category		**Requirement levels**					
Tests:	**References:**	**1**	**2**	**3**	**4**	**5**	**6**
Water ([1])	EN 12720	6 h	16 h	16 h	24 h	24 h	24 h
Grease ([1])	EN 12720	24 h	24 h	24 h	24 h	24 h	24 h
Grease + scratches ([1])	SS 83 91 22	-	-	-	24 h+3 N	24 h+3 N	24 h+3 N
Scratches ([2])	SS 83 91 17	-	3 N	3 N	5 N	5 N	5 N
	alt. EN 15186. Method A ([3])	-	1,5 N	1,5 N	1,5 N	3 N	3 N
Alcohol ([1])	EN 12720	-	-	-	1 h	1 h	1 h
Coffee ([1])	EN 12720	-	1 h*	1 h	1 h	1 h	1 h
Heat, dryness ([1])	EN 12722	-	-	-	70 °C	70 °C	180 °C
Heat, moisture ([1])	EN 12721	-	-	-	-	-	85 °C
Heat on edge ([1])	NS 8061	-	-	-	-	-	85 °C
Water on edge ([1])	SS 83 91 20	-	-	1 h***	-	-	-
Sweat, acid and alkaline ([1])	EN 12720	-	1 h**	-	-	-	-

([1]) A result of 4 is pass score in the assessment. Assessment after 24 h

([2]) Maximum scratch width 0.5 mm. Penetration of the varnish layer is not acceptable.

([3]) Maximum scratch width 0.3 mm.

* Applies to storage units – external horizontal surfaces ≤ 1,250 mm above floor-level.

** Applies to armrests.

*** Applies to doors and drawer fronts.

✉ Information on which function/end use the paints or varnishes have been tested for and which standard has been used, the test institute and a full test report clearly showing that the requirements are fulfilled.

Background to requirement O26

Paints for use on furniture must meet the Möbelfakta criteria[85], which are the same as those in the criteria for Nordic Ecolabelled furniture with Möbelfakta's requirement specification of 2019-05-01. As such the indoor and outdoor paints and furniture are harmonised in this requirement. The Möbelfakta criteria is a measure of how resistant the paint film is to scratches, heat, water, grease, coffee, and alcohol. The requirement levels vary depending on the intended application for the paint. For example, a paint intended for worktops needs to meet higher standards than a paint for kitchen drawer bottoms.

O27 Scratch resistance for UV-cured floors, panels and similar

Scratch resistance can be tested using the following methods or equivalent:

- Scratch resistance ASTM D2794 (http://www.astm.org/Standards/D2794.htm)
- "Sheen Automatic Scratch Tester" according to ISO 1518

✉ Complete test report showing that the paint/varnish has satisfactory scratch resistance for its intended purpose.

Background to requirement O27

Industrial paints for purposes other than furniture are to show their quality via a scratch resistance test. The scratch resistance of a surface is a measure of how well it stands up to impact.

O28 Abrasion/wear for surfaces subject to heavy wear, e.g., UV-cured floors and sheeting

- Floor paints, floor coatings and other products subject to an equivalent level of wear must have an abrasion resistance not exceeding 70 mg weight loss after 1000 test cycles with a 1000 g load and a CS10 wheel according to EN ISO 7784-2.
- Alternatively, a test according to ISO 5470-1 can be performed with 1000 test cycles with 1000 gram load and H22-wheel where the weight loss is maximum 3000 mg.

✉ The applicant must submit a test report showing that this requirement has been fulfilled in accordance with EN ISO 77842-2 or ISO 5470-1.

Background to requirement O28

Surfaces subject to heavy wear, e.g., floors, need to be painted/coated with paints or varnishes that are highly resistant to abrasion. One way of testing wear resistance of paints is by performing an abrasion resistance test according to EN ISO 7784-2 or alternative test method ISO 5470-1.

O29 Water resistance for surfaces subject to heavy wear, e.g., UV-cured floors and sheeting

- Varnishes, floor coatings and floor paints shall have a resistance to water, as determined by ISO 2812-3, such that after 24 hours' exposure and 16 hours' recovery no change of gloss or of colour occurs.

[85] Möbelfakta: https://www.mobelfakta.se/?lng=en (visited 2022-0617)

✉ Assessment and verification: The applicant shall provide a test report using the method ISO 2812-3 (Paints and varnishes – determination of resistance to liquids – Part 3: Method using an absorbent medium).

Background to requirement O29

In addition to being resistant to abrasion, paints used on floors must also be resistant to water. Water resistance is tested in accordance with the method ISO 2812-3 Part 3: Method using an absorbent medium. This is the same method used in the EU Ecolabel criteria for indoor paints[86].

O30 Quality requirements for anti-corrosion paint for industry and infrastructure

Paint systems shall be tested according to the methods relevant to the purpose of the treatment, i.e., C5 or alternatively CX.

Anti-corrosion paints containing zinc:

- Metallic zinc included in the product must be of Type II or higher grade according to ASTM D520.
- The paints must meet the requirements for corrosion class C5 (Very High) according to EN-ISO 12944-6 and test for immersion category: Im1 (fresh water), Im2 (salt water) and Im3 (soil) according to EN ISO 12944-6, and test EN ISO 2812-2 (synthetic seawater) made with scratched samples according to EN-ISO 12944-9.
- If the intended use of the paints is offshore or equivalent, the paints must meet the requirement for corrosion class CX (Offshore). If cathodic protection is to be used, the paints must meet the requirement of Im4 according to EN ISO 12944-9.

Anti-corrosion paints without zinc:

- The paints must meet the requirements for corrosion class C5 (Very High) according to EN-ISO 12944-6.
- If the paint is to be used immersed in water or in soil, it must also pass tests according to Im1 (fresh water), Im2 (salt water) and Im3 (in soil) according to EN-ISO 12944-6, as well as testing EN ISO 2812-2 for immersion category Im4 (synthetic sea water) according to EN ISO 12944-9.
- If the intended use of the paint is offshore or equivalent, the paints must meet the requirement for corrosion class CX (Offshore). If cathodic protection is to be used, the paints must meet the requirement of Im4 according to EN ISO 12944-9.

✉ Test report for metallic zinc according to ASTM D520.

✉ Test report for anti-corrosion protection according EN ISO 12944-6 or EN ISO 12944-9 depending on relevant method which clearly shows that the requirement is met.

Background to requirement O30

Test methods and standards have been chosen in consultation with the industry and with Research Institutes of Sweden (RISE). Test methods for anti-corrosion can be specific of the purpose of the treatment because corrosion is a

[86] Commision decision of 28 May 2014. https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:02014D0312-20211026&from=EN

sustainability question that affects areas such as public safety, durability, and the economy.

In general, anti-corrosion protection with a high quality and a longlifespan provides a surface treatment that can minimize both costs and environmental imprints from a life cycle perspective. Therefore, it is relevant to set a high-quality requirement for products to be labelled with the Nordic Swan. It is also important to use products that contain the lowest possible levels of harmful substances that can contribute to the environmental impact. The quality test for anti-corrosion paints is divided into two parts, the first part is to ensure that the product does not contain heavy metals. In the second part of the quality requirement, it is ensured that the anti-corrosion paint maintains a sufficiently high quality for use for various purposes.

Requirement on heavy metal levels

When excavating zinc, impurities are often obtained from heavy metals, including lead and cadmium. The quality requirements for the purity of zinc are designed to ensure that zinc powder used is free from heavy metals. Suitable test methods for determining zinc powder content may be ICP-OEMS, Atomic absorption spectroscopy or similar quantitative analysis. To ensure low levels of heavy metals, zinc powder used in anti-corrosion paints must meet the purity requirements specified for the "zinc dust type II" specification according to the US standard ASTM D520.

Quality requirement

Test methods for anti-corrosion paints are specific to the purpose of the treatment. This is because environmental conditions and other external parameters can have a major impact on how aggressive the corrosion is. The most suitable requirements for anti-corrosion paints are found in the international standard series EN ISO 12944 where test methods for anti-corrosion paints are specified in EN ISO 12944-6 and EN ISO 12944-9.

To ensure that the anti-corrosion protection can withstand harsh conditions such as industrial areas with high humidity, aggressive atmosphere and coastal areas with high salinity, the minimum requirement is set to the highest classification, i.e., C5 according to EN ISO 12944-6. If the anti-corrosion protection contains zinc, the paint system must also pass the tests of immersion category Im1-4, where the different classifications are matched by: Im1 (fresh water), Im2 (salt water), Im3 (in soil) and Im4 (synthetic sea water). These tests are relevant for zinc-rich colours even if the paints are to be used in atmospheric exposure.

The tests are intended to phase out zinc-rich paints with highly active zinc. Too active zinc can cause unnecessarily high zinc leaching. If the anti-corrosion paint does not contain zinc, approved results according to Im1-4 are required only if the anti-corrosion protection is used for a protective steel exposed in soil or immersed in water. In regards with the above requirements, the anti-corrosion protection must also comply with the durability class Very High (VH). The durability class VH is defined as paints with a durability greater than 25 years, where the specified time is defined as the expected time until the first major maintenance needs to be done.

5 Requirements concerning packaging, labelling, consumer information and recycling

O31 Metal packaging

- Packaging solely made from metal or containing metal parts is not permitted.

The requirement does not apply to handles nor to packaging for industrial paints and varnishes ≥ 18 L.

✉ Declaration from the paint manufacturer that the packaging does not contain metal parts.

Background to requirement O31

All metal production is associated with great climate and environmental impact as virgin metal has considerably higher CO_2-emissions (up to 95% more depending on the metal and process) and their production requires considerably larger amounts of energy (up to 95% more, depending on the metal and process) than secondary metals from scrap. Therefore, there is a prohibition of metal in packaging in the product group as packaging has short lifespan, and it is better that metal is reserved for longer-lived products such as furniture and building materials.

In the development of the previous version of the criteria, metal packaging was never included as the primary packaging for paints and varnishes. It was however included in the criteria at a later stage due to claims that the paint loses quality if it is not stored in metal due to leakage and skin formation with plastic containers. This does not correspond to today's reality. All Swan Ecolabelled paint and varnishes are water-based, and there is thus no longer an issue with solvents reacting with or leaking from the plastic packaging. The paint industry itself is also turning more and more away from metal packaging and towards plastic containers with a certain proportion of recycled plastic.

O32 Recycled material in hard plastic packaging

- Hard/rigid plastic packaging must contain a minimum of 50 weight% post-consumer recycled (PCR)* material.

The requirement does not apply to lids and handles, nor to packaging for industrial paints (≥ 18 L).

* *Post-consumer/commercial recycled material is defined according to ISO 14021:2016: Material generated by households or by commercial, industrial, and institutional facilities in their role as end-users of the product, which can no longer be used for its intended purpose. This includes returns of material from the distribution chain.*

✉ Description and documentation from plastic manufacturers showing that the plastic is recycled in compliance with the requirement's definition or has EuCertPlast certification or Global Recycled Standard certification.

✉ Calculation or statement from the packaging manufacturer showing the percentage of recycled material in the packaging showing that the packaging is made of at least 50% recycled material.

Background to requirement O32

To promote circular economy and to avoid many of the negative environmental impacts associated with production of virgin plastic, an increased use of recycled material is necessary. However, some types of recycled plastics may have limited areas of use due to variations in quality or properties. For instance, today post-consumer plastics are generally suitable for fewer types of products compared to pre-consumer plastics. It is therefore especially important that post-consumer plastics are used when it is possible, to reduce the need of virgin plastic. Post-consumer plastic is very suitable as a packaging material for paint.

The limit of 50% has been set based on information received from packaging manufacturers and license holders. It is technically possible to use an even greater proportion of recycled material in the packaging, but this requires that the recycled material is of higher quality, i.e., cleaner fractions, in order for the plastic to achieve the desired properties that make it suitable as paint packaging. With a proportion of 50% recycled, the plastic collected from Nordic households will be of good enough quality to be used, and this will then contribute to creating a larger market for the collected plastic.

Plastics that contain a large proportion of recycled material can become brittle and are thus more susceptible to damage from impacts and other loads. This is also the reason why there are no requirements for recycled material in the lid and handle. The paint bucket must be able to be stacked on top of each other to improve transport and storage capacity, and lids containing recycled plastic may have problems withstanding this load.

Industrial paints are exempted from the requirement as they are stored in large containers that are reused.

O33 Recycled material in flexible bags and pouches

- Flexible bags and pouches must contain a minimum 30 weight% post-consumer recycled (PCR)* material.
- The bags, pouches and any surface coating must not contain halogens e.g., PVC or PFAS.

* *Post-consumer/commercial recycled material is defined according to ISO 14021:2016: Material generated by households or by commercial, industrial, and institutional facilities in their role as end-users of the product, which can no longer be used for its intended purpose. This includes returns of material from the distribution chain.*

✉ Description and documentation from the plastic manufacturer showing that the plastic is recycled in compliance with the requirement's definition or has EuCertPlast certification or Global Recycled Standard certification.

✉ Declaration from the packaging manufacturer that the packaging and any surface coating does not contain halogens.

✉ Calculation or statement from the packaging manufacturer showing the percentage of recycled material in the packaging showing that the packaging is made of at least 50% recycled material.

Background to requirement O33

Recently some paint manufacturers have started to use flexible bags and pouches as packaging for paint, especially for paint that are sold online directly to the consumer. A requirement for a certain amount of recycled content is set to promote circular economy and to avoid many of the negative environmental impacts associated with production of virgin plastic. Information from the plastics industry indicates that it is possible to produce pouches with 30% recycled material[87].

O34 Consumer information

The following information must be placed on the packaging or enclosed with each individual product:

- The purpose, substrate, and other conditions of application for which the product is intended. This shall include advice on preparation, e.g., correct preparation of the substrate or temperature.
- Estimate of "normal" coverage (e.g., l/m^2 or equivalent).
- Recommended preventive safety measures for users, such as safety equipment and ventilation (particularly when working in enclosed spaces or similar).
- The label must contain information on how the packaging should be sorted in the relevant country of sale.
- Information that liquid paint and washing water with paint residues must not be emptied down the drain but delivered to an approved hazardous waste collection point.
- Recommendations on cleaning used tools and how waste products from cleaning can best be disposed of (to limit water pollution). These recommendations are to be adapted to the product types and areas of application. Pictograms may also be used where appropriate.
- Recommendations on how the product is to be stored after opening, including safety instructions where relevant.
- Dry and empty packaging is sorted as plastic waste. (Only applicable for Norway)
- Remove the handle before sorting (only relevant if the handle is made of metal).

✉ Label, product sheet or equivalent and description of how the information accompanies each product.

Background to requirement O34

Consumer information requirements have been set to facilitate the correct use of the product and to minimise the impact of the product on health and the environment. The recommendation concerning preventive safety measures has been clarified to explicitly include safety equipment and ventilation. It must be made clear what level of ventilation is required when using each type of product.

Recommendations on how to store the products after opening and how to handle residues to minimise the risk of incorrect handling is required to inform the user. Correct handling of residues and washing water is important to avoid the spread of microplastics.

[87] Personal contact Daklapack

Information for the user on how to use the product, on which substrates and how much product is estimated to give “normal” coverage can help to reduce waste through correct handling of the product.

6 Licence maintenance

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

O35 Customer complaints

The licensee must guarantee that the quality of the Nordic Swan Ecolabelled product or service does not deteriorate during the validity period of the licence. Therefore, the licensee must keep an archive over customer complaints.

Note that the original routine must be in one Nordic language or in English.

✉ Upload your company’s routine for handling and archiving customer complain.

Background to requirement O35

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.

O36 Traceability

The licensee must be able to trace the Nordic Swan Ecolabelled products in the production. A manufactured / sold product should be able to trace back to the occasion (time and date) and the location (specific factory) and, in relevant cases, also which machine / production line where it was produced. In addition, it should be possible to connect the product with the actual raw material used.

You can upload your company’s routine or a description of the actions to ensure traceability in your company.

✉ Please upload your routine or a description.

Background to requirement O36

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.

7 Areas without requirement

A requirement for the energy production of polymers was investigated as it is an energy intensive industry for the conversion of raw material to final polymer which requires a large amount of electricity for thermal energy. Sources for the energy are mainly conventional fossil coal-based resources, e.g., coal, petrol, and natural gas and there are several improvements that could be made within the industry. This includes improvements to reduce energy intensity through energy efficient synthesis and alternative energy sources for primary energy, e.g., green hydrogen and renewable electricity.

For steerability, the project group looked at factors such as rising energy prices being of great importance in getting the polymer industry to invest in alternative energy measures. However, there are steerability issues regarding an energy requirement, as it is dependent on variables such as energy infrastructure, climate zone and ambient temperature, which differ depending on the location of production globally.

The main environmental problem described in the reference document on best available techniques in the production of polymers[88] (BAT) is primarily a focus on emissions of volatile organic compounds and waste. For energy there are general recommendations, such as increased amount of polymers in the reactors leads to energy efficiency linked to reduced downtime, which is the major energy problem. Development of the requirement concluded and was not included in this version of the criteria due to insufficient information from stakeholders and outdated information from the BAT, however, may be investigated upon in further revisions.

An energy requirement for the manufacturing plant of paints and varnishes was examined based on previous LCA-reports as described in the preliminary report of the Revision of EU European Ecolabel and Development of EU Green Public Procurement Criteria for Indoor and Outdoor Paints and Varnishes[89]. Additionally, the PEFCR for paints[90] identified electricity grid for the manufacturing of paints as an impact in regard to climate change for paints. The data examined in the preliminary report showed that the activities at the manufacturing plant contributes to 25% of the paints overall environmental impact. However, the data is based upon information from a generic chemical manufacturing plant. A further investigation of this data was warranted as it could have an impact on paint manufacturing's environmental impact. By reviewing more recent EPDs from several paints and paint manufacturers, the environmental impact in terms of energy only contributed up to 5% of the total impact. Therefore, more investigation is warranted for future criteria before a requirement is included.

A requirement for microplastic emissions in the manufacturing facility of the paint and varnish and polymer production was also explored in order to reduce unintentional leakage of plastics to the waste system. Whilst high environmental, safety and quality management controls are applied throughout the plastics industry, unintentional loss of pellets can occur at different stages

[88] “Best Available Techniques for the Production of Polymers reflects an information exchange carried out under Article 16(2) of Council Directive 96/61/EC (IPPC Directive).
[89] https://susproc.jrc.ec.europa.eu/product-bureau//product-groups/461/documents
[90] https://ec.europa.eu/environment/eussd/smgp/documents/PEFCR_Decorative%20Paints_Feb%202020.pdf

along the value chain and end up in the environment. For all the polymer producers it was acknowledged that they are actively members of the “Operation Clean Sweep” (OCS) initiative and are using strict processes and measures to prevent any pellet loss in our installations.

Because of the previous management controls within the industry and the initiative OCS to further take measures to prevent plastic loss, Nordic Ecolabel determined that polymer producers are already doing vast measures to prevent pellet loss through its value chain, and therefore a requirement from Nordic Ecolabel would not have enough additional potential.

For the manufacturer of paint, the main issue during the investigation was a speculation of possible plastic spill from the use of processing water used to clean the manufacturing line. Process water is taken care of in the same between all manufacturers, and it is not possible to distinguish process water between ordinary products and Nordic Ecolabelled products. Process water is often reused circularly and then sent to a remediation company where they purify the water together with water from all sorts of industries.

The customers who send process water do not analyse the water beforehand, and the remediation companies do not analyse the water. When the sanitation companies receive the water, microfiltration and reverse osmosis are used to purify the water. Microplastic ends up in the sludge that is incinerated. Based on current routines, it is not relevant to analyse for microplastics.

Thus, the requirement is already controlled via work environment legislation and if Nordic Ecolabel were to make a requirement, it would primarily be for communication purposes. The requirement is based on high relevance, low potential and low steerability.

Criteria version history

Draft for consultation, 30 November 2022.

New criteria

- Determine environmental gains with energy requirement for polymer producers.
- Determine environmental gains with energy requirement for paint manufacturer.
- Evaluate the possibility of stricter requirement for biobased binders.
- Determine possible environmental gains with requirement to SVOC (Semi-Volatile Organic Compounds) in industrial paints and varnishes