

About Nordic Swan Ecolabel  
**New Buildings**

Residential, educational and office buildings



Version 0.0 • 12 January 2022 – 15 March 2022

Consultation version

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# Addresses

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

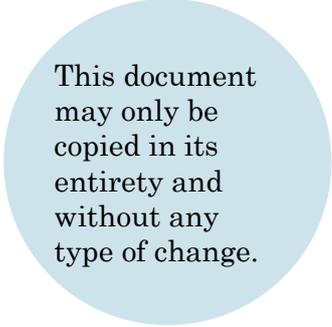
Denmark  
Ecolabelling Denmark  
Fonden Dansk Standard  
Göteborg Plads 1, DK-2150 Nordhavn  
Fischersgade 56, DK-9670 Løgstør  
Tel: +45 72 300 450  
info@ecolabel.dk  
www.ecolabel.dk

Iceland  
Ecolabelling Iceland  
Norræn Umhverfismerking  
á Íslandi  
Suðurlandsbraut 24  
IS-108 Reykjavík  
Tel: +354 591 20 00  
ust@ust.is  
www.svanurinn.is

Finland  
Ecolabelling Finland  
Urho Kekkosen katu 4-6 E  
FI-00100 Helsingfors  
Tel: +358 9 61 22 50 00  
joutsen@ecolabel.fi  
www.ecolabel.fi

Norway  
Ecolabelling Norway  
Henrik Ibsens gate 20  
NO-0255 Oslo  
Tel: +47 24 14 46 00  
info@svanemerket.no  
www.svanemerket.no

Sweden  
Ecolabelling Sweden  
Box 38114  
SE-100 64 Stockholm  
Tel: +46 8 55 55 24 00  
info@svanen.se  
www.svanen.se



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# 1 Summary

Section will be written after consultation.

## 2 Definitions

Definition	Description
Biocide treated articles	Articles and products that have been intentionally treated with or intentionally incorporate a biocidal product. Biocides are substances or mixtures that contain or generate one or more active substances that are intended to neutralise or prevent the effects of harmful organisms, such as bacteria, moulds, viruses and insects. The products are treated with biocides to achieve a certain function, for example to prevent bacterial growth.
Chemical products	Chemical products refer to a chemical substance or mixtures of different chemical 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.
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”.
Homes for the elderly	In order to be covered by the criteria for New Buildings, the building must be classified as a residential building in the national building legislation. Shared areas for the home’s residents and staff areas are also covered by the Nordic Swan Ecolabel and must fulfil the 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	<u>Chemical products:</u> All substances in the chemical product, including additives (e.g. preservatives and stabilisers) in the raw materials. Substances known to be released from ingoing substances (e.g. formaldehyde, arylamine, in situ-generated preservatives) are also regarded as ingoing substances.  <u>Construction products:</u> All substances in the construction product that are present in concentrations higher than 100 ppm (0.010 w%, 100 mg/kg).
Nanomaterial	A nanomaterial is a natural, incidental or purposely manufactured material containing particles, in an unbound state or as an aggregate or as an agglomerate and where, for 50% or more of the particles in number or size distribution, one or more external dimensions are in the size range 1–100 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.

<p>Residential institutions / homes for persons with physical or mental functional impairment</p>	<p>In order to be covered by the criteria for New Buildings, the building must be classified as a residential building in the national building legislation. Shared areas for the home's residents and staff areas are also covered by the Nordic Swan Ecolabel and must fulfil the requirements.</p>
<p>Reused materials</p>	<p>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.</p>
<p>Supplementary buildings</p>	<p>Supplementary buildings are refuse depots, bicycle sheds, garages (both as a separate structure or connected to the building) and similar constructions.</p>
<p>Take Back Systems</p>	<p>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.</p>
<p>Technical service areas</p>	<p>Technical service areas are fan rooms, substations, lift shafts, machine rooms, electricity centres 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.</p>

### 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.

#### RPS Analysis for New Buildings

Area	RPS level (high-medium-low)	Comment
<b>Climate impact</b>	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 declaration for the building, leading to increased attention to the critical parts of materials and constructions in relation to the climate footprint.
<b>Circular economy</b>	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
<b>Building's energy demand</b>	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.
<b>Chemical products and construction products</b>	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.
<b>Indoor environment</b>	R= High P= Medium S= Medium	We spend a large part of our time in our homes, schools and preschools. A Nordic Ecolabelled building contributes to a good indoor environment and good health. Identified indoor environmental factors that are critical for achieving a good indoor climate are: acoustics, daylight, moisture prevention control and radon.
<b>Biodiversity</b>	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.

## UN's Sustainable Development Goals

At an overall level the Nordic Swan Ecolabel contributes to Goal 12, “Ensure sustainable consumption and production patterns”. The criteria for New Buildings contribute to Goal 12 by:

- 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 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.

## EU Taxonomy compliance

The obligatory requirements in the criteria for New Buildings in combination with national legislation cover both the technical screening criteria and the DNSH criteria (Do-No-Significant-Harm in the EU Taxonomy for the construction of new buildings).

The technical screening criteria are according to the internal assessment done by Nordic Ecolabelling covered by the following requirements:

Technical screening criteria	Relevant requirement in criteria for New Buildings
#1: Primary energy demand	O3: Energy demand of the building
#2: Air tightness	O44: Air permeability O48: The contractor's self-monitoring system
#3: GWP calculation	O7: Climate declaration of the building

The DNSH criteria are according to the internal assessment done by Nordic Ecolabelling covered by the following requirements:

<b>DNSH criteria</b>	<b>Relevant requirement in criteria for New Buildings</b>
#2: Climate Change adaption	Considered to be covered by national legislation in the Nordic countries
#3: Sustainable use and protection of water and marine resources	O6: Water saving sanitary tapware
#4: Transition to a circular economy	O12: Waste management O17: Design for Disassembly and Adaptability (DfD/A)
#5: Pollution and prevention control	Section 9 of this criteria (New Buildings) regulates relevant parameters for chemical substances in building products. Note: Nordic Ecolabelling has an ongoing dialogue with the European Commission to clarify the requirement for formaldehyde and carcinogenic substances, as test methods and the possibility to use alternative documentation methods (declaration of content from producers) are currently unclear.  Handling of brownfield sites, noise, dust and pollutant emissions are considered to be covered by local legislation in all Nordic countries.
#6: Protection and restoration of biodiversity and ecosystems	O36: Ecology report.  Note: Nordic Ecolabelling only sets a requirement for evaluation of compliance with part a) "arable land" and c) "forest". Part b) of the EU Taxonomy is covered by national legislation.

Please, contact Nordic Ecolabelling's national organizations for further information.

## 4 Justification of the requirements

This chapter outlines proposed requirements for generation 4 of the criteria and also 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 and any permanent supplementary building must fulfil all relevant requirements. Communal areas for residents are also included (e.g. gyms and hobby rooms in the building). Supplementary buildings are refuse depots, bicycle sheds, garages (both as a separate structure or connected to the building) and similar constructions.

Commercial areas such as shop premises, hairdressers etc. are exempt from the requirements. Please see the section “What can carry the Nordic Swan Ecolabel?”.

Outdoor areas that are included in the building project are covered by the relevant requirements.

### **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.
- Materials used on outdoor areas that are included in the building project 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.
- 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.
- Installations up to the building are not included. This means, for example, that electrical cables up to the main fuse box are not included, nor are sewerage pipes before they enter the building through the base plate.
- No requirements apply for pipes laid under the base plate or in the ground at the building site, such as drainage pipes in the capillary layer.
- Permanently installed fittings, furnishings and trimmings as well as loose fittings and furnishings (e.g. wardrobes and lockers) that are included in the construction project.

### **Exempted areas, materials and products**

The following are not subject to any requirement:

- Technical service areas
- Elevator
- Installation/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.
- Building fixtures (e.g. locks, handles, hole plates and hinges).
- Nails, screws, nuts, bolts, washers and similar fasteners.
- Plastic products such as palletising trays, plastic spacers, ground spacers, bends, sleeves, mounting boxes, roof boxes, inflow and outflow pipes for white goods and similar items.

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

### **Prefabrication**

When anything that would normally have been built on site is purchased as prefabricated, 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
- Primed and final-coated wooden panels and ceilings (indoor and outdoor products)
- Concrete elements (incorporated building products and surface treatment)

Examples where chemical requirements do not apply, but where material requirements still apply:

- Pre-painted windows, doors and interiors (mouldings, kitchen and bathroom fittings)
- Surface-treated steel

For two-component products used in prefabrication, the following applies: The sub-components must comply with the chemical requirements or alternatively the hardened two component product must comply with the chemical requirements.

## 6 General requirements

### O1 Overall description of the building

A description of the building(s) and the immediate surroundings must be given, including information on the following:

- The situation plan, general layouts and facade drawings.
- Building type(s) and number of buildings. Buildings at the construction site that are not included in the application.
- Number of storeys, number of square metres (NO: BRA, SE: BOA, FI: A(netto), DK: Brutto and Netto, IS: A(brutto)).
- Commercial spaces or other supplementary activities (canteen, gym etc.) in the building.
- System to ensure that office buildings have individual metering of electricity for each rentable unit or each floor as a minimum.
- The carcass/load-bearing structure, facade, roof, foundation, heating system and ventilation system.
- Number of residential units. For offices and educational buildings: intended number of users of the building.
- Any supplementary buildings such as garages, storerooms, bicycle storage rooms, waste sorting stations, etc.
- Outdoor areas: layout and materials.
- Options for various layouts, materials or fittings.

Situation plan, general layouts and facade drawings.

Documented description of the aforementioned items. Appendix 1 or corresponding documentation can be used.

### Background

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

### O2 Points achieved

Projects must fulfil the minimum requirement for total points according to Table 1. Table 2 displays an overview of all point requirements and the minimum number of points that must be achieved for ecolabelled products.

**Table 1 Total minimum number of points**

Building type	DK / NO / SE	FI	IS
Small houses	28	26	25
Apartments	25	23	22
Homes for the elderly	25	23	22
Offices	25	23	22
Educational Buildings	24	22	21

**Table 2 Summary of all point requirements and minimum number of points required for ecolabelled products.**

Area	Requirements on the area
<b>Energy and Climate</b>	P1 Household appliances of better energy class (3p) P2 Energy efficient or water saving sanitary tapware (2p) P3 Management of energy consumption and power peaks (2p) P4 Local energy sources and energy recovery (4p) P5 Quality assurance of the climate calculation (2p) P6 Building sites, construction machinery (3p) P7 Bicycle transport (2p)
<b>Resource efficiency/Circular economy</b>	P8 Construction waste reduction (5p) P9 Take-back systems (2p) P10 Reused construction materials (5p) P11 Insulating materials from sustainable or recycled sources (3p) P12 Renewable carcass, facade or inner walls (3p)
<b>Ecolabelled products</b>	P13 Ecolabelled products (14p)  DK/SE/NO: Minimum 8 points FI: Minimum 6 points IS: Minimum 5 points
<b>Biodiversity</b>	P14 Improvement and preservation of biodiversity (6p)
<b>Indoor climate</b>	P15 Quality assurance of acoustics (1p) P16 Daylight experience optimisation (3p) P17 Solar shading and energy efficient cooling technologies (2p)
<b>Innovation and green initiatives</b>	P18 Innovation and green initiatives (4p)
<b>Total available points</b>	<b>66</b>

- ☒ Summary of the points that the licensee obtains. Appendix 2 can be used.  
Documentation needed for each point requirement as described in the relevant requirement.

## Background

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.

## 7 Energy and climate

### 7.1 Energy

#### 03 Energy demand of the building

The calculated energy demand must at least correspond to:

##### **Denmark**

All building types: 10% better than BR18 or according to the Low energy class in BR18.

##### **Sweden**

Apartment buildings and single-family houses: 15% better than BBR.

Preschools and schools\*: 20% better than BBR.

Office buildings: 15% better than BBR.

##### **Norway**

Small houses: 15% better than TEK17.

Preschools and schools\*: 15% better than TEK17.

Apartment buildings: 10% better than TEK17.

Office buildings: 15% better than TEK17.

##### **Finland**

Small houses and apartments: Energy class A according to the Ministry of the Environment's regulation for buildings' energy performance (1010/ 2017).

Preschools and schools\*: 20% better than the regulation limit\* of 100 kWh/m<sup>2</sup>.

Office buildings: Energy class A according to the Ministry of the Environment's regulation for buildings' energy performance (1010/ 2017).

##### **Iceland**

For all building types: 20% better than BRG #112/2012 with later additions. In order for the building to be EU Taxonomy compliant, the energy demand must meet the requirement for one of the other Nordic countries.

*\* The same requirement applies for sports halls when included in the licence (and for gymnastics halls if they are calculated separately).*

*The energy calculation must be performed in accordance with national building legislation, see Appendix 3.*

*The transitional periods set by the national authorities also apply to the fulfilment of Nordic Ecolabelling's energy requirements. If new national regulations and thresholds for a building's energy demand are introduced during the criteria's term of validity, Nordic Ecolabelling will perform a new assessment of the energy requirement and may adjust the requirement, including the percentage, in relation to the new regulations. The adjustment will be made after a national round of consultation.*

*For extensions to existing buildings, the energy requirement must be fulfilled by the extension. The energy calculation must be made for the extension and fulfil the requirements for new buildings.*

- ☒ Energy calculation according to the national legislation (see specifications in Appendix 3). If the energy consumption varies for different building configurations, it must be specified that each configuration in the application fulfils the requirements. Alternatively, the requirements must be fulfilled for the building configuration that has the greatest energy consumption.

## **Background**

The construction and real estate sector has the potential to reduce greenhouse gas emissions. New buildings designed to minimise energy use can make a substantial contribution to climate change mitigation.

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 is all 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, 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.

The requirement in all countries is compliant with the EU Taxonomy. However, Iceland must meet the requirement for one of the other Nordic countries in order to be compliant.

In Norway new energy and climate requirements (TEK17) are out for consultation as of summer 2021. The requirement for total energy demand is unchanged in the legislation and also for the Nordic Swan Ecolabel. The requirement defined for offices is on the same level as schools.

## **O4 Lighting management**

### **Outdoor lighting**

All outdoor lighting must have automatic demand control installed based on daylight and presence. The lighting control must be connected to the fixture and not only to/in the light source. This applies to lighting in all common areas, including shared courtyards, shared roof terraces and playgrounds, as well as facade lighting.

*Instead of completely turning the light off, dimming to a low level in response to daylight could be accepted where there are safety and security reasons.*

### **Indoor lighting**

#### ***Apartment buildings***

- Automatic demand control must be installed in all communal areas such as entrance halls, stairs, laundry rooms, storage rooms, common eating areas and technical rooms.
- In communal areas with access to daylight, the artificial lighting must dim in response to daylight levels.

#### ***Educational buildings***

- Automatic demand control must be installed in all rooms.
- In rooms with access to daylight, the artificial lighting must dim in response to daylight levels.

#### ***Office***

- Automatic demand control must be installed in all rooms.
- In rooms with access to daylight, the artificial lighting must dim in response to daylight levels.

#### ***General exemption***

- Dormitories in preschools
- Lifts
- Lighting for works of art.
- Workplace lighting, worktop lighting and lighting fitted into technical installations and equipment.
- Emergency lighting and lighting in bombshelters.
- Common areas in homes for the elderly with special functions or with special safety concerns.

- Description of the automatic demand control for indoor and outdoor lighting in accordance with the requirement.

### **Background**

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

For safety and security reasons, outdoor lighting in schools and preschools 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 or walkways.

## 05 Energy-efficient white goods

Household appliances and professional kitchen appliances must fulfil the energy class requirements in accordance with Tables 3 and 4 below.

If new legislation comes into force during the validity period of the criteria, Nordic Ecolabelling will assess the requirement and an adjustment may be implemented.

**Table 3 Requirements for household appliances**

Product type	Energy labelling according to Energy Label Regulation 2017/1369	Energy label in accordance with the Energy Labelling Directive 2010/30/EC (including supplements)
Washing machine	B	
Refrigerator	D	
Integrated refrigerator	E	
Freezer	E	
Combined refrigerator and freezer	D	
Integrated combined refrigerator and freezer	E	
Refrigerator for mini kitchen (under 80 cm)	E	
Drying cabinets	Must have an energy consumption of no more than 0.4 kWh/kg of laundry	
Dryers		A+++
Combined wash and tumble dryer	D	
Dishwasher	C	
Oven		A+
Electric water heater		C

*For fridges in prefabricated mini kitchens/kitchenettes the requirement of minimum energy class E applies.*

**Table 4 Requirements for professional kitchens**

Product type	Requirement
Boiling pans	At least 90% energy efficiency according to EFCEM's Energy Efficiency Standard for boiling pans or equivalent.
Refrigerators	Class A or better*
Freezers	Class B or better*
Combined freezer/refrigerator cabinets	B or better*

\* Energy class according to Energy Labelling Directive 2010/30/EC (1094/2015/EU)

*Refrigerators and freezers with central cooling systems are not covered by the requirement.*

- ☒ Household appliances: Overview of all household appliances installed in the Nordic Ecolabelled building, which includes name/product specification, product type and energy label. For drying cabinets, additional documentation showing the drying cabinet's energy consumption.

- ☒ For professional kitchen products: Overview of all products stating the type of product, product sheet, technical manual or similar document showing fulfilment of the requirement.
- ☒ For boiling pans: Results from tests performed in accordance with EFCEM's Energy Efficiency Standard for boiling pans or equivalent.

## **Background**

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.

### ***Household appliances***

In order to have ambitious requirements for both integrated and regular white goods (refrigerators and combined refrigerator/freezers), separate requirements have been introduced for these product types. For integrated freezers the availability on the market means that there is no need for a separate category.

Electric water heaters are introduced in the requirement since this product group can now be energy labelled. There is no energy labelling or ecodesign requirement for dryer cabinets often used in preschools and primary schools to dry the children's outerwear. The difference between drying cabinets and tumble dryers is that drying cabinets are also used to dry sandy and muddy clothes as well as shoes. Energy use is often shown in kWh/X kg of laundry.

### ***Professional kitchens***

Cooking equipment, freezers, fridges 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.

## **P1 Household appliances of better energy class**

If all products within a product type/category are two classes higher (or the highest energy class available on the market) than stated in Table 3 in O5, 1 point is given.

For electrical water heaters the following alternative applies: One point is granted if the heater is equipped with a control system that ensures that the primary electricity consumption is located outside peak hours.

A maximum of 3 points can be achieved. Every row in Table 3 corresponds to one product type/category.

- ☒ Overview of all white goods within a product type/category. Product specifications or similar, stating model and energy label/energy class.
- ☒ Documentation of control system for electric water heaters.

## Background

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 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.

A requirement for electric water heaters has been introduced, since this product group can now be energy labelled.

## O6 Water saving sanitary tapware

The minimum levels in table 5 must be fulfilled for all building types.

**Table 5 Requirements for water saving sanitary tapware**

Type/category of sanitary tapware	Maximum water usage
Washbasin taps	6 L/min
Kitchen taps	6 L/min
Showers*	8 L/min
WCs, suites, bowls and flushing cisterns	Maximum full flush volume: 6 L Average flush volume: 3.5 L
Urinals	2 L/bowl/h Flushing urinals must have a maximum full flush volume of 1 litre

*\*A hand shower must be installed unless a verification is presented by certification bodies that show that both the overhead shower and hand shower meet the relevant maximum water usage.*

*Bath mixer taps and utility sinks are exempt from the requirement.*

- ☒ Overview of the type/model/name of sanitary tapware and documentation of maximum water usage such as product datasheets or product label.

## Background

The requirement in the EU Taxonomy for water saving sanitary tapware is implemented as an obligatory requirement. This is done in order to minimise unnecessary use of water and limit the use of energy related to hot water usage.

## P2 Energy efficient sanitary tapware and technologies

One point is awarded if all products within a product category either fulfil energy class A (according to SS 820000 or SS 820001) or have touchless operation, see Table 6.

Installation of water saving systems that reuse greywater or rainwater for toilet flushing are awarded 2 points. An estimated annual water saving of minimum 20% is required.

Maximum 2 points are available.

**Table 6 Energy labelled or water saving sanitary tapware.**

Type/category of sanitary tapware	Energy class according to SS 820000 and SS 820001	Points
Washbasin and mixer taps	A	1
Kitchen taps	A	1
Touchless taps	n.a.	1
Thermostatic mixers with shower*	A	1
Installation of system for reuse of greywater/rainwater for toilet flushing	n.a.	2

*Bath mixer taps, taps in broom cupboards, two-handle shower mixers and sanitary fixtures for separate purposes that are not intended for household use are exempt from the requirement.*

*\* Points are only awarded when a hand shower is installed unless a verification by certification bodies is presented, showing that both the overhead shower and the hand shower function meet the relevant energy class.*

- ☒ Energy class or touchless taps: Overview of the type/model/name of sanitary tapware and the energy class label, certificate number and name of the standard.
- ☒ Description of the installation for reuse of greywater/rainwater and estimated annual water saving.

## Background

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 in order to promote water saving measures beyond the obligatory requirement O6. Reuse of rainwater has also been added to the requirement.

## P3 Management of energy consumption and power peaks

### Management of energy consumption

A maximum of 2 points can be achieved. One point can be given for the following installations to reduce total energy use:

- Residential buildings: A building automation and control system (BACS)\* defined according to standard EN 15232. The installation must communicate with the users, and offer guidance and/or adjust to the users'

preferences and behaviour patterns (based on indoor climate preferences, for example).

- Buildings for preschools, schools/educational buildings, office buildings and other buildings with common areas must have installed a centralised technical solution\* defined according to standard EN 15232. The system can be operated by external operators such as those providing janitor services. The system must communicate with the operator and offer guidance on energy efficient building operation.

### Management of power peaks

Two points are given if the building has installed a technical solution that enables load responsive control of electricity use. The following is required:

- The BACS solution must have the potential to reduce purchased electricity when the electricity grid is heavily loaded.
- The system\*\* must include the possibility of automatic control of power outtake, e.g. by a load aggregator, energy service company or grid company.

*\* The BACS solution for management of energy use must at least include heating, hot water, lighting and ventilation. Any installation for vehicle charging, heat pumps, solar panels, or solar thermal collector or snowmelt must also be included. For buildings with common areas, cooling in the area must be included.*

*\*\* The control system must at least include any installed electric vehicle charging, hot water and/or heating and installed solar panels (on the building or in the immediate vicinity and controlled by the operator of the building).*

- The installed energy management system must be documented according to the requirement.
- The system for controlling power peaks must document an automatic control system installed for flexible electricity use.

### Background

#### *Energy management*

There is demand from residents for instruction on how they can live a more energy efficient and climate friendly life. The report “End User Flexibility Potential in the Service Sector”<sup>1</sup> found a lack of the necessary smartness level in the building they studied and a lack of off-the-shelf technologies for demand response control.

One point is given if a “smart house” technology is installed. The intention is for occupants to reduce their energy use. This applies to all energy sources that can be connected to the system, such as district heating, electricity, solar collectors, solar panels or automated bio-based heating systems. However, systems for energy management may come into conflict with the reduction of electricity peaks, which is

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<sup>1</sup> Lien, S. K. et al.: A case study on the flexibility potential of service buildings and the barriers needed to unlock this potential. ZEN REPORT No. 27 – 2020 Available at: <https://ntnuopen.ntnu.no/ntnu-xmlui/handle/11250/2684264>

the second part of the requirement. If the building has both an energy management system and a system for reduction of electricity peaks, these must be coordinated.

### *Electricity peaks*

The increasing share of renewable, intermittent electricity production from wind and solar power in the Nordic grid increases the importance of utilising all flexibility resources in the electricity system, i.e. flexible production, storage and demand flexibility.

The electricity grid and the power production system need to be designed to accommodate peak loads in electricity consumption<sup>2</sup>. An alternative to some of these investments can be to reduce the electricity load during peak hours<sup>3</sup>. A contribution to flexibility in electricity consumption can be made using different control systems, which require smart meters that can communicate information such as consumption of electrical energy, voltage levels, current and power factor.

The Energy Market Inspectorate in Sweden has compiled the potential for demand flexibility in different sectors, and the potential for e.g. household customers is significant. Electric 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.<sup>4</sup>

Nordic Ecolabelling considers that the system should be automatic to contribute to levelling out peaks in electricity use (peak shaving). We are aware that this is not common technology today, but believe this will change within the generation of these criteria. Household electricity for the likes of lighting and appliances does not need to be included in the system because the potential will be lower.

## **P4 Renewable energy production and energy recovery**

Installed solar panels (photo-voltaic (PV) modules), solar thermal collectors, or systems for wastewater heat recovery can give a maximum of 4 points. The installations must be situated on/in the building or in the immediate vicinity and at least fulfil the following measures for the building/project:

- a. Solar PV panels showing an estimated electricity production of minimum:
  - 4 kWh/m<sup>2</sup> heated floor area/year gives 1 point.
  - 8 kWh/m<sup>2</sup> heated floor area/year gives 2 points.
  - 12 kWh/m<sup>2</sup> heated floor area/year gives 3 points.

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<sup>2</sup> L. Ødegården and S. Bhandana, "Status og prognoser for kraftsystemet 2018-NVE," 2018. Available at: [http://publikasjoner.nve.no/rapport/2018/rapport2018\\_103.pdf](http://publikasjoner.nve.no/rapport/2018/rapport2018_103.pdf).

<sup>3</sup> Market design options for procurement of flexibility, Nordic Energy Research report 2021 <https://doi.org/10.6027/NER2021-04>

<sup>4</sup> 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](https://www.ei.se/Documents/Publikationer/rapporter_och_pm/Rapporter%202016/Ei_R2016_15.pdf)

- 16 kWh/m<sup>2</sup> heated floor area/year gives 4 points.
  - b. A solar collector showing estimated energy production of minimum 50% of the energy for hot water on a yearly basis gives 2 points.  
If solar collectors deliver surplus energy to increase the inlet temperature of a heat pump, 1 extra point is given.
  - c. Wastewater heat recovery installation gives 2 points. As a minimum the installation must cover more than 50% of the showers.
  - d. Liquid-to-water heat pumps that supply minimum 90% of the estimated energy need for hot water, space heating and ventilation. Points can only be achieved outside district heating areas. 1 point.
- ☒ For solar PV panels: Description of the installation, its location and calculated annual energy generation relative to the heated floor area of the building.
  - ☒ Solar thermal collectors: Description of the installation, its location, calculated annual energy generation relative to the building's energy demand for hot water.
  - ☒ For wastewater heat recovery installations: Description of the installation, its location, and the calculated efficiency.
  - ☒ Liquid-to-water heat pumps: Description of the installation and the supplied energy delivered in relation to the total demand for hot water, space heating and ventilation.

## Background

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 as long as 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 schools and sport halls, school kitchens, etc. will be suitable for greywater heat recovery. The technology will reduce primary energy consumption for water heating and the energy that is not recovered is lost into the environment. To obtain 1 point, the installation must at least recover energy from showers,

For solar PV panels, 1–4 points may be awarded, based on minimum 4, 8, 12, or 16 kWh/m<sup>2</sup> heated floor area on an annual basis. Specific limits are defined according to licensing data from all countries.

Air-to-liquid heat pumps are an efficient alternative to electric heating panels and air-to-air heat pumps. This is especially the case in the colder parts of the Nordic region, where winters are freezing. Therefore, the Nordic Swan Ecolabel gives points for these installation despite the fact that in some regions they are relatively

standard installations. Points can only be achieved outside district heating areas. Air-to-air heat pumps and air-to-water heat pumps are considered to be standard installations in the energy system of the building and do not give points.

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

## 7.2 Climate

### 07 Climate declaration of the building

In countries where the authorities have implemented a system for obligatory or voluntary climate declaration/calculation for buildings < 5000 m<sup>2</sup>, this declaration must be submitted to Nordic Ecolabelling.

All buildings >5000 m<sup>2</sup> must document compliance with Annex 1 of the EU Taxonomy Climate Delegated Act (21 April 2021 or later). The climate declaration must be submitted to Nordic Ecolabelling. The climate declaration must also be disclosed to investors and clients on demand.

Official national calculation tools can be used to perform the calculation. The climate declarations/calculations must document that the building fulfils the following national threshold limits\*:

- Denmark: < 8 kg CO<sub>2eq</sub>/m<sup>2</sup>/year\*\*
- Sweden: No limit for the time being.
- Finland: No limit for the time being.
- Norway: No limit for the time being.
- Iceland: No limit for the time being.

\* A limit value that is stricter than the authorities' obligatory requirements (where the authorities have introduced a limit value) will be determined by Nordic Ecolabelling after a national consultation. There will be a notification period before a requirement limit is introduced.

\*\* Level is defined in the "voluntary sustainability class". The limit value in the "voluntary sustainability class" has been determined by the Danish Housing and Planning Agency. The requirement may later be tightened in line with the requirement level in the "voluntary sustainability class".

- Buildings < 5000 m<sup>2</sup> in those countries where a obligatory climate declaration requirement has been introduced: Climate declaration/calculation according to the authorities' requirements for calculation methods and threshold limit.
- Buildings > 5000 m<sup>2</sup>: Climate declaration/calculation that complies with the requirements of the EU Taxonomy. National calculation method is accepted.

### Background

A greenhouse gas calculation for the entire life cycle of the building has the advantage that all emissions are taken into account over the entire life of the building. 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<sub>2</sub>e figure is achieved per m<sup>2</sup> 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).

The situation today (November 2021) is that in Sweden a new law enters into force from 1 January 2022 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. In Denmark there will be a legal requirement in 2023 with a CO<sub>2</sub>e limit value for buildings over 1000 m<sup>2</sup> and with an even stricter requirement in the “voluntary sustainability class” 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. The Danish calculation also includes parts of modules B and C as well as module D. The Finnish climate declaration has the most phases of the government methods. In Norway, the authorities do not set such a requirement, but the national standard for greenhouse gas calculations has all phases with the exception of B7 Water consumption in operation<sup>5</sup>. The Norwegian authorities have not yet introduced requirements for obligatory greenhouse gas calculations in the building regulations. However, a proposal has been put out for consultation as of summer 2021. It is suggested that the greenhouse gas accounts shall as a minimum include modules A1–A3 and B4–B5 for the building elements, load-bearing systems, external walls, internal walls, ceilings and roofs.

Due to the Nordic differences, Nordic Ecolabelling requires calculations to be based on the principles of the national authorities. 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 value for the climate declaration. It is set at 12 CO<sub>2</sub>/m<sup>2</sup>/year in the building code and 8 CO<sub>2</sub>/m<sup>2</sup>/year according to the “voluntary sustainability class”. The requirement is in line with the level in the “voluntary sustainability class”.

## P5 Quality assurance of the climate declaration

One point is awarded for each of the following quality measures a–f in the climate declaration/calculation\* for the building. For some of the quality requirements below, it is required that the calculation also includes specific modules in the standard EN 15978. A maximum of 2 points can be achieved.

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<sup>5</sup> Nordic building LCA comparison, Tilgjengelig fra: <https://www.lifecyclecenter.se/nordic-building-lca-comparison/> (15.04.2021)

For a project that consists of several independent buildings, a calculation must be submitted for at least one of the (main) buildings in the project.

The calculations and their quality measures must be verified by someone other than the person performing the calculation, such as an external third party or an internal specialist who has not participated in the climate declaration/calculation.

- a. Completeness of the calculation: The degree of completeness of the calculations relating to the unit processes must be at least 90% and is evaluated by balancing the mass or economic value of the building materials. Percentage deviations must be reported.
- b. Data quality: At least 50% of the total contribution to greenhouse gas emissions from the materials included in the calculation is based on product-specific EPDs.
- c. Time effect<sup>\*\*</sup>: Analyses where the CO<sub>2</sub>e emissions are weighted with regard to the specific time of the emissions. As a minimum, the analysis must include modules A1–A5, B4, B6, C3, C4 and D.
- d. Consequential LCA: The calculation has been performed as a consequential LCA, and the most important consequence considerations that have been performed must be stated.
- e. Sensitivity analysis: A sensitivity analysis has been performed to calculate how results and conclusions change if important assumptions change. This must be done for the assumptions or parameters that make the three largest contributions to the calculation of the total CO<sub>2</sub>e contribution.
- f. A calculation is performed in at least two phases during the project's lifetime, e.g. in the design phase, the engineering phase and/or as a finished building.

*Countries that do not need to submit a climate declaration/calculation in O7 can still obtain points in this requirement by submitting a calculation that meets at least one of the points in the requirement.*

*\* The climate declaration/calculation shall be based on EN15978 and performed using either a national standard, a government-authorized method or according to Level (s)<sup>6</sup>.*

*\*\* When weighting with a time effect, both positive and negative emissions must be taken into account at the times they occur, such as for replacement of materials and installations, carbon sequestration in forests and cement, waste incineration, reuse, energy use and exported energy. Simplified methods with weighting factors can be used, e.g. the methods set out in the FutureBuilt Zero method description (Resch, E. et al. (2020): FutureBuilt ZERO metodebeskrivelse). When using other simplified weighting factors, Nordic Ecolabelling must be contacted for approval.*

- The climate declaration/calculation, along with a statement from the person who has checked that the specified quality requirements have been met.
- Description of education and experience of external third party or internal specialist.

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<sup>6</sup> [https://ec.europa.eu/environment/levels\\_en](https://ec.europa.eu/environment/levels_en)

## Background

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<sub>2</sub> 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<sub>2</sub> calculations for buildings do not provide results that are sufficiently consistent and comparable. The consultant report also recommends that CO<sub>2</sub> calculations should be performed at a comprehensive building level and in several stages of the project. The Nordic Ecolabel does not currently set any requirements for the time when the calculations are to be performed, but 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. Points are awarded to construction projects where special consideration is given to the completeness of the calculation, data quality, time effect, sensitivity analysis, use of impact LCA and recurring analyses in different phases of design and construction. Better control of how complete the analysis is will reduce the uncertainty in the calculations and make them more robust.

## O8 Cement and concrete

Choose two of the concrete construction categories a–g in order to fulfil the required measures below:

- a. Foundation
- b. Columns
- c. Beams
- d. Slabs
- e. Shear walls
- f. Elevator shaft
- g. Facade elements, balcony elements, terraces and verandas

Both prefabricated and cast-in-place concrete are covered by the requirement. The requirements are not set for hemp concrete (hemcrete).

If cement/concrete is only used in the foundation, only this must be accounted for.

At least 50% by weight of the chosen construction categories must fulfil one of the measures 1–5.

### **A. The manufacturer of cement clinker, cement or alternative binder (measure 1–3)**

1. Must meet the technical screening criteria for specific greenhouse gas emissions for manufacture of cement clinker, cement or alternative binder in Annex 1 to the EU Taxonomy Climate Delegated Act from 21 April 2021 or later.
2. Use at least 75% biobased and/or alternative\* fuels for the production on a yearly basis.
3. Reduce at least 50% of the CO<sub>2e</sub> emissions with carbon capture and storage (CCS)\*\*.

### **B. The manufacturer of the concrete product**

4. Must document the use of concrete with low carbon impact compared to concrete with the same compressive strength. The documentation with a product specific EPD must at least indicate fulfilment of the threshold value for CO<sub>2e</sub> emissions defined in a concrete classification system. For example, fulfilling low carbon concrete A or better in the Norwegian Concrete Association's publication no. 37 Low carbon concrete (NB37)\*\*. Other low carbon classification systems for concrete in the Nordic countries will be included with a limit value or class when they are adopted.

### **C. Responsible contractor/consulting engineer/architect etc.**

5. Must use reused concrete parts in 50% of the chosen construction category.

*\* Alternative fuels are waste fuels derived from pre-treated and sorted waste fractions, including solid and liquid recovered fuels. Examples are given in Table 1.20 in the EU BREF report for the Production of Cement, Lime and Magnesium Oxide (2013).*

*\*\* The thresholds are given in the Norwegian Concrete Association's publication no. 37 Low carbon concrete (NB37), which classifies the concrete material without reinforcement. Each low carbon class provides generic values for greenhouse gas emissions for the different compressive strength classes of the concrete. EPDs for similar strength classes in other Nordic countries can be used as documentation after approval from Nordic Ecolabelling.*



Specify the construction categories chosen for documentation in this requirement. Submit a calculation, for each of the two categories, showing that at least 50% by weight fulfils the chosen measures. The construction category in question must document the measures with one of the following alternatives:

- 1, 2, and 3: Documentation from the manufacturer of cement clinker or cement alternative binder showing compliance with the requirement.

- 4. Product specific EPD from the concrete manufacturer showing that the concrete meets the requirement for greenhouse gas emissions for the required strength class, and is made according to the ISO standard 14025 Environmental Labels and Declarations Type II.
- 5. Documentation showing that the concrete parts are reused.

## Background

Cement-based materials are often used in large quantities in a building<sup>7,8,9</sup> and they are produced in energy intensive and CO<sub>2</sub> emitting processes. Concrete typically accounts for 34–40% of the GHG emissions of office buildings, schools, apartment blocks and homes for the elderly<sup>10</sup>. Nordic Ecolabelling has defined an obligatory requirement in order to help lower the GHG emissions associated with these structures and processes.

### *The manufacturer of cement clinker*

Reductions in the GHG emissions can be achieved in different ways: use of renewable fuel in the furnace, installation of technology for carbon capture and storage (CCS). CCS is planned to operate at one of the Norwegian sites from 2024 and in Sweden from 2030. The EU Taxonomy sets benchmark thresholds for the manufacture of cement and cement clinker per tCO<sub>2e</sub> per tonne and year in Annex I<sup>11</sup>. Nordic Ecolabelling uses these thresholds as limits for the environmental measures.

To be approved in the 75% non-fossil fuel in the requirement, the fuel must not derive directly from fossil products. Post-consumer waste such as tyres is not regarded as fossil fuel.

### *The cement clinker content in concrete*

Another way to reduce GHG emissions for cement is to reduce the clinker content by adding fly ash, silica dust or blast furnace slag (BFS). The requirement sets a maximum of 70% cement clinker in the cement or based on the binder/filler content when mixing the concrete. The requirement is relevant for the cement types CEM II and III. CEM I contains at least 95% Portland cement and therefore cannot fulfil this requirement. The documentation must be given by the concrete manufacturer or supplier. This is not obligatory information in today's EPDs for concrete products.

Nordic Ecolabelling has included an option for documentation of low carbon concrete based on the definition in NB 37, a classification system for concrete from

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<sup>7</sup> Life cycle assessment of MiniCO<sub>2</sub> houses in Nyborg, Danish Building Research Institute, 2013.

<sup>8</sup> A. Doodoo, Life Cycle Primary Energy Use and Carbon Emission of Residential Buildings, 2011.

<sup>9</sup> Solem, Bård: Bærekraftige materialvalg (2018) Preeentasjon 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-arkitekter.pdf>

<sup>10</sup> 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/>

<sup>11</sup> Sustainable finance: TEG final report on the EU taxonomy Technical annex I (April 2021) Available at: [Implementing and delegated acts | European Commission \(europa.eu\)](https://ec.europa.eu/economy_finance/implementation-and-delegated-acts_en)

the Norwegian Concrete Association<sup>12</sup> based on best practice. The industry reference, which is used to estimate savings in GHG emissions, uses Norwegian generic values. The concrete associations in other Nordic countries also suggest similar low carbon classification systems. When they are adopted, Nordic Ecolabelling will include them in the requirement and assess the level of a limit value.

The classification system provides 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.<sup>13</sup> The compared EPDs show a correlation between increasing clinker content and increasing global warming potential (GWP) impact per tonne for the modules A1–A3. A large proportion of the GHG emissions come from the calcination of limestone (~ 60%) and from burning fuels (~40%) in the kiln for the production of cement.

### ***The building***

There is ongoing work to increase the reuse of old building parts, including those made of concrete. Nordic Ecolabelling wishes to encourage this as it is considered a good option for significant GHG emission savings.

## **O9 Steel**

### **Steel rebars**

Stainless steel rebars used in the building must be made of at least 75% recycled steel. For other steel rebars at least 95% of the material must come from recycled steel.

The supply chain must be specified, and there must be traceability through the supply chain from the smelter to the finished product.

*Recycled steel is defined as both pre- and post-consumer according to definitions in ISO 14021, see definitions.*

### **Beams and columns for construction, roof and facade panels for exterior use**

Beams and columns for construction, and roof and facade panels for exterior use must fulfil one of the three alternative measures 1) Recycled content, 2) Reused parts or 3) Improvements in iron ore-based production.

The requirement also applies to the steel element in sandwich panels. Mouldings around doors and windows, valley gutters and masonry crowns are exempted from

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<sup>12</sup> The Norwegian Concrete Association is a Norwegian professional society for personal and corporate members arranging seminars and courses, and publishes reports on of concrete technology.

<sup>13</sup> 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\\_EP](https://www.researchgate.net/publication/341943113_Embodied_carbon_of_concrete_in_buildings_Part_1_analysis_of_published_EP)

the requirement. Panels mounted in combination with entrances are also exempted.

Facade and roof panels that make up less than 20 m<sup>2</sup> or 100 kg are exempted from the requirement. The total facade area is calculated as the total area of outer walls (windows and doors excluded).

### **1) Recycled content**

The recycled content in the product must be at least 80%. Recycled steel is defined as both pre- and post-consumer, according to definitions in ISO 14021.

The supply chain must be specified, and there must be traceability through the supply chain from the smelter to the finished product.

### **2) Reused steel parts**

At least 50% of each category of steel construction product must be reused building parts. There must be traceability back to the parts' most recent use in construction.

### **3) Iron ore-based production**

The requirement can be met by measures in A or B below:

#### ***A. Steel production based on new technologies with reduced greenhouse gas emissions***

The steel used comes from steel production sites that have implemented one of the following technologies:

- direct electrolysis of iron ore;
- blast furnace top gas recycling with carbon capture and storage;
- direct smelting reduction processes;
- hydrogen steelmaking in shaft furnaces using green H<sub>2</sub>, produced via water electrolysis using renewable electricity sources.

or

#### ***B. Steel production – traditional methods***

The steel producer (of ore-based steel) must show energy and climate calculations with time-limited reduction targets for energy consumption and greenhouse gas emissions. The result of the calculations must be transparent, meaning it must be stated which assumptions and conditions form the basis for the calculation (e.g. factors used in the calculation, system limits, use of databases, etc.).

In addition, one of the points below must be met:

- A minimum of 50% by weight of the steel included in the product must come from production sites that are certified according to the standard Responsible Steel, version 1.0, 2019 or later versions.
- Emissions to air and water must be within the emission values stated as BAT-AEL in the EU BREF document for iron and steel production from

2013 or later. This includes the parameters that are included in the requirement, as well as limit values given in Tables 1 and 2 in Appendix 4.

- The steel producer must have introduced at least 2 of the energy efficiency measures stated as BAT in the EU BREF document for iron and steel production. The measures are listed in Table 3 in Appendix 4.
- ☒ The proportion of recycled steel in the product must be stated.
- ☒ The smelter must declare the amount of recycled steel in the production. The annual average for the smelter is approved.
- ☒ Traceability in the supply chain must be documented, e.g. in the form of a flow chart, so that the amount of recycled steel is secured through the supply chain. This can be done e.g. by information on invoices or accounting from the steel supplier that shows the amount of recycled steel purchased and how much is sold. There must be an agreement between the steel supplier and the manufacturer/builder of the Nordic Swan Ecolabel building showing that recycled steel is delivered.
- ☒ Reused steel products must be described and the traceability back to the parts' most recent use in construction must be documented.
- ☒ Ore-based steel production: For A) Steel production based on new technologies with reduced greenhouse gas emissions: State which smelter(s) the steel comes from, as well as a brief description of which technology is used.
- ☒ For B) Steel production – traditional methods: Energy and climate calculation with reduction targets, where it is clear which assumptions form the basis for the calculation.
- ☒ Valid Responsible Steel certificate from the steel manufacturer/smelter. Overview from the supplier/manufacturer of the constituent steel part, showing which smelters are certified according to the standard and demonstrating that the requirement of a minimum of 50% certified is met.
- ☒ Declaration from the steel producer that the emission levels are within the stated values in the tables, as well as information on the emission values. Nordic Ecolabelling may request additional documentation for emission values.
- ☒ Description of how energy efficiency is worked on in production, showing which BAT measures have been implemented.

## Background

Using recycled metal significantly reduces the environmental impact and provides a significant climate benefit. Among other things, this is highlighted in the taxonomy work in the EU<sup>14</sup>. 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 in itself, and is important for several aspects, e.g. it provides

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<sup>14</sup> Taxonomy report, technical annex, EU technical expert group on sustainable finance, March 2020.

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<sup>15</sup>. 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 in order 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<sup>16</sup>. According to the World Steel Association<sup>17</sup> 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 a 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 similar to those stated in the EU's technical annex to the taxonomy report<sup>18</sup>.

## O10 Aluminium

The requirement can be met by documenting A) Reused products B) High proportion recycled aluminium or C) Improvements in primary aluminium production.

The requirement also applies to aluminium in sandwich panels. Mouldings around doors and windows, valley gutters and masonry crowns are exempted from the requirement. Panels mounted in combination with entrances are also exempted.

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<sup>15</sup> <https://www.stalforbund.no/miljo/>

<sup>16</sup> <http://www.eurofer.org/About%20us/About%20Steel/EuropeanSteelMap.fhtml>

<sup>17</sup> <https://www.worldsteel.org/en/dam/jcr:96d7a585-e6b2-4d63-b943-4cd9ab621a91/World%2520Steel%2520in%2520Figures%25202019.pdf>

<sup>18</sup> 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](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)

Facade, roof panels or aluminium profiles for alu-glas facade systems that make up a maximum of 20 m<sup>2</sup> or less than 100 kg are exempted from the requirement. The total facade area is calculated as the total area of outer walls (windows and doors excluded).

### **A) Reused products**

At least 50% of aluminium facade, roof panels or aluminium profiles for alu-glas facade systems are reused.

### **B) High proportion recycled**

A minimum of 75% by weight of aluminium must be recycled. The proportion of pre- and post-consumer must be stated and at least 30% by weight must be post-consumer.

Aluminium from primary production must not come from production using the Söderberg process.

The supply chain must be specified, and there must be traceability through the supply chain from the smelter to the finished product, so that the amount of recycled material is assured through the supply chain.

*\*Recycled metal is defined as both pre- and post-consumed, cf. definition in ISO 14021.*

### **C) Primary aluminium production**

The two following obligatory requirements must be met:

1. The manufacturer of the facade, roof panels or aluminium profiles for alu-glas facade systems shall purchase aluminium from a primary aluminium producer who has energy and climate calculations with time-limited reduction targets for energy consumption and greenhouse gas emissions. The result of the calculations must be transparent, meaning it must be stated which assumptions and conditions form the basis for the calculation (e.g. factors used in the calculation, system limits, use of databases, etc.).
2. Pre-baked anodes must be used in the production.

In addition, at least one of the following requirements must be met:

- A minimum of 50% by weight of aluminium included in the product must be certified according to the ASI Performance Standard. The manufacturer must document that the proportion of certified aluminium in the product is at least 50% by weight. The documentation can be done on an annual basis.
- Emissions to air must be within the emission values stated as BAT-AEL in the BREF document from 2017 or later for the production of aluminium. The parameters that are included in the requirement, as well as limit values, are specified in Tables 4, 5 and 6 in Appendix 4.
- The direct climate-affecting emissions for primary aluminium production must not exceed 1.5 tonnes of CO<sub>2e</sub>/tonne of aluminium produced.
- Electricity consumption for electrolysis must not be higher than 15.5 MWh/tonne of aluminium produced.

- ☒ Reused aluminium products must be described and the traceability back to the parts' most recent use in construction must be documented.
- ☒ The proportion of recycled aluminium in the product must be stated.
- ☒ The aluminium producer must declare the amount of recycled aluminium in the production and provide an overview of the share that is pre- and post-consumer, showing that a minimum of 30% by weight is post-consumer. An annual average for production is approved. The traceability of the supply chain must be documented, e.g. in the form of a flow chart, so that the share recovered is assured through the supply chain all the way to the product being used in the building. This can be done e.g. by information on invoices or accounts from the aluminium supplier, showing the amount of recycled material purchased and how much is sold. The requirement can be documented with a valid certificate showing that the limit for recycled pre- and post-consumer content has been met and where the recycling share is certified by an independent third party.
- ☒ Primary aluminium production: Energy and climate calculations with reduction targets, where it is clear which assumptions form the basis for the calculation.
- ☒ Declaration from the aluminium manufacturer that pre-baked anodes are used in the production.
- ☒ ASI certification: Valid ASI traceability certificate from aluminium supplier. Documentation showing that the proportion of certified aluminium in the panels is at least 50% by weight on an annual basis. The documentation must be supported by claims on the invoice or delivery note.
- ☒ Emissions to air: Declaration from the aluminium manufacturer that the emission levels are within the values given in the tables, as well as an indication of the emission values. Nordic Ecolabelling may request additional documentation for emission values.
- ☒ Direct emissions of greenhouse gases: Declaration that the requirement is met, as well as calculation and indication of direct emissions in tonnes of CO<sub>2e</sub>/tonne of aluminium produced.
- ☒ Electricity consumption electrolysis: Declaration that the requirement is met, as well as calculation and indication of electricity consumption in MWh/tonne of aluminium produced.

## Background

Using recycled metal significantly reduces the environmental impact and provides a significant climate benefit. Among other things, this is highlighted in the taxonomy work in the EU<sup>19</sup>. 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 in itself, and is important for several aspects, e.g. it provides opportunities to select suppliers based on environmental work, working conditions, quality etc.

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<sup>19</sup> Taxonomy report, technical annex, EU technical expert group on sustainable finance, March 2020.

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 a obligatory requirement for the producer to have an energy and greenhouse gas calculation with defined reduction targets.

In addition, it must be documented that the metal has not been produced using the Söderberg process. This is an older production method that is less energy efficient and has higher emissions of fluoride. This technique has been partially phased out, and new plants do not use this technology, but it is still in use worldwide. Using pre-baked anodes is an environmentally better production technique. 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. Production of aluminium 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. For aluminium, the requirement can also be fulfilled by documenting direct emissions of greenhouse gases and energy efficiency in the electrolysis process, where the limits are based on values stated in the EU Taxonomy report. Direct emissions are to be calculated according to the methodology used for EU-ETS benchmarks. Please note that these values may change based on the final outcome of the EU Taxonomy work.

## O11 Construction site fuel restrictions

Energy used for concrete setting, temporary heating and drying out at a building site, thawing/frost protection and heating of construction barracks must be fossil-free\* i.e. produced from bio-based fuels, electricity, heat pumps, district heating and hydrogen.

Interior drying out shall not begin until the building envelope is sealed and must be regulated using temperature sensors.

An exception can be made if natural gas will be used for heating of the building after construction.

*\*There is no requirement concerning the origin of the energy used on the building site, i.e. the fuel mix for district heating or the types of energy from which the electricity or hydrogen are produced.*

- A description of the energy sources used for heating at the building site.
- A project plan with time schedule showing that interior heating of the building starts after the building envelope is sealed.
- A description of the thermostats installed and location of the thermostats.

## Background O11 and P6

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. Activities on building 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 building sites in Norway are around 340,000 tonnes CO<sub>2</sub>e and 4,700 tonnes NO<sub>x</sub>. 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 building 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 building 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 building 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 building sites. These are building sites where energy use does not contribute to any local emissions of CO<sub>2</sub>e or NO<sub>x</sub>. Alternatives for heating that are emission-free on the building site are district heating, electricity or other energy sources that do not lead to local emissions of CO<sub>2</sub>e or NO<sub>x</sub>, such as hydrogen. 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.

The focus in this requirement is on heating and construction machinery. Heating includes heating for concrete setting, facade heating and interior heating. Transport of materials, machinery and people to and from the building site, as well as waste handling, waste treatment and material production, are not included in this requirement.

### P6 Construction site machinery

Points will be given according to the following:

- 1 point: 100% of the fuel used for construction machines\* is fossil-free\*\*.
- 2 points: A minimum of 50% of the construction machines\* are emission free on the building site (powered by electricity or hydrogen), while the remaining 50% are fossil-free\*\*. At least 2 of the electric construction machines must be 8 tonnes or larger.
- 3 points: 100% of the construction machines\* are emission free on the building site (powered by electricity or hydrogen).

A maximum of 3 points can be achieved.

\* *Vibration platform machines and wheeled construction machines are exempted.*

*\*\* Fossil-free, i.e. here defined as: bio-based fuels (HVO, FAME/RME, ED95, etc.), hydrogen and electricity.*

- A list of all construction machines by brand and type.
- Information on the energy used to power the machines.

## P7 Bicycle transport

A maximum of 2 points are given when one or more of the following measures are taken to promote bicycle transport.

Residential buildings	
Indoor bicycle workshop available to all residents.	1 point
At least 1.5 bicycle parking spaces per residential unit are provided and equipped with access to frame locks. Bicycle stands alone are not sufficient to achieve points.	1 point
At least 50% of bicycle parking is weather protected. Minimum 1.5 bicycle parking spaces per residential unit.	1 point
Communal cargo bike(s) with designated weather protected parking are available for the residents.	1 point
Weather protected bicycle parking for cargo bikes and bicycle trailers is available. Minimum 1 per 10 residential units.	1 point

Educational buildings	
One bicycle parking space per student and teacher is provided and equipped with access to frame locks. Bicycle stands alone are not sufficient to achieve points.	1 point
At least 50% of bicycle parking is weather protected. Minimum number of parking spaces according to alternative 1 must be fulfilled	1 point
Preschools: Weather protected bicycle parking for cargo bikes and bicycle trailers is available. Minimum 1 parking space per 15 children.	1 point
Facility for charging electric bikes is available as part of the bicycle parking facilities.	1 point

Office buildings	
One bicycle parking space per 10 employees is provided in a locked room.	1 point
At least 50% of bicycle parking is weather protected. Minimum number of parking spaces according to alternative 1 must be fulfilled	1 point
Facility for charging electric bikes is available as part of the bicycle parking facilities.	1 point
Bikes are available for the employees in the office building for local transport. A minimum of 1 bike per 20 employees must be available.	1 point

- Description of the specific measures in relation to the requirement.

## Background

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

Other means of environmentally friendly transport, such as electric vehicles, 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 / circular economy

### O12 Construction waste management

At least 85% by weight of the non-hazardous construction waste generated on the construction site\*, must be prepared for reuse, recycling and other material recovery including backfilling operations using waste to substitute other materials, in accordance with the waste hierarchy and the EU Construction and Demolition Waste Management Protocol. The percentage excludes naturally occurring material referred to in category 17 05 04 in the European List of Waste established by Decision 2000/532/EC.

Untreated wood must always be sorted separately from treated wood.

Unsorted waste intended for energy recovery is not considered material recovery.

*\*If more than 50% of the building (calculated as total cost of the materials) is constructed as a module/prefabricated elements, the waste generated in the factory must be accounted for in the calculation. In this case, the sorting percentage at the construction site must be at least 70%, while the total percentage of the building project must be 85%.*

The waste management plan for the project must be sent to Nordic Ecolabelling before the construction of the building begins. The plan must contain information about waste fractions, waste collector(s) and intended use of the fractions.

- The waste management plan for the project must be delivered before the construction starts at the building site.
- A report from the waste contractor showing the amount of waste collected in relation to the total volume of the project's construction waste. The intended use of the waste fractions must be stated.

### Background

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 sorted fractions to the established recovery systems in each country.

The delivery of the waste management plan before the start of construction will help to identify any possible problems with sorting and handling of waste later on. Those issues can be easily addressed before construction, while in later phases of the project it might be too late.

This requirement is harmonised and even exceeds 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.

## O13 Waste sorting inside the building

Facilities for waste sorting must be available in the Nordic Swan Ecolabel building. The number of fractions is stated for each building type below. Residual waste is considered one fraction.

### Residential buildings

- Sorting vessels for minimum six fractions in all residential units\*.
- Communal kitchens: Sorting vessels for minimum six fractions must be installed in or in the vicinity of the kitchen (e.g. in homes for the elderly and dormitories)

*\* Tea kitchens without cooking facilities such as oven and stove (e.g. homes for the elderly) are exempted from the requirement.*

### Educational buildings

- Sorting vessels for six fractions must be installed in or in the vicinity of the main kitchen and in all other permanent kitchen facilities.
- Sorting vessels for four fractions must be installed in all classrooms and common rooms.

### Office buildings

- Sorting vessels for six fractions must be installed in canteen facilities.

☒ Sorting vessels for minimum four fractions must be installed in all tea kitchens. Description of sorting vessels for waste sorting. Documentation can be description, pictures or datasheet.

## Background

In order to support extensive recycling of waste, a Nordic Swan Ecolabel building comes equipped with vessels for sorting at source.

The number of fractions in residential units is set at six sorting fractions, which might be: residual waste, food waste, plastic, metal, glass and 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.

In schools and preschools, every room with kitchen facilities, where appliances are permanently installed for cooking and preparing meals, should have six fractions for sorting of waste. That includes small kitchens attached to sports facilities.

In elderly homes every room with kitchen facilities, where appliances are permanently installed for cooking and preparing meals, should have six fractions for sorting of waste. Tea kitchens are exempted.

## P8 Construction waste reduction

Minimisation of the construction waste at the building site gives points according to table 7 below.

The entire building period from construction of the base plate to the finished building is included.

**Table 7 Requirement for minimisation of construction waste.**

Waste per square metre floor area	Points
≤35 kg/m <sup>2</sup>	1
≤30 kg/m <sup>2</sup>	2
≤25 kg/m <sup>2</sup>	3
≤20 kg/m <sup>2</sup>	4
≤15 kg/m <sup>2</sup>	5

*Floor area is calculated as the total area of all floors (including areas covered by walls or other constructions.)*

Naturally occurring material defined in EU waste category 17 05 04 – soil and stones and total hazardous waste are excluded when calculating the total amount of waste.

If more than 50% (calculated as total cost of the materials) of the building has been constructed as modules in a factory facility, yearly-based data from the factory must be combined with the waste data from the building site.

- Report from the waste contractor showing the total amount of construction waste from the construction site and/or module factory.
- Calculation of the construction waste generated per square metre.

## Background

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<sup>2</sup> 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.

## P9 Take-back systems

Points are given if producer take-back systems for excess material/waste are used at the construction site or module production facility in the following categories:

- Mineral insulation
- EPS and/or XPS (The system must collect cuttings and other materials (e.g. material from packaging) that can be recycled by the producer)
- Flooring
- Untreated wood for temporary safety constructions. Both external services and internal reuse within the company are accepted
- Roof membranes
- Cement-bonded wood fibre

- Other products must be approved by the Nordic Swan Ecolabel.

1 point can be given for each category. Maximum 2 points can be achieved.

- ☒ An agreement with the supplier/producer or documentation with specific details showing how the take-back system is implemented at the construction site or module production facility.
- ☒ Report from the receiver of the material handled in the take-back system.

## Background

Nordic Ecolabelling wishes to encourage the usage of producer take-back 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 waste from the specific material/product is gathered separately from the waste collection system of 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 recycle the material in question most effectively.

The requirement can in principle cover all relevant construction materials. Materials are specified where relevant potential is seen in the current market.

## O14 Windows and exterior doors in non-renewable materials

Windows and exterior doors made from non-renewable materials must comprise a certain proportion of recycled material as follows:

- At least 40% of the aluminium profiles in the frames and leaves for windows and doors must be recycled aluminium.
- At least 20% of the steel/stainless steel in the frames and leaves for doors must be recycled steel.
- At least 30% of the PVC in the frames and leaves for windows and doors must be recycled PVC. Recycled plastic resources may not contain lead or cadmium in levels exceeding 100 ppm\*\*. Plastic items  $\leq 50$  grams are excluded.

The requirement does not apply to:

- external cladding of outer wood components for the sole purpose of weather proofing
- plastic composite material
- materials that account for less than 3% by weight of the window, patio door or exterior door's total weight
- hinges, handles, fittings, stabiliser plates and kick plates
- window and exterior door insulation
- non-renewable components in glass panes/insulation panes.

A Nordic Swan Ecolabel window, patio door or exterior door will fulfil the requirement and must only verify the requirement with the product name and licence number.

*Skylights and roof domes regulated by product standard EN 1873 and windows and exterior doors that are resistant to fire pursuant to standard EN 16034 are not included in the requirement.*

- ☒ Specification of the proportion of recycled material used, for example in a construction product declaration. Declaration from the material supplier on the share of recycled material on an annual basis, in accordance with Appendix 5.
- ☒ For recycled plastic, also test results or the equivalent showing that the requirement concerning lead and cadmium is fulfilled in accordance with Appendix 5.

## Background

In this criteria document, windows and exterior doors are:

- Windows and exterior doors between the interior climate and exterior climate, according to the EN 14351-1 standard: 2006.
- 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, O4.

There is great variation in energy use during production of the materials used in different windows<sup>20</sup>. To reduce the embodied carbon, a certain ratio of recycled material is required. Both pre- and post-consumer material may be used to calculate the proportion of recycled material. The definition of recycled material can be found in Definitions and follows ISO 14021. The requirement concerning the proportion of recycled content must, as a minimum, be verified on an annual basis by the supplier of the material.

A number of exemptions are listed in the requirement. Plastic composite material is manufactured from hard plastic, which impedes recycling, and for quality reasons it is currently not possible to use recycled fibreglass. The requirement also does not apply to insulation materials.

Recycled PVC may currently contain lead, cadmium and other undesirable substances. Nordic Ecolabelling therefore sets the requirement that the recycled plastic may not contain levels of lead and cadmium exceeding 100 ppm.

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<sup>20</sup> LEED, Study of points given for PVC in LEED Green Buildings and A study from the University of Bath, UK, summarising data for construction materials in the report "Inventory of Carbon & Energy (ICE)", Version 2.0, 2011.

## O15 Hazardous substances in reused construction products and materials

- For reused construction products, fittings and materials, a risk analysis documenting the presence of undesirable substances listed in Appendix 6 and relevant local legislation must be conducted by a competent third party\*. The risk analysis must, as a minimum, be based on the age of the building/construction, the renovation history of the building, and the state and cleansing of the material.

If the competent third party identifies any risk of undesirable substances (according to Appendix 6 and relevant local legislation), analyses must be performed by an accredited laboratory to verify the content in relation to relevant threshold limits. Nordic Ecolabelling always have the right to require laboratory analysis.

*\* The competent third party conducting the risk analysis must be trained in conducting environmental surveys and have at least 3 years' experience in the field of environmental mapping/surveys of buildings.*

- Overview of the reused materials used.
- Risk analysis from competent third party that documents the presence of undesirable substances listed in Appendix 6 and relevant local legislation.
- Where relevant, an analysis report from an accredited laboratory on the substances listed in Appendix 6 and relevant local legislation.

### Background

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.

Two documentation alternatives are present in the requirement. One is based on a risk analysis of the materials made by an expert, whereas the other is based on laboratory analysis. Often 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.

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.

## O16 Reused construction products and materials

Minimum 25% of the need for one specific construction product, fitting or material must be covered by reused products. The material can be used in the primary building, supplementary building or outdoor areas.

A list of reused products must be included with the material documentation that is handed over to the final owner of the building.

*All products/materials must comply with requirements in O15.*

*The same product can give points in P10 if the requirement is fulfilled.*

*The same products can be used to fulfil O8, O9 and O10.*

- Calculation of the ratio of reused product.
- Documentation for the purchased products.

## Background

Reused construction materials, products and fittings are a large resource that is currently used to a very limited amount. They are materials available in the market at builders' merchants for reused products or directly from the demolition companies. In order to promote a circular economy and start the use of reused products in the building sector, an obligatory requirement has been introduced.

The amount of material needed to fulfil the requirement is very limited as the Nordic Swan Ecolabel recognises that this is a new area of work for most businesses in the building sector. This also means that it is possible to limit the use of these products to supplementary buildings or outdoor areas (e.g. lighting or cladding of shed). The intention is that this requirement will help to kickstart the use of reused products in the building sector.

## P10 Reused construction products and materials

The following product categories give points for reused products. The minimum share of the total demand that must be covered by reused products to obtain points is shown in table below. All materials/products must comply with requirement O15.

A list of reused products must be included with the material documentation that is handed over to the final owner of the building.

Product category	Minimum share of total demand	Points
Facade material (Wood, steel, aluminium, glass etc.)	25%	2
	50%	3
Roof material	25%	2
	50%	3
Inner walls (Timber, bricks, aerated concrete etc.)	25%	2
	50%	3
Floor slab/ floor framing (Timber, concrete elements, steel beams)	25%	2
	50%	3
Load-bearing walls (Timber, bricks, concrete elements etc.)	25%	2
	50%	3
Load-bearing roof structures (Timber, concrete elements etc.)	25%	2
	50%	3
Doors	50%	1
	90%	2
Flooring	50%	1
	90%	2
Lighting sources	50%	1
	90%	2

Suspended ceiling	50%	1
	90%	2
Untreated construction wood/timber for supplementary buildings	50%	1
	90%	2
Untreated construction wood/timber for temporary safety constructions	50%	1
	90%	2
Outdoor decking (stone, wood, tiles etc)	50%	1
	90%	2
Capillary break layer	50% of total need for sand/ aggregates must be taken from another construction site where it is surplus to requirement.	1
Concrete foundation	50% of total need for aggregates must be crushed concrete	1
<b>Maximum points</b>		<b>5</b>

*On request, Nordic Ecolabelling will assess any other products and materials that are suggested for inclusion on a project basis.*

- Calculation of the share of reused product in the relevant product category.
- Documentation for the purchase of reused products.

## Background

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 provided that there is enough information showing that the products can be safely reused/used without posing a health risk for the users of the building.

### P11 Insulating materials from renewable or recycled sources

This requirement applies to the insulation materials in the following construction parts: outer walls, inner walls, roof and foundation.

1 point is given when a minimum of 90% of the total need for insulation in a construction part is covered by one of the following:

- EPS or XPS products that contain  $\geq 30\%$  recycled material documented on an annual basis on the production site. Maximum 10% of the recycled material on an annual basis can be internal production waste.
- Mineral wool products that contain  $> 80\%$  post-consumer recycled material documented on an annual basis on the production site.
- Paper wool insulation containing minimum 80% recycled material documented on an annual basis on the production site.

- Wood fibre insulation or other types of renewable insulation. Must contain minimum 80% renewable material. A maximum of 5% recycled synthetic fibre is accepted in the products.
- Maximum 3 points are available.

*All materials must comply with the requirements in O31.*

*Wood fibre must also comply with O35 and O36.*

## **Background**

Insulation is present in large quantities in buildings. While it ensures lower energy demand for the final building, large amounts of energy are used to produce insulation materials. Nordic Ecolabelling wishes to promote materials that are based on either recycled material or renewable sources.

EPS (Expanded polystyrene insulation) and XPS (Extruded polystyrene insulation) are insulation materials made of polystyrene that are used in all types of buildings, for example under floors on the ground, on walls against terrain and on flat, compact roofs. Earlier recycled content in EPS insulation was only internal production waste, but today products made of 30–100% recycled EPS are also available in the Nordic market<sup>21</sup>. Systems for collection of used boxes for transport of fresh fish and insulation are steadily being improved. The Nordic Swan Ecolabel rewards the use of products with high content of recycled materials. This is also the case for mineral wool insulation, where a few products with recycled content of minimum 80% are available. Paper wool insulation is based on recycled material and is rewarded.

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.

All materials must comply with the chemical requirements in O31.

## **O17 Design for disassembly and adaptability**

In order to support circularity, it must be demonstrated how the building is designed to promote reuse and recycling with regard to resource efficiency, adaptability, flexibility and dismantlability (according to ISO 20887 or other relevant standards for assessing the disassemblability or adaptability of buildings). The following must be accounted for in a design for disassembly and adaptability specification of the measures taken to ensure that:

- Reversible connections are used where technically possible
- Installation shafts and technical service areas are dimensioned to ensure accessibility to the installations for repair and refurbishment.
- Technical installations (ventilation duct systems/electrical installations) are designed for rerouting and/or reuse with minimal damage to materials.

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<sup>21</sup> According to research of the Nordic market and dialogue with the Nordic EPS-industry.

- Office buildings and educational buildings account for the flexibility of the floor plan and the disassemblability of the interior.
  - Design details (drawings) that provide information on how to disassemble building components for optimal recovery of materials, are delivered to the building owner.
- A design for disassembly and adaptability specification is provided, verifying the bullets for the building or relevant components.
- A description of how the information on design for disassembly and adaptability is delivered to the building owner.

## Background

Design for disassembly/adaptability is an important concept in the circular economy and is also encouraged by Nordic Ecolabelling. The specific content of the requirement is based on ISO 20887:2020 – Design for disassembly and adaptability.

The aim of the DfD 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.

## P12 Renewable carcass, facade or inner walls

For buildings with timber construction in the carcass, facade or inner walls, the following points are given:

Building component	Minimum share	Points
Floor framing	90%	1
Load-bearing walls	90%	1
Load-bearing roof structures	100%	1
Facade area (excluding windows and doors)	50%	1
<b>Maximum points</b>		<b>3</b>

\* *WPC (Wood polymer composite) will not be given points.*

- Description/drawings of the relevant building component.
- Calculation of reused/timber/renewable material in facade/inner walls.

## Background

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.

## 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, and 3. Construction products, goods and materials. Reference is made to the individual requirements 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 section.

### 9.1 Product list and logbook

#### O18 Product list

A list of construction products, construction materials, goods and chemical products used in the Nordic Swan Ecolabel building and any supplementary building must be created in the Nordic Ecolabelling Portal.

An external database service that has an agreement with Nordic Ecolabelling can be used if traceability is ensured. Acceptance of external databases must be given by Nordic Ecolabelling.

Product list in the Nordic Ecolabelling Portal or in a verified external database.

#### Background

The requirements on chemical products and construction supplies can be fulfilled by choosing reviewed products in the portal. A list of accepted products can be made early in the process even during the design phase. That will help to identify products that should require an approval before using them, or products that should not be used at all.

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 product list in the Nordic Ecolabelling Portal offers a good level of control, preventing unwanted situations and potential negative environmental and financial effects.

#### O19 Logbook

The Nordic Swan Ecolabel project must have a digital logbook that includes all the construction products, goods, materials and chemical products used in the

construction of the project. Reused products must also be registered. The logbook must provide the following obligatory information:

- Product name
- Product type
- Name of producer (or supplier if they declare the product)
- The location of the product in the building(s)\*

*\* Minimum level of description: 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, elevator shaft.*

There must be routines in place to ensure that the digital logbook is accessible to the owner of the building and to Nordic Ecolabelling.

The following is not necessary to include in the logbook: 1. products under the triviality limit, 2. technical instruments and 3. products related to electrical installations (apart from those specifically mentioned in requirements).

*The GTIN number if available or the ID number in a national product registry can be included in the information but is not obligatory.*

- ☒ A digital logbook (e.g. PDF, Word or Excel) must be available to the final owner of the building and to Nordic Ecolabelling. The logbook can also be created using a verified third-party logbook service after approval by Nordic Ecolabelling.

## Background

The purpose of a logbook is to act as an inventory of materials and products used today in order 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 aforementioned purposes, it must include not only the names of products and a product description to report the content, but also where it is located 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, elevator shaft.

## 9.2 Chemical products

Chemical products are chemical substances or mixtures of different chemical 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?”.

## O20 Classification of chemical products

Chemical products used in the production of Nordic Swan Ecolabel buildings must not be classified according to the table below.

Classification of chemical products CLP Regulation 1272/2008:		
Hazard statement	Hazard class and category	Hazard code
Toxic to aquatic life	Toxic to aquatic life, Acute 1	H400
	Toxic to aquatic life, Chronic 1	H410
	Toxic to aquatic life, Chronic 2	H411
Harms public health and the environment by destroying ozone in the upper atmosphere	Hazardous to the ozone layer	H420
Acute toxicity	Acute Tox. 1 or 2	H300
	Acute Tox. 1 or 2	H310
	Acute Tox. 1 or 2	H330
	Acute Tox. 3	H301
	Acute Tox. 3	H311
	Acute Tox. 3	H331
Specific target organ toxicity: single exposure and repeated exposure	STOT SE 1	H370
	STOT RE 1	H372
Skin sensitising	Skin sens. 1, 1A or 1B	H317
Carcinogenic	Carc. 1A or 1B	H350
	Carc. 2	H351
May cause genetic defects	Muta. 1A or 1B	H340
	Muta. 2	H341
Toxic for reproduction	Repr. 1A or 1B	H360
	Repr. 2	H361
	Lact.	H362

*The classifications in the table concern all classification variants. For example, H350 also covers classification H350i.*

Exemptions:

- Chemical anchors classified H400, H410 and H411 due to dibenzoyl peroxide (CAS 94-36-0) are allowed.
- Hardener for acrylic floor coatings classified H400, H410 and H411 due to dibenzoyl peroxide (CAS 94-36-0) are allowed for use in commercial kitchens. In Nordic countries with an authorisation system, the flooring contractor must be authorised.
- For naphtha-based primers used in waterproofing assembly (flat roofs, green roofs, courtyards, terraces and similar applications) and naphtha-based adhesives for cellular rubber insulation intended for cooling pipes and ventilation ducts indoors, the classification H411 is accepted.

- For primers for expansion joints on concrete, concrete-metal and metal-metal outwardly/outside on the building and for roof adhesive/adhesive for waterproofing outwardly, the classification H411 is accepted.
  - For all outdoor products, the classification H317 is accepted.
- Declaration from the manufacturer of the chemical product, in accordance with Appendix 7
- Safety data sheet in accordance with Annex II to REACH (Council Regulation (EC) no. 1907/2006) for all chemical products.

## Background

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.

The classification H317 has been added to the list for indoor products. As the legislation continues to regulate isothiazolinones based on their ability to cause contact allergy, a general ban has been introduced regarding product classification with the risk phrase Skin sens. 1 H317 for isothiazolinones. The risk phrase is introduced because more isothiazolinones are now classified at the specific concentration limit of 0.0015%, where we previously restricted the isothiazolinones that had that limit before, such as CMIT/MIT and MIT.

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

## O21 CMR substances

Chemical products, used in the production of Nordic Swan Ecolabel buildings, must not contain any ingoing substances classified as carcinogenic, mutagenic or reprotoxic according to CLP Regulation 1272/2008, see Table 8 below.

**Table 8 Non-approved classifications of ingoing substances in chemical products according to CLP Regulation 1272/2008:**

Hazard statement	Hazard class and category	Hazard code
Carcinogenic	Carc. 1A or 1B	H350
	Carc. 2	H351
May cause genetic defects	Muta. 1A or 1B	H340
	Muta. 2	H341
Toxic for reproduction	Repr. 1A or 1B	H360
	Repr. 2	H361
	Lact.	H362

*The classifications in the table concern all classification variants. For example, H350 also covers classification H350i.*

**Exemptions:**

- Glyoxal (CAS no. 107-22-2, H341)  $\leq$  100 ppm (0.01% by weight) in the final product if the pH value in the final product is higher than pH 8.
- TiO<sub>2</sub> (CAS no. 13463-67-7, H351 inhalation).
- The dispersant trimethylolpropane (CAS no. 77-99-6, H361 self-classification) up to  $\leq$  5000 ppm (0.5% by weight) in the final product.
- Dibutyltin (DBT) and dioctyltin (DOT) in sealing products (the primer and joint product respectively)  $\leq$  5000 ppm (0.5% by weight) in the final product.

*Note that tributyltin (TBT) and triphenyltin (TPT) are not accepted regardless of content or product type.*

- Declaration from the manufacturer of the chemical product, in accordance with Appendix 7.
- Safety data sheet in accordance with Annex II to REACH (Council Regulation (EC) no. 1907/2006) for all chemical products.

**Background**

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.

**O22 Preservatives in indoor paint and indoor varnish**

The amount of preservative/combination of preservatives is limited according to the tables below. For tinting systems, a worst-case calculation must be performed for the colour with most tinting paste and the base paint with most environmentally hazardous substances.

**Table 9 Concentration limits for preservatives totally.**

Preservatives in total	Concentration limit
Paints, varnishes, base paints with tinting paints etc. for indoor use.	900 ppm (0.09% w/w)
Wet room paint specifically	1000 ppm (0.1% w/w)

**Table 10 Concentration limits for specific compounds.**

Preservatives	Concentration limit
Isothiazolinone compounds in total*	600 ppm (0.06% w/w)

*The term preservative refers to both PT 6 (in-can) and PT 7 (dry-film protection).*

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

- Declaration from the manufacturer of the chemical product, in accordance with Appendix 7.

## O23 Preservatives in other chemical products intended for indoor use

The amount of preservative/combination of preservatives in other chemical products for indoor use is limited according to Table 11 below.

**Table 11 Concentration limits for preservatives in other chemical products for indoor use.**

Preservatives	Concentration limit
Isothiazolinone compounds in total*	600 ppm (0.05w/w)
Iodopropynyl butylcarbamate (IPBC) (CAS no. 55406-53-6)	2000 ppm (0.2% w/w)
Bronopol (CAS no. 52-51-7)	500 ppm (0.05% w/w)

*The term preservative refers to both PT 6 (in-can) and PT 7 (dry-film protection).*

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

- Declaration from the manufacturer of the chemical product, in accordance with Appendix 7.

## Background

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 varnishes. For all other chemical products for indoor use, the levels are the same as for Nordic Swan Ecolabel fillers, which is considered to be reasonable for a Nordic Swan Ecolabel building.

Specific limits for isothiazolinone compounds have been removed, since they are regulated by the classification H317 for the chemical product itself. 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.

## O24 Other substances excluded from use

The following substances must not be an ingoing substance in chemical products used in the production of Nordic Swan Ecolabel buildings:

- Substances on the Candidate List.
- Substances evaluated by the EU to be PBT substances (persistent, bioaccumulative and toxic) or vPvB substances (very persistent and very bioaccumulative) in accordance with the criteria in Annex XIII to REACH.
- Substances shall not be potential or identified endocrine disruptors according to any of the EU member state initiated “Endocrine Disruptor Lists” I, II and III.
  - <https://edlists.org/the-ed-lists/list-i-substances-identified-as-endocrine-disruptors-by-the-eu>
  - <https://edlists.org/the-ed-lists/list-ii-substances-under-eu-investigation-endocrine-disruption>
  - <https://edlists.org/the-ed-lists/list-iii-substances-identified-as-endocrine-disruptors-by-participating-national-authorities>

A substance that is transferred to one of the corresponding sublists called “Substances no longer on list”, and no longer appears on any of Lists I–III, is no longer excluded. The exception is those substances on sublist II which were evaluated under a regulation or directive that does not have provisions for identifying EDs (e.g. the Cosmetics Regulation, etc.). For those substances, ED properties may still have been confirmed or suspected. Nordic Ecolabelling will evaluate the circumstances case-by-case, based on the background information indicated in sublist III. In addition, the following individual substances and substance groups are prohibited or restricted. There may be an overlap between the substances listed below and substances categorised above.

- Short-chain chlorinated paraffins (C10-C13) and medium-chain chlorinated paraffins (C14-C17).
- Perfluoroalkyl and polyfluoroalkyl substances (PFASs)
- APEO – alkylphenol ethoxylates and other alkylphenol derivatives (substances that release alkylphenols on degradation).
- Halogenated flame retardants.
- Phthalates.
- Bisphenol A, bisphenol S and bisphenol F.
- The heavy metals lead, cadmium, arsenic, chromium (VI), mercury and their compounds.
- Volatile aromatic compounds >1% by weight.
- Organic tin compounds.

Exemptions are made for:

- Naphtha-based primers for waterproofing assembly (flat roofs, green roofs, courtyards, terraces and similar applications), primers for expansion joints on concrete, concrete-metal and metal-metal outwardly/outside on the building and roof adhesive/adhesive for waterproofing outwardly may contain up to 20% by weight of volatile aromatic compounds

- Dibutyltin (DBT) and dioctyltin (DOT) in sealing products (the primer and joint product respectively)  $\leq 5000$  ppm (0.5% by weight) in the final product.

*Note that tributyltin (TBT) and triphenyltin (TPT) are not accepted regardless of content or product type.*

- Declaration from the manufacturer of the chemical product, in accordance with Appendix 7.
- Safety data sheet in accordance with Annex II to REACH (Council Regulation (EC) no. 1907/2006) for all chemical products.

## Background

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.

### O25 Nanoparticles in chemical products

Nanoparticles according to European Commission definition (2011/696/EU) must not be an ingoing substance in chemical products, with the following exemptions:

- Pigments\*
- Naturally occurring inorganic fillers\*\*
- Synthetic amorphous silica\*\*\*
- Unmodified calcium carbonate (Ground Calcium Carbonate (GCC) and Precipitated Calcium Carbonate (PCC))
- Polymer dispersions

*\* Nano-titanium dioxide is not considered to be a pigment and is therefore covered by the requirement.*

*\*\* This applies to fillers covered by Annex V, item 7 of REACH.*

*\*\*\* This applies to unmodified synthetic amorphous silica. Chemically modified colloidal silica can be included in the products as long as the silica particles form aggregates in the final product. Surface-treated nanoparticles must fulfil requirement O21 (classification of ingoing chemical substances) and requirement O25 (Other substances excluded from use).*

- Declaration from the manufacturer of the chemical product, in accordance with Appendix 7.

## Background

There is still great uncertainty related to how nanoparticles affect health and the environment<sup>22</sup>. Nordic Ecolabelling wishes to take a restrictive approach to the use

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<sup>22</sup> European Council, Recommendation 2017 (2013), Provisional version, Nanotechnology: balancing benefits and risks to public health and the environment. Available on page: (21/5-13).

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 for the production of 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<sup>23</sup>, 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, nanosilver, nanocopper and nano-titanium dioxide.

### 9.3 Construction products – restricted material

#### O26 Halogen-free cables

All heavy current cables must be documented as halogen-free according to IEC/DIN EN 60754-1, IEC/DIN EN 60754-2, 60754-2 or DIN EN 31023-2.

*The requirement does not include data, telephone and TV cables.*

*Obligatory requirement O22 must also be met.*

- Documentation from the supplier such as technical datasheet stating compliance with relevant standard.

#### **Background**

Nordic Ecolabel wishes to limit the use of PVC cables in order to reduce the harmful environmental and health effects 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 set as a requirement for larger private investors and in public projects.

The cables must be documented as halogen-free according to IEC 60754-1, IEC 60754-2, DIN EN 60754-1, DIN EN 60754-2 or DIN EN 31023-2. A 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.

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<sup>23</sup> COMMISSION RECOMMENDATION of 18 October 2011 on the definition of nanomaterial (2011/696/EU).

## O27 Surface layers on floors, ceilings, walls and interior doors

Interior doors and interior surface layers on floors, ceilings and walls may not contain chlorinated plastics (PVC). This includes watertight layers, wall film, acoustic dampening foams and other products used under the surface layer.

The following are exempt from the requirement:

- Mouldings, skirting boards and baseboards in bathrooms, professional kitchens and staircases in apartment buildings.
- Floorings in professional kitchens with floor drain.
- Floorings in wet rooms with floor drain in educational buildings, homes for the elderly and homes for disabled.

*Products covered by the exemption must fulfil O31 (Appendix 12).*

- ☒ Documentation to show how the requirement is fulfilled, for example floor plans, product data sheet, construction product declaration or similar.

### Background

PVC (polyvinyl chloride) is one of the most widely used thermoplastic materials. The environmental and health impacts of PVC are associated with emissions of harmful organic chemicals from manufacturing, emissions of potential endocrine disruptors such as phthalates used as plasticisers in the use stage and waste management handling in production and end of life.

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

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.

## O28 Durable wood for outdoor use

The use of pressure impregnated wood containing heavy metals and/or biocides is restricted according to Table 12. This applies to the following:

- The Nordic Swan Ecolabel building
- Supplementary buildings (i.e. refuse depots, bicycle storage rooms and sheds)
- Decking, fences, pergolas, permanently installed outdoor furniture, playground and park equipment and similar items

*Nordic Swan Ecolabel products automatically fulfil the requirement.*

**Table 12 Restrictions for the use of pressure impregnated wood.**

User class as per EN 335	Allowed area of use	Allowed NTR Class
UC 5	Direct contact with salt water according to user class 5 in EN 335. Not valid for outdoor furniture and playground and park equipment.	NTR M
UC 4	Direct contact with soil, fresh water according to user class 4 in EN 335. Not valid for outdoor furniture and playground and park equipment.	NTR A
UC 3.2	Weather-exposed load-bearing constructions with specific demands for durability of the material e.g. for safety reasons. Not valid for facades, decking, fences, acoustic barriers, pergolas, permanently installed outdoor furniture, playground and park equipment and similar items.	NTR AB
UC 3.1	Windows	NTR B

•  
Exemption:

- Impregnated wood that contains no heavy metals and a maximum of 500 ppm of biocides in the final product is exempt from the requirement.
- ☒ Nordic Swan Ecolabel products: State producer, licence number and product name
- ☒ Documentation for wood in the relevant user class: NTR certificate, user class per EN 335 and documentation/drawings clearly showing that impregnated wood is used according to the relevant exemption.
- ☒ For the exemption: Documentation from the producer that verifies the content of heavy metals and biocide in the wood products.

## Background

The purpose of the requirement is to limit the use of chemical wood preservative containing heavy metals and biocides. The requirement contains a list of permitted areas where pressure impregnated wood can be used due to the fact that impregnated wood can be hard to replace in these specific parts of the construction.

Wood treated through impregnation with wood preservative is divided by the 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 and NTR AB may be accepted, if only used for certain parts of the product 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 AB is only permitted for specific wooden parts that belong to the use sub-class UC 3.2 according to EN 335, i.e. parts that remain wet for long periods or where water can accumulate.

Nordic Ecolabelling recognises that it can be a challenge to use unimpregnated wood where the exposure to weather is high. Wood products that can document a very limited content of impregnation chemicals are exempted. The threshold limit is set to: no heavy metals added to the product by the producer and a maximum of 500

ppm of biocides in the final product. Limits are defined in accordance with the best available products on the market.

## O29 Copper

A. Tap water pipes must not consist of copper.

Exemptions:

- Visible pipelines
- Water fittings connecting pipes
- Closed water supply systems, for example in a water-borne heating system
- Pipes through the wall for an outdoor tap

B. Roof and facade cladding must not contain more than 10% by weight of copper. The same applies to other products for roofs and facades (roof drainage products, gutters, exhaust hoods, eaves nets, cover profiles and the like).

- Declaration from applicant, Appendix 8.
- Description of the use of copper in the project. Where relevant, supplementary documentation for roof and facade cladding, such as product data sheet, construction product declaration or information from producer.

## Background

The largest sources of copper spreading into the environment are road traffic and tap water. 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 for this 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 vary across the country. In order 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 in order 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<sup>24</sup> 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 in particular, 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 come to the conclusion that it is not relevant or practically possible to write geographically adapted requirements. Therefore, a general Nordic restriction requirement remains in the criteria.

### O30 Infill of granules on playgrounds and outdoor areas

Surfaces on playgrounds and other outdoor areas included in the Nordic Swan Ecolabel project/assignment must not consist of material with infill of plastic or rubber granules

- Declaration from the applicant that plastic or rubber granules or other synthetic material have not been used as infill on surfaces in playgrounds and other outdoor areas, Appendix 9.

## Background

Artificial turfs have been identified as major sources of microplastic pollution<sup>25 26</sup>. In addition, the granules and mulches can contain several potentially hazardous substances, including polycyclic aromatic hydrocarbons (PAHs), metals and phthalates.<sup>27</sup> In order to minimise these environmental aspects, an obligatory requirement has been set, prohibiting the use of plastic and rubber granules as infill.

## 9.4 Construction products – ingoing substances and emissions

### O31 Excluded substances in construction products, construction goods and materials

The requirement applies to the following product categories:

1. Sealing products on walls, foundation and roofing.
2. Thermal, acoustic and technical insulation
3. Interior and exterior building panels. Does not include panels of solid wood, laminated timber, veneer, OSB, plywood, MDF/HD, chipboard, HPL, CPL and compact laminates.

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<sup>24</sup> 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.

<sup>25</sup> [Kerstin Magnusson, Karin Eliasson, Anna Fråne, Kalle Haikonen, Johan Hultén, Mikael Olshammar, Johanna Stadmark, Anais Voisin, Swedish sources and pathways for microplastics to the marine environment, Number C 183, 2016](#)

<sup>26</sup> <https://www.miljodirektoratet.no/globalassets/publikasjoner/m954/m954.pdf>

<sup>27</sup> [Granules and mulches on sports pitches and playgrounds – ECHA \(europa.eu\)](#)

4. Heavy current cables and electrical conduits
5. Wood that is impregnated as protection from rot, blue stain and mould (see Ox for restrictions on use)
6. Wood plastic composite (WPC)
7. Plastic coverings for floors, ceilings and walls for interior use.
8. Textile coverings for floors, ceilings and walls.

In the construction products and materials mentioned above, the following substances must not be an ingoing substance in the product. Ingoing substance means all substances in the construction product that are present in concentrations higher than 100 ppm (0.010 w%, 100 mg/kg).

- A substance on the EU's Candidate List
- Substances evaluated by the EU to be PBT substances or vPvB substances in accordance with the criteria in Annex XIII to REACH.
- Substances classified as carcinogenic, mutagenic or toxic for reproduction (CMR) Category 1A and 1B.
- Substances that are potential or identified endocrine disruptors according to any of the EU member state initiated "Endocrine Disruptor Lists" I, II and III.
  - <https://edlists.org/the-ed-lists/list-i-substances-identified-as-endocrine-disruptors-by-the-eu>
  - <https://edlists.org/the-ed-lists/list-ii-substances-under-eu-investigation-endocrine-disruption>
  - <https://edlists.org/the-ed-lists/list-iii-substances-identified-as-endocrine-disruptors-by-participating-national-authorities>

*A substance that is transferred to one of the corresponding sublists called "Substances no longer on list" and no longer appears on any of Lists I–III, is no longer excluded. The exception is those substances on sublist II that were evaluated under a regulation or directive that does not have provisions for identifying EDs (e.g. the Cosmetics Regulation, etc.). For those substances, ED properties may still have been confirmed or suspected. Nordic Ecolabelling will evaluate the circumstances case-by-case, based on the background information indicated in sublist III. In addition, the following individual substances and substance groups are prohibited or restricted. There may be an overlap between the substances listed below and substances categorised above.*

- Short-chain chlorinated paraffins (C10-C13) and medium-chain chlorinated paraffins (C14-C17).
- Perfluoroalkyl and polyfluoroalkyl substances (PFASs)
- Alkylphenol ethoxylates (APEO) and other alkylphenol derivatives (substances that release alkylphenols on degradation).
- Halogenated flame retardants.
- Phthalates.
- The heavy metals lead, cadmium, arsenic, chromium (VI), mercury and their compounds.
- Bisphenol A, bisphenol S and bisphenol F.

- Boric acid, sodium perborate, perboric acid, sodium borate (borax) and any other boron compounds classed as carcinogenic, mutagenic or reprotoxic in category 1A/1B/2/Lact.
- Organotin compounds.

Exemptions are made for:

- The material in (electrical) conduits, which may contain halogenated flame retardants provided that the following limits are fulfilled:
  - Bromine content (Br)  $\leq 0.15\%$
  - Chlorine content (Cl)  $\leq 0.15\%$
  - Total content: bromine content (Br) + chlorine content (Cl)  $\leq 0.2\%$

The content must be verified using ion chromatography (IC) according to the methods in EN 14582 or modified IC methods according to EN50642.

- Declaration from the manufacturer of the construction product, construction goods or construction material in accordance with Appendix 10.
- Construction product declaration or corresponding if available for the product.

## Background

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 Ecolabelling regarding undesirable compounds in combination with corresponding requirements for other Nordic Swan Ecolabel 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<sup>28</sup>. 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

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<sup>28</sup> Kortlægning og risikovurdering af kemiske stoffer i gulvtæpper til børn Kortlægning af kemiske stoffer i forbrugerprodukter nr. 147, 2016.

relevant chemicals are considered to be handled in the general chemical requirements. All products used on floors, ceilings or walls are covered by the requirement.

Drainage pipes are no longer covered by the requirement as the materials used (PP, PE and (hard) PVC) are found to have little relevance with regard to 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).

### O32 Antimicrobial surface treatments

Biocide treated articles, see Definitions, (including antifouling and self-cleaning treatments) where the purpose is to create an antimicrobial or antiviral surface must not be used in construction products, construction goods or materials. This also includes treatment with silver nanoparticles.

Exemptions are made for:

- Wood that is impregnated as protection from rot, blue stain and mould. Products must still meet requirement O28 and O31.
- Air filters and door gaskets in white goods

☒ Declaration from the applicant confirming compliance with the requirement concerning antibacterial/antiviral additives not permitted in Nordic Swan Ecolabel building. Appendix 11 must be used.

### Background

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 a type of biocide. Increased use of biocides can lead to bacteria becoming resistant to agents that are actually necessary for hygiene and health in other contexts.

The general requirement in generation three of the criteria regulating nanotreatment 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 Nanosafety concludes in their report “Nanomaterial i byggbranschen” that nanomaterials have a limited use within the building sector today. Nordic Ecolabelling will consider to regulate this area again if the situation changes over time.

### O33 Formaldehyde emissions

The requirement covers all wood-based or laminate panels and boards for indoor use, containing formaldehyde-based additives, such as building panels (raw or surface treated), panels in floors, panels in doors\* or other fitments as well as mouldings, baseboards and frames.

The requirement does not apply to panels solely marketed as facade panels, solid wooden worktops and individual fixture details such as a hat or shoe shelf.

The average emission of formaldehyde must not exceed the limit values for the relevant test method according to Table 13.

**Table 13 Threshold limits for formaldehyde emissions.**

Test method	EN 717-1	EN 16516
<b>Wood-based panels and fitments</b>	0.062 mg/m <sup>3</sup>	0.124 mg/m <sup>3</sup>
<b>Laminate** panels and fitments</b> Including high pressure laminates (HPL), continuous pressure laminates (CPL) and compact laminates	NA	0.03 mg/m <sup>3</sup>

*If the panel is covered by e.g. melamine or laminate, it is the complete product with covering that should be tested. If a fitment consists of more than one panel, the complete product can be tested or the panels can be tested separately.*

*\* For Finland, apartment doors that are fire-protected according to EN16034 instead of the emission limit value in the table above must comply with M1.*

*Analysis methods other than those stated in the above table can be used, provided that the correlation between the testing methods can be verified by an independent third party.*

If legislation is introduced or tightened and becomes tighter than Nordic Ecolabelling's requirement levels for formaldehyde during the term of validity of these criteria, this requirement will be adjusted.

- Declaration concerning occurrence of formaldehyde-based additives in accordance with Appendix 12.
- Certificate or analysis report from an independent third party documenting the requirement level and the method/standard used.

## Background

The requirement is harmonised with Nordic Swan Ecolabel furniture and fitments, where it has been decided to only refer to methods EN 717-1 and EN 16516 with the same limit values as the legal requirement in Germany. Other test methods may be approved if an independent third party (e.g. a test institute) has made a correlation.

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/m<sup>3</sup> 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.

On 1 January 2020, Germany introduced a new legal requirement which means that the reference method for measuring formaldehyde emission has been changed from the previous EN 717-1 to EN 16516. If the method EN 16516 is used, the limit value is the same as that for E1, 0.124 mg/m<sup>3</sup>. If, on the other hand, EN 717-1 is used as a method, the panel must meet a limit value of half E1 (0.062 mg m<sup>3</sup>).

Resins containing phenol, formaldehyde and methanol are used in the production of several types of laminates to waterproof the paper. It is considered relevant to set requirements for emissions to ensure that the resin used to manufacture the laminate has properly hardened.

## 9.5 Ecolabelled products

### P13 Ecolabelled products

Nordic Swan Ecolabel or EU Ecolabel products used in a Nordic Swan Ecolabel building qualify for points. Each product category in Table 15 is subject to an individual maximum point score.

A maximum of 14 points can be achieved. A minimum point score must be achieved according to Table 15.

**Table 14 Minimum point score for each country.**

Country	Minimum points
DK/SE/NO	8
FI	6
IS	5

**Table 15 Product categories available for point.**

Product category	Maximum points for category (Pmax)
Construction and facade panels outside the vapour barrier	2
Construction, wall covers and panels inside the vapour barrier	2
Flooring (visible layer, excluding tiles)	3
Tiles (floors and walls)	1
Bathroom fittings	1
Wardrobes (including coat racks/hat shelves and similar)	2
Kitchens (front, frames and countertops)	3
Windows	2
Exterior doors	1
Indoor doors	2
Outdoor furniture	2
Playground equipment	2
Stove/fireplace	1
Durable wood	2
Indoor paint	3
Indoor fillers	2
Outdoor paint	2

Sealants	2
Adhesives and microdispenser	2
Other chemical building products	2
Other products	Defined when relevant
<b>Maximum points total</b>	<b>14</b>

The total point score ( $P_{total}$ ) is calculated according to the following:

$$P_{total} = \sum \frac{Eco_A}{Total_A} * P_{max,A} + \frac{Eco_B}{Total_B} * P_{max,B} + \dots + \frac{Eco_n}{Total_n} * P_{max,n}$$

$Eco_x$  = amount of ecolabelled product in category X

$Total_x$  = total amount of product in category X

$Pmax_x$  = maximum point for category X

*The choice of unit in the calculation is up to the licensee, but only one unit can be used per product category.*

*The total number of points must be rounded to the nearest whole number.*

- Completed calculation with relevant product information.
- Documentation for amounts and products in calculation such as invoices or estimates of relevant amounts.

## Background

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 Ecolabel 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 type I ecolabels such as 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 Ecolabel 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 Ecolabel building projects.

## 10 Biodiversity and wood raw materials

### O34 Tree species with restricted use

This requirement applies to all wood-based products used in the construction of the Nordic Swan Ecolabel building, supplementary buildings and outdoor areas. The requirement also applies to wood-based products used in construction but not incorporated in the building, such as wood in casting moulds.

Nordic Ecolabelling's list of restricted tree species\* consists of virgin tree species listed on:

- a. CITES (Appendices I, II and III)
- b. IUCN red list, categorised as CR, EN and VU
- c. Rainforest Foundation Norway's tree list
- d. Siberian larch (originated in forests outside the EU)

The use of tree species listed on a) CITES (Appendices I, II and III) **is not permitted**.

Tree species listed on either b), c) or d) **may be used** if they meet all of the following requirements:

- the tree species does not originate from an area/region where it is IUCN red listed, categorised as CR, EN or VU.
- the tree species does not originate from an Intact Forest Landscape (IFL), defined in the World's IFL 2000 map in Google Earth <http://www.intactforests.org/world.map.html>.
- the tree species shall originate from an FSC or PEFC certified forest/plantation and shall be covered by a valid FSC/PEFC Chain of Custody certificate documented/controlled as FSC or PEFC 100% through the FSC transfer method or PEFC physical separation method. Tree species grown in plantations shall, in addition, originate from a FSC or PEFC certified forest/plantation established before 1994.

\* The list of restricted tree species is located on the website: <http://www.nordic-ecolabel.org/certification/paper-pulp-printing/pulp--paper-producers/forestry-requirements-2020/>

The declaration is made by the applicant for the whole project.

The declaration is made by the supplier in the event that the wood-based products are subject to declaration in the supply chain declaration portal.

- Declaration that tree species listed in a–d are not used in the Nordic Swan Ecolabel building. Appendix 13 must be used.
- If species from the lists b, c or d are used:
- If a tree species is listed in either b, c or d, the supplier is required to present a valid FSC/PEFC Chain of Custody certificate that covers the specific tree species

and demonstrates that the tree is controlled as FSC or PEFC 100% through the FSC transfer method or PEFC physical separation method.

☒ If a tree species is listed in either b, c or d, the supplier is required to document full traceability back to the forest/certified forest unit, thereby demonstrating that:

- the tree species does not originate from an area/region where it is IUCN red listed, categorised as CR, EN or VU;
- the tree species does not originate from Intact Forest Landscape (IFL), defined in the World's IFL 2000 map in Google Earth <http://www.intactforests.org/world.webmap.html>;
- For plantations, the applicant/manufacturer/supplier is required to document that the tree species does not originate from FSC or PEFC certified plantations established after 1994.

## Background

A number of tree species are restricted or not permitted for use in Nordic Swan Ecolabel 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 Ecolabel 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<sup>29</sup> Appendices I, II and III.
- IUCN red list<sup>30</sup>, categorised as critically endangered (CR), endangered (EN) and vulnerable (VU).
- Regnskogsfondet<sup>31</sup> (Rainforest Foundation Norway) tree list
- Siberian larch (originating in forests outside the EU)

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

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<sup>29</sup> <https://www.cites.org/> (visited January 2020)

<sup>30</sup> <http://www.iucnredlist.org/> (visited January 2020)

<sup>31</sup> <https://www.regnskog.no/no/hva-du-kan-gjore/unnga-tropisk-tommer/tropiske-treslag> (visited January 2020)

Ecolabelling takes a precautionary approach and wants further documentation about the tree species and its origin.

Nordic 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.

### O35 Wood and bamboo, traceability and certification

This requirement applies to the following construction elements of solid wood, glulam, LVL, bamboo, plywood, veneer or particle/fibre board used in the construction of the Nordic Swan Ecolabel building and supplementary buildings:

- Frames, trusses, studs and joists used in the wooden structure of the building (roof, walls and floors)
- Underlay on roofs, walls and floors such as plywood, particle boards, tongue-and-groove and rafters
- Interior panels
- Exterior cladding and facade panels
- Timber for balcony, terrace, decking, veranda and fences
- Wooden floors
- Mouldings
- Doors and door frames
- Windows
- Kitchen cabinets and worktops
- Wood fibre insulation

The applicant may include other building parts in the calculation of certified wood raw materials. Nordic Swan Ecolabel wood products comply with the certified wood raw material requirement.

#### **Name of tree species**

The applicant/supplier must state the name (species name) of the wood raw material or bamboo used in Nordic Swan Ecolabel buildings.

#### **Chain of Custody certification**

The supplier of wood raw materials/bamboo materials must have valid Chain of Custody (CoC) certification under the FSC/PEFC schemes.

Suppliers who only deliver recycled material in the Nordic Swan Ecolabel buildings are exempted from the requirement for Chain of Custody certification. For a definition of recycled material, see below\*.

As an exception to the above, a supplier (e.g. a joinery workshop) of the applicant that does not have FSC/PEFC CoC certification may also be approved. This is subject to a guarantee from the supplier that the wood raw materials are purchased from a CoC certified supplier of wood that can prove that the wood raw materials comply with the requirements stated here. The supplier must guarantee

that the certified wood is sold to the applicant of the Nordic Swan Ecolabel building. The applicant must have an agreement with the supplier which describes how the supplier guarantees that the certified timber will be delivered to the applicant. The agreement shall state that the supplier is obliged to report to the applicant when changing wood supplier.

### **Certified wood raw materials and bamboo**

A minimum of 70% by weight of all wood raw materials and bamboo used in the Nordic Swan Ecolabel building must originate from forests managed according to sustainable forest management principles that meet the requirements set out by the FSC or PEFC Chain of Custody schemes, or be recycled material\*.

The remaining proportion of wood raw material must be covered by the FSC/PEFC control schemes regarding FSC controlled wood/PEFC controlled or be recycled material (see Definitions).

Nordic Ecolabelling considers products from primary wood processing industries (sawdust, wood chips, bark, etc.) or residues from forestry (bark, branches, roots, etc.) as recycled material.

- The names (species names) of the wood raw materials and bamboo that are used.
- Valid FSC/PEFC Chain of Custody certificate from all suppliers of wood-based products, covering all wood materials and bamboo used in the Nordic Swan Ecolabel building. Alternatively, a link to the certificate holder's valid certificate information in the FSC/PEFC certificate database.
- Documentation alternative 1: A summary showing i) the total quantity of wood raw materials and ii) the total percentage of certified wood raw material or recycled material used in the project. Copy of invoice(s) to confirm the proportion of certified wood raw materials or recycled materials purchased for the project.
- Documentation alternative 2: An aggregated signed list from suppliers (compilation of all wood raw material deliveries to the project containing information on: CoC code, name of tree species, type of product items, FSC/PEFC claims for each product item, quantities of wood raw materials and percentage of certified/recycled wood and the invoice number (reference)) can be used as a basis for the summary. Nordic Ecolabelling may ask for copies of invoices to confirm the proportion of certified timber purchased for the Nordic Swan Ecolabel building.
- If the applicant does not use a CoC certified supplier, the supplier shall present i) invoices for the wood raw materials in question from the CoC certified supplier and ii) a valid certificate which must be in accordance with the invoice(s). The invoice must state the volume of certified wood raw material and certification number.
- The applicant must have a documented agreement with the supplier which describes how the supplier guarantees that the specified, certified wood raw material on the invoice is delivered to the project. The agreement shall also state that the supplier is obliged to report any change in the source of the wood raw material. Nordic Ecolabelling may ask for further information.

## Background

The requirement includes more construction materials compared to generation 3 of the criteria. 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 of 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 Ecolabel 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.

### O36 Ecology report

An ecology report covering the building site must be delivered and include the following:

- a. Assessment of whether the building site is covered by the following definitions:
  - o Arable land and crop land with a moderate to high level of soil fertility and below-ground biodiversity as referred to in the EU LUCAS survey.
  - o Land matching the definition of forest as set out in national law used in the national greenhouse gas inventory, or where not available, in accordance with the FAO definition of forest.
- b. Mapping of the existing biodiversity and natural value at the building site. This includes evaluation of landscape ecology and ecosystem services,

geological deposits, water bodies, ecologically functional areas for game and fish, habitats, species of national management interest and invasive species. The method for the mapping performed must be described. Reference is made to Appendix 14 for guidance.

- c. Recommended measures to preserve the existing biodiversity and measures that can be taken to improve the biodiversity or compensate for the loss of biodiversity at the building site. The recommended measures must be ranked according to their impact on biodiversity and suggestions must be given as to how the measures can be implemented in the building project. Reference is made to Appendix 14 for guidance.

Whenever possible, the report must be completed before the preparation of the building site and the construction process begins.

The mapping must be done by a biologist/ecologist with minimum two years' experience of mapping biodiversity.

- Ecology report
- Documentation showing the competence and minimum 2 years' experience of the ecologist/biologist.

## Background

Part “a” of the requirement assesses the compliance of the building site with the requirement defined in the EU Taxonomies on arable land and forest.

The ecology report is intended to give advice on measures that preserve and improve the biodiversity on the site. In order 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.

## O37 Measures for biodiversity

### A: Improving and protecting the biodiversity of the building site

The applicant must describe what measures and recommendations from the ecology report they will implement to preserve and improve/compensate the biodiversity on the building site during and after the building is completed.

Two alternatives apply depending on the ownership of the building site:

1. If the applicant owns the building site, the following measures must as a minimum be implemented (if recommended in the ecology report):
  - Invasive species found on the site must be removed or controlled\*. Such species must also not be planted. This also applies to green roofs.

- Elements with natural value that already exist on the site must, as far as possible, be protected in accordance with the recommendations in the ecology report \*\*.
  - Local plant species must be planted in all common areas.
2. If the applicant does not own the building site, the applicant must have an active dialogue with the owner of the building site to implement the bullets mentioned in 1.

*\* This mainly applies to species that are prohibited from being imported and sold. They are found in the following documents: Denmark: The Danish Environmental Protection Agency's list of invasive species. Finland: National list of invasive species. Norway: Regulation on invasive organisms Appendix 1. Sweden: Currently, the requirement applies to species on the EU list and the list of most problematic species that have not yet been regulated by law. This may be changed when the authorities prepare new lists. Iceland: Act 583/2000. All countries: Regulation (EU) 2016/1141.*

*\*\* Elements of high natural value include old oak trees and other large trees, such as beech and birch, and natural ponds and streams.*

## **B: Protection and maintenance plan:**

The applicant must deliver a management plan for the biodiversity on the site, and it must be handed over to the future residents and/or caretakers. The following must, as a minimum, be included in the plan if it is considered relevant in the ecology report:

- Ecology report
- Instructions and recommendations from the action plan
- Overview of who is responsible for the care, e.g. what should be done by caretakers, and what should be done by residents
- Overview of which local species are recommended for planting, and instructions for care
- Overview of alien invasive species that should not be planted
- Description of good gardening practice, including a ban on the use of pesticides on green areas and guidance on which alternative methods of pest and weed control are recommended
- Description of how any compost should be used, also stating that alien species should not be placed in the compost, but sent to the municipal facility for garden waste.

A1: Description of the measures and recommendations from the ecology report that the applicant plans to implement in order to preserve and improve/compensate the biodiversity on the site during and after the building is completed.

A2: Documentation of dialogue with the owner of the site and description of possible measures and recommendations from the ecology report that they plan to implement to improve/compensate the biodiversity on the site during and after the building is completed.

B: The management plan for the biodiversity on the site and information about how it will be handed over to future residents and caretakers.

## Background

The required minimum is measures that are positive for biodiversity and can be implemented on the plot. Native biodiversity should be preserved as far as possible, and good habitats should be created for local species of animals, birds, insects, plants, etc. In order to succeed in the long term, it is important to have a management plan with clear instructions for how biodiversity is to be preserved and improved/compensated, along with a clear chain of responsibility.

### *Natural values*

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*

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

### *Local 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.

### *Protection and maintenance plan*

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. This knowledge is in high demand.

## P14 Improvement and preservation of biodiversity

Points are awarded for measures that preserve and promote biodiversity in the construction project.

A maximum of 6 points can be obtained from the measures below.

**Table 16 Biodiversity measures**

Measures	Points
Green roofs. The total green surface must be at least 50% of the possible available roof area. If a green roof is combined with cultivation boxes, the cultivation boxes must be in addition to the 50%, alternatively the total green surface (green roof + cultivation boxes) must be at least 75% of the total area. 1 point for extensive roofs and 2 points for intensive roofs.*	2
Local management of surface water (rain or melt water that flows over various surfaces such as grass, gravel, asphalt and roofs, or drainage water) that promotes biodiversity, i.e. the establishment of open waterways and ponds with natural banks, moisture habitats and rain beds.	2
Permeable surfaces: At least 75% of the area of all paths, roads and social meeting places and/or playscapes on the site are permeable. Parking spaces are not included. Asphalt, tiles and concrete pavements are not considered permeable.	2
Create opportunities for urban gardening, e.g. in cultivation boxes. Water outlets should be located nearby. There is no requirement for how large the area or the return should be, but an overall assessment must be made by the ecologist.	1

Gardens with rich biological diversity. Emphasis will be placed on increasing the proportion that is not monoculture, increasing the proportion of perennial beds, flower meadows, multi-layered vegetation and new habitats. The gardens should have edible plants, fruit trees and plants that benefit pollinators (bumblebees, honey bees, etc.). Trees, planting and any green roofs must be planned so that it is easier for the insects to move around. There is no requirement for how large the area should be, but an overall assessment must be made by the ecologist.	2
Create habitats for local species of insects, birds, bats, flying squirrels or ponds for amphibians. At least one bird box, insect hotel, etc. must be installed for every tenth apartment. In educational buildings and office buildings a minimum of one bird box, insect hotel, etc. must be installed for every tenth user of the building. Points are not awarded for beehives because domestic bees are considered an alien species.	1
Composting of garden waste if it is permitted by the municipality and recommended by the ecologist. The ecologist must recommend where the composting should be located, among other things to avoid run-off. The size must be in accordance with the size of the garden.	1
Social meeting places and/or natural playscapes. Social meeting places can be created in combination with measures for biodiversity, such as cultivation boxes. Natural playscapes are detailed, nature-based playgrounds with loose materials.	1
<b>Maximum points</b>	<b>6</b>

\* *Extensive roofs have a thin layer of soil or mats of growth medium (often sedum roofs). Intensive roofs have a thicker soil mass that can support shrubs and small trees and thereby contributes to greater biological diversity.*

- Description of the measures that have been implemented in accordance with the recommendations in the ecology report.
- Documentation for the establishment of measures.

## Background

### *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.

### ***Composting***

Composting contributes to the recycling of local resources and reduces demand for peat-based soils.

### ***Social meeting places and/or natural playscapes***

Social meeting places provide ecosystem services in the form of experiential values that are important for the social dimension in sustainable development. Places with rich ecosystem services are also the best playgrounds.

### ***Local management of surface water***

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.

### ***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.

## **11 Indoor environment**

### **O38 Acoustics**

The requirement must be verified in an acoustic plan showing calculated sound levels and designed sound classes in the building project.

The survey must be performed by an acoustic technician with minimum 2 years' experience.

#### **Educational buildings**

**Sweden (according to SS 25268):** Buildings must fulfil noise class B for all parameters assessed according to the valid national sound class standard.

**Finland:** Guideline values given in the Ministry of the Environment's guide to the sound environment of a building, 2018 (based on Decree 796/2017) must be fulfilled. Parameter for reverberation time shall be class B according to SFS 5907:2004 or corresponding later standard.

**Denmark:** Reverberation time, airborne sound insulation and noise from technical installations must fulfil the levels defined in BR18.

#### **Norway (according to NS 8175):**

- Schools: according to national legislation.
- Preschools: Sound class B for reverberation time and another optional sound environment parameter. Other sound environment parameters must comply with class C.

#### **Island (according to IST 45):**

- Schools: Sound class C for reverberation time.
- Preschools: Sound class B for reverberation time and another optional sound environment parameter. Other sound environment parameters must comply with class C.

*Rooms that are occupied temporarily are exempt from the requirement. For safety reasons, each preschool section is viewed as one room in relation to evaluation of the airborne sound insulation parameter.*

## **Residential buildings**

**Sweden:** Sound class B for two optional acoustic environment parameters. The rest of the sound environmental parameters must comply with class C (according to SS 25267).

**Finland:** Values for weighed standardised level difference ( $D_{nT,w}$ ) and for weighted standardised impact sound pressure level  $L'_{nT,w}+CI_{50-2500}$  are required to be 3 dB better than the values given in Decree 796/2017. Parameter for reverberation time shall be class B according to SFS 5907:2004 or corresponding later standard.

**Norway:** Recommended supplementary requirements for low frequencies concerning impact noise according to NS 8175:2012 must be taken into account in the acoustic calculations. Airborne noise from ventilation in bedrooms cannot be higher than 27 dB. Between bedrooms in student housing, the airborne sound insulation has to fulfil a weighted apparent sound reduction index,  $R'_{w}$ , of minimum 52 dB.

**Iceland:** Recommended supplementary requirements for low frequencies concerning impact noise and airborne noise according to the national acoustic environment standard must be taken into account in the acoustic calculations, in combination with sound class C (according to IST 45):

**Denmark:** Sound class B for reverberation time and noise from ventilation systems. The rest of the sound environment parameters must comply with class C (According to DS 490). Exemption for Denmark: According to BR18, light constructions in apartment boundaries, i.e. partitions with weight per area unit  $<100 \text{ kg/m}^2$  and floor separations with a weight per area unit  $<250 \text{ kg/m}^2$ , must meet airborne sound insulation  $R'_{w} + C_{50-3150} \geq 53 \text{ dB}$  and step sound level  $L'_{n,w}+CI_{50-2500} \leq 53 \text{ dB}$ .

## **Office buildings**

**Sweden:** Buildings must fulfil noise class B for all parameters assessed according to the valid national sound class standard (according to SS 25268):

**Finland:** Guideline values given in the Ministry of the Environment's guide to the sound environment of a building, 2018 (based on Decree 796/2017) must be fulfilled. Parameter for reverberation time shall be class B according to SFS 5907:2004 or corresponding later standard.

**Denmark:** Reverberation time, airborne sound insulation, indoor noise from traffic, and noise from technical installations must fulfil the guideline levels given in "Bygningsreglementets vejledning om lydforhold, vejledning for kontorbyggeri", BR18.

**Norway:** According to national legislation.

**Island:** Sound class B for reverberation time and another optional sound environment parameter. Other sound environment parameters must comply with class C (According to IST 45).

*Rooms that are occupied temporarily are exempt from the requirement.*

- Acoustic plan that shows calculated sound levels and designed sound classes in the building project.
- Competence description of the acoustic technician such as CV.

## Background

Bad acoustics can have a great influence on both physical and mental health. Poor acoustics give a high noise level and a poor learning/working/living environment. Concentration, understanding of speech, memory capacity and comprehension are all negatively affected if acoustics are poor. Reverberation time is considered to be especially important in offices, schools and day-care centres.

Nordic Ecolabelling has set requirements for the acoustics in all buildings types that can be certified. The requirement is differentiated between the different Nordic countries, due to the differences in size and threshold values in the sound standards and national legislation.

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 survey must be performed by an acoustic technician or another person with equivalent competence. A minimum experience of 2 years is required.

## P15 Quality assurance of acoustics

For all building types, control measurements of any acoustic parameter in accordance with obligatory requirement O39 gives 1 point. Maximum 1 point can be achieved.

If deviations from the projected/simulated values are found, the relevant issues in the construction must be dealt with. Documentation must be sent to Nordic Ecolabelling.

The extent of the conducted measurements must be defined by the acoustic technician to ensure their relevance.

Measurement methods must be in accordance with national legislation and/or national industry guidelines.

- Results of the control measurements of relevant noise parameters, including description of measurement methods and reasoning for the controlled rooms/areas.
- Documentation of corrections to deviations from the projected values, if relevant.

## Background

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 in

order to ensure the quality of the building. Points can be granted for all building types based on the number of parameters controlled. Maximum 2 points are available.

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).

### O39 Daylight provision

Daylight provision\* in the Nordic Ecolabelled building must be evaluated through computer simulations, using one of the two methods described in CEN 17037, Target daylight factor\*\* or Target illuminance. At least 50% of the utilised area\*\*\* in a room must meet the target illuminance level or daylight factor. For details about the methods and input values, see Appendix 15.

#### *Residential buildings*

The applicant shall demonstrate that the daylight provision in the common living areas fulfils the requirement shown in Table 17. Common living areas\*\*\*\* are defined as spaces intended for gathering, dining, watching television, etc. All residential units must fulfil the requirement, which is shown through simulations. For apartment buildings or identical small houses, simulations of the critical residential units ( $\geq 5$  units) are accepted. The selection should be justified.

**Table 17 Minimum levels for Target illuminance level and Target daylight factor for each country in residential buildings.**

Nation	Target illuminance level	Target daylight factor (DT)
Denmark	200 lux	1.4%
Sweden	150 lux	1.3%
Norway	200 lux	1.6%
Finland	150 lux	1.1%
Iceland	200 lux	1.7%

#### *Educational buildings*

The applicant shall demonstrate, through computer simulation, that the daylight provision achieved for each of the common areas, which include common rooms/playrooms, classrooms as well as areas for group working and studying, fulfils the requirement shown in Table 14. Areas used only for transient activity, such as corridors or bathrooms, and areas with special lighting requirements are excluded, as shown in Table 19.

#### *Office buildings*

The applicant shall demonstrate, through computer simulation, that the daylight provision achieved for the workplace areas fulfils the requirement shown in Table 18. Areas used only for transient activity, such as corridors or bathrooms, and areas with special light requirements are excluded, as shown in Table 19.

**Table 18 Minimum levels for illuminance and daylight factor for each country in educational buildings and offices**

Nation	Target illuminance level	Target daylight factor (DT)
Denmark	300 lux	2.1%
Sweden	300 lux	2.5%
Norway	300 lux	2.4%
Finland	300 lux	2.2%
Iceland	300 lux	2.6%

**Table 19 Excluded areas**

<b>Areas excluded from the simulations</b>	
Sports facilities and gymnasiums	
Auditoriums	
Music rooms	
Areas with special security needs, such as rooms for technical work or laboratories	
Rooms for health care, dental care, etc.	
Offices for teachers and staff room	
Conference rooms	
Canteens	
Other rooms with special needs that may be exempted from this requirement need to be approved by Nordic Ecolabelling	*

*Daylight provision is defined as the level of illuminance achieved across a fraction of a reference plane for a fraction of daylight hours within a space.*

*\*\* Target daylight factor (DT) is defined as the ratio of the light level inside a structure to the light level outside the structure, for a given illuminance level on the inside.*

*\*\*\* Utilised area is the fraction of the space of a room intended to be occupied.*

*\*\*\*\* Common living areas are defined as space intended for gathering, dining, watching television, etc. In homes for the elderly, both private and common areas intended to be used for gathering, dining, watching television, etc. are included.*

- ☒ Description of the selection of the critical units (worst-case units for each project) in residential buildings, the common areas in educational buildings or the workplace areas in office buildings.
- ☒ Results of the computer simulation for either Method 1 or Method 2 and drawings of the area defined as the utilised area and its daylight provision.

## Background

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<sup>32</sup>. Studies also show that daylight increases productivity<sup>33</sup> and improves student performance. Moreover, good daylight saves electrical energy that would otherwise be used for lighting.

There are some market trends in the building industry that have led to reducing the exposure to daylight. These trends include increasing urban densification, maximisation of leasable space and increased energy efficiency. Buildings are regularly being constructed in which most of the occupiable rooms do not fulfil the minimum statutory requirements concerning daylight. This issue also carries an ethical aspect, as the popular and more expensive flats located higher up in

<sup>32</sup> 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.

<sup>33</sup> 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.

apartment buildings usually have better daylight than less expensive flats on floors further down in the same building.

The majority 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 also 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 climate.

**P16 Daylight experience optimisation**

The applicant can choose one or more of the following options. Each option gives 1 point with a maximum of 3 points.

**A. Illuminance prediction method (1 point)**

Use of method 2 (see Appendix 15 for details) as the calculation method in O39 gives 1 point.

**B. Daylight provision optimisation (2 points)**

Points are awarded for buildings that provide good daylight distribution in a greater part of the rooms, compared to the obligatory levels in O39. While fulfilling O39, at least 95% of the utilised area must reach the target levels shown in Table 20. For details on simulations and methods, see Appendix 15. Definitions and exemptions apply according to O39.

**Table 20 Minimum levels for illuminance and daylight factor.**

Nation	Illuminance level	Daylight factor
Denmark	100 lux	0.7%
Sweden	100 lux	0.8%
Norway	100 lux	0.8%
Finland	100 lux	0.7%
Iceland	100 lux	0.9%

- Description of the selection of the critical units (worst-case units for each project) in residential buildings, the common areas in educational buildings or the workplace areas in office buildings.
- Results of the computer simulation for either Method 1 or Method 2 and drawings of the area defined as the utilised area and its daylight provision.

**C. View out (1 point)**

The applicant shall demonstrate compliance with the minimum level of recommendations for the view out by following the criteria according to Annex C of EN17037. Included and excluded rooms are defined as in obligatory requirement O39.

- In the living and activity zone, view openings as seen from the reference point of the view have a total horizontal sight angle higher than 14°.
- The distance to the outside view is larger than 6 m.

- In the living and activity zones at least the landscape layer (urban and/or nature) is seen from at least 75% of the utilised area.
- ☒ Description of the selection of the critical units (worst-case units for each project) in residential buildings, the common areas in educational buildings or the workplace areas in office buildings.
- ☒ Results of the three levels and drawings of the area defined as the utilised area.

#### **D. Glare (1 point – only for day-care, preschools, schools and office buildings)**

The applicant must demonstrate that the following criteria are met according to Annex E of EN17037:

- $DGP_{e} < 5\%$  for the occupied space\* does not exceed 0.45 for 5% of the occupation time of the relevant space.

The daylight glare probability (DGP) can be assessed using a simplified method or an annual DGP calculation. Both methods are described in Annex E of EN 17037. The DGP assessment is not applicable for a space with horizontal daylight openings.

*\* Occupied space: spaces where the activities are comparable to reading, writing, or using display devices and the occupants are not able to choose position and viewing direction.*

- ☒ Description of the occupied space.
- ☒ Results of the simulated calculations for  $DGP_{e} < 5\%$  for the occupied space.

#### **E. Exposure to sunlight (1 point – only for residential buildings)**

The applicant must demonstrate, through computer simulation, that the following criteria are met according to Annex D of EN17037:

- On a selected date between 1 February and 21 March, the common living areas receive sunlight for at least 1.5 hours.

Calculation methods are described in Annex D of EN 17037.

The calculation must be performed for the common living areas of the critical units. Common living areas and critical units are defined as in obligatory requirement O39 and Appendix 15.

- ☒ Description of the selection of the critical units (worst-case units for each project).
- ☒ Results of the computer simulation for the common living areas in the critical units.

### **Background**

This point requirement encourages the licensees and their building designers to be ambitious regarding daylight, as well as addressing other issues related to visual comfort, such as view out, protection against glare, and exposure to sunlight. The objective of this requirement is to give the licensees the opportunity to improve daylight in the buildings due to its benefits on health. There has been some work, based on European standard EN 17037, done in the different national building

codes towards a more ambitious approach to daylight. The standard approaches daylight and its benefit on health from four different angles, keeping the daylight provision as the main parameter.

**Optimisation of the daylight provision** is one of the options that can be chosen to obtain points. This option is similar to the obligatory requirement, but with stricter limit values (95% of the area). This requirement ensures a very high level of daylight provision and therefore a project can get points for it.

**View out** provides a visual connection to the surroundings and relieves the fatigue associated with long periods of being indoors, as well as stress. The view from a window is vital, especially to old people or people who spend a lot of time indoors. The standard defines three levels of recommendation for view out. The minimum level for each parameter has been chosen for this requirement.

**Glare protection** is important for activity zones where the expected activities are comparable to reading, writing, or using display devices, and where the user is unable to freely choose their position and viewing direction. Therefore, this requirement has only been defined for day-care, preschools, and schools. In those cases, it is recommended to assess the potential risk of glare. The standard defines three levels of recommendation for glare protection. The minimum level has been chosen for this requirement.

**Exposure to sunlight** contributes to human well-being. The standard defines three levels of recommendation for exposure to sunlight. The minimum level has been chosen for this requirement. The scope is reduced to only residential buildings and homes for the elderly on the recommendation of experts, because these are the types of buildings where this requirement generates higher health benefits.

#### O40 Thermal comfort and overheating

Nordic Swan Ecolabel buildings must be designed to tackle overheating. Rooms that risk overheating must be identified and evaluated for compliance according to Tables 19 and 20. This must be verified through dynamic simulations of the average hourly operative temperature on a room basis. Parameters for the simulation are given in Appendix 16. Rooms not intended for habitation/occupancy, such as bathrooms, hallways, corridors, stairwells, and storage and maintenance rooms are exempt from the requirement.

Temperatures\* can exceed the following values only for a limited number of hours per year, as given in Tables 21 and 22:

**Table 21 Long-term operative temperatures**

Long-term operative temperatures		Denmark	Finland	Iceland	Norway	Sweden
<b>Residential buildings* and offices</b>	Temperature, °C	27	27	26	26	26
	Max time, h	100	150	100	50	100
<b>Homes for the elderly and educational buildings</b>	Temperature, °C	26	26	26	26	26
	Max time, h	100	150	100	50	100

**Table 22 Short-term operative temperatures**

Short-term operative temperatures		All countries
Residential buildings and offices	Temperature, °C	28
	Max time, h, within the hours given in Table 21	25
Homes for the elderly and educational buildings	Temperature, °C	27
	Max time, h, within the hours given in Table 21	25

*\* Instead of temperature simulations, PPD simulations can be used with the following thresholds: PPD<10% corresponds to 26°C, PPD<15% corresponds to 27°C and PPD<20% corresponds to 28°C. Simulations must be done in accordance with EN ISO 7730, and parameters in Appendix 16 should be used.*

- Calculations of the average operative indoor temperature for the critical rooms based on dynamic simulations.
- Drawings of the buildings indicating the chosen critical rooms.

## Background

Thermal comfort impacts health, productivity and stress levels. With energy efficient buildings and a warming climate, overheating is becoming a common problem. Good thermal comfort is achieved when the air temperature, radiative temperature, humidity and air movement are properly balanced. Hence, thermal comfort is impacted by more than just the temperature.

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.

**Denmark:** The limits for obtaining good thermal comfort in residential buildings are a suggestion in the Danish buildings code. However, they are not always followed by the developers. It is only a request to control the room that is considered more critical rather than e.g. a whole building. By defining the critical rooms in the requirement, we are more ambitious. Educational buildings are not specified in the Danish buildings code.

**Sweden:** The limits for obtaining good thermal comfort are suggested in the Swedish buildings code and they are usually followed by the developers. There is, however, some uncertainty about the fulfilment of the national requirement because long-term temperature and short-term temperature are not defined by the legislation. The Swedish expert suggested approaching it with the 100 hours and 25 hours as in Denmark.

**Finland:** There are no requirements in the Finnish legislation for residential buildings other than apartments and there is not a limit for short-term temperatures. The long-term temperature is defined as 150 hours, so this is

specified in the requirement, and the short-term temperature has been added following the Danish and Swedish approach.

**Norway:** The national building code recommends a certain temperature for a “median-term” temperature defined as 50 hours, for residential buildings, day-care, preschools and schools. However, it is not obligatory for residential buildings, but only for buildings such as offices and educational buildings. A short-term temperature has been added to the requirement for Norway as for the rest of the countries.

### P17 Solar shading and energy efficient cooling technologies

1 point is granted for each of the following technologies used to control the indoor temperature. Maximum 2 points are available.

- External solar shading, provided by architectural elements such as awnings, protrusions, louvres etc., or solar shading provided by vegetation. All southeast, south and southwest facing windows must be accounted for.
- Cooling provided by sea or lake water
- District cooling
- Seasonal energy storage provided by e.g. water, salt, phase change materials, snow or ice.
- Passive cooling techniques such as automated night ventilation.
- All cooling agents used in the central cooling systems has a GWP  $\leq 5$ .

Description of the chosen technical solutions.

Reference to either the energy demand calculations in O3 or thermal comfort simulation in O40.

### Background

The warming climate is leading to longer and warmer summers in the Nordic countries. In order to ensure a comfortable indoor climate, limitation of heat gains as well as efficient cooling methods are necessary. Nordic Ecolabelling wishes to reward the climate adaption of buildings and encourage the use of passive or energy efficient technologies. 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.

### O41 Radon

Buildings must be constructed to be radon proof. Verification of the relevant construction principles must be carried out according to the building site’s geology and the relevant national building legislation.

Buildings in Norway and Iceland are exempted from the requirement, see Background text.

Verification of the building’s radon-proof design according to the construction site geology and relevant national legislation.

## Background

Long-term exposure to radon gas can cause lung cancer. The purpose of this requirement is to ensure very low radon levels in buildings. The measures taken to ensure radon-proof building support compliance with the national limits according to the table below.

As there are various local conditions and many different technical construction methods to ensure low radon levels, the individual construction projects must describe the measures that will be taken in the specific building project.

**Table 23 The official threshold values for radon in buildings in the Nordic countries**

	Denmark	Norway	Sweden	Finland	Iceland
Maximum threshold value	100 Bq/m <sup>3</sup>	200 Bq/m <sup>3</sup>	200 Bq/m <sup>3</sup>	200 Bq/m <sup>3</sup>	N/A
Action limit		100 Bq/m <sup>3</sup>			N/A
Other		Levels that are as low as possible*			

\* Measures may also be relevant below the action level at which it is considered possible to achieve a significant reduction of the levels by taking action. For new construction, the technical building regulations set out requirements regarding preventive radon measures and threshold values.

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<sup>34</sup>. The results indicate that the radon concentration in Iceland is very low. 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.

## O42 Moisture prevention

Moisture prevention in the building must be documented in line with A to C:

### A. Plan for moisture prevention

A plan for moisture prevention must be submitted to Nordic Ecolabelling before construction work begins. The project-specific plan for moisture prevention must include:

- List of relevant moisture-sensitive materials and constructions.
- Weather protection of materials/elements during transport and storage.

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<sup>34</sup> 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>)

- Plan for closure of the building and weather protection of relevant constructions.
- Description of procedures and methods for drying out the building.
- Description of how it is ensured that subcontractors adhere to applicant's moisture prevention plan.
- Description of the requirements set for manufacturers of prefabricated elements/modules in relation to moisture prevention during manufacturing, transport and installation.

#### **B. Plan for moisture measurements**

A plan for moisture measurements must be made according to the following:

- Moisture measurements must be performed for all relevant materials and constructions in the building, according to the national legislation or official guidelines. The relevant structures and materials must be listed in the plan.
- In concrete-based materials that are covered by moisture-sensitive materials (e.g. parquet) the moisture content must be verified by borehole/specimen measurements.
- Measured values must be below requirements from the manufacturer of surface materials (e.g. linoleum, parquet, etc.) or official national industry guidelines. Relevant target values must be stated.
- Measurement results must be documented and be available to Nordic Ecolabelling upon request.

#### **C. Coordinator for moisture management**

- A moisture coordinator must monitor adherence to the moisture prevention plan. The coordinator must fulfil the following:
- Education in moisture prevention in buildings
- At least 2 years' experience in construction site moisture management/control or moisture damage investigations

- A. Plan for moisture prevention.
- B. Plan for moisture measurements.
- B. Monitoring reports and measurement results must be available to Nordic Ecolabelling upon request.
- C. Competence description of the moisture coordinator such as CV.

### **Background**

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 by 50%.

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.

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.

## O43 Indoor air quality

### **Offices and educational buildings:**

An indoor maximum concentration of 1000 ppm CO<sub>2</sub> in air must be adhered to in all the common areas, which include common rooms/playrooms, classrooms as well as areas for group working and studying. Sensors for automatic demand control based on the concentration of CO<sub>2</sub> must be installed.

### **Homes for the elderly and homes for disabled:**

An indoor maximum concentration of 1000 ppm CO<sub>2</sub> in air must be adhered to in all common rooms. Areas in the building that are defined as residential areas must comply with the requirement below. Sensors for automatic demand control based on the concentration of CO<sub>2</sub> must be installed.

### **Residential buildings:**

The required supply air for the extraction hood must be supplied automatically without occupant intervention.

Hoods based on recirculation and filtration are not allowed.

A minimum of one window/door that can be opened to the outside must be available in all bedrooms and living rooms.

- ☒ Office buildings, educational buildings and homes for the elderly: Description of the demand control system.
- ☒ Residential buildings: Documentation of the air supply system connected to the exhaust hoods. Availability of windows/doors in relevant rooms must be documented.

## **Background**

Air quality is an important aspect of the indoor environment, with directly affects the occupants' health and well-being. Many Europeans spend more than 90% of their time inside buildings and most of the 10,000 litres of air they breathe each day will be indoor air.

Good ventilation is very important, especially in buildings occupied by sensitive people such as children and old people. Poor ventilation and therefore poor indoor air quality increase the risk of children developing asthma or of spreading viruses and infections.

**Offices and educational buildings:** A requirement for demand-controlled ventilation establishing 1000 ppm CO<sub>2</sub> as the limit value has been chosen. This is based on the national legislation and European standards and recommendations. CO<sub>2</sub> concentration is the most relevant parameter for correlating to the indoor air

quality and therefore we have chosen this indicator instead of the air flow supplied by the ventilation unit. A high level of CO<sub>2</sub> can cause headaches, fatigue and difficulty concentrating.

**Homes for the elderly:** In some national legislation, homes for the elderly are not covered by the requirement for CO<sub>2</sub> concentration. This is due to the fact that these buildings are defined as residential buildings by law. People who live in homes for the elderly are old people, in many cases suffering from illness, which makes them very sensitive to poor air quality. Furthermore, they will often spend many hours in the indoor environment. Therefore, a requirement is defined in the common areas of the building where many people will be located simultaneously.

**Residential buildings:** Kitchen odours are one of the most impactful sources of bad indoor air quality in residential buildings. Since cooker hood performance is not always regulated, this is a common source of problems related to air quality. The requirement seeks to ensure the good function of the unit and its ability to remove the polluted air from the building (hoods based on recirculation and filtration are not allowed). In new buildings with high requirements for air tightness, it is necessary to have automatic supply of air when the hood is in use in order to ensure proper functioning of the system.

## 12 Innovation and other green initiatives

### P18 Innovation and other green initiatives

Points are given for innovative measures taken in the construction process or in direct relation to the Nordic Ecolabelled project. A maximum of 4 points can be achieved. The list below shows the measures that are awarded points.

- a. A minimum of 90% of the main brick walls are built using lime mortar for construction. Other types of mortar that allow for bricks to be disassembled can also earn points. Documentation must be provided for mortar types other than lime mortar. 2 points
- b. Mass management plan that verifies a significantly minimised need for transport of mass at the construction site. 2 points.
- c. Point foundation or ground screw foundation of the Nordic Swan Ecolabel building. 2 points.
- d. Minimum 25% of the certified wood (according to xx) comes from wood that is produced by the concept of continuous cover forestry\*. 1 point
- e. Minimum 50% of the certified wood (according to xx) comes from wood that is produced by the concept of continuous cover forestry\*. 2 points
- f. Other measures may be accepted after consideration by Nordic Ecolabelling.

*\* Forests that are managed according to the principles of close-to-nature forestry with forests of different ages. (There are several models, but the common feature is that forestry is run without clear-cutting, with trees of different ages and local species.) The forest must have an operating plan showing how it is managed and renewed, and that clear-cutting is not done. There must be a delivery note/invoice stating that the wood comes from this forest area.*

- A) Documentation of the mortar used and the relative amount used in the project.
- B) Mass management plan.
- C) Documentation of the principle used for the point foundation or ground screw foundation.
- D/E) Operating plan for management of the forest and documentation of certified wood produced by the concept of continuous cover forestry.

## Background

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 disassembled is rewarded. This means that bricks can also be reused in the future.

A plan for mass management that verifies a significantly minimised need for transport of mass at the construction site is rewarded. Minimising the need for transport minimises the climate impact of the project.

A point foundation or ground screw foundation for the Nordic Swan Ecolabel 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.

## 13 Quality management of the construction process

### O44 Air permeability

The applicant must have routines to test air permeability/air-tightness based on the standard EN ISO 9972 in order to ensure the performance that is set at the design stage. The routines must include defect analysis and corrective measures in cases where the projected air permeability is not achieved.

*Air permeability must be measured for each building (small houses and educational buildings) or at least 10% of the total number of residential units (in apartments and town houses). Both measurements of individual apartments and entire staircases are approved methods. When air permeability is measured on a random sample basis, there must be a routine to ensure that other apartments have equivalent air permeability. In projects that comprise more than one building, apartments from each building need to be evaluated.*

- ☒ Routine(s) to measure air permeability, comprising measurement method, corrective measures, and error analysis when the measured value deviates from the project designed value.
- ☒ Results of the air permeability tests and comparison with the air permeability value used in the energy calculation (O3).

### **Background**

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.

The 10% minimum limit for apartment buildings and town houses has been established to take account of the real-world approach when testing those types of buildings. Standardised buildings have been removed from this exception because there is no evidence that this way of constructing buildings has an influence on the air permeability.

### **O45 Compliance with material and chemical requirements**

The licensee must ensure fulfilment of all material and chemical requirements. A routine must be established for the whole construction process, including:

- Chain of responsibility for the material requirements (O15–O29) in the design phase, construction phase(s) and procurement.
- Instructions for subcontractors, e.g. via agreements and control plans.
- Procedure for construction site inspections that covers:
  - Frequency of internal inspections during the construction period
  - Extent of the internal inspections (minimum: material storage, active construction site and area for construction waste).
  - Documentation for internal inspections: inspected materials and their compliance with material requirements in the criteria must be documented, e.g. in the self-inspection system.

- ☒ Routines that as a minimum document the bullets above.

### **Background**

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.

#### O46 Information for those involved in the construction process

Employees, including supervisors, site managers and subcontractors involved in the construction process, must have the relevant knowledge to be able to ensure fulfilment of the requirements in conjunction with the project design and construction of a Nordic Swan Ecolabel building.

The routines for the training and information programme must include at least the following:

- Content and scope of the training/information, depending on the participant's role.
- Frequency of the training/information.
- Division of responsibilities.

The applicant must ensure that training and information are available in relevant languages.

- Routine in the quality management system and training programme.

#### Background

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 subsuppliers involved in the construction of a Nordic Swan Ecolabel building must have the relevant knowledge to be able to ensure fulfilment of the requirements in conjunction with the project.

#### O47 Unforeseen non-conformities

The applicant must describe how unforeseen non-conformities that affect Nordic Ecolabelling's requirements are handled and reported to Nordic Ecolabelling. Unforeseen non-conformities must be reported to Nordic Ecolabelling in writing, without delay. Appendix 17 can be used.

- Routines describing how unforeseen non-conformities are handled and reported to Nordic Ecolabelling.
- Non-conformity reports if relevant. Appendix 17 can be used.

#### Background

The purpose of the requirement is to ensure that the applicant has routines on how to handle and report unforeseen non-conformities to Nordic Ecolabelling. The requirement covers unforeseen non-conformities that affect Nordic Ecolabelling's requirements.

## O48 The contractor's self-monitoring system

The contractor must have a documented quality self-monitoring system during the entire construction period. As a minimum, the self-monitoring system must include routines for:

- a. Overview of chain of responsibility for the control measures
- b. System for management of documents, including archiving and corrections of drawings
- c. System for checks on deliveries at time of receipt
- d. System for process control, defining control levels and frequency of control for subcontractors, advisors and the construction site management
- e. Procedures for checks on prefabricated elements
- f. Procedure for the final inspection and handover of the building

Nordic Ecolabelling must have access to the quality self-monitoring system through the entire construction process. This can be handled in the contractor's digital quality assurance system, if that is an option.

- Routines describing the self-inspection system according to the requirement.

### Background

The requirement aims to ensure a solid quality self-monitoring system for the construction of the Nordic Swan Ecolabel 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.

## 14 Changes compared to previous generation

**Table 24 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	O1	Overall description of the building	Updated and adjusted requirement. Appendix is created for the requirement.
		O2	Responsibility for Nordic Ecolabelling	Removed. Included in the Nordic Ecolabelling portal.
O2	Points achieved	O3	Points achieved	Updated according to Gen 4's point system.
O3	Energy demand of the building	O4	Energy consumption of the building	Threshold limits are updated, office is implemented and requirement for Iceland is added.
O4	Lighting management	O5	Lighting management	Demand control must be based on both daylight and presence. Exception for private spaces (e.g. balconies) has been removed.
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	Household appliances of better energy class	P4	White goods of better energy class	Stricter limits have been introduced. Updated according to Energy Labelling Regulation 2017/1369.
O6	Water saving sanitary tapware	P5	Energy efficient sanitary tapware	New obligatory requirement. The option of choosing between energy efficient and water saving sanitary tapware has been introduced.
P2	Energy efficient and water saving sanitary tapware and technologies			Stricter limits for points. Introduction of systems that reuse greywater or rainwater for toilet flushing.
P3	Management of energy consumption and power peaks	P1	Individual metering of domestic hot water	New requirement. Individual metering of domestic hot water has been removed.
P4	Renewable energy recovery and production, local sources	P5	Local energy sources and energy recovery	Adjustment of threshold limits for points for solar panels. Introduction of liquid-to-water heat pumps outside district heating areas.
O7	Climate declaration of the building	P3	Calculation of HWC losses and buildings' climate imprint	New obligatory requirement on climate declaration of the building. Calculation on HWC losses has been removed.
P5	Quality assurance of the climate calculation			New point requirement
O8	Cement and concrete products			New obligatory requirement
O9	Steel rebars, beams and columns, roof and facade panels			New obligatory requirement
O10	Aluminium facade and roof panels			New obligatory requirement
O11	Construction site fuel restrictions			New obligatory requirement

P6	Construction site machinery			New point requirement
P7	Promotion of bicycle transport	P14	Green initiatives	Parts regarding bicycle transport are now in separate requirement.
O12	Waste management and sorting	P13	Recycling of building waste	New obligatory requirement with stricter limits than P13 gen. 3.
O13	Waste sorting inside the building	O7	Possibility of sorting waste	Office buildings added and stricter requirement level.
P8	Construction waste reduction			New point requirement
P9	Take-back systems			New point requirement
O14	Windows and exterior doors in non-renewable materials	O25	Recycled materials in doors, windows and facade panels	Minor changes and clarifications
O15	Hazardous substances in reused construction products			New obligatory requirement regulating chemical substances in reused products.
O16	Reused materials			New obligatory requirement
P10	Reused construction materials	P12	Recycled or reused materials in construction products	More points available and new calculation method for relevant amounts.
P11	Insulating materials from renewable or recycled sources			New point requirement
O17	Design for Disassembly and Adaptability (DfD/A)			New obligatory requirement
P12	Renewable carcass, facade or inner walls	P7	Timber structure	Minor clarifications
O18	Product list	O15	Product list and logbook of the building	Divided into two individual requirements, one for logbook and one for product list.
O19	Logbook			
O20	Classification of chemical products	O16	Classification of chemical products	Classification H317 has been added. The classification H410 has been added as exemption for acrylic floor and chemical anchors due to a new classification of a peroxide.
O21	CMR substances	O17	CMR substances	Due to raised impurity limit (from 100 ppm in final product to 1000 ppm) some exemptions have been removed.  Exemption of organotin compounds has been updated.
O22	Preservatives in indoor paint and indoor varnish	O18	Preservatives in indoor paint and indoor varnish	Specific limits for isothiazolinone compounds have been removed since this is regulated by the classification H317 on the chemical product itself. Updated limits for total preservatives.

O23	Preservatives in other chemical products intended for indoor use	O19	Preservatives in other chemical products intended for indoor use	Specific limits for isothiazolinone compounds have been removed since this is regulated by the classification H317 on the chemical product itself.
O24	Other excluded 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
O25	Nanoparticles in chemical products	O21	Nanoparticles in chemical products	Exemption regarding synthetic amorphous silica and calcium carbonate has been clarified
O26	Halogen-free cables			New obligatory requirement
O27	Surface layers on floors, ceilings, walls and interior doors	O24	Surface layers on floors, ceilings and walls	Exemption introduced in professional kitchens and in wet rooms in educational buildings and homes for the elderly.
O28	Durable/resistant wood for outdoor use	O29	Durable/resistant wood for outdoor use	Requirement clarified and changed. Exemption for wood with no heavy metals and a maximum of 500 ppm of biocides.
O29	Copper in tap water pipes, facades and roofing material	O26	Copper in tap water pipes and as facade and roofing material	Basically unchanged
O30	Infill of granules on playgrounds and outdoor areas			New obligatory requirement
O31	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.
O32	Antimicrobial surface treatments	O23	Nanoparticles and antibacterial additives in construction products and construction goods	Requirement for nanoparticles in construction materials has been removed. This new obligatory requirement deals with the primary issues regulated by the former requirement.
O33	Formaldehyde emissions	O14	Formaldehyde emissions	The requirement has been harmonised with Nordic Swan Ecolabel furniture and fitments. Laminates have been added. Previously it was only products containing more than 3% by weight formaldehyde-based additives, but that limit has been removed.
P13	Ecolabelled construction products	P9	Ecolabelled construction products	Obligatory minimum points introduced, nationally adapted.
O34	Tree species with restricted use	O27	Tree species not permitted to be used in Nordic Swan Ecolabel buildings	Goes from a ban to restricted use of tree species. Reference to new tree list from 2020.
O35	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.

O36	Ecology report			New obligatory requirement
O37	Measures for biodiversity			New obligatory requirement
P14	Improvement and preservation of biodiversity	P14	Green initiatives	Parts of P14 in generation 3 in combination with new elements.
O38	Acoustics	O12	Noise environment	All building types now have obligatory requirement.
P15	Quality assurance of acoustics			New point requirement
O39	Daylight provision	O13	Daylight	Reviewed and updated requirement according to EN17037
P16	Daylight experience optimisation			New point requirement
O40	Thermal comfort and overheating			New obligatory requirement
P17	Solar shading and energy efficient cooling technologies			New point requirement
O41	Radon	O9	Radon	Radon-proof construction is required.
O42	Moisture prevention	O10	Moisture prevention	Reviewed and updated
O43	Indoor air quality through ventilation			New obligatory requirement
P18	Innovation and other green initiatives	P14	Green initiatives	New point requirement, partly inspired by P14 in gen. 3.
O44	Air	O30	Air permeability	Reviewed and updated requirement
O45	Compliance with material and chemical requirements	O31	Management of requirements on products and materials	Updated and partly rewritten
O46	Information for those involved in the construction process	O32	Information to those involved in the construction process	Updated and partly rewritten
O47	Unforeseen non-conformities	O38	Unforeseen non-conformities	Basically unchanged
O48	The contractor's self-monitoring system	O33	The contractor's self-monitoring	Rewritten