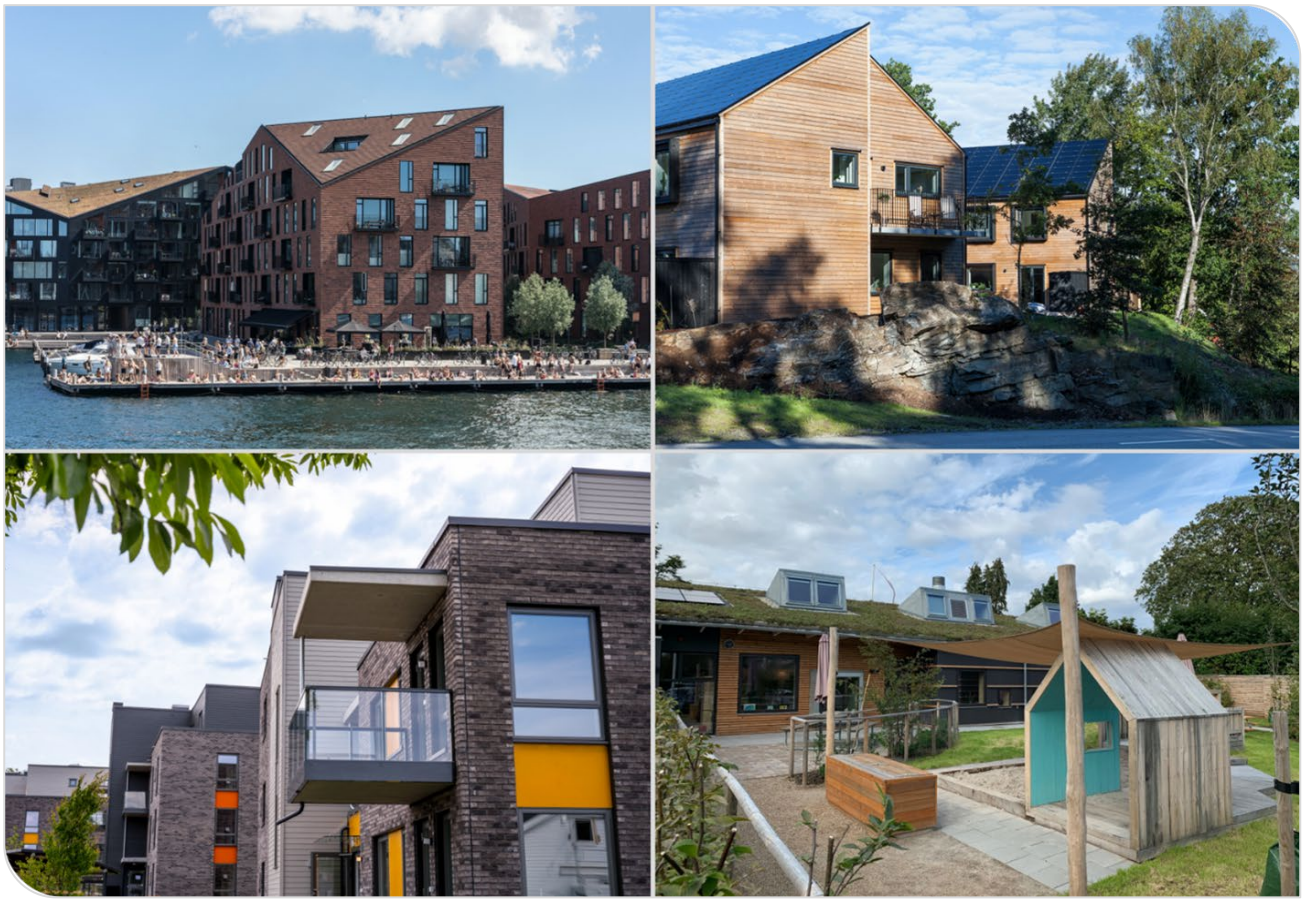
About Nordic Swan Ecolabelled

New buildings



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Nordic Ecolabelling

Content

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Contact information

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

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1 Summary

During 2020-2022 the criteria New Buildings (previously small houses, apartment buildings and pre-school) have been revised. As from this revision, office buildings can also be Nordic Swan Ecolabelled. Holidays homes are removed from the criteria.

The main focus areas have been climate, circular economy and biodiversity where large changes have been implemented compared to generation 3. The number of obligatory points is changed from 41 to 42. The number of point-score requirements have been increased from 14 to 23. Several completely new point-score requirements have been added, especially in the section's climate and circular economy.

The most important changes because of the revision are presented below:

- A new section on climate, including requirements for a climate calculation for the building, climate adaptation and requirements for materials with high climate impact such as concrete, steel and aluminium.
- A new section on circular economy that includes new areas such as Design for Disassembly and adaptability, producer take-back systems and increased focus of handling of construction waste preparation for reuse, recycling, and material recovery.
- A new section on biodiversity that includes mandatory requirements for biodiversity that verifies the current state of the building plot in order to preserve and improve the biodiversity.
- A mandatory level for the use of ecolabelled products and materials.
- Office buildings are now covered by the criteria.

2 Definitions

Definition	Description
Chemical products	A chemical product is a substance or a mixture of two or more substances, in liquid, gaseous or solid form, which are used on a construction site or by a manufacturer of prefabricated building components. Chemical products both for indoor and outdoor use are covered by the requirements. Nordic Ecolabelling does not set chemical requirements for cement or concrete, nor for metal alloys such as steel or brass.
Construction products	Products used in the construction of buildings, for example wall elements, flooring, power cables, doors, thermal insulation etc. In EU regulation No 305/2011, a construction product is defined as "any product or kit which is produced and placed on the market for incorporation in a permanent manner in construction works or parts thereof and the performance of which has an effect on the performance of the construction works with respect to the basic requirements for construction works".
EPD	A product specific EPD according to the standard ISO 14025 and EN 15804 is a third-party verified document based on product category rules (PCR) and life cycle assessment (LCA). A daughter EPD is based on a third-party verified EPD but can be adapted to small variations in the composition of the product.

EU Taxonomy	In these criteria, references to the "EU Taxonomy" means the Delegated Act on the objective climate change mitigation (Commission Delegated Regulation (EU) 2021/2139 of 4 June 2021). Specifically, reference is made to the activity 7.1 "Construction of new buildings".
Facade	The principal front of a building, that faces on to a street or open space.
Heavy current cables	Heavy current cables/Electricity cables for nominal voltage equivalent to or more than 50 V AC voltage or 120 V DC voltage. The definition does not include data, telephone, and TV cables. Cables that arrive at the construction site together with electric appliances, such as lifts, white goods, pumps, and fans are not subject to material requirements.
Impurities in chemical products	Residuals, pollutants, contaminants etc. from production, incl. production of raw materials that remain in the raw material/ingredient and/or in the chemical product in concentrations of less than 1000 ppm (0.100 w-%, 1000 mg/kg) in the chemical product. Examples of impurities are residues of the following: Residues or reagents incl. residues of monomers, catalysts, by-products, scavengers, and detergents for production equipment and carry-over from other or previous production lines.
Ingoing substances	Chemical products: All substances in the chemical 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. Construction products: All substances in the construction product that are present in concentrations higher than 100 ppm (0.010 w-%, 100 mg/kg).
Nanomaterial	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 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.
Post-consumer/commercial recycled material	“Post-consumer” is defined as material generated by households or commercial, industrial or institutional facilities in their role as end-users of a product that can no longer be used for its intended purpose. This includes materials from the distribution chain.
Pre-consumer/commercial recycled material	Material that is reclaimed from the waste stream during a manufacturing process. Production waste (scrap, rework, regrind) that can be returned directly to the same process in which it was generated is not counted as recycled pre-consumer material. Nordic Ecolabelling defines rework, regrind or scrap, that cannot be reused directly in the same process, but requires reprocessing (e.g., sorting, reclamation and granulation) before it can be reused, to be pre-consumer material. This is regardless of whether it is produced in-house or externally.
Recycled material	Recycled material is defined according to ISO14021 in the categories of pre-consumer and post-consumer and includes both mechanical and chemical recycling.
Reused materials	Reuse of a material means using it again for the same purpose for which it was originally made. The original product is usually not altered in any significant way before being used again. These criteria also include use of a certain material again, but in a manner different to what it was originally intended for. The original product is left mostly intact, utilising its shape, form and material for a different purpose.
Supplementary buildings	Supplementary buildings are refuse depots, bicycle sheds, garages (both as a separate structure or connected to the building) and similar constructions.
Take back systems	An initiative organized by the manufacturer or retailer, to collect used products or materials from the construction sites and module manufacturers and reintroduce them to the original processing and manufacturing cycle. A company may implement this program in collaboration with end-of-life logistics and material processing firms.
Technical service areas	Technical service areas are fan rooms, substations, lift shafts, machine rooms, electrical rooms, and other areas to which unauthorised persons do not have access.

	The following are not service areas: all living areas and communal areas such as dressing rooms, shower rooms, stairways, entrance areas, storerooms, corridors in basements/galleries, pram rooms and bicycle rooms. Installation shafts.

3 Environmental impact of new buildings

The criteria for Nordic Swan Ecolabel new buildings are based on the principles of life cycle assessment and RPS (Relevance, Potential and Steerability) analysis. The following table sums up the overall output of the RPS analysis, which aims to maximise the total environmental benefit of the criteria.

3.1 RPS Analysis for New buildings

Area	RPS level (high medium low)	Comment
Climate impact	R = High P= High S = Medium	The Nordic Swan Ecolabel contributes to reduced climate gas emissions through different pathways: reduced energy use, specific climate requirements for materials with high climate impact (cement, steel and aluminium), transition from fossil to sustainable energy, renewable raw materials and reduced waste. Furthermore, Nordic Ecolabel sets a requirement to produce a climate calculation for the building, leading to increased attention to the critical parts of materials and constructions in relation to the climate footprint. Warehouse buildings have been found to have potential and steerability to set mandatory requirements for climate adaptation.
Circular economy	R = High P = High S = Medium	The construction sector produces a large amount of construction waste and consumes a lot of resources. When possible, materials should stay in closed loops and be reused or recycled into new construction products instead of ending up as waste. The Nordic Ecolabel focuses on setting requirements so that virgin materials of today can be reused or recycled in the future. This is ensured, for instance, through strict chemicals requirements that minimise harmful substances in construction materials and waste. Furthermore, requirements are set in order to increase the demand for secondary materials in the current market. Warehouse buildings have been found to have potential and steerability to set mandatory requirements for design for disassembly.
Building's energy demand	R = High P = High S = Medium	From a life cycle perspective, the user phase of the building is critical in relation to the building's total energy demand. The Nordic Ecolabel sets strict requirements to lower the energy demand of the building across its entire lifetime. In the case of warehouse buildings, it is furthermore required to install solar PV on the roofs.
Chemical products and construction products	R = High P = High S = Medium	Chemicals that are hazardous to health and the environment are found in many construction products and chemical products. In many cases, environmentally friendly alternatives are available, where the content of hazardous substances has been limited or completely phased out. Through its requirements for chemical content in materials and products, Nordic Ecolabelling contributes to the use of chemicals that are less damaging to health and the environment.
Indoor environment	R = High P = Medium S = Medium	We spend a large part of our time in our homes and educational buildings. A Nordic Swan Ecolabel building contributes to a good indoor environment and good health. Identified indoor environmental factors that are critical for achieving a good indoor environment are: acoustics, daylight and moisture prevention control and radon. In warehouses sections of buildings there is low RPS for daylight, overheating and acoustics.
Biodiversity	R = High P = Medium S = Medium	Nordic Ecolabel aims to protect and preserve the existing biodiversity at the construction site. Where possible, measures are taken to improve biodiversity in relation to the construction projects.

3.2 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 contributes to Goal 12, “Ensure sustainable consumption and production patterns”. The criteria for new buildings contribute to Goal 12 as follows:

- Having requirements for reduced climate impact of the building and regulation of specific materials with a high impact on the climate, such as concrete/cement, aluminium, and steel.
- Promoting the principles of a circular economy by increasing the demand for recycled products, demanding a logbook/building passport, ensuring comprehensive sorting of construction waste and implementing the principles of design for disassembly.
- Having restrictions on chemical substances that are harmful to health and the environment, including construction products, materials and chemical products. Thereby ensuring a healthy indoor environment, reducing the spread of substances of concern and promoting the potential for material reuse in the future.
- Setting strict requirements for low energy consumption in the final building, automatic control of outdoor lighting and energy efficient white goods.
- Having requirements for certified, sustainable wood raw materials and traceability.
- In the construction process, maintaining a focus on quality and on the correct handling and installation of materials in the building to ensure that the resources are used optimally.

4 Justification of the requirements

This chapter outlines proposed requirements for generation 4 of the criteria and provides the background as to why the requirement has been included, the proposed requirement level and any delimitation. The appendices referred to in the respective requirements are the appendices to the criteria document.

5 What is subject to the requirements?

Buildings, supplementary buildings, and outdoor areas

The Nordic Swan Ecolabel building, outdoor areas on the plot and any permanent supplementary building must fulfil all relevant requirements. Communal/shared areas for residents or occupants are also included, e.g., gyms and hobby rooms in the building. Supplementary buildings are refuse depots, bicycle sheds, storage buildings, garages (both as a separate structure or connected to the building), carports and similar constructions.

Commercial areas making up more than 25% of the building area such as shop premises, hairdressers, restaurants etc. are exempt from the requirements. Please see the section “What can carry the Nordic Swan Ecolabel?”.

General scope of the material requirements

- The requirements include all materials and products that are incorporated in the Nordic Swan Ecolabel buildings and supplementary buildings included in the project.
- The material requirements apply to all structures above the capillary layer. This includes materials used for insulation of the base plate (above or below the plate) and any radon barrier wherever it is placed.
- Materials used on outdoor areas that are included in the building project and/or delivered by the house manufacturer are covered by relevant requirements. This includes products and construction materials such as decking, fences, pergolas, permanently installed outdoor furniture, playground and park equipment and similar items.
- Installations up to the building are not included. This means, for example, that electrical cables up to the main fuse box are not included.
- Requirements apply to permanently installed fittings, furniture and trimmings as well as loose fittings and furniture (e.g., wardrobes and lockers) that are included in the construction project and sold/let with the residential unit or premise.

Exempted areas, materials and products

The following are not subject to any requirement:

- Technical service areas* including lift cabins* and lift shafts*.
- Garage floors* and floors* in bicycle rooms where there is a need for waterproofing due to a dry level below the floors in question.
- Control units* for water, ventilation, and heating.
- Marking paint, marking tape that is removed, cable/pipe lubricant and cleaning agents.
- Sealing foam, formwork oil, etc. used to seal or lubricate casting moulds.
- Touch-up paint for damage to white goods and fittings.
- Rust protection paint to restore railings and beams after welding and when screw holes have been drilled or similar work.
- Builders' hardware (e.g., locks, handles, hole plates and hinges).
- Nails, screws, nuts, bolts, washers and similar fixings and fasteners.
- Palletising trays, plastic spacers, ground spacers, inflow and outflow pipes for white goods and similar items.
- Temporary products and structures used in the construction but later removed. Examples of temporary products and structures are moulds, struts, tarpaulins or plastic film temporarily used for weather protection or sealing. However, wooden products are always covered by O29 such as wood in casting moulds.

** The materials used are however subject to the logbook requirement O13.*

Any other exemption must be communicated to Nordic Ecolabelling for approval.

Prefabrication

When anything that would normally have been built on site is built in a module/construction element factory the same chemical and material requirements apply. This for instance includes:

- Prefabricated bathroom modules
- Sandwich elements and other modules for wall, floor, roof or similar
- Concrete elements (incorporated building products and surface treatment)

Chemical curing products can be used in prefabrication if mixing and application takes place in designated areas and/or with methods and systems protecting from exposure (in accordance with national work environment legislation.

Curing is a chemical process that produces the hardening of a polymer material by cross-linking of polymer chains. One- or two-component products, where the curing can depend on various factors such as reactive substances, UV light, heat, humidity.

Industrial surface treatments

Examples where chemical requirements (chapter 6.2) apply:

- Primed and final-coated outdoor wooden panels and boards that are not covered by the bullet below.

Examples where chemical requirements (chapter 6.2) do not apply, but where material requirements on construction products (chapter 6.3 and 6.4) still apply:

- Outdoor wooden facade panels and boards that are primed or treated with a biocidal product (PT8) according to Regulation (EU) 528/2012, if all other coatings (including products used at the construction site) are ecolabelled.

Examples where chemical requirements (chapter 6.2) do not apply, but where material requirements on construction products (chapter 6.3 and 6.4) still apply:

- Pre-painted windows, doors, and interiors (mouldings, kitchen and bathroom fittings, indoor stairs)
- Primed and final-coated indoor wooden panels, boards and ceilings
- Fire retardant-treated wood for indoor and outdoor use where the only purpose is to achieve a certain fire protection class
- Surface-treated steel

6 General requirements

Background O1: Overall description of the building and the plot

The purpose of the requirement is to give an overview of the building project that is to be Nordic Swan Ecolabelled and the immediate surroundings. The information is relevant to ensure efficient and correct certification in relation to the rest of the document.

Background O2: Points achieved

This requirement defines the minimum point score for the specific building types. Certain points are more easily available for certain building types. Therefore, the Nordic Swan Ecolabel has implemented differentiated requirements for various building types based on experience from the applications in generation 3 of the criteria. Furthermore, Iceland and Finland have a reduced point requirement due to a lower availability of ecolabelled products in these countries. New building types implemented in version 4.3 require a minimum of points according to the best comparable existing building type, then lowered with one point. Buildings for cultural activities are deemed like educational buildings in terms of materials and have the same minimum point score.

For warehouse buildings the following point requirements are excluded from the calculation, as they are typically not relevant for this building type: P1, P2, P3 and P19. In typical projects for other building types these make up 10-14 points. The point score is therefore reduced significantly for warehouses. No national difference as these is based on the availability of ecolabelled products for the order building types. Instead, it is mandatory to take points in P5, P7, P8 and P18. P5 ensures that the potential for utilizing roofs for solar PV is handled. Warehouses buildings are less complex compared to e.g. residential - or office buildings and are therefore well suited for working with the principles of design for disassembly and adaptability in P18.

7 Energy and climate

7.1 Energy

Background O3: Energy demand of the building

New buildings designed to minimise energy use can make a substantial contribution to climate change mitigation. The requirement ensures alignment with the requirement 7.1.1 in Annex 1 to the Commission Delegated Regulation (EU) 2021/2139 in DK, FI and SE.

National requirements for energy performance/energy efficiency are not directly comparable between the Nordic countries. The countries' requirements include different parts of a building's total energy demand. Other differences concern parameters such as net energy needs, purchased/delivered energy and primary energy. Furthermore, building areas are calculated in different ways, which makes it difficult to compare numbers that are normalised in relation to area. Nordic Ecolabelling has therefore chosen to set energy requirements based on national legislation. The national legislation in all EU countries is based on the EU Directive on the energy performance of buildings 2010/31/EU and the concept of Nearly-zero-energy buildings (NZEB). The energy requirements for Nordic Swan Ecolabel buildings in all Nordic countries are below the national level for nearly-zero-energy buildings, except for Iceland, Faroe Islands and Norway, which has not implemented this legislation. The Icelandic building regulation is not nearly as strict as the ones in the other Nordic countries, as there has been less incentive to improve the energy efficiency in buildings due to the availability of thermal energy. However, the requirement for energy demand of buildings is set to be 20% better than BRG # 112/2012. The levels are set based on licence data and an assessment in each country.

For details in relation to Norway's interpretation and alignment with NZEB and the EU Taxonomy, please refer to section 2 Alignment with the EU Taxonomy framework.

A requirement has been introduced for Faroe Islands. As the building regulation on energy demand is not nearly as strict as the ones in the other Nordic countries both the air permeability, heating source and energy demand of the building is regulated.

New building types implemented in version 4.3 have similar threshold limits at the same ambition level as the existing building types.

Buildings for cultural activities have limit values in accordance with other buildings of the same group/class in national legislation.

Warehouse buildings were introduced in version 4.6. In Finland there are no energy requirements for warehouses in the legislation. Instead, reference is made to energy labelling of buildings, which is still possible to this building type. In the building legislation in DK and NO the energy demand of warehouse buildings must be documented with an energy calculation for buildings heated to > 15º C. For Sweden it must be done for buildings heated to >10º C. Below these limits the buildings must only comply with a simple heat loss calculation based on U-values. Many of these buildings change in use over time, so there is a potential in ensuring that the buildings are built and insulated to be used for different activities in the future. This will also ensure that the building can obtain an energy performance certificate. The buildings design temperature must always be used in the energy calculation and the calculation must therefore as a minimum be performed for an indoor temperature of 15º C.

Background O4: Lighting management

Even with the use of energy efficient lighting products, it is important to use automated lighting management to control the use of electricity. Automatic demand control based on daylight could be a daylight sensor or an astronomical timer. Automatic demand control based on presence or absence could be motion detectors, acoustic detection, key-card control or presence sensors.

For safety and security reasons, outdoor lighting in educational buildings may need to be on throughout the dark and gloomy part of the day. School premises are often used in the evening for various organised activities, which requires illuminated schoolyards and entrances. Nordic Ecolabelling wants to emphasise that the requirement for automatic lighting management is not in opposition to these needs. The same reasoning applies to areas around residential buildings where lighting is necessary for safety and security reasons, such as parking spaces, entrances, sign lighting or walkways. Exemptions are made for light that must ensure safe logistic work for warehouses in generation 4.6. Manual switches are allowed to ensure safe logistic work during work hours - if the light e.g. automatically turns off during unloading it can cause serious safety issues.

Light pollution disturbs birds, bats and insects. All luminaires must be well shielded from the sky with <0.5% light above the horizontal line of the light fixture. This level is defined by the International Dark-sky Association as sufficient to achieve the desired effect.

Background O5: Energy efficient white goods

Energy classification of household appliances and professional kitchen appliances is an important tool for reducing energy use during the use phase of the building. The

requirement on energy efficiency is based on both Energy Labelling Directive 2010/30/EC and Energy Labelling Regulation 2017/1369 with later supplements. The specific requirement concerning the energy label for each product group is set in accordance with the market supply in the Nordic countries. As more types of white goods are moved to the Energy Labelling Regulation 2017/1369, the corresponding new requirement level is discussed with white goods suppliers to ensure that the requirement level remains fairly like the level under the Energy Labelling Directive 2010/30/EC.

Household appliances

Household appliances are all appliances covered by the Energy Labelling Directive 2010/30/EC or Energy Labelling Regulation 2017/1369 with later supplements, regardless in which building type they are installed. Electric water heaters are introduced in the requirement since this product group can now be energy labelled. Since there is no energy labelling or eco-design requirement for dryer cabinets often used in preschools and primary schools to dry the children's outerwear, a requirement is expressed in kWh/kg instead.

Professional kitchens

Cooking equipment, freezers, refrigerators and dishwashers use the most energy in the kitchen. Nordic Ecolabelling sets requirements for refrigerators, freezers, and boiling pans.

The Energy Labelling Regulation only covers refrigerators and freezers with built-in refrigeration units. Refrigerators and freezers with central cooling systems are not covered and are thus not subject to this requirement.

Boiling pans are large-capacity cooking vessels that stand on the floor. Nordic Ecolabelling requires a boiling pan to be at least 90% energy efficient in accordance with EFCEM's Energy Efficiency Standard for boiling pans.

Nordic Ecolabelling does not set any performance requirements for professional kitchen cookers or dishwashers, as there are no recognised standards for assessing the energy performance of these products.

Background P1: White goods of better energy class

This point requirement is a supplement to the obligatory requirement Energy-efficient household appliances and professional kitchen (O5) and will contribute to ensuring that household appliances and professional products of better energy classes than the obligatory level are chosen for Nordic Swan Ecolabel buildings. This will lead to minimised energy consumption during the use phase of the building.

Background P2: Water saving sanitary tapware

The requirement in the EU Taxonomy requirement 7.1 DNSH (3) in Annex 1 to the Commission Delegated Regulation (EU) 2021/2139 for water saving sanitary tapware is implemented as a point requirement. Relevant water flows ae defined according to the technical specifications for water appliances should follow Appendix E, Annex 1 to the Commission Delegated Regulation (EU) 2021/2139.

Background P3: Energy efficient and water saving sanitary tapware and technologies

The purpose is to reduce energy use by selecting energy efficient taps for kitchens, washbasins and showers. Touchless taps save both energy and water primarily in educational and office buildings, by ensuring that taps are never left on. Reuse of greywater from e.g., showers or bathtubs has been added to promote further water saving measures. Reuse of rainwater has also been added to the requirement to lower the need for tap water for toilet flushing.

Background P4: Management of electricity consumption and power peaks

The electricity grid is dimensioned to accommodate peak loads in the electricity consumption[1]. To reduce the need for grid investments, and to reduce electricity consumption, load shifting, and peak shaving are possible strategies. There are several smart home solutions on the market that make this possible. Some energy suppliers offer the possibility of switching off equipment when prices are high. In a few years, we expect that systems will be established that enable load aggregators to trade flexibility in a local flexibility market. This point requirement also applies to such systems.

Electric water- and space-heating (heat pumps or direct-acting electricity) is the part that households can influence to the greatest effect. In addition, heating can be controlled for a few hours without causing any noticeable reduction in comfort for households because there is a degree of thermal inertia in the house.[2]

Nordic Ecolabelling considers that the system should be automatic to contribute to levelling out peaks in electricity use (peak shaving). Household electricity for the likes of lighting and appliances does not need to be included in the system because the potential will be lower.

Background P5: Local renewable energy generation and energy recovery

To support a transition to a net-zero emissions economy and to reduce the need for bought energy, points will be given for installed solar PV panels, solar thermal collectors, and systems for wastewater heat recovery. The aim of the requirement is, as in earlier generations of the criteria, to stimulate energy sources and energy recovery that might not normally be installed.

The installations can be in/on the building or in the immediate vicinity. A neighbouring building or a supplementary building are also approved if the electricity generated supplies the Nordic Swan Ecolabel building or project. The building regulations of the various Nordic countries give various weighting to local and renewable energy sources, but Nordic Ecolabelling does not see this as an impediment to the point requirement.

Various activities in areas such as communal laundries in apartment buildings, shower facilities in educational buildings and sport halls, school kitchens, etc. will be suitable for wastewater heat recovery. The technology will reduce the energy demand for water heating using energy that is otherwise dissipated into the ground.

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[1] L. Ødegården and S. Bhantana, “Status og prognoser for kraftsystemet 2018-NVE,” 2018. Available at: http://publikasjoner.nve.no/rapport/2018/rapport2018_103.pdf

[2] Karin Alvehag et al. Åtgärder för ökad efterfrågeflexibilitet i det svenska elsystemet (2016) Swedish Energy Markets Inspectorate. Available at: https://www.ei.se/Documents/Publikationer/rapporter_och_pm/Rapporter%202016/Ei_R2016_15.pdf

Liquid-to-water heat pumps are an efficient alternative to electric heating panels and air-to-air heat pumps. This is especially the case in the parts of the Nordic region where winters are cold. Therefore, the Nordic Swan Ecolabel gives points for these installations even though in some regions they are relatively common. Points can only be achieved outside district heating areas, since it is favourable to use the low exergy waste heat that is part of many district heating systems. Many district heating systems are phasing out fossil fuels. Exhaust air heat pumps heat pumps and air-to-water heat pumps are standard installations in large parts of the Nordic region and do not give points.

A special potential is seen on roofs of warehouse buildings. It is therefore mandatory to take minimum two points for Solar PV for this building type. The other alternatives in P5 cannot be used to fulfil this requirement for warehouses.

Battery systems connected to solar PV system is rewarded when connected to the national electricity grid. This increases the flexibility internally and contributes to balancing services in the national grid. In total it increases the environmental benefit of the solar PV systems.

Local wind turbines do not give points as they are problematic due to noise.

7.2 Climate

Background O6: Climate calculation of the building

A greenhouse gas calculation for the entire life cycle of the building has the advantage that all emissions are considered. For example, the need for replacement of building parts and consequences of other measures such as material selection, construction, etc. are included in the calculations. At the same time, a total CO_2e figure is achieved per m^2 and year or over the entire technically determined service life of the building. In principle, such calculations can be compared with other buildings with the same function. However, it requires that the assumptions for the greenhouse gas calculations are the same and that the quality of the design and the detailed data used are high. In a full assessment the modules A–D are all assessed (A: production and implementation, B: use phase, C: end of life and D: consequences outside the system boundary).

In Sweden a new law entered into force from 1 January 2022 specifying that all buildings must have a climate declaration that is submitted together with the application for a building permit. Finland is currently trialling voluntary submission of a climate declaration, aiming to introduce an obligatory requirement around 2025. Denmark has a legal requirement since 2023 with a CO_2e limit value for buildings over 1000 m^2 and with an even stricter voluntary requirement which is an optional part of the Danish building regulations.

The biggest difference is which phases in the building's life cycle are included in the calculations. The Swedish climate declaration only includes module A, covering the production phase and the implementation phase. Modules B2, B4, B6 and C1-C4 are proposed to be implemented in January 2027. The Danish calculation includes parts of modules B and C as well as module D. The Finnish climate declaration has most phases in the government methods.

In Norway, the authorities require that the calculation of greenhouse gas emissions as a minimum include modules A1–A4, B2 and B4. In addition, the waste from the construction site must be included in the greenhouse gas emission calculation. In Norway, two different scenarios for the estimated climate impact from purchased electricity must be calculated according to the standard. Scenario 1 is based on the Norwegian consumption mix and Scenario 2 on the EU's consumption mix (EU28+NO). In addition to the calculations, you can also state whether an agreement for guarantees of origin has been entered, and if so, also the time period for the agreement.

Due to the Nordic differences, Nordic Ecolabelling requires calculations to be based on the principles of the EU Taxonomy for all buildings and building projects above 5000 m2 useful internal floor area. The limits for the EU Taxonomy are defined according to "Useful internal floor area is interpreted". EU's reporting tool LEVEL(s) User manual 2 further describes it: IPMS measurement standard 3 for office buildings and IPMS measurement standard 3B. Official national calculation tools can be used to perform the calculation when in compliance with the EU Taxonomy. There are no obligatory requirements for the calculation methods or databases used in addition to what is required by the authorities. Specific threshold values will be defined as the Nordic countries implement them in their legislation. Currently only Denmark has a threshold limit for the climate declaration set by the authorities. It is set at 12 kg CO_2e/m^2/year in the building from 2023. The requirement threshold for the Nordic Swan Ecolabel in Denmark is defined as the next coming obligatory threshold limit from the authorities building regulation (BR18). This means a requirement threshold at 10,5 kg CO_{2e}/m^2/year from 2023 to July 2025. From July 2025 the legislation level is tightened, and the calculation method updated. The new level for the Nordic Swan Ecolabel in Denmark is defined as the next coming obligatory threshold limit from the authorities building regulation (BR18), which is in line with the level for BR18 in 2027. These levels are differentiated for different building types and includes a separate threshold limit for the construction process. Please refer to the requirement for the specific levels. If the calculation method or the threshold limits in the building regulation (BR18) are changed, this requirement will be adjusted accordingly. The calculation must always be performed according to the current version of the calculation method and scope of the calculation. This includes special conditions for the building (placement, function etc) defined in § 298 BR18, which must be specifically approved by Nordic Ecolabelling. For buildings that are combinations of more than one building type the relevant threshold limit must be found by weighing the areas of the building types in question. Alternatively complying with the strictest limit.

Background P6: Quality assurance of the climate calculation

Performing a climate gas calculation involves a great deal of data, assumptions and choices and it is therefore difficult to determine how credible a calculation is and thus how useful it is as a tool for reducing climate impact.

There are ongoing developments in the Nordic countries in relation to CO_2 calculations for construction, for example regarding calculation tools, databases, several product specific EPDs and various requirements in the voluntary building certification system and standards. Nordic Ecolabelling wishes to contribute to these developments by giving points when the calculations meet one or more quality requirements.

With support from the Nordic Council of Ministers, Nordic Ecolabelling has had a report carried out by 2.-0 LCA Consultants – “Assessment of the feasibility and

potential impact of adding additional ecolabel criteria for global warming impacts of buildings and building materials". This report recommends that the Nordic Ecolabel contributes to the development of calculation methods for greenhouse gas emissions with quality requirements. The report points out that current life cycle-based CO_2 calculations for buildings do not provide results that are sufficiently consistent and comparable. The consultant report also recommends that CO_2 calculations should be performed at a comprehensive building level and in several stages of the project. The Nordic Ecolabel gives points if calculations have been performed for at least 2 different phases in the project. The greenhouse gas calculation must as a minimum be based on EN15978 and performed with either a national standard, an authority-designated method or according to Level (s) before the quality measures are added.

There are several ways to improve the quality of greenhouse gas calculations. The quality measures relevant for this criterion are determined by what is possible to influence with a type 1 ecolabel. Here points are awarded to construction projects where special consideration is given to the completeness of the calculation, third-party specialist control, data quality (use of product specific EPDs) and two stage calculations. The required completeness calculation by mass balance gives a better quality than the economic completeness calculations normally performed in the construction sector. Overall, the aim is improving the quality of the calculations in order to have more robust results to guide the applicant in lowering the climate impact of the building.

Background P7 and P8: Assesment of riks in a changing climate and adaptation to a changing climate

Climate change is giving rise to a warmer climate and more extreme weather. Problems with heat waves, floods and heavy downpours are present today and will become more frequent. The construction sector has good opportunities to reduce future damage and health hazards in the built environment by working with climate change adaptation[3].

In Sweden and Denmark, the ultimate responsibility for implementing climate adaptation measures on the property lies with landowners, developers, and property owners[4]. Municipalities have the main responsibility for implementing climate-adapted measures in the planning work in Norway, Sweden, and Finland[5]. In Denmark, climate adaptation is primarily regulated by laws and regulations, and Norway also has legislation that covers climate adaptation. Iceland currently has no requirements for climate adaptation. There are holes to fill in the Nordic climate adaptation work of properties and Nordic Ecolabelling wishes to encourage developers and property owners to work more with climate adaptation.

The climate adaptation requirements are designed to be aligned with the DNSH criteria of the EU taxonomy for sustainable activities.

Nature-based solutions are multifunctional measures that, in their design, are based on the functions that ecosystems possess and contribute, i.e., ecosystem services. By using nature-based solutions, ecosystems benefit while providing socially beneficial functions[6]. Nature-based solutions promote climate adaptation in a variety of ways and can, for example, improve resilience to floods and extreme rainfall,

[3] Klimatanpassa din fastighet. Fastighetsägarna
[4] 2017/18:163 Nationell strategi för klimatanpassning
[5] PBL 2010:900
[6] Naturbaserade lösningar. Naturvårdsverket

provide coolness for residents and cool building surfaces such as roofs and walls, and reduce risks of collapse and landslides.

A special potential is seen for warehouse buildings as this building type is typically a large commercial investment where these analyses are more common to conduct. It is therefore mandatory to take these points.

Background O7: Cement and concrete

Cement-based materials are often used in large quantities in a building[7],[8],[9] and they are produced in energy intensive and CO_2 emitting processes. Concrete typically accounts for 34–40% of the GHG emissions of office buildings, educational buildings, apartment blocks and residential care facilities.[10] Nordic Ecolabelling has defined an obligatory requirement in order to help lower the GHG emissions associated with these structures and processes.

The requirements are based on the national concrete classification systems in SE, NO and FI. The classification systems provide guidelines on how to calculate the emissions. This is important because inconsistencies in data for EPDs for cement, aggregates and concrete have been found in individual EPDs.[11] The industry reference, which is used to estimate savings in GHG emissions, uses national generic values. The threshold limits and concrete classes for each country are defined in dialogue with the manufactures and the national concrete association. Documentation must be done according to national EPD-tools.

In Denmark there is no classification system for concrete. Nordic Ecolabelling has assessed the possibility to define its own concrete class system for Denmark. The conclusion was however that there is not sufficient reliable data available to define a fair concrete classification system. The data available is very limited for both ready mixed concrete and especially for elements, piles etc.

In Denmark the specific concrete products / materials used must be verified by product specific EPDs for both ready mixed concrete and elements. The data must be used in the climate calculation O6. In the Danish building legislation, a threshold limit for CO_2 emissions will be introduced in 2023. To be sure to minimize the CO_2 emissions of the building, Denmark has a limit stricter than the authorities. The input Nordic Ecolabelling has got from consultants performing the calculations is that the introduced limit in O7 will in fact result in CO_2 reductions in concrete/cement in buildings with loadbearing structures in concrete. In practice the GWP calculation will therefore drive the change in the sector in Denmark.

[7] Life cycle assessment of MiniCO2 houses in Nyborg, Danish Building Research Institute, 2013
[8] A. Dodoo, Life Cycle Primary Energy Use and Carbon Emission of Residential Buildings, 2011
[9] Solem, Bård: Bærekraftige materialvalg (2018) Presentasjon på Samling 1 i prosjektet Fra ide til realisering - bærekraftig bygg under Innovative anskaffelser - Nasjonalt program for leverandørutvikling. Available at: https://innovativeanskaffelser.no/wp-content/uploads/2018/10/181023-baerekraftig-materialvalg-bard-solem-eggen-arktitekter.pdf
[10] Fuglseth, M., et al. (2020) Studie potensial og barrierer for bruk av klimavennlige materialer - Potensial og barrierer klimavennlige materialer. Utarbeidet for Enova. Available at https://www.enova.no/bedrift/bygg-og-eiendom/tema/klimavennlige-byggematerialer/
[11] Anderson, J. and Moncaster, A.: Embodied carbon of concrete in buildings, Part 1: analysis of published EPD (2020). Available at: https://www.researchgate.net/publication/341943113_Embodied_carbon_of_concrete_in_buildings_Part_1_analysis_of_published_EPD

Iceland has no classification system, but the producers must provide product specific EPDs. In addition, a requirement is set on the content of cement clinker on minimum two building parts.

Background O8: Steel production

Using recycled metal can reduce the environmental impact and provides a significant climate benefit. Among other things, this is highlighted in the taxonomy work in the EU.[12]. Nordic Ecolabelling is aware that the availability of recycled metal and traceability can be a challenge. Traceability in the production chain is also a value, and is important for several aspects, e.g., it provides opportunities to select suppliers based on environmental work, working conditions, quality etc.

Among the most common building materials, steel is the only material that can be recycled 100% without losing its quality..[13] It is also a material that is suitable for reuse, and compared to recycled steel, reused steel has 80% lower climate gas emissions. Hence, both recycling and reuse of steel should be encouraged to reduce the carbon footprint of buildings. The two steel production processes are Basic Oxygen Furnace (BOF) for which the input is iron ore, and Electric Arc Furnace (EAF) for which the input is mainly scrap steel. It is necessary to have an ambitious requirement to promote the use of recycled steel and traceability. In practice, this means that steel that should contain more than 20% recycled steel and must be produced at plants that use EAF technology. There are steel producers using the EAF process across the whole of Europe.[14] According to the World Steel Association.[15] the EU produces 58% of steel using BOF and 41% using EAF technology. Globally, approx. 70% is produced using BOF and 30% using EAF technology.

Nordic Ecolabelling has introduced requirements for iron ore-based steel production. Requirements for metal can therefore be met either by including a high proportion of recycled, or by fulfilling several requirements for primary metal production. The requirement model is based on an obligatory requirement for the producer to have an energy and greenhouse gas calculation with defined reduction targets.

Certification with Responsible Steel is something that Nordic Ecolabelling sees as a positive initiative, since it focuses on economic, social and environmental aspects. Production of steel also produces emissions to air and water, and Nordic Ecolabelling wishes to limit this by requiring that the emissions are within the BAT-AEL values specified in the BREF documents. The requirement can also be met if the steel comes from a manufacturer who has adopted new technologies that significantly reduce the climate impact from production. The technologies are like those stated in the EU's technical annex to the taxonomy report..[16]

Nordic Ecolabelling do not set requirements for steel rebars as the consultation has clearly shown that these are almost always made of high proportions of recycled steel. The work with documenting the recycled content and addressing the issues of traceability are not considered to be reasonable when the environmental benefit that can be achieved is limited. Therefore, this requirement is only activated when large

[12] Taxonomy report, technical annex, EU technical expert group on sustainable finance, March 2020
[13] https://www.stalforbund.no/miljo/
[14] http://www.eurofer.org/About%20us/About%20Steel/EuropeanSteelMap.fhtml
[15] https://www.worldsteel.org/en/dam/jcr:96d7a585-e6b2-4d63-b943-4cd9ab621a91/World%2520Steel%2520in%2520Figures%25202019.pdf
[16] EU technical expert group on sustainable finance, Taxonomy Report: Technical Annex, March 2020: https://ec.europa.eu/info/sites/info/files/business_economy_euro/banking_and_finance/documents/200309-sustainable-finance-teg-final-report-taxonomy-annexes_en.pdf

amounts of steel is used for applications where more climate friendly alternatives (such as wood) are available, in façade, load bearing systems and indoor steel panels in warehouses. Roof panels are not covered by the requirement.

Background O9: Aluminium production

Using recycled metal can reduce the environmental impact and provides a significant climate benefit. Among other things, this is highlighted in the taxonomy work in the EU..[17] Nordic Ecolabelling is aware that the availability of recycled metal and traceability can be a challenge. Traceability in the production chain is also a value, and is important for several aspects, e.g., it provides opportunities to select suppliers based on environmental work, working conditions, quality etc.

For aluminium, Hydro has launched its own traceability certification with a minimum of 75% recycled Al, Hydro Circal. Currently, there is a small plant in Luxembourg that can supply this, but from 2020, the Azuqueca plant in Spain will be able to supply Hydro Circal with a production capacity of 25,000 tonnes. The industry average for EU-produced Al is approx. 50% recycled, while for Al outside the EU it is approx. 40%. The major environmental benefit comes from the use of post-consumer recycled aluminium. Nordic Ecolabelling therefore requires that a certain proportion of the recycled material must be post-consumer.

In this version of the criteria, Nordic Ecolabelling has for the first time introduced requirements concerning primary aluminium production. Requirements can therefore be met either by including a high proportion of recycled material, or by fulfilling several requirements for primary aluminium production. The requirement model is based on an obligatory requirement for the producer to have an energy and greenhouse gas calculation with defined reduction targets.

Certification by the Aluminium Stewardship Initiative (ASI) is something that Nordic Ecolabelling sees as a positive initiative, as it focuses on economic, social and environmental aspects. For aluminium, the requirement can also be fulfilled by documenting direct emissions of greenhouse gases and energy efficiency in the electrolysis process, where the limits are based on values stated in the EU Taxonomy report. Direct emissions are to be calculated according to the methodology used for EU-ETS benchmarks. Please note that these values may change based on the outcome of the EU Taxonomy work.

The requirement is limited to handling the most significant parts of aluminium in buildings; façade panels, profiles for windows and doors in aluminium (external cladding of outer wood components for the sole purpose of weather proofing is exempted) and aluminium profiles in glass facade systems when the system covers more than 20% of the façade area (excluding windows/doors).

Direct reuse of aluminium is difficult due to properties of the material and is therefore not included as an option for documentation,

In this criteria document, windows and exterior doors are defined as:

- Windows and exterior doors between the interior climate and exterior climate, according to the EN 14351-1 standard: 2006.

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

- Other types of exterior doors such as entry hall doors/apartment doors, exterior corridor doors, window-walls in school and office buildings, warm storage room doors, cold storage room doors etc.

The recycled share is unchanged from generation 3 of the criteria as Nordic Ecolabelling has experienced that fulfilling and documenting this level is still challenging for the producers. The single most significant contribution to a window's overall environmental impact is related to the window's energy utilisation during operation of the building. This is dealt with in the requirement of the building's energy use, O3.

Background P9 and P10: Construction site fuel restrictions and construction site machinery

The requirements for energy use on the construction site apply only to emissions on the construction site and do not cover the energy sources earlier in the value chain, such as the energy sources for the district heating or for producing the electricity or hydrogen. The focus in these requirements is on heating and construction machinery/heavy equipment. Heating includes heating for concrete setting, facade heating and interior heating. Transport of materials, machinery, and people to and from the construction site, as well as waste handling, waste treatment and material production, are not included in this requirement.

Activities on construction sites contribute to greenhouse gas emissions due to the vast use of fossil fuels. In addition, this leads to emissions of nitrogen oxide and particulate matter pollution. The annual emissions from construction sites in Norway are around 340,000 tonnes CO_{2e} and 4,700 tonnes NOx. Emissions are produced by construction machines and vehicles at the building sites, and by burning fuel for heating. Diesel is the main energy source for construction machines and transport, while both natural gas and mineral oil are used for heating. From 2022, the Norwegian Government will ban the use of mineral oil for heating of construction sites. It is expected that this ban will reduce greenhouse gas emissions by around 80,000 tonnes per year by 2030. From 2025, the goal is that all Norwegian construction sites will be fossil-free. There are similar goals in the other Nordic countries. Through the C40 Clean Construction Forum, Oslo, Copenhagen, and Stockholm have committed to take the lead in creating a global market for low-emission construction materials and zero-emission machinery (October 2019).

Options for fuels that are fossil-free on the construction site are bio-based fuels (e.g., HVO/Hydrogenated Vegetable Oil, FAME/RME/Rapeseed Methyl Ester and ED95/ethanol-based biofuel), district heating, hydrogen and electricity. An even more ambitious goal would be zero-emission construction sites. These are construction sites where energy use does not contribute to any local emissions of CO_{2e} or NOx. Alternatives for heating that are emission-free on the construction site are district heating, electricity or other energy sources that do not lead to local emissions of CO_{2e} or NO_x, such as hydrogen used in fuel cells. For construction machines and transport, emission-free alternatives are battery electric machines and vehicles, or cable electric machines. Hydrogen is used for fuel cell systems that produce heat and off-grid electricity as an alternative to diesel generators. When Hydrogen is instead combusted, there will be emissions of NO_x just like when bio or fossil fuels are combusted. Nordic Ecolabelling awards both the use of electricity and hydrogen.

Examples of construction machines include excavators, loaders, haulers, drilling rigs, bulldozers, road rollers, graders, dumpers, telescopic handlers, pile drivers, soil

stabilisers, compactors, asphalt pavers, cranes, and lifts.
Groundworks by a former landowner (or similar) must not be considered.

Background P11: Bicycle transport

Nordic Ecolabelling rewards measures to simplify and encourage the use of bicycles as a means of transport. This applies in relation to all building types.

Charging points for electric cars, are not rewarded since this is relatively strictly regulated by the authorities. The environmental benefit of such a requirement would therefore be limited.

Public transport is also considered a green alternative, but this is outside the scope of the requirement because it is beyond the control and influence of the Nordic Ecolabel.

8 Resource efficiency and circular economy

Background O10 and P12: Construction waste management and construction waste optimisation

EU waste directives and national plans have identified the material recovery of construction waste for recycling or reuse as a core issue in the transition to a circular economy. This obligatory requirement for all ecolabelled buildings will ensure that construction companies contribute towards this goal, delivering construction waste that is prepared for reuse, recycling, and other material recovery to the established recovery systems in each country.

The delivery of the waste management plan before the start of construction will help identify any possible problems with sorting and handling in the building project. In addition, it will ensure that the waste management is in alignment with the situation at the construction site and the local possibilities for handling of the waste. Any issues can be addressed before start of the construction, while in later phases of the project it might be too late.

This requirement is in alignment with the level in the EU Taxonomy's "Do No Significant Harm" criteria that require at least 70% of non-hazardous waste to be prepared for reuse, recycling, and other material recovery. It should be noted that demolition waste is not accounted for. For details on the EU Taxonomy please refer to the section on the EU Taxonomy in this criterion.

Production of modules and prefabricated elements must account for and fulfil the requirement when the building is mainly constructed from prefabricated modules/elements with finished or nearly finished interior surfaces. Finished or nearly finished interior surfaces should be understood as surfaces that only require minor work on the building site to be finished, e.g. covering up joints between elements, installing thresholds between elements, minor plastering work or applying a bespoke nuance of paint. In cases where materials like insulation, vapour barrier or building panels are to be added on the building site, it is not considered as finished or nearly finished.

Sweden: According to Byggföretagen and Fastighetsägarna sorted wood waste can be calculated as part of the non-hazardous construction and demolition waste even if it is incinerated after collection by the waste management company. This

interpretation differs from the other Nordic countries. Nordic Ecolabelling awaits clarification from the EU commission on this issue.

The requirement P12 aims at rewarding when even higher level than 70% are achieved.

Background P13: Construction waste reduction

The prevention of waste is the most desirable action in the waste hierarchy. The EU's circular economy action plan also mentions this as a core principle to "ensure less waste". Prevention of waste not only has an environmental benefit but also leads to reduced costs for the construction process. The Nordic Swan Ecolabel encourages projects to work actively in reducing the total amount of waste produced.

Internal data from Nordic Swan Ecolabel projects shows that the average waste generation still currently lies well above 30 kg waste/m^2 gross area. This indicates that the construction companies should be further motivated to reduce generation of waste, greatly helping to minimise the environmental impact of the sector.

Background P14: Producer take-back systems

Nordic Ecolabelling wishes to encourage the usage of producer take-back systems for products/materials that can be handled better outside the existing waste handling systems. A take-back system is an efficient way to avoid generating waste, as excess material can be used in the production of a new product. The used material, scraps or cut-off from the specific material/product is gathered separately from the waste collection system at the construction site and is sent back to the producer or supplier. This means that the materials will be handled by the producers, with their specific knowledge on how to reuse or recycle the material in question most effectively.

The requirement can in principle cover all relevant construction materials.

Sorted packaging materials (cardboard, plastic wrapping etc.) will normally be recycled within the existing waste sorting/handling systems. Nordic Ecolabelling do not see an extra environmental benefit by handling these fractions separate from the existing systems.

Wooden pallets are normally reused from the construction sites and Nordic Ecolabelling do not see an extra environmental benefit by handling these fractions separate from the existing systems.

Incineration and composting is not rewarded in this requirement.

Background O11: Waste sorting inside the building

To support extensive recycling of waste, a Nordic Swan Ecolabel building must be equipped with vessels for sorting at source. Tea kitchens are exempted. The number of fractions in residential units is set at four sorting fractions, which could be: residual waste, food waste, plastic, metal, glass or paper. The last four fractions, apart from the residual and food waste, are also the minimum fractions required by the revised European Directive 2008/98/EC on waste. However, Nordic Ecolabelling will not set requirements concerning which specific fractions must be sorted, due to variations in the collection systems of the countries and municipalities. Some fractions are often collected mixed and then sorted afterwards.

In hotels, educational buildings, health centres/clinics, every room with kitchen facilities, where appliances are permanently installed for cooking and preparing meals, should have four fractions for sorting of waste. That includes small kitchens attached to sports facilities.

In conference centres the kitchenettes, where food and beverages is served, must be equipped with a minimum of three fractions.

In buildings for cultural activities, there must be waste sorting facilities in connection with kitchens, canteens and rooms where visitors can eat their own brought along food. There must also be possibilities for sorting at least three fractions in the entrance area and in connection to rooms used by the visitors such as ateliers, rooms used for public lectures or meetings, libraries. Any staff areas within the building should follow the requirement for office buildings, health centres and clinics.

Background O12: Hazardous substances in reused construction products and materials

Reusing products instead of manufacturing new ones is a fundamental concept in a circular economy. The requirement ensures that no harmful substances are introduced in new buildings from old materials.

A risk analysis of the materials made by an expert must be performed as an assessment based on the age of the building/construction, the renovation history of the building, and the state and cleansing of the material can verify any risks in relation to the material in question. In addition, knowledge and experience with the materials used at the time the building of origin was first constructed and renovated must be included in the assessment. This includes content of problematic substances in the material itself and in surrounding materials if substances found have migratory properties.

When an expert cannot verify the lack of harmful substances in reused products, it is necessary to perform a laboratory analysis to ensure that any contaminated products will be taken out of the circular loop.

Appendix 6 specifies relevant substances that must be investigated for. The threshold limits correspond with the strictest levels required in Nordic Swan Ecolabel building renovations or generation 3 of these criteria. In addition, any national threshold limits must be fulfilled.

The requirement contains a list of materials that are considered safe to use and are therefore exempt from further documentation in this requirement. The list is based in a project undertaken in partnership by IVL (Swedish Environmental Research Institute), Kompanjonen, Folksam and Vasakronan.

Background P15: Reused construction products and materials

Creating closed material loops is one of the core principles of a circular economy and Nordic Ecolabelling actively supports this by creating demand for reused products.

Substituting virgin materials with reused products is important when trying to lower the total impact that a new building has on the climate and the environment. Using the resources already in circulation and avoiding the production of new materials in the chosen categories has a great benefit for the environment.

Nordic Ecolabelling can approve other products and materials for a specific project if there is enough information showing that the products can be safely reused/used without posing a health risk for the users of the building.

Aggregates from crushed concrete can make up maximum 30% of the aggregates according to EN 206:2014 + A2:2021.

Background P16: Insulation materials made from renewable sources

Insulation is present in large quantities in buildings. While it ensures lower energy demand for the final building, energy is also are used to produce insulation materials. Nordic Ecolabelling wishes to promote materials that are based on renewable sources. Wood fibre insulation is rewarded, as it is based on renewable sources. It must furthermore fulfil the requirement on certified wood to ensure material from sustainable sources. Paper wool insulation is based on recycled material but originates from wood and is therefore also rewarded.

All materials must comply with O25.

Background P17: Renewable loadbearing structure or facade

Greater use of renewable materials generally gives a lower resource, energy and climate impact from the building structure. Studies such as “Life Cycle Assessment of Different Building Systems: The Wälludden Case Study” and “Carbon, Fossil Fuel and Biodiversity Mitigation with Wood and Forests” show that timber constructions have a lower climate footprint compared to concrete constructions. The Nordic Swan Ecolabel wishes to steer towards sustainable renewable material and to minimise the climate impact of buildings. Therefore, timber in the main structure of the building is rewarded.

If reused wood is used it can be rewarded both here and in P15.

Background P18: Design for disassembly and adaptability

Design for disassembly/adaptability is an important concept in the circular economy and is also encouraged by Nordic Ecolabelling. Reference should be made to ISO 20887:2020 – Design for disassembly and adaptability.

The aim of the DfDA is to be able to deconstruct a building through planning and designing, leading to easy recovery of components, products and materials without material loss and generation of waste. Those components can then be reused in another construction, or the materials can be recycled without loss of quality. This can also facilitate the flexibility of a building, in changing uses by dismantling and replacing a part of it. This is defined as adaptability of the building and the same principles as in disassembly are applied.

The long-term goal of this principle is for the materials to always stay in closed loops and not end up in a state where they cannot be recovered and reused, but also that the building will stay in use as long as possible, adapting to new needs.

The requirement is based closely on the requirement in the EU taxonomy. Nordic Ecolabelling will not interpret what level of documentation is necessary to fulfil the EU Taxonomy. When documenting the requirement, the applicant should focus on having a plan that covers all the relevant parameters in the building: How the building designs and construction techniques support circularity, disassembly or adaptability

of buildings, how buildings are designed to be more resource efficient, adaptable, flexible and dismantlable to enable reuse and recycling.

A special potential is seen for warehouse buildings as the construction are typically not as complex as for e.g. office or residential buildings. It is therefore mandatory to take minimum one point.

9 Chemical products, construction products, construction goods and materials

This chapter consists of three sections of requirements:

1. Product list and logbook
2. Chemical products
3. Construction products, goods and materials

Reference is made to the individual requirements, the section "Definitions" and the section “What is subject to the requirements?” for an explanation of what is included in the requirements.

Nordic Swan Ecolabel products automatically fulfil the requirements in this chapter.

9.1 Product information and logbook

Background O13: Logbook

The purpose of a logbook is to act as an inventory of materials and products used today to ensure the best possible reusability or recyclability in the future. It is an important tool for the transition to a circular economy and for the concept of buildings as material banks. The logbook can also contribute to proper maintenance of the building during its life cycle and to the identification of hazardous substances prior to renovation and demolition.

To ensure that the logbook serves all the purposes, it must include not only the names of products and a product description to report the content, but also where it is in the building. The location can be stated on a uniform basis, like in other building-related documentation and drawings. This can be as detailed as possible but there is a minimum level of description based on the following definitions: ceiling, walls and floor, building’s roof, facade, cellar, stairwell, slab, building’s frame, terrace, balconies, garage, sports halls, garden, entrance hall, technical installation rooms, waste sorting room, laundry room, lift shaft.

To ensure compliance with the materials in this criterion the logbook must be dynamic and be updated according to the building process. Problematic products and materials, especially if discovered in the late stages of the project, can lead to measures that will be costly and will take time to undertake, even leading to the denial of certification. It is also a waste of resources and an environmental burden to replace materials and products already used in the construction. For those reasons, the logbook also offers a good basis of control, preventing unwanted situations and potential negative environmental and financial effects.

9.2 Chemical products

A chemical product is a substance or a mixture of two or more substances, in liquid, gaseous or solid form, which are used on a construction site or by a manufacturer of prefabricated building components.

Chemical products for both indoor and outdoor use are covered by the requirements. The requirements in the criteria document and accompanying appendices apply to all ingoing substances in the chemical product. Impurities are not regarded as ingoing substances and are exempt from the requirements. Ingoing substances and impurities are defined in the Definitions section.

For details on what is subject to the requirements, reference is made to the section “What is subject to the requirements?”

Background O14: Classification of chemical products

Nordic Ecolabelling seeks to ensure that the health and environmental effects of chemical products are as low as possible. The requirements therefore specify that products classified as environmentally hazardous, highly toxic, toxic, carcinogenic, mutagenic or reprotoxic must not to be used to construct Nordic Swan Ecolabel buildings.

The requirement concerns the classification of the actual chemical products and not the individual compounds in the products, which are governed by subsequent requirements.

There are a few exemptions from the prohibited classifications of chemical products where the functionality requires substances for which unclassified alternatives are not available. One example of this is melamine in intumescent steel paints, which has recently gotten a harmonised classification. The Finnish construction industry has a specific need for repairing concrete cracks using epoxy injection resins. This is an indirect consequence of Finnish building regulations and standards, where shuttering slab elements are not commonly used.

The commission regulation EU 2020/1149 will be implemented during the summer 2023 according to our information. For the PU products exempted this means that no additional working environment requirements will be implemented. This should be handled satisfactory according to this new legislation of 3 August 2020. Flooring in warehouses is typically made by one of the following materials/methods: Epoxy, PU, Dustbound concrete, Polymer reinforced concrete flooring and Fiberarmed concrete. It is found that options 3, 4 and 5 can be used with our existing chemical requirements. Polymer reinforced concrete flooring seems to be the best/most durable option and can be widely used in different areas. The polymer reinforcement is typically styrene based but has been pre-polymerized so that it could fulfil the chemical requirements. However, as it is a chemical additive for concrete there are no chemical requirements. Dialogue with companies that “install” this polymer reinforced concrete floors has shown that it is available in the entire Nordic and that they can compete on price as well.

Background O15: CMR substances

In addition to the requirement concerning the classification of the chemical products, it is also required that chemical products cannot contain substances that are carcinogenic, mutagenic or reprotoxic (CMR substances cat 1A and 1B). Nor may

chemical products contain substances that are suspected to be carcinogenic, mutagenic or reprotoxic (category 2).

Substances that may cause cancer, change genetic material or interfere with reproduction are prioritised substances within the EU's chemical legislation, due to their inherently dangerous properties. It is therefore of central importance to considerably reduce, and in the long term move away entirely from, the use of CMR substances.

There are a few exemptions from the prohibited classifications of chemical products where the functionality requires substances for which unclassified alternatives are not available.

The exemption for zinc pyrithione has been set to correspond with the time limitations in criteria for Nordic Swan Ecolabelled paint.

The commission regulation EU 2020/1149 will be implemented during the summer 2023 according to our information. For the PU products exempted this means that no additional working environment requirements will be implemented. This should be handled satisfactory according to this new legislation.

Exemption is given for respirable crystalline silica/quartz classified as H372/H350i with a maximum content of 1% in raw materials. This is similar to the criteria for Nordic Swan Ecolabelled paint generation 4. For further background refer to that criteria.

Background O16 and O17: Preservatives in indoor paint and varnish, and other chemical products intended for indoor use

The requirement and the levels for highest permitted preservatives are partly harmonised with equivalent requirements in the criteria for Nordic Swan Ecolabel indoor paints and varnishes and for products for indoor use in the criteria for Nordic Swan Ecolabel chemical building products respectively. Levels for the highest permitted concentrations of the respective preservatives are partly the same as those that apply to Nordic Swan Ecolabel indoor paints and varnished. For all other chemical products for indoor use, the levels are the same as for Nordic Swan Ecolabel fillers, which is considered reasonable for a Nordic Swan Ecolabel building.

Updates for total preservatives and total isothiazolinone compounds in indoor paint and indoor varnish have been updated to 900 ppm and 600 ppm respectively, in accordance with corresponding updates for Nordic Swan Ecolabel indoor paints and varnishes.

Background O18: Prohibited substances

The list is based on the general principles from Nordic Ecolabelling regarding undesirable compounds in combination with corresponding requirements for Nordic Swan Ecolabel indoor paints and varnishes and chemical building products. A few exemptions are made when deemed necessary for the functioning of the chemical product.

Exemptions are made for 2,2-dibromo-2-cyanoacetamide (DBNPA, CAS. No 10222-01-2) and Butylated hydroxytoluene (BHT, CAS. no 128-37-0) up to 100 ppm in the final product. This is similar to the criteria for Nordic Swan Ecolabelled paint generation 4. For further background refer to that criteria.

Background O19: Nanoparticles in chemical products

There is still uncertainty related to how nanoparticles affect health and the environment.[18] Nordic Ecolabelling wishes to take a restrictive approach to the use of nanoparticles and the requirement is based on the environmental consequences when nanoparticles are released to the surroundings (indoor environment or the surrounding environment, seen over the entire life cycle). The requirement concerns chemical products that are used to produce Nordic Swan Ecolabel buildings and is in line with equivalent requirements concerning Nordic Swan Ecolabel chemical building products.

The definition of nanomaterials follows the European Commission's definition of nanoparticles[19], see Definitions.

The requirement means that newer nanomaterials produced with the intention of containing nanoparticles must not be used. Examples of such nanoparticles are fullerenes, carbon nanotubes, nano silver, nano copper and nano-titanium dioxide.

9.3 Construction products – restricted material

Background O20: Halogen free cables

Nordic Ecolabel wishes to limit the use of PVC cables to reduce the harmful environmental and health risks related to them. This requirement focuses on cables that can affect the indoor environment due to the content of plasticisers.

The market for and use of PVC-free cables have been accessed and the products are widely available in all Nordic countries. Halogen-free cables are often put as a requirement for larger private investors and in public projects.

The cables must be documented as halogen-free according to EN 60754-1, EN 60754-2 or EN 63355. Tests according to the older standard EN 50267-2-3 use the same test method and can also be accepted although the standard has expired. An obligatory requirement for sewage pipes and electrical cable conduits has not been introduced, since these products are made from hard PVC and can be handled in the existing waste system. Furthermore, electrical cable conduits, which are not made of PVC, contain varying concentrations of brominated flame retardants, which are also problematic in relation to the indoor environment.

Cables in the classes, Dca, Cca and Bca according to EN 13501-6 must always be tested for halogens according to 60754-1,-2. In addition, they must be verified by a third party. Halogen-free additional parameters in 13501-6 are a1, a2 or a3. Only parameter a3 can contain halogens above the threshold limits specified by the NSE. Therefore, additional parameter a1 and a2 specified in the DoP are accepted as a proof of a halogen free cable.

In the case of the Eca class, appendix 8 and testing according to standards EN 60754-1,-2 must be applied.

This requirement applies to cables used both on site and in construction module factories. Cables that arrive at the construction site together with electric appliances,

[18] European Council, Recommendation 2017 (2013), Provisional version, Nanotechnology: balancing benefits and risks to public health and the environment. Available on page: (21/5-13)
[19] COMMISSION RECOMMENDATION of 18 October 2011 on the definition of nanomaterial (2011/696/EU)

such as lifts, white goods, pumps, and fans are not subject to this requirement. Cables used on site, to connect the end of the appliance cable, must fulfil the requirement.

Nordic Ecolabelling has investigated the Norwegian market for halogen free cables in autumn 2023. The Conclusion was that the availability of products was low in Norway compared to the other Scandinavian countries. This is among other things caused by the differences in regulatory requirements related to sprinkler systems. Class E (i.e. PVC cables) are allowed in buildings with sprinkler systems and in building regulations in Norway there is a requirement for an elevator for all buildings where there is more than one floor up to the entrance door to the apartment. If a building has an elevator, this in turn triggers a requirement for a sprinkler system. The consequence is that apartment buildings with 3 floors or more must have sprinkler systems in Norway anyway, and the industry has therefore continued to use class E cables that are cheaper and well established.

The Norwegian market does not seem ready to implement this as a mandatory requirement at the moment which is why an exemption has been implemented. Nordic Ecolabelling will encourage the applicants to request halogen free cables which we expect will lead to a better availability from 2025.

Background O21: Surface layers on floors, ceilings, walls, doors, and windows

The requirement covers doors, windows and surface layers on floors, ceilings and walls including both PVC and PVDC as a material or component. The latter may involve cork flooring coated with a thin outer layer of PVC or textile flooring with a PVC backing.

PVC (polyvinyl chloride) is one of the most widely used thermoplastic materials. Nordic Ecolabelling has traditionally been taking a restrictive position in relation to PVC due to emissions of harmful organic chemicals from manufacturing and waste management, as well as emissions of potential endocrine disrupters such as phthalates in the use stage.

It is worth noticing that PVC products today can be produced in a much more circular way as additives such as phthalates and lead/cadmium-based stabilisers can be replaced by non-hazardous alternatives. Issues associated to PVC products end-of-use are being addressed, as both techniques to safely incinerate PVC waste and handle neutralisation residues in a responsible manner exist, while take-back, collection, identification, and separation processes to increase the amount of PVC which is recycled, already exist or are being developed. It will however require a relatively extensive list of requirements to regulate the PVC used in buildings according to this. Nordic Ecolabelling will follow the development closely but do not currently see the possibility to allow PVC more generally without overcomplicating the criteria for New Buildings. Exemptions are made for areas or surfaces with specific needs for high durability or slip resistance (related to working environment legislation) and for smaller details.

When Nordic Ecolabelling’s criteria for floor coverings (gen. 7) are revised and published, requirements for surface layers on floors may be adjusted according to these requirements.

Background O22: Durable wood

The purpose of the requirement is to limit the use of chemical wood preservative containing heavy metals and biocides and to document the durability of treated wood. Nordic Ecolabelling recognises that it can be a challenge to use untreated wood where the exposure to weather is high. The requirement contains a list of non-permitted areas (use classes, UC, according to EN 335) where preservative-treated, such as pressure impregnated, wood cannot be used since these areas are less exposed to weather. UC 5, which is when wood is permanently or regularly submerged in salt water, is not allowed because of the amount and types of biocides that are used.

All preservative-treated or chemically modified wood must meet the requirements for chemical substances in accordance with O32, also wood that is NTR-certified.

Nordic Swan Ecolabelled chemically or thermally modified wood automatically fulfils the chemical requirements in O25 and the durability requirements for their respective use class in Table 26. The use must be specified on drawings, but since the chemical and durability requirements are already evaluated, it is sufficient to provide the product name and licence number as proof.

When preservative-treated, chemically modified or thermally modified wood is used the durability must be documented. Wood treated through impregnation with wood preservative is divided by the Nordic Wood Preservation Council (NTR) into four classes: NTR M, NTR A, NTR AB and NTR B. The classification is based on EN 351-1 and is linked to the use classes defined in EN 335. Wood protection classes NTR A, NTR B and NTR AB may be accepted, if only used for certain parts that are judged to be particularly exposed. NTR A is allowed for wooden parts with ground contact, i.e., use class UC 4 according to EN 335. NTR B is only permitted for windows which belong to the use sub-class UC 3.1 according to EN 335. NTR AB is only permitted for specific wooden parts that belong to the use sub-class UC 3.2 according to EN 335 and as described in the requirement, i.e., parts that remain wet for long periods or where water can accumulate.

NTR’s system for modified wood (thermal and chemical) is similar to its system for wood treated with chemical wood preservative. Here, the wood protection classes are NTR Mmod, NTR Amod, NTR ABmod and NTR Bmod, in line with the use classes defined in EN 335. Since 2017, it has been possible to produce thermally or chemically modified wood according to the NTR standard. However, there is still no producer who is certified (2022). Therefore, for modified wood it is also possible to test the wood in line with established EN standards for the appropriate user class as described in the requirement.

Background O23: Copper

The largest sources of copper spreading into the environment are via tap water and road traffic. Sheet metal on the outside of buildings (roofs and facades) and contact cables for the railway are also relatively large sources. The primary recipients of the copper differ. For water mains, it is the sewage treatment plant, while the distribution of copper in road traffic primarily ends up in stormwater and soil. A predominant percentage (60–80%) of the copper entering the treatment plants originates from tap water pipes in properties.

A large part of the copper that reaches the treatment plants via wastewater ends up in the sludge. Unfortunately, the general positive trend for reduced levels of metals in the sludge does not apply to copper and zinc. One reason is that copper is largely

built into the infrastructure and it is therefore not as easy to reduce the supply of copper as it is for other metals that should be reduced in the cycle. The Swedish Environmental Protection Agency states that the copper levels found in arable land do not show negative microbiological effects, but that the margin is small. Both the background content of copper and local factors varies across the country. To provide general protection against the effects of copper, it is therefore justified to have stricter requirements regarding copper for the return of sludge. The Swedish Environmental Protection Agency further states that the supply of copper must specifically be reduced for sludge to be recycled in a manner that is sustainable in the long term. This is important as increased recycling of phosphorus from sludge is desirable from a resource efficiency and recycling point of view. This is the primary reason why Nordic Ecolabelling wants to limit copper as a material in tap water pipes and as a roof and facade material.

A study carried out by SYKES[20] on behalf of the Finnish Ministry of Employment and Economic Affairs concludes that the negative effects of the supply of copper to the environment through sludge returned to agricultural land are not a general Nordic problem. This is correct. However, the problem is not limited to the Stockholm area, which is incorrectly pointed out in the investigation. On the contrary, copper is a limiting factor for returning sludge to arable land in large parts of Sweden. Nordic Ecolabelling has concluded that it is not relevant to write geographically adapted requirements. Therefore, a general Nordic restriction requirement remains in the criteria.

Background O24: Plastic and rubber surfaces on playgrounds and outdoor areas

Nordic Ecolabelling wishes to minimise the use of plastic and rubber ground cover materials but recognises the need for impact attenuating surfaces accessible to people with disabilities and therefore work with restrictions rather than prohibitions.

Artificial turfs with loose infill of granules and mulches have been identified as major sources of microplastic pollution[21],[22]. Granules and mulches are often made from recycled tyres (SBR) and can contain several potentially hazardous substances, including polycyclic aromatic hydrocarbons (PAHs), metals and phthalates[23] REACH sets limit values for eight PAHs which cannot be exceeded by granules and mulches put on the market[24]. These eight are however only a small part of the over 300 identified substances found in SBR rubber granules. ECHA recommends further investigation into the effects on health and environment for some of these substances[27]. Nordic Ecolabelling has prohibited the use of rubber from recycled tyres (SBR) to reduce undesired substances.

Plastic- and rubber-based ground cover also comes in the form of granules held together by polymer-based binders. These materials are cast on the site using isocyanate binding agents or delivered as prefabricated mats or tiles that are screwed or glued to the underlay and sometimes covered by a layer of artificial turf glued on top. Although the granules are bound together, there will be spread of

[20] Jyrki Laitinen and Riikka Malila, Finish Environment Institute, Sustainable Water Management, Assessment of pipe material used in buildings, Carbon footprint and health and toxicity effects, November 2020
[21] https://www.ivl.se/download/18.34244ba71728fcb3f3f9f0/1591705616592/C183.pdf
[22] https://www.miljodirektoratet.no/globalassets/publikasjoner/m954/m954.pdf
[23] Granules and mulches on sports pitches and playgrounds – ECHA (europa.eu)
[24] https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32021R1199&from=EN

microplastics due to wear on the surfaces.[25] Alternative products containing cork or other natural materials instead of synthetic rubber granules are potentially less severe sources of microplastic, since only the binding agent is plastic. The materials also reduce the spread of undesired substances that can still be present in plastic and rubber materials even if they are free from recycled SBR. Wood chips or bark covered with rubber or plastic materials may not be used since they contain synthetic components but are not suitable for accessibility reasons.

Nordic Ecolabelling wishes to minimise the use of isocyanates on the construction site. The isocyanate binding agents and glues used for installation of the impact attenuating surfaces typically do not comply with the chemical requirements O14 and O15 and they are only accepted in this application, with restrictions, since there is a lack of alternatives for accessible surfaces. The commission regulation EU 2020/1149 will be implemented during the summer 2023 according to our information. For the PU products exempted this means that no additional working environment requirements will be implemented. This should be handled satisfactory according to this new legislation.

9.4 Construction products – ingoing substances and emissions

Background O25: Excluded substances in construction products, construction goods and materials

The requirement comprises two parts. First comes a description of which construction products are included, i.e., those for which the chemical content must be verified. The purpose is to focus on the most important construction supplies and thereby the material within the vapour barrier (moisture barrier), supplemented with known problematic material outside the vapour barrier. The second part of the requirement concerns a list of the substances/groups of substances that may not be contained in these construction supplies in quantities of 100 ppm or more.

The list is based on the general principles from Nordic Swan Ecolabelling regarding undesirable compounds in combination with corresponding requirements for other Nordic Swan Ecolabelled construction products. A few exemptions are made when deemed necessary for the quality and technical performance of the product.

Textile coverings for floors, ceilings and walls are added as a new product type, since they are highly relevant in offices. Textile flooring may contain chemical substances from production that can affect the indoor environment – this is especially relevant due to the large surface areas of textile flooring and because the products are not washed before usage. Textile flooring is often produced outside the EU and there is no regulation specifically for these products, meaning that the general rules in REACH apply. Relevant substances are phthalates, PFAS, aldehydes and a range of other VOC.[26]. Nordic Ecolabelling focuses on setting strict chemical requirements for the known problematic substances in the textile flooring, thereby limiting exposure to these substances for the end-user. Emission testing is not a requirement as the main environmental and health effects in relation to the relevant chemicals are handled in the general chemical requirements. All products used on floors, ceilings or walls are covered by the requirement.

[25] https://www.ivl.se/download/18.57581b9b167ee95ab9919a1/1552466299144/C359.pdf
[26] Kortlægning og risikovurdering af kemiske stoffer i gulvtæpper til børn, Kortlægning af kemiske stoffer i forbrugerprodukter nr. 147, 2016

Drainage pipes are no longer covered by the requirement as the materials used (PP, PE and (hard) PVC) are found to have little relevance regarding the chemical substances regulated in the requirement. Plastic pipes for drinking water are not regulated by Nordic Ecolabelling, as national legislation and certification systems already set requirements for these products (e.g., GDV in DK and Rise/Kiwa in SE).

Background O26: Antimicrobial surface treatments

Antimicrobial (e.g., antibacterial or antiviral) treated products are often marketed as preventing bacteria or viral formation, growth and odours. Yet antimicrobial treatment is often not needed, and many of its methods must be used with caution, since they can be hazardous to human health and the environment. Antimicrobial substances are biocides. Increased use of biocides can lead to bacteria becoming resistant to agents that are necessary for hygiene and health in other contexts.

The general requirement in generation three of the criteria regulating nano treatment of construction products has been removed. By assessing the licensing data and the general state of the market, it has been concluded that the primary effect of the nano requirement was to regulate antimicrobial treatments. This is handled in this new requirement. Furthermore, the work from the Swedish National Platform for Nano safety concludes in their report “Nanomaterial i byggbranschen” that nanomaterials have a limited use within the building sector today. Nordic Ecolabelling will consider regulating this area again if the situation changes over time.

The applicant must gather the necessary information from suppliers of the relevant construction products to ensure that the requirement is met, e.g. by requiring in contracts with suppliers that the requirement is met.

Background O27: Formaldehyde emissions

The requirement is harmonised with Nordic Swan Ecolabelled building panels where reference is made to EN 717-1 and EN 16516. Threshold limits are at the same level in this criterion. Other test methods may be approved if an independent third party (e.g., a test institute) has made a correlation to these methods.

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

Formaldehyde emissions from wood-based panels are communicated in the EU with a classification system, defined in the harmonised standard EN 13986. The current lowest emission class is E1, where the limit values are a maximum of 0.124 mg/m3 according to test method EN 717-1. Work is underway on a new common statutory lower limit value in the EU. Nordic Ecolabelling is monitoring this work and will review all criteria with requirements for formaldehyde emissions when the limit value has been decided.

9.5 Ecolabelled products

Background O28 and P19: Ecolabelled products

In their life cycles, construction materials have been shown to contribute to environmental impacts such as energy and resource consumption, undesirable chemical risks, and negative effects on biodiversity. The criteria for ecolabelled construction materials set requirements for environmental parameters throughout the product's life cycle, having a relevant environmental impact that can be reduced and documented in relation to ecolabelling.

To be able to make a difference, it is important that a Nordic Swan Ecolabelled building uses a certain amount of the building products with a reduced environmental impact that are available in the market. Construction materials, in a variety of product categories with the Nordic Swan Ecolabel and the EU Ecolabel are available in all Nordic markets, which makes it easier to promote their use in Nordic Swan Ecolabelled buildings.

The building materials represent an increasingly larger share of the environmental burden, and the product decisions in a project give a significant environmental effect. This is the main reason for our decision to change the requirement (from version 3 to 4 of the criteria document), to an obligatory one, thereby encouraging projects to buy more ecolabelled products in Nordic Swan Ecolabelled building projects.

Warehouses buildings must not comply with this requirement as these types of materials are typically not relevant for this type of buildings.

10 Biodiversity and wood raw materials

Background O29: Prohibited and restricted tree species

A number of tree species are restricted or not permitted for use in Nordic Swan Ecolabelled buildings. The requirement applies only to virgin forest tree species and not tree species defined as recycled material according to ISO 14021. The list of restricted tree species is based on the wood species that are relevant to Nordic Ecolabelling's criteria, i.e., tree species that have the potential to be included in Nordic Swan Ecolabelled products. Listed tree species are indicated by the scientific name and the most common trade names.

The criteria for tree species found in the list relate to wood originating from:

- Tree species listed on CITES[27] Appendices I, II and III.
- IUCN red list[28], categorised as critically endangered (CR), endangered (EN) and vulnerable (VU).
- Regnskogsfondet[29] (Rainforest Foundation Norway) tree list
- Siberian larch (originating in forests outside the EU)

[27] https://www.cites.org/ (visited January 2020)
[28] http://www.iucnredlist.org/ (visited January 2020)
[29] https://www.regnskog.no/no/hva-du-kan-gjore/unnga-tropisk-tommer/tropiske-treslag (visited January 2020)

Many of the tree species on the list are grown in countries which still have large areas of Intact Forest Landscapes (IFLs). Protecting these is important for biodiversity and climate. Many of these countries also have a high risk of corruption and the national legislation related to the environment, human rights and land ownership are weak and/or not controlled by the authorities. There are different views on whether certification is good enough to meet the challenges of forest management in countries with a high risk of corruption and illegal logging. Due to the uncertainty about whether FSC and PEFC certification systems are good enough in protecting important areas of biodiversity and ethical aspects such as human rights and land ownership in areas with a high risk of corruption, Nordic Ecolabelling takes a precautionary approach and wants further documentation about the tree species and its origin.

Nordic Swan Ecolabelling is aware that tree species originating from b, c or d can originate from legal and sustainable forestry. Therefore, it is possible to use tree species listed in b, c or d if the applicant/manufacturer/supplier can demonstrate compliance with a number of strict requirements regarding certification and traceability. Using the exemption for eucalyptus and acacia in wood-based boards requires the fibre raw materials to be certified to ensure that it comes from legal and sustainable forestry.

Background O30: Wood and bamboo, traceability and certification

The intention is to include wood products used in the largest volumes in the construction of the building. Nordic Ecolabelling requires that wooden construction elements must come from sustainable forestry through requirements to traceability and certification. The requirement for Chain of Custody certification contributes to traceability in the supply chain within FSC and PEFC's control systems for traceability. Both the FSC and PEFC schemes allow several methods to verify the traceability: physical separation method, percentage-based method, and volume credit method. Nordic Ecolabelling accepts all FSC and PEFC's methods to verify traceability and the share of certified and controlled wood/sources. Suppliers of recycled material are exempted from the requirement regarding Chain of Custody certification.

It is possible to use a supplier that is not CoC-certified as not all small/local suppliers are certified. In such cases, it should be documented that wood raw materials are purchased from certified areas.

Applicants must document that at least 70% by weight or volume of all wood raw materials and bamboo used in the Nordic Swan Ecolabelled building comes from forestry certified under the FSC or PEFC schemes or is recycled material. The remaining proportion of wood must meet the requirements of FSC controlled wood or PEFC controlled sources or be recycled. The requirement limit, a minimum of 70% of all wood raw material (virgin or recycled), correspond to the FSC and PEFC's requirement limits for use of the respective labels on products, such as "FSC Mix" and "PEFC certified".

The applicant must demonstrate that the quantity of certified wood raw material or recycled material is met. The certification shall be documented through invoices/delivery notes from suppliers or an aggregated signed list from suppliers. The invoices/aggregated signed list must contain information on: CoC codes, name of tree species, type of product items, FSC/PEFC claims such as FSC MIX 70% or FSC 100% for each product item and quantities of wood raw materials. In the case of

an aggregated signed list, Nordic Ecolabelling may ask for copies of invoices to confirm the proportion of certified timber purchased.

Background O31: Assessment of biodiversity on the building plot

The ecology report is intended to give advice on measures that preserve and improve the biodiversity on the site. To succeed, it is important to have advice based on professional knowledge. Mapping of habitat types and species over larger areas is usually done by public authorities according to specific methods, and the results are available to the public. The intention here is to map biodiversity on the plot before construction works start. The methods and scope of the mapping should be adapted according to the kind of biodiversity that is often found on plots for housing, and according to the size and condition of the plot. The surveyor can use data from public databases and should also collect data from inspections on site. In the report, the surveyor should describe the natural diversity that already exists in the area, such as red-listed and alien species and elements of great ecological value such as old trees. In addition, there must be recommendations for measures to preserve and/or improve the biodiversity on the site.

Background O32: Measures to perserve and improve biodiversity

The required measures are meant to preserve valuable elements already present at the building plot, remove invasive species and plant plants adapted to the native environment.

Elements of high importance for biodiversity on the plot should be preserved. This applies for example to old oaks and other large trees, or naturally occurring streams or ponds.

Invasive alien species are one of the five greatest causes of loss of biodiversity. Invasive species should be removed or controlled to make room for native species.

Loss or deterioration of contiguous habitats is one of the greatest threats to biodiversity. Shrubs and trees that originally belong to the local area create better living conditions for local species of insects, birds and animals. Local species can also help to create cohesive habitats where insects, animals and birds can move around.

Background O33: Management plan for biodiversity

To succeed in the long term, it is important to have a management plan with clear instructions for how biodiversity is to be preserved. A management plan supports future residents and caretakers in managing the outdoor areas. It also increases awareness of good gardening practices related to preserving and improving biodiversity. In addition, it aims at phasing out the use of pesticides.

Background P20: Biodiversity measures and ecosystem services

Green roofs

Green roofs contribute to the local management of surface water by absorbing and dissipating water. In addition, they can increase biological diversity. Intensive roofs absorb more rainwater and offer greater biodiversity than extensive roofs and are therefore given more points.

Urban gardening

Opportunities to grow edible plants are a way to increase knowledge about sustainable lifestyles and food cultivation, create social meeting places and contribute to self-sufficiency. They can also contribute to less food waste and transportation.

Gardens with rich biodiversity

Flower meadows, perennial beds, multi-layered vegetation, and less monoculture create more diversity of insects, birds and animals. Local species can help to create cohesive habitats where insects, animals and birds can move both on the plot itself and through a larger urban area.

Habitats

Creating habitats for insects, birds, bats, flying squirrels and amphibians encourages diversity in the garden.

Local management of surface water and collection of water for irrigation

Local surface water management prevents flooding and protects local water sources, by ground infiltration, retention, or dissipation. Measures such as open waterways and ponds with natural banks, rain beds and moisture habitats also contribute positively to biodiversity.

Water systems that collect water for local irrigation helps minimizing water usage.

Permeable surfaces

Permeable surfaces are important for protecting local water sources, absorbing surface water, and reducing floods. Permeable surfaces are a prerequisite for planting the varied vegetation that creates greater biodiversity. The surfaces can be anything from soil with grass or garden plants, which is most permeable, via stone slabs with grass in between, to gravel, which is less permeable.

EU taxonomy DNSH 6.2

Evaluating and confirming the buildings compliance with this requirement is rewarded 2 points.

Bird friendly glass facades:

When the building is designed to have bird friendly glass facades it is rewarded. All glass railing used on terraces and balconies in the building/project must be endowed with inherent properties that reduce the risk of bird collisions i.e., UV-patterned glass, window films, frit or acid-etched patterns on glass, opaque and translucent glass that is etched, stained, or frosted.

Habitats for insects, birds, mammals and ecological corridors:

To preserve and promote the local biodiversity it is essential to promote local habitats and corridors that can link otherwise separate habitats.

Light pollution:

Light pollution can have a negative impact on diversity of insects, birds, and animals in addition to preventing people from seeing the night sky. Light sources must be planned, designed, and placed in locations where they are used only for the purpose of guiding people safely. Glare and too much light can also be negative for safety in the form of excessive contrasts.

11 Indoor environment

Background O34: Acoustics (Educational and office buildings)

Poor acoustics give a high noise level and a poor learning or working environment with negative influence on both physical and mental health. Concentration, understanding of speech, memory capacity and comprehension are all negatively affected if acoustics are poor. Reverberation time is especially important in offices, schools and day-care centres.

While acoustics are important for occupant health and productivity, there is a balance to maintain between a good acoustic environment and material resource use.

Nordic Ecolabelling has set requirements for the acoustics in educational and office buildings. The requirement is differentiated between the different Nordic countries, due to the differences in scope, methods and threshold values in the acoustic standards and national legislation. However, there are no acoustic requirement for health centres, medical clinics, hotels and conference facilities. The building types often have other legal requirements, already have a high motivation for a comfortable acoustic environment and primarily short-term stays.

Acoustic environment parameters are: Airborne sound insulation, impact sound insulation (step sound insulation), room acoustics (reverberation time), indoor sound level from technical installations, indoor sound level from outdoor sources and noise levels in outdoor living areas.

The requirement must be verified via an acoustic plan – a document often created in the project design phase – showing calculated sound levels and designed sound class. The acoustic plan must be performed by an acoustic technician or another person with equivalent competence. A minimum experience of 2 years is required.

Nordic Ecolabelling has decided to not put requirements on the acoustic environment in residential buildings, residential care facilities, health centres and medical clinics, hotels, conference buildings and buildings for cultural activities. In residential buildings it would mean increased material use and costs to require more than the legislative level. Residential care facilities, health centres and medical clinics are generally subject to stricter legal requirements compared to residential, due to the activities in these buildings. Hotels and conference facilities as well as buildings for cultural activities are strongly motivated to achieve a good acoustic environment to have high customer/visitor satisfaction. Furthermore, they are only used temporarily by the visitors, and the acoustic environment is therefore considered to have a very minor impact on the visitors' health if legal requirements or authority guidelines for sound levels are followed for concerts, movie screenings and the like.

Background P21: Quality assurance of acoustics

Control measurements of acoustic parameters are an effective tool to find and correct mistakes during construction. Building mistakes in relation to acoustics can be very difficult to correct once the building has been taken into use. Nordic Ecolabelling wishes to encourage contractors to conduct control measurements to ensure the quality of the building. Points can be granted for all building types, including residential buildings.

Measurement methods must be in accordance with national legislation and/or national industry guidelines (Denmark: SBI-anvisning 217 Udførelse af bygningsakustiske målinger, Norway: NS-EN ISO 16283-1:2014).

Background O35: Daylight provision

Urban densification, maximisation of leasable space and increased energy efficiency tends to limit the exposure to daylight. Buildings are regularly being constructed in which most of the occupiable rooms do not fulfil the minimum statutory requirements concerning daylight. Nordic Ecolabelling wishes to inspire the construction of new buildings that deliver appropriate levels of daylight, since daylight creates a good indoor environment and promotes health and general well-being. The Nordic population risks not getting enough daylight, due to spending 90% of their time indoors. The consequences are long-term health problems such as disturbed sleep, seasonal depression, and diabetes[30].

Studies show that daylight increases productivity[31] and improves student performance. The aim of the requirement on educational buildings is to provide sufficient daylight in the rooms and areas where students spend the majority of their day.

Most of the Nordic countries have a requirement for daylight in their national building codes, but the content of their legislation differs. That, together with cultural and architectural differences, makes it difficult to compare daylight expectations across the Nordic countries. The access to daylight must be balanced with concern for summer thermal comfort and energy use. Therefore, this requirement must be understood as part of a whole approach for improving the quality of the indoor environment. Since zoning plans often do not provide adequate conditions for sufficient daylight in residential buildings, there are possibilities for exemptions from the requirement for some apartments that do not reach the requirement level. The requirement is relevant for almost all building categories, except health centres and medical clinics (privacy reasons) and commercial areas. In hotels and conference facilities there are mainly short-term stays, and therefore not a requirement for minimum level of daylight provision. It is however required to have a window to the outside in all hotel rooms. Buildings for cultural activities are used temporarily by the visitors and the different activities will have very diverse needs for lighting and daylight. Therefore, there are no requirements on daylight for the spaces used by the visitors.

Low potential is found for making a difference for warehouses, therefore no requirements apart from national legislation.

[30] Rogers, Paul; Tillberg, Max; Bialecka-Colin, Ewa et al., 2015, Vad innebär BBR God tillgång till direkt dagsljus? (Implications of BBR Good access to direct daylight?) – SBUF report 12996
[31] Figueiro, Rea, Stevens & Rea, 2002, Daylight and productivity – A possible link to circadian regulation. Light and Human Health EPRI/LRP 5th International Lighting Research Symposium, California

Background O36: Thermal comfort and overheating

Thermal comfort impacts health, productivity, and stress levels. With well insulated buildings and a warming climate, overheating is becoming a common problem. The longer and more frequent heat waves with higher temperatures result in heat stress which costs human lives and health, especially among the elderly. Residential care facilities must therefore fulfil this requirement, on a level that is stricter than the authorities' requirements or recommendations.

The requirement for thermal comfort ensures acceptable temperature levels across the whole year. The requirement is inspired by national legislation and guidelines, which are not always upheld. The requested calculations must be a set of dynamic calculations as a means of determining compliance. Reports based only on the energy calculations are not accepted.

Hotels, conference facilities, buildings for cultural activities and commercial areas are not covered by the requirement. Achieving a comfortable indoor temperature in these buildings is already strongly motivated by customer/visitor satisfaction. The potential for a requirement to make significant impact is found to be low.

Background P22: Solar shading and energy efficient cooling technologies

The warming climate is leading to longer and warmer summers in the Nordic countries. Nordic Ecolabelling wishes to reward the climate adaptation of buildings and encourage the use of passive or energy efficient technologies. Summertime overheating is a common problem in both new and older buildings, and there is a trend towards residents using air to air heat pumps[32] or portable air-cooling units[33] to lower the indoor temperature, with increasing energy use as a result. Minimising heat gains and using passive and energy efficient cooling technologies is essential to curb this trend. Evaporative cooling and cooling of the indoor air through ground pipes, “earth tubes”, are not rewarded, due to the risk of microbial growth and radon intrusion.

Background O37: Radon (applies only in Finland)

Long-term exposure to radon gas can cause lung cancer. The purpose of this requirement is to ensure very low radon levels in buildings.

In Finland authorities require that buildings shall be designed and built in a way that the radon concentration does not exceed value 200 Bq/m^3. There are, however, large regional differences in radon prevention work and differences in municipalities' radon prevention requirements in building permit process. The entire country is a risk area for radon and for this reason Nordic Ecolabelling wants to ensure the use of radon-safe construction methods in Finland.

The Icelandic Radiation Safety Authority conducted a survey in 2014, measuring radon concentration on the ground floor or in the basements of 250 homes around Iceland[34]. The results indicate that the radon concentration in Iceland is very low.

[32] https://www.ssb.no/energi-og-industri/artikler-og-publikasjoner/stadig-flere-anskaffer-varmepumpe
[33] https://www.market.se/affarsnyheter/forsaljning/rusning-efter-flaktar-i-varmen-trodde-inte-att-intresset-kunde-bli-mycket-storre/
[34] Óskar Halldórsson, Sigurður M. Magnússon, Róbert Karl Lárusson, Gísli Jónsson, July 2014, Styrkur radons í húsum á Íslandi (https://gr.is/wp-content/uploads/2016/09/GR-1401Styrkur-radons-i-husum-a-Islandi.pdf)

Based on these results, Nordic Ecolabelling concluded that Iceland should be exempted from the requirement.

According to the Norwegian legislation, buildings must always be constructed according to radon-proof design principles. No verification is required by Nordic Ecolabelling, as this is always evaluated by the authorities.

Denmark has the lowest official threshold limit for radon in the Nordic. In addition, mapping of the local radon levels is publicly available thereby forming the basis for proper risk assessments and handling. The national legislation and the compliance with it is considered to be unproblematic for New Buildings. The Nordic Swan ecolabel cannot make a difference here which is why the requirement does not apply in Denmark.

In Sweden, Boverket[35] states that it is the developer's responsibility to ensure that the new building complies with the national threshold level of radon in indoor air. The choice of technical solutions to achieve the threshold limit is left to the developer, and radon protective measures must be followed up in the control plan. Radon mapping is available, to aid in the risk assessments. Nordic Ecolabelling has concluded from documentation in criteria generation 3 that radon proofing measures are taken when relevant, and Nordic Ecolabelling cannot make a difference in fulfilment of the threshold limit. Therefore, the requirement does not apply to Swedish buildings.

12 Innovation and other green initiatives

Background P23: Innovation and other green initiatives

Specific measures that can document a significant contribution to a reduced environmental or climate impact or that contribute to circularity in the building sector are rewarded in this requirement. Measures other than those listed may be accepted after consideration by Nordic Ecolabelling.

The use of lime mortar or other types of mortar that allow for bricks to be easily disassembled is rewarded. This means that bricks can also be reused in the future.

A point foundation or ground screw foundation for the Nordic Swan Ecolabelled building ensures minimum use of concrete/cement, thereby minimising the climate impact of the project.

Forestry close to nature without clear-cutting helps to preserve biodiversity in the forest. There are several models, but the common feature is that forestry is conducted without clear-cutting, with trees of different ages and local species. According to the UN’s Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES), it is absolutely essential to get biodiversity back into the production landscapes. This means, among other things, less monoculture, and forestry close to nature is one way to achieve this.

Filtering of wastewater from laundry equipment has a potential to reduce the spread of microplastics as well as natural fibre fragments to the recipients.

Heavy goods transport must shift from diesel to alternatives. NSE awards the establisment of charging possibilities at warehouses as charging can then be done

[35] https://www.boverket.se/sv/byggande/halsa-och-inomhusmiljo/radon/nybyggnation/

during loading and unloading of the vehicle. The infrastructure for smaller vehicles is already better established and often regulated by national legislation when new buidlings are constructed. Bassed on the smaller potential these are not included.

13 Quality management of the construction process

Background O38: Air permeability

A building's air permeability affects its heat losses to the outdoor environment, as well as the spread of odours between apartments and into the stairwell. Air permeability testing allows comparison between the result and the projected value and is therefore an important quality indicator. Routines must exist to perform air permeability testing and to take corrective measures.

When accepted in national building legislation it is possible to test only part of the residential units in apartment buildings and town houses. Standardised buildings have been removed from this exemption because there is no evidence that this way of constructing buildings has an influence on the air permeability.

Warehouse buildings included in the criteria must also document air permeability, no matter to what extend it is heated. This is also a necessity to obtain an energy performance certificate.

The requirement is part of the documentation for alignment with the EU Taxonomy (7.1.1.2: Air tightness). See section on the EU Taxonomy for details.

Background O39: Moisture prevention

Moisture problems in buildings have environmental, health and financial effects. A building's lifetime might decrease due to moisture problems, with an increased need for renovations. Moisture in buildings increases the risk of respiratory infections and illness such as asthma and respiratory irritation.

Exposure of construction materials to moisture can lead to mould and increased emissions of volatile chemical substances. Timber structures and concrete slabs must be sufficiently dry before further installation of the surface layer. Materials and construction elements must be sufficiently weather protected during transport to the construction site and storing at the construction site. The building and its water- and sewage installations must be designed to minimise the risk of water damage from drip leakage.

Moisture measurements are needed to ensure compliance with the target values required by the manufacturer of the surface material. Surface moisture measurements are not sufficient to determine whether the concrete slab is dry enough, hence borehole/specimen measurements are required.

Background O40: Compliance with material and chemical requirements

The requirement is intended to ensure fulfilment of the chemical and materials requirements at various stages of the process, and between the different parties involved. Many questions may arise during the process. How should communication take place? Who requests attestation of products and chemicals, and how early? Who must be informed when products do not fulfil the requirements and approve any cost increases or delays? How should reconciliations be made? This requirement

ensures that these questions are assessed early in the process by defining a set of routines that will contribute to improving control over the chemicals, materials and construction products used in the project.

Background O41: Information for those involved in the construction process

The requirement covers the need for the licence applicant to define the training programme, showing the content and scope of the training/information. The aim is to provide information on the Nordic Ecolabelling requirements and how the requirements can affect standard processes and routines. All employees, supervisors, site managers, subcontractors and sub suppliers involved in the construction of a Nordic Swan Ecolabelled building must have the relevant knowledge to be able to ensure fulfilment of the requirements in conjunction with the project.

Background O42: The contractor's self-monitoring system

The requirement aims to ensure a solid quality self-monitoring system for the construction of the Nordic Swan Ecolabelled building. The focus is on documentation, communication, and inspection through the construction period. The requirement is designed to include the most critical elements in a typical best-practice self-inspection system in the Nordics.

Background O43: Planned changes and non-conformities

This requirement was implemented in version 4.3. The requirement is a combination of two requirements from the previous generation 3, where the requirements was a part of Nordic Swan Ecolabel's general quality requirements.

Changes compared to previous generation

Table 1 Overview of requirement changes in generation 4 compared with generation 3.

Generation 4		**Generation 3**		**Change**
No	**Name**	**No**	**Name**	
O1	Overall description of the building and the plot	O1	Overall description of the building	Updated and adjusted requirement. Appendix is created for the requirement.
		O2	Responsibility for Nordic Swan Ecolabelling	Removed. Included in the Nordic Ecolabelling portal.
O2	Points achieved	O3	Points achieved	Updated according to Generation 4’s point system.
O3	Energy demand of the building	O4	Energy consumption of the building	Threshold limits are updated and requirements for Iceland and Faroe Islands are added.
O4	Lighting management	O5	Lighting management	Indoor demand control must be based on both daylight and presence. Outdoor lighting must be directed to the ground.
O5	Energy efficient white goods	O6	Energy-efficient white goods	Stricter limits have been introduced. Updated according to Energy Labelling Regulation 2017/1369. Products for professional kitchens have been introduced, together with

				requirements for drying cabinets. Integrated white goods now have separate requirements.
P1	White goods of better energy class	P4	White goods of better energy class	Points for professional white goods are introduced.
P2	Water saving sanitary tapware	P5	Energy efficient sanitary tapware	New point requirement for office and educational buildings aimed at alignment with the EU taxonomy
P3	Energy efficient and water saving sanitary tapware and technologies			Stricter limits for points. Introduction of systems that reuse greywater or rainwater for toilet flushing.
P4	Management of electricity consumption and power peaks	P1	Individual metering of domestic hot water	New requirement. Individual metering of domestic hot water has been removed.
P5	Local renewable energy generation and energy recovery	P5	Local energy sources and energy recovery	Adjustment of threshold limits for solar panels and solar collectors. Introduction of liquid-to-water heat pumps outside district heating areas.
O6	Climate calculation of the building	P3	Calculation of HWC losses (and buildings' climate imprint, only available in Finland)	New obligatory requirement on climate declaration of the building. Calculation on HWC losses has been removed.
P6	Quality assurance of the climate calculation			New point requirement
P7	Assessment of risks in a changing climate			New point requirement A climate risk and vulnerability analysis of the building should be performed.
P8	Adaptation to a changing climate			New point requirement Climate adaptation measures implemented according to climate risk analysis will give points.
O7	Cement and concrete			New obligatory requirement
O8	Steel production			New obligatory requirement
O9	Aluminium production			New obligatory requirement
P9	Construction site fuel restrictions			New point requirement
P10	Construction site machinery			New point requirement
P11	Bicycle transport	P14	Green initiatives	Parts regarding bicycle transport are now in separate requirement.
O10	Construction waste management	P13	Recycling of building waste	New obligatory requirement with stricter limits than P13 gen. 3.
P12	Construction waste optimisation			New point requirement
P13	Construction waste reduction			New point requirement
P14	Producers take-back systems			New point requirement
O11	Waste sorting inside the building	O7	Possibility of sorting waste	Office buildings added and stricter requirement level.

		O25	Recycled materials in doors, windows and facade panels	Steel and aluminium windows worked into requirements O8 and O9. PVC windows worked into O21
O12	Hazardous substances in reused construction products and materials	P12	Recycled or reused materials in construction products	Obligatory requirement regulating chemical substances in reused products.
P15	Reused construction products and materials	P12	Recycled or reused materials in construction products	More points available and new calculation method for relevant amounts.
P16	Insulating materials made from renewable sources			New point requirement
P17	Renewable carcass, facade or inner walls	P7	Timber structure	Minor clarifications
P18	Design for disassembly and adaptability			New point requirement
O13	Logbook	O15	Product list and logbook of the building	Clarification about the logbook being subject to updates along the construction process. Clarification that the logbook must be handed to the building owner.
O14	Classification of chemical products	O16	Classification of chemical products	Exemption regarding biocide-containing wood primers classified H411 used for treatment of cut surfaces and end timbers has been added.
O15	CMR substances	O17	CMR substances	Due to raised impurity limit (from 100 to 1000 ppm) some exemptions have been removed. Exemption of organotin compounds has been updated. Exemption for biocide-containing wood primers containing substances classified H361d used for treatment of cut surfaces and end timbers has been added.
O16	Preservatives in indoor paint and indoor varnish	O18	Preservatives in indoor paint and indoor varnish	New limits for total amount of preservatives and changed limits for substances due to updated classifications.
O17	Preservatives in other chemical products intended for indoor use	O19	Preservatives in other chemical products intended for indoor use	New limits for total amount of preservatives and changed limits for substances due to updated classifications.
O18	Prohibited substances	O20	Other excluded substances	Updated definition of substances considered to be potential endocrine disruptors. The exemption for the phthalates DINP DIDP and DIUP is being removed. Due to raised impurity limit (from 100 ppm in end product to 1000 ppm) some exemptions have been removed. Exemption of organotin compounds has been updated
O19	Nanoparticles in chemical products	O21	Nanoparticles in chemical products	Exemption regarding synthetic amorphous silica and calcium carbonate has been clarified
O20	Halogen free cables			New obligatory requirement
O21	Surface layers on floors, ceilings, walls doors and windows	O24	Surface layers on floors, ceilings and walls	Exemption introduced in professional kitchens and in wet rooms in educational buildings and residential care facilities.
O22	Durable wood for outdoor use	O29	Durable/resistant wood for outdoor use	Introducing new exemptions for the use of preservative treated wood.

				Requirement on the durability of durability treated wood.
O23	Copper	O26	Copper in tap water pipes and as facade and roofing material	Introducing an exemption where fire regulation requires copper pipes.
O24	Plastic and rubber surfaces on playgrounds and outdoor areas			New obligatory requirement
O25	Excluded substances in construction products, construction goods and materials	O22	Excluded substances in construction products, construction goods and materials	Basically unchanged. Text clarified. Exemptions for fire protected EPS/XPS have been removed.
O26	Antimicrobial surface treatments	O23	Nanoparticles and antibacterial additives in construction products and construction goods	The responsibility to check material compliance now lies with the applicant.
O27	Formaldehyde emissions	O14	Formaldehyde emissions	Laminates have been added. Previously it was only products containing more than 3% by weight formaldehyde-based additives, but that limit has been removed.
O28	Ecolabelled products	P9	Ecolabelled construction products	Obligatory minimum points introduced, nationally adapted.
P19	Ecolabelled products	P9	Ecolabelled construction products	The point requirement introduces a table which is used for calculating points.
O29	Prohibited and restricted tree species	O27	Tree species not permitted to be used in Nordic Swan Ecolabelled buildings	Goes from a ban to restricted use of tree species. Reference to new tree list from 2020.
O30	Wood and bamboo, traceability and certification	O28	Wood raw material	An alternative way to documentation was added, using lists from the suppliers instead of invoices. More constructions elements are added to the requirement.
O31	Assessment of biodiversity on the building plot			New obligatory requirement
O32	Measures to preserve and improve biodiversity			New obligatory requirement
O33	Management plan for biodiversity			New obligatory requirement
P20	Biodiversity measures and ecosystem services	P14	Green initiatives	Parts of P14 in generation 3 in combination with new elements.
O34	Acoustics (Educational and office buildings)	O12	Noise environment	Obligatory for educational and office buildings. Updated levels and references to standards.
P21	Quality assurance of acoustics			New point requirement
O35	Daylight provision	O13	Daylight	Reviewed and updated requirement according to EN17037. Updated check for overheating in residential buildings.
O36	Thermal comfort and overheating			New obligatory requirement for educational and office buildings, and residential care facilities.
P22	Solar shading and energy efficient cooling technologies			New point requirement
O37	Radon (applies only in Finland)	O9	Radon	The requirement only applies to Finland.

P23	Innovation and other green initiatives	P14	Green initiatives	New point requirement, partly inspired by P14 in gen. 3.
O38	Air permeability	O30	Air permeability	Reviewed and updated requirement
O39	Moisture prevention	O10	Moisture prevention	Reviewed and updated
O40	Compliance with material and chemical requirements	O31	Management of requirements on products and materials	Updated and partly rewritten
O41	Information for those involved in the construction process	O32	Information to those involved in the construction process	Updated and partly rewritten
O42	The contractor's self-monitoring system	O33	The contractor's self-monitoring	Rewritten
O43	Planned changes and non-conformities	O37 O38	Planned changes Unforeseen non-conformities	Requirements merged