Nordic Ecolabelling for

Biological durable wood for outdoor use

Version 3.0 • 07 March 2025 – 31 March 2030

Nordic Ecolabelling

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1 Summary

Nordic Ecolabelling criteria for biological durable wood has been revised to generation 3.

Durable wood affects the environment over the whole of its life cycle, but life cycle assessment shows, that long service life in relation to the intended field of application has a high overall environmental impact.

The focus in this revision has been on implementing clearer and stricter requirements for wood documented resistance to wood destroying fungi according to intended use class. The focus has also been on introducing a new absolute mandatory requirement for energy use as well as promoting the use of non-fossil energy in production. The requirements for chemicals and wood raw materials have been revised to reflect the most updated requirements on these areas of Nordic Ecolabelling. Requirements for product- and customer information have been updated in accordance with the Construction Products Regulation (EU/2024/3110) in relation to the documentation of the properties and functions of which the product is marketed.

The most important changes within this revision are presented below:

- New requirement for surface treatment of durable wood if the paint/varnish is Nordic Swan- or EU Ecolabelled.
- Chemical requirements are aligned with the most updated requirements in Nordic Ecolabelling e.g., the list of prohibited substances now also includes substances on EUs endocrine disruptor list III.
- Requirements regarding the quality of the durable wood have been improved, introducing a requirement for test of minimum durability performance according to use class. Fire-retardant treated wood must document the durability of its performance.
- New absolute requirement for energy uses as well as excluding and/or limiting use of fossil fuels.

1.1 Background to the product group definition

The definition of the product group has been adjusted compared to generation 2. As in generation 2 of the criteria, heartwood with natural durability, chemically- and thermally modified wood with documented good durability performance, may be Nordic Swan Ecolabelled. It has been clarified that heartwood and thermally modified wood may be used in special indoor constructions such as saunas. However, the heartwood and thermally modified wood must not be impregnated, or surface treated as chemical substances can be released into the environment and lead to possible health issues due to large temperature differences in saunas.

The use of biocides/preservatives in wood treatment embodies a fundamental conflict of objectives that must be carefully balanced. On one hand, extending the service life of wood through biocidal treatment enhances sustainability by reducing the need for resource-intensive replacements and minimising waste. On the other hand, the use of chemical treatments introduces potential risks to human health and the environment, which require diligent management. Achieving this balance involves weighing the long-term benefits of durability and reduced environmental impact against the necessity of mitigating chemical risks.

The environmental and health risks associated with wood preservatives are evaluated by the EU Biocidal Products Regulation (BPR)[1] and REACH. At the same time, the EU Taxonomy Regulations encourage the phase-out of hazardous chemicals. The range of hazardous chemicals to be avoided is very broad and includes not only established “substances of very high concern” (SVHC) but also SVHC candidates and a large number of substances falling within a variety of CLP Classification categories, including preservatives used in wood treatment.

The use of biocides/preservatives in wood treatment are very complex and it's very difficult to designate certain assessed biocides and usage quantities in relation to the overall environmental and health performance (lack of potential). Even though the environmental and toxic impact on humans and animals has been investigated within the BPR (PT8) approval of biocides, leaching from preservative treated wood products still occurs[2],[3] (variation in results in different studies).

Since alternative wood technologies that provide wood with long biological durability exist on the marked, Nordic Ecolabelling has decided (from a precautionary principle) to maintain current requirements for a ban on the use of biocides/BPR PT8 approved biocides in generation 3 of the criteria.

New requirement for surface treatment of durable wood if the paint/varnish is Nordic Swan- or EU Ecolabelled has been introduced in generation 3 of the criteria. Ecolabelled paint or vanish complies with strict requirements for ingoing substances classified as CMR and environmentally hazardous. Pressure impregnated fire resistance treated durable wood can also be Ecolabelled provided compliance with the chemical requirements. Biological durable wood must meet the obligate durability requirements (tests) without the use of any surface treatment or pressure impregnation with fire-retardant chemicals. Wood impregnated solely for fire resistance purposes, and not biological durability, cannot be Ecolabelled.

2 Requirements and justification of these

This section presents requirements, and explains the background to the requirements, the chosen requirement levels, and any changes since generation 2. The appendices referred to in the requirements can be found at the end of the criteria document.

2.1 Description of the product

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

[1] https://health.ec.europa.eu/biocides/regulation_en
[2] Morsing et. Al, 2010.: "Comparison of laboratory and semi-field tests for the estimation of leaching rates from treated wood - part 1: above ground (UC 3). IRG/WP 10-50274
[3] Rapport U 6481 - Förstudie – kopparurlakning från impregnerat virke jämfört med övriga kopparflöden i Sverige. IVL Svenska Miljöinstitutet 2021

Background to requirement O1 Description of the product

The requirement has been adjusted compared to generation 2. The purpose of this requirement is to give a general understanding of the product, its intended use and how it is marketed in accordance with the Construction Products Regulation (EU/2024/3110)[4]. This includes chemicals (formerly a separate requirement in generation 2) and production processes that are used. Products not covered by the Construction Product Regulation must document corresponding technical information e.g. data sheet describing intended use and relevant performance properties. The information is important in obtaining a good overview and ensuring efficient evaluation of applications. A description of any suppliers is also important in achieving a true and complete picture.

2.2 Wood raw materials

Background to requirement O2 Prohibited and restricted tree species

Several tree species are restricted or not permitted for use in Nordic Swan Ecolabel products. Many of the restricted tree species are grown in countries which still have large areas of Intact Forest Landscape (IFLs). These are important to protect due to biodiversity and climate. A lot of these countries also have a high risk of corruption, and the national legislation related to environment, human rights and ownership to land are weak and/or not controlled by the authorities. Applying a precautionary approach, the use of listed restricted tree species must comply with strict requirements on origin, traceability and certification.

The list of prohibited species contains species on the CITES list while the list of restricted species contains species on the IUCN red list (categorized as critically endangered (CR), endangered (EM) and vulnerable (VU)), Rainforest Foundation Norway list and Siberian Larch (originated outside the EU). Restricted species can be used in Nordic Swan Ecolabelled products if certain strict conditions on origin, certification and traceability are met.

The requirement only applies to virgin wood and not wood defined as recycled material in accordance with ISO 14021. For more information about Nordic Swan Ecolabelling's approach on forest[5].

Background to requirement O3 Traceability and certification

The requirement has been tightened, and it is now required that the manufacturer of the Nordic Swan Ecolabelled product must hold Chain of Custody certification. The certified share has increased to 70%, while the remainder must be covered by the CoC system and be controlled wood/from controlled sources.

Nordic Ecolabelling's requirements concerning raw materials based on wood, bamboo or cork focus on sustainable forestry and traceability of raw materials.

The many benefits that sustainably managed forests deliver to society include wood for materials and energy, protection against global warming, homes and livelihoods for local

[4] https://eur-lex.europa.eu/eli/reg/2024/3110/oj/eng (visited March 2025)
[5] https://www.nordic-swan-ecolabel.org/pulp-paper-declaration-portal/what-can-be-declared/forestry-requirements/

communities and indigenous peoples, support of biodiversity and protection of water and soil from pollution and erosion. By setting a requirement that wood raw material must originate from certified, sustainable managed forests, Nordic Ecolabelling is supporting the move towards more sustainable forestry practices.

Nordic Ecolabelling requires a declaration of the species of wood contained in the Nordic Swan Ecolabelled product. This makes it possible to check the validity of Chain of Custody certificates in the supply chain. The requirement for CoC certification improves the traceability of materials in the supply chain within the guidelines and control systems of the FSC and PEFC. The company's CoC certification proves how certified wood is kept separate from other wood during production, administration and storage and is inspected annually by independent certification bodies.

The manufacturer of the product must be CoC certified, and there is a requirement that certified raw material must be assigned/allocated to the Nordic Swan Ecolabelled product in the accounts for certified/non-certified material. This ensures that FSC/PEFC credits are used for the Nordic Swan Ecolabelled production and that the credits are "used up" and not sold twice. This will stimulate increased demand for certified wood raw materials because more certified wood raw materials must be purchased if the manufacturer wants to label other products, and not just the Nordic Swan Ecolabelled products, with the FSC/PEFC logo. This also means that it is possible to label the finished product with the FSC/PEFC logo and that a Nordic Swan Ecolabelled product can carry both the Nordic Swan Ecolabel logo and the FSC/PEFC logo. It should be noted that Nordic Ecolabelling approves both the percentage system and the credit system for accounting and sale of certified material.

2.3 Chemical requirements

What do the chemical requirements cover?

The chemical requirements cover all chemical products used for modification, surface treatment or other treatment of the wood. The requirements apply to the chemicals used by the manufacturer and those used by any supplier.

Definitions

The requirements in the criteria document apply to all ingoing substances in the chemical product. Impurities are not regarded as ingoing substances and are therefore exempt from the requirements. Ingoing substances and impurities are defined below unless stated otherwise.

- Ingoing substances: All substances in the 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.
- Impurities: Residues from production, incl. raw material production, which remain in the chemical product at concentrations below 1000 ppm (0.1000% by weight).

Examples of impurities are reagent residue incl. residues of monomers, catalysts, by-products, "scavengers" (i.e., chemicals used to eliminate/minimise undesirable substances), cleaning agents for production equipment and "carry-over" from other/previous production lines.

Background to requirement O4 Ecolabelled products - surface treatment

A new proposed requirement for surface treatment of durable wood has been introduced in generation 3. If the wood is surface treated, the paint or varnish must be either Nordic Swan Ecolabelled or EU Ecolabelled. Ecolabelled paint or vanish complies with strict requirements for ingoing substances classified as CMR and environmentally hazardous. Moreover, Ecolabelled paint and varnish meet strict quality requirements to promote long-lasting, durable, and efficient paints and varnishes, which therefore leads to automatic compliance (if used) with all requirements in section 5.4.

The application process for any surface treatment must be industrial (no manual application of products) to optimize paint quantities, application and quality of the application.

Background to O5 Classification of chemical products

The requirement has been adjusted to also include the classifications Toxic to the environment (Ozone) H420). The adjustment reflects Nordic Swan Ecolabelling's general requirement for the classification of chemical products. Nordic Ecolabelling is generally committed to restricting the use of chemicals that are harmful to health and the environment, and the classification requirement prohibits the products of the highest concern.

Exemptions are given for the following reasons:

- Furfuryl alcohol is used in the chemical modification method of furfurylation, where furfuryl alcohol is polymerised during hardening after penetration of the wood. Since the furfuryl alcohol is polymerized to a solid, insoluble polymer, there is a very low risk of leakage to the environment and tests have shown that leachate from furfurylated wood is non-toxic[6]. The exemption only applies if the requirements O11 and O12 are fulfilled.
- Maleic acid anhydride is used in a process where it is mixed with water, reacts and forms maleic acid which has no classification in conflict with the criteria.
- Acetic acid anhydride is an essential reagent used for acetylation. The exemption only applies if the requirements O11 and O12 are fulfilled.

Background to requirement O6 Classification of ingoing substances

The Nordic Swan Ecolabel has included the new CLP classifications to align with the European Green Deal's goal of a toxic-free environment. The requirement regarding the use of substances that are carcinogenic, mutagenic and toxic for reproduction (CRM) are identical to generation 2.

This inclusion of new classifications reflects the need to establish hazard identification for endocrine disruptors and addresses criteria for environmental toxicity, persistency, mobility, and bioaccumulation. By incorporating these classifications, Nordic Swan Ecolabel ensures that the criteria relate to up-to-date scientific understanding and regulatory compliance. Additionally, the inclusion of PMT and vPvM substances is crucial due to their persistence, mobility, and potential impact on water quality. The Nordic Swan Ecolabel aims for comprehensive hazard identification and protection of the environment and human health.

[6] https://woodpreservation.ca/wp-content/uploads/2021/09/schneider28.pdf

An exemption is made for furfuryl alcohol (CAS 98-00-0) classified Carc 2, H351. The exemption only applies if the requirements concerning workplace limits (O11) and chemical residues in the product (O12) are fulfilled.

Background to requirement O7 Prohibited substances

The requirement has been stringent compared to generation 2. The following prohibited substances have been added to the requirement: Per- and polyfluoroalkyl substances (PFASs), butylhydroxytoluene (BHT, CAS No. 128-37-0), aziridine and polyazidirines, phthalates, bisphenols and bisphenol derivatives. The requirement concerning endocrine disruptors now also includes substances on list III.

Candidate List Substances and PBT, vPvB

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

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

SVHC may be included on the Candidate List with a view to later inclusion on the Authorisation List. This means that the substance becomes regulated (ban, phasing out or some other form of restriction). Nordic Ecolabelling prohibits Candidate List substances due to their hazardous properties. Other SVHC substances are addressed via bans on the use of PBT and vPvB substances, the classification requirements, and a ban on endocrine disruptors.

PBT (and vPvB substances) are substances defined in Annex XIII of REACH, which are generally undesirable in Nordic Swan Ecolabelled products.

Endocrine disruptors:

Potential endocrine disruptors are substances that can negatively affect the hormonal balance in humans and animals. Hormones control a number of vital processes in the body and are particularly important for the development and growth in humans, animals and plants.

Changes in the hormone balance can have adverse effects, with a particular focus on hormones that affect sexual development and reproduction. Several studies have shown effects on animals that are probably due to changes in the hormone balance. Effluent discharges are one of the major sources of the presence and distribution of endocrine disruptors in aquatic ecosystems[7]. Nordic Ecolabelling excludes identified and potential endocrine disruptors listed on the “Endocrine Disruptor Lists” at www.edlists.org, which is based on the EU member state initiative. Substances listed in Lists I, II and/or III are excluded.

Licensees are responsible for keeping track of updates to the lists so that their Nordic Swan Ecolabelled products fulfil the requirement throughout the entire validity period of the licence. Nordic Ecolabelling recognises the challenges associated with new substances that are added to Lists II and III. We will evaluate the circumstances and possibly decide on a transition period from case to case.

The requirement applies to substances on the main lists (Lists I, II and III) and not to the corresponding sub-lists called “Substances no longer on list”. Substances that are transferred to one of the sub-lists and that no longer feature on Lists I–III are not prohibited. However, special attention is paid to the substances on List II that have been evaluated under the Cosmetics Regulation, for example, where there are no specific provisions to identify endocrine disruptors. It is still unclear how these substances will be handled at www.edlists.org after the evaluation (safety assessment of the substances included in cosmetics, for example) has been completed. Nordic Ecolabelling will assess the circumstances for the substances on Sub-List II on a case-by-case basis, based on the background information provided in the sub-list. By excluding both identified and prioritised potential endocrine disruptors that are under evaluation, Nordic Ecolabelling ensures a restrictive approach towards endocrine disruptors.

Halogenated organic compounds

Halogenated organic compounds that contain halogens such as chlorine, bromine, fluorine, or iodine must not be present in the chemical products used. This includes halogenated flame retardants, chloroparaffins, perfluoroalkyl compounds and certain organic bleaching chemicals. Halogenated organic compounds have various properties that are not desirable in Nordic Swan Ecolabelled products. They are harmful to human health and the environment, highly toxic to aquatic organisms, carcinogenic or harmful to health in other ways. The halogenated organic compounds do not break down readily in the environment, which increases the risk of harmful effects from the substances. Exemptions applies to preservatives/biocides in O9 (however, not PFASs).

Per- and polyfluoroalkylsubstances (PFASs), e.g., PFOA and PFOS

Fluorosurfactants and other per- and polyfluoroalkyl substances (PFASs) constitute a group of substances that have harmful properties. Certain per- and polyfluorinated compounds can degrade to the very stable PFOS (perfluorooctane sulphonate) and PFOA (perfluorooctanoic acid) and similar substances. These substances are extremely persistent and are easily absorbed by the body[8]. The substances are found all over the globe, from the large oceans to the Arctic. PFOS have also been found in birds and fish and in their eggs. The substances

[7] Miljøstatus i Norge (2008) (Environmental status in Norway): Endocrine disruptors. http://www.miljostatus.no/Tema/Kjemikalier/Noen-farlige-kjemikalier/Hormonforstyrrende-stoffer/#D (dated 26 February 2009).

[8] Borg, D., Tissue Distribution Studies And Risk Assessment Of Perfluoroalkylated And Polyfluoroalkylated Substances (PFASS), Doctoral Thesis, Institute Of Environmental Medicine (IMM) Karolinska Institute, Stockholm, Sweden 2013 http://publications.ki.se/xmlui/bitstream/handle/10616/41507/Thesis_Daniel_Borg.pdf?sequence=1

in this group impact on the biological processes of the body and are suspected to be endocrine disruptors, carcinogenic and to have a negative impact on the human immune system[9]. PFOA, APFO (ammonium pentadecene fluoro octanoate) and certain fluoride acids are on the Candidate List due to their reprotoxicity, as well as PBT. There are new research results showing that shorter chains (2-6 carbon atoms) have been discovered in nature[10].

BHT

Butylhydroxytoluene (BHT, CAS No. 128-37-0) is new to the list of prohibited substances. BHT does not have an official harmonized classification. BHT is included in the EU member state initiative “Endocrine Disruptor Lists”, List II Substances under evaluation for endocrine disruption under EU legislation. Nordic Ecolabelling introduces an exemption for UV curing chemical products. BHT has an important function in such products and can be difficult to replace. Nordic Ecolabelling does not want to prohibit the use of UV curing chemical products as they have other positive properties such as low VOC content. If BHT receives a harmonized official classification that is not allowed in these criteria, then the exemption is no longer valid.

Alkylphenols, alkylphenol ethoxylates and/or alkylphenol derivates

Alkylphenol ethoxylates (APEO) and/or alkylphenol derivatives (APD) are a group of non-readily degradable surfactants that are proven endocrine disruptors. APEOs may be present in binders, dispersing and thickening agents, siccatives, foam inhibitors, pigment pastes, wax, etc. Alternatives to APEOs are available based on alkyl sulphates, alkyl ether sulphates and alcohol ethoxylates. These are readily biodegradable but also have harmful properties, being toxic to aquatic organisms and some may be bioaccumulative. However, there is an environmental gain to be made by substitution since they break down rapidly and the degradation product nonylphenol, with its endocrine-disrupting effects, is avoided.

Bisphenols and bisphenols derivatives

Several bisphenols with the general bisphenol structure and 'bisphenol derivatives' which have constituents with structural properties common to bisphenols are now prohibited. Based on the potential for widespread use and available information on potential endocrine disruptors, reproductive toxicity and PBT/vPvB properties, 34 substances[11] were identified in need for further regulatory risk management in EU[12].

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[9] Heilmann, C. et al, Persistente fluorbindelser reducerer immunfunktionen, Ugeskr Læger 177/7, 30.3.2015 OSPAR 2005: Hazardous Substances Series, Perfluorooctane Sulphonate (PFOS), OSPAR Commission, 2005 (2006 Update), MST, 2005b: Miljøprojekt nr. 1013, 2005, More Environmentally Friendly Alternatives to PFOS-compounds and PFOA, Danish Environmental Protection Agency, 2005.
10 Perkola, Noora, Fate of artificial sweeteners and perfluoroalkyl acids in aquatic environment, Doctoral dissertation Department of Environmental Sciences, Faculty of Biological and Environmental Sciences, University of Helsinki, Finland 12.12.2014, https://helda.helsinki.fi/bitstream/handle/10138/136494/fateofar.pdf?sequence=1

[11] Assessment of regulatory needs: Bisphenols. ECHA – 16 December 2021: Section 2.1: Bisphenols for which further EU RRM is proposed – restriction https://echa.europa.eu/documents/10162/c2a8b29d-0e2d-7df8-dac1-2433e2477b02
[12] 2] Annex XV restriction report https://echa.europa.eu/documents/10162/450ca46b-493f-fd0c-afec-c3aea39de487

Phthlalates

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

For precautionary reasons, Nordic Ecolabelling has decided to continue to exclude phthalates as a group.

Aziridines and polyazidirines

Aziridine and polyaziridines are classified as H350 (carcinogenic) and H340 (mutagenic) and are thus included in the ban on CMR substances. However, they are on the list of prohibited substances to make it clear that they are prohibited. The substances were also not on the list for generation 2 of the criteria.

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

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

Background to requirement O8 Nanomaterials

The requirement has been updated according to Nordic Swan Ecolabelling's general requirement for nanomaterials. Due to the small size and large surface area of nanoparticles, they are usually more reactive and may have different properties than larger particles of the same material. There is concern among public authorities, researchers, environmental organisations, and others about the lack of knowledge regarding the potentially harmful effects on health and the environment[13],[14],[15],[16],[17],[18]. Coatings and other modifications may also alter the properties. Nordic Ecolabelling takes the concerns about nanomaterials seriously and uses the precautionary principle to rule out nanomaterials/particles in the products. Nanomaterials/-particles are defined according to the EU Commission Recommendation on the Definition of Nanomaterial (2022/C 229/01)[19].

Most nanomaterials on the market today have either been in use for decades or have recently been manipulated into nanoforms of existing materials[20]. For example, carbon black nanoparticles and amorphous silicon dioxide (SiO2) have been used in previous centuries. Titanium dioxide (TiO2) has long been used as a dye in bulk form but is now manufactured as a nanomaterial for other purposes[21]. Other types of engineered nanomaterials are expected to enter the market in the future[22].

In the biological durable wood product group, nanomaterials are used, among other things, to impregnate, in order to create hydrophobic, self-cleaning, and antibacterial surfaces. These effects may, for example, come from the addition of nanometals such as silver, gold and copper or titanium dioxide. The requirement has the following exemptions:

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

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

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

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

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

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

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

[19] https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32022H0614(01)&from=EN

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

[21] European Commission, COMMISSION STAFF WORKING PAPER, Types and uses of nanomaterials, including safety aspects, Accompanying the [..] second regulatory review of nanomaterials, SWD(2012) 288 final

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

Pigments

Pigments are finely ground, insoluble particles that are used to give the products a certain colour. There are no substitutes that can perform the function of pigments such as paint dyes, inks, fabric dyes, masterbatch, etc. and many pigments consist entirely or partially of nanoparticles. Therefore, nano size pigments are exempted. Although clear conclusions on the safety of nano pigments cannot be drawn[23], release by decomposition of facades is very limited and the nanoparticles are probably mainly embedded in the paint matrix rather than released as individual nanoparticles[24],[25]. Paint pigments consist of particles of individual crystals up to aggregates of several crystals. It is generally more effective to use pigments with smaller particles than larger to get the same colour. Inorganic pigments used in the paint industry, which can occur in nano size, include carbon black, and iron oxides[26]. Carbon black used in paints is very finely ground and has a particle size of approximately 10–30 nm[27]. Iron oxide pigments can include only nano size particles, or only a fraction of the particles may be nano. Inorganic nano pigments are also added to products for a number of purposes other than colouring. Nano-titanium dioxide, for example, is used to provide a self-cleaning effect in paint.

Naturally occurring inorganic fillers

Traditional fillers are permitted. Naturally occurring fillers, e.g., from chalk, marble, dolomite, and limestone, are exempted from registration in accordance with Annex V, point 7 of REACH, if these fillers are only physically processed (ground, sieved and so on) and not chemically modified. An exemption for inorganic fillers has been added if they are covered by Annex V, point 7 of REACH.

Synthetic amorphous silicon dioxide

Synthetic amorphous silica (SAS) is a manufactured silica (SiO2) that has been used in industrial, consumer and pharmaceutical products for decades[28]. Silica plays an important role in coating formulations; this is true for non-surface treated types as well as surface modified types.

The surface-treated and non-surface-treated forms are expected to have the same (eco)toxicological profile because the influence of surface treatment on dissolution rate and solubility which was demonstrated in various in vitro experiments has not resulted in biologically relevant differences in bioavailability and toxicokinetic nor were there significant differences in (eco)toxicological outcomes of representative materials tested in key in vivo studies. None of the recent available data for surface-treated and non-surface-treated SAS

[23] Hynes J, Novotný T, Nic M, Kocurkova L, Prichystalová R, Brzicová T, Bernatikova S (2018) Literature study on the uses and risks of nanomaterials as pigments in the European Union. European Chemicals Agency.
[24] Mackevica A, Hansen, SF (2016) Release of nanomaterials from solid nanocomposites and consumer exposure assessment – a forward-looking review. Nanotoxicology, 10(6), 641–653. https://doi.org/10.3109/17435390.2015.1132346
[25] Nowack B, Hincapié I, Sarret G, Larue C, Legros S (2013) Environmental fate of nanoparticles from façade coatings. NanoHouse Dissemination report Nº 2013-03. https:// DOI: 10.13140/2.1.2206.3040
[26] Industrial Organic Pigments; W. Herbst, K. Hunger; Third edition 2004; pp. 120–124
[27] Coatings Handbook; Thomas Brock, Michael Groteklaes, Peter Mischke; 2000; p. 128
[28] https://www.asasp.eu/images/Publications/Nano_-_SAS_factsheet_-_201209.pdf

gives any evidence for a mechanism of systemic toxicity that may raise concerns regarding human health or environmental risks[29].

The synthetic amorphous silica can be manufactured in two ways. One way is the precipitation to receive a precipitated silica, and the other way is the fumed synthesis to receive a pyrogenic silica. Since the definitions of “colloidal may be ambiguous and the substance used is pyrogenic silica, exemption has been edited and is granted only to surface-treated pyrogenic silica.

Background to requirement O9 Biocides

The use of biocides/preservatives in wood treatment is very complex and it's very difficult to designate certain assessed biocides and usage quantities in relation to the overall environmental and health performance (lack of potential). Even though the environmental and toxic impact on humans and animals has been investigated within the BPR (PT8) approval of biocides, leaching from preservative treated wood products still occurs[30],[31] (variation in results in different studies).

Since alternative wood technologies that provide wood with long biological durability exist on the marketed, Nordic Ecolabelling has decided (from a precautionary principle) to maintain current requirements for a ban on the use of biocides/BPR PT8 approved biocides in generation 3 of the criteria.

Preservatives used for in-can preservation compliant with PT 6 (in-can) according to Regulation (EU)528/2012 (The Biocidal Products Regulation) can as in generation 2 still be used in small amounts (see table in requirement) in chemical products.

Background to requirement O10 Volatile organic compounds

The limits requirement is slightly stricter compared to the previous generation (from 5% to 3%). Volatile organic compounds (VOC), including VAH, are of particular concern due to their inherent properties. They can be absorbed through the lungs and skin and cause damage to various organs. Prolonged exposure to certain organic solvents can cause chronic damage to the brain and nervous system, while other organic solvents can cause cancer or reproductive damage. Nordic Ecolabelling therefore limits VOC levels in chemical products.

The capacity for solvents to dissolve other substances and their volatility make them extremely useful, but they can also be highly harmful to health and can create health issues in the workplace. Solvents that evaporate pollute the air that is inhaled and are then carried onward from the lungs and the blood. They can cause dizziness, headaches and lasting damage to the nervous system.

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[29] https://echa.europa.eu/de/registration-dossier/-/registered-dossier/15556
[30] Morsing et. Al, 2010.: "Comparison of laboratory and semi-field tests for the estimation of leaching rates from treated wood - part 1: above ground (UC 3). IRG/WP 10-50274
[31] Rapport U 6481 - Förstudie – kopparurlakning från impregnerat virke jämfört med övriga kopparflöden i Sverige. IVL Svenska Miljöinstitutet 2021

Background to requirement O11 Occupational exposure limit

The requirement has been rewritten in generation 3, but the content is unchanged. It is still considered an appropriate level and has not been tightened during this revision.

Furfuryl alcohol, classified as Carc 2 H351, may be used on condition that the production fulfils this requirement (O11) concerning workplace limits and the requirement on chemical residues in the product (see O12 below). The workplace limit is set at 1 ppm in the workplace atmosphere during the production of Nordic Swan Ecolabelled durable wood. This is half the limit value in Finland, which is the strictest in the Nordic region. The limit value states the highest acceptable limit value over an eight-hour shift and may be exceeded by a maximum of 200% for periods of 15 minutes, which is partly based on the Norwegian authority's acceptable exceedances.

There is a limit value of 0.6 ppm for acetic acid anhydride based on the exemption from the classification H330 in requirement O4. The limit value has been added to this requirement to secure a safe working environment or workplace condition while using the chemical product. It is assessed that risks associated with the classification H330 (Fatal if inhaled) is a working environment aspect. This must be handled by the manufacturers via regulatory requirements handling hazardous substances. The limit value of 0.6 ppm in this requirement is set 8 times lower than the Norwegian occupational exposure limit value which is 5 ppm[32].

Background to requirement O12 Chemical residues in the final product

The requirement has been rewritten in generation 3, but the content is unchanged. It is still considered an appropriate level and has not been tightened during this revision.

The finished modified wood may contain a maximum of 0.2% furfuryl alcohol by weight. The moisture level in the finished wood (pre-dried) must be considered during the calculations of the chemical residue. The requirement intends that residues of a substance classified as Carc 2 H351 will not leach out during the use of the modified wood, or that they will leach out in such small quantities that they do not constitute a risk to health or the environment. A previous leaching test has shown that moisture from brand-new furfurylated wood is more toxic to algae and crustaceans than untreated wood, but that moisture from wood that was furfurylated one year earlier showed no difference compared with untreated wood[33]. It could not be ruled out that the toxicity was due to the low pH of the moisture that leached out.

Furfuryl alcohol is readily soluble in water, and according to the industry organisation's datasheet, it is assumed to be readily degradable in water, and not bioaccumulative[34]. Bioaccumulative potential is measured as log(oil/water) = 0.28. The degradation products are less toxic than the furfuryl alcohol itself.

There is also a limit of 0.1% by weight of acetic acid anhydride in the final product due to the exemption for classification H330 in O4. When using acetic anhydride in the acetylation

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[32] Guidance on Administrative norms for pollution of the working atmosphere, Directorate of Labour Inspection (Norway) 15th Edition, December 2011.

[33] Plesser, Thale Sofie Wester et al., Miljøanalyse av trefasader, SINTEF Byggforsk, ISBN 978-82-536-1339-0, 2013

[34] ATP to the CLP Regulation (the EU's new regulation on the classification of chemicals). Amendment to EU Directive 67/548/EEC of 15 January 2009 (2009/2/EC). Available at: http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2009:011:0006:0082:EN:PDF (25 January 2009)

process acetic acid is formed as a by-product. When the reaction/acetylation is complete, the acetic acid anhydride and the acetic acid are extracted from the wood product[35]. Although an extraction is carried out in the process, a limit value for the eventual residual content of acetic anhydride in the final product is required. The limit value is set to <0.1% by weight as acetic acid anhydride is exempted from the hazard statement of H330 in requirement O4.

2.4 Quality and durability

Background to requirement O13 Biological durability performance

This requirement has been revised. The requirement aims to ensure that products have a documented good durability performance in accordance with its intended use e.g., façade cladding or terrace decking, as well as overall harmonization with requirements in other Nordic Swan ecolabel criteria.

One of the greatest challenges in developing alternative products to conventionally impregnated wood has been achieving sufficient durability. Therefore, wood in use classes 3, 4 and 5 need to be tested in both laboratories and field/marine tests.

The largest volume of wood on the current market is used in UC 3.2 according to EN 335 and as described in the requirement, i.e., parts that remain wet for long periods or where water can accumulate. It is therefore in this segment that the greatest environmental gains can be made by switching from traditionally impregnated wood to alternative wood products with similar documented good durability performance.

Chemically modified wood has the highest durability and can be used both above ground and in contact with the ground. Thermal treatment of wood changes the construction properties. Durability is a very important factor in assessing the environmental impact of wood protection treatment methods as these are closely linked to the lifespan of the products and are thus important factors in the life cycle assessment.

NTR's system for modified wood (thermal and chemical) is like its system for wood treated with chemical wood preservatives. Here, the wood protection classes are NTR Mmod, NTR Amod, NTR ABmod and NTR Bmod, in line with the use classes defined in EN 335. Since 2017, it has been possible to produce thermally or chemically modified wood according to the NTR standard. It is also possible to test the wood in line with established EN standards for the appropriate user class as described in the requirement.

Natural and thermally modified wood intended/marketed for only indoor use (use class 1 and 2) in saunas is exempted from this requirement. Timber decay by wood destroying fungi is not relevant for wood indented for use in saunas.

Background to requirement O14 Documentation of fire classification

This is a new requirement aimed at confirming the durability of fire-retardants, ensuring that the fire class withholds over time. Customers who purchase Nordic Swan Ecolabelled

[35] Consultation comment from Accsys Technologies (2014)

products can be assured of their safety for many years. This only applies if efforts are made to enhance the product's fire resistance properties through pressure impregnation.

At the time of criteria development, the standard EN 16755 is under revision as the industry does not find today's version of the standard adequate. Their recommendation has been to solely refer to the new standard, expected in 2024-2026, as the existing version has multiple flaws in the described testing method. When the new standard is published, Nordic Ecolabelling will require a test according to this standard within a specified timeframe. It has not been relevant to include the standard during the revision as that will imply a requirement for two tests, which is not deemed cost effective.

The criteria only allow superficial treatment if the product applied is Ecolabelled. In the current criteria of 096, Paints and varnishes, it is not possible to Nordic Swan Ecolabel a paint whose properties is a fire retardant. It is not expected that this will be included in the next version, and therefore not included as an alternative in these criteria. If there is an Ecolabelled surface treatment on the product, the durability of the fire-retardant properties must not be tested. The durability of these properties will rely heavily on the maintenance of the product.

2.5 Energy and climate

This chapter contains requirements for the energy consumption in the production of biological durable wood.

The energy consumption is calculated as MJ/m^3 product produced (final product), and encompasses all energy used from gate to gate (phase A3 in EPDs) at the production site. Energy use for any pre-drying of wood or transport before the production (chemical/thermal modification process) is not part of the requirement. Processes included in the calculation: wood modification process, drying, cooling, cutting, trimming, sanding, surface treatment and packaging.

The requirements must be documented in the form of energy consumed (actual energy used in production) without the use of primary energy factors.

The requirement may be documented either just for the specific production of the Nordic Swan Ecolabelled durable wood (production line) or for the company’s total annual production at the production site.

Background to requirement O15 Energy consumption – production of durable

The requirement has been changed from a requirement for information on energy use/consumption in generation 2 to a new requirement for absolute energy consumption in generation 3.

The MECO analysis and the various life cycle analyses of durable wood show that energy consumption in the raw material and production phases often accounts for a substantial amount of the product's environmental impact[36],[37],[38]. The process of both chemical- and thermal wood modification requires high temperature/steam/pressure and the relevance for reducing energy consumption is therefore high. Energy savings have an important role to play in reducing environmental impact and thus also global warming and climate change.

Production of modified wood is characterized by a need for energy for both the preliminary drying of wood and the modification process itself. The process of preliminary drying of wood constitutes a large proportion of the total energy consumption (e.g., up to 50% in the production of thermo modified wood[39]) and is often carried out by subcontractors. Due to the limited steerability to influence the energy consumption by subcontractors, the energy requirement only applies to the actual production of durable wood. The energy consumption is calculated as MJ/m^3 product produced and encompasses all energy used from gate to gate (phase A3 in EPDs) at the production site.

There is a general difference between energy consumption in the various technologies to produce modified wood. Chemical modification (acetylated and furfurylated wood) appears to have a slightly higher energy use compared to thermal wood, which in turn is higher than the technology of both impregnation with supercritical CO_2 and pressure-treated wood. The energy consumption requirement has therefore been developed based on the wood's tested durability class, i.e. that wood in durability class 1 can use slightly more energy than wood in durability class 2. The proposed energy limits are based on data from licensees, EPDs, LCA-reports, The international Thermowood Association and dialogues with other stakeholders. Being a new requirement the intention behind the proposed limits is only to affect the very most energy-consuming production sites.

Background to requirement O16 Energy consumption – fossil fuels

This is a new requirement in generation 3. Burning fossil fuels like coal, oil and natural gas results in carbon dioxide emissions, which contributes to climate change as well as air and water pollution[40]. Excluding and/or limiting the use of fossil fuels supports EUs climate policy to achieve climate neutrality by 2050[41].

Dialogue and data received from licensees/manufacturers of modified wood show that natural gas is still a widely used energy source. A ban on the use of natural- and or LPG gas will have major consequences for the ability to produce Nordic Swan Ecolabelled durable wood. Manufacturers who use natural gas must therefore work actively with energy savings by either being certified according to ISO 50001, ISO 14001 (including extended energy review corresponding to part 6.3 of ISO 50001 upon recertification or audit according to EN 16247 within the last 3 years).

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[36] Candelier K. and Dibdiakova J.: A review on life cycle assessments of thermally modified wood, published online August 14, 2020 (https://doi.org/10.1515/hf-2020-0102

[37] Hill, C., Hughes, M., & Gudsell, D. (2021). Environmental Impact of Wood Modification. Coatings, 11(3), Article 366. https://doi.org/10.3390/coatings11030366

[38] www.thermowood.fi (visited March 2024)

[39] elier K. and Dibdiakova J.: A review on life cycle assessments of thermally modified wood, published online August 14, 2020 (https://doi.org/10.1515/hf-2020-0102

[40] https://www.greenpeace.org/usa/8-reasons-why-we-need-to-phase-out-the-fossil-fuel-industry/ (visited April 2024)

[41] https://www.consilium.europa.eu/en/press/press-releases/2023/10/16/cop28-council-sets-out-eu-position-for-un-climate-summit-in-dubai/

2.6 Customer information

Background to requirement O17 Product specification, instruction for use and maintenance

The requirement has been adjusted and expanded to also require instructions for installation, information regarding waste disposal and to encourage reuse. This requirement aims to ensure that the customers receive adequate information to ensure a prolonged lifetime of their product.

A long lifetime is dependent on instructions for installation, correct maintenance and reuse instead of disposal. Most of the wood used for outdoor use in the Nordic countries is today burned and used for recovering energy. According to the waste hierarchy, this is a low-grade use of the product. Material recovery of biological durable wood, being slightly higher on the hierarchy, varies some in the Nordic countries. The trend is that wood fibres are undesirable for producers utilising wood from the waste stream. Nordic Ecolabelling wants to encourage producers to have a clear recommended end-of-life treatment, and reuse should be prioritized as far as possible. Where reuse is not suitable, or possible, information regarding correct waste management is important to avoid that the biological durable wood is handled as hazardous waste.

As the producer does not have steerability regarding how customers install, maintain and treat products at their end-of-life, they should instead inform the customers and have a clear recommendation.

2.7 Licence maintenance

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

Background to requirement 018 Customer complaints

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

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

Background to requirement 019 Traceability

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

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

3 Environmental impact of biological durable wood

The relevant environmental impacts found in the life cycle of Nordic Swan Ecolabelled durable wood are set out in a MECO scheme, see below. A MECO describes the key areas that have an impact on the environment and health throughout the life cycle of the product – including consumption of materials/resources (M), energy (E), chemicals (C) and other impact areas (O).

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

RPS scheme

Lifecycle stages	Area and assessment of R, P, S (high, medium or low)	Comments
Raw materials		
	Resources - wood raw materials R: High P: High S: High	Wood raw materials used in durable wood has a high RPS. From a life cycle perspective, forestry is a key part of wood products' environmental impact, and it is also important that wood as a renewable raw material is grown / harvested and used in a sustainable way. Much of the world´s forest loss is driven by conversion of natural forest to other land uses such as cattle farming, palm oil and soy plantations. Deforestation and degradation from illegal and unsustainable logging, fires and fuelwood harvesting can harm wildlife, jeopardize people´s livelihoods and intensify climate change. Credible forest management certification contributes to a more sustainable wood / timber product industry by helping create market conditions that support forest conservation. Requirements for hight share of certified wood raw materials and certified traceability ensures more sustainable forestry.
Production/distribution		
	Chemicals used in manufacturing of modified wood R: High P: Medium/high S: High	Chemicals used in the manufacturing of panels and possible surface treatment contain many difference substances, such as heavy metal, preservatives, and fungicides, with many different harmful effects on the environment and health[42]. The potential for excluding the use of toxic substances and promote the use of less toxic chemicals in the process of

[42] Plesser, Thale Sofie Wester et al., Miljøanalyse av trefasader, SINTEF Byggforsk, ISBN 978-82-536-1339-0, 2013

		wood modification/producing durable wood with a low need for maintenance, is considered to be high. A leaching experiment from 2011 with Danish and Norwegian impregnated pine with Wolmanitt CX-8 showed that appr. 18% copper and boric acid was leached out[43]. Another study from 2010 estimated that between 8 to 15% copper and 30% boron was leached during a period of 20 years[44] (variation in results in different studies). Steerability in reducing the use of toxic chemicals is judged to be high in professional manufacturers of durable wood, which are also able to easily control work environment conditions at the factory. For wood where the end user must carry out much of the chemical application/ maintenance, steerability is lower.
	Energy – production of durable wood R: High P: Low/medium S: Medium/high	High/medium RPS has been identified in relation to energy impact for production of durable wood (drying- and modification of wood)[45], [46]. The process of both chemical- and thermal wood modification requires high tempeture/steam/pressure and relevance for reducing energy consumption is therefore high. Initial drying of wood before the wood modification process is also energy intensive. However, this produess is often carried out by subcontractors and the portential to influence this process is therefore reduced (low medium). Energy savings have an important role to play in reducing environmental impact and thus also global warming and climate change. All manufactures of durable wood are focusing on reducing their energy consumption and therefore the potential for introducing strict absolute energy requirements are medium. The steerability (S) to measure energy consumption is high.
Use phase		
	Optimal use and long durability of the durable wood R: High P: High S: High	High RPS for securing conformity between the properties (durability) and the function (Use class/field of application) for which the product is marketed. The durability/product lifetime of different products has a huge effect on the overall environmental impact[47], [48], [49], [50] of durable wood. Laboratory test for biological durability in relation to use class and field/marine test ensures that only wood with documented long durability can be Ecolabelled (steerability).
	Quality and properties R: High	High RPS for securing conformity between the properties and the functions for which the durable wood is marketed, and the

[43] Kängsepp, K. et al. 2011. Leaching of commonly used impregneation agents affected by wood properties.
[44] Morsing et. Al, 2010.: "Comparison of laboratory and semi-field tests for the estimation of leaching rates from treated wood - part 1: above ground (UC 3). IRG/WP 10-50274.
[45] Candelier K. and Dibdiakova J.: A review on life cycle assessments of thermally modified wood, published online August 14, 2020 (https://doi.org/10.1515/hf-2020-0102
[46] Hill, C., Hughes, M., & Gudsell, D. (2021). Environmental Impact of Wood Modification. Coatings, 11(3), Article 366. https://doi.org/10.3390/coatings11030366
[47] Larsson Brelid P.: Benchmarking and State of the Art for modified wood, SP Technical Research Institute of Sweden, SP report 2013:54 ISSN 0284-5172
[48] Candelier K. and Dibdiakova J.: A review on life cycle assessments of thermally modified wood, published online August 14, 2020 (https://doi.org/10.1515/hf-2020-0102)
[49] Erlandsson M. et al (2018).: LCA on NTR treated wood decking and other decking materials, Report nr. 715202 IVL report C302.
[50] Hill, C., Hughes, M., & Gudsell, D. (2021). Environmental Impact of Wood Modification. Coatings, 11(3), Article 366. https://doi.org/10.3390/coatings11030366

	P: High S: High	performance declarations drawn up in relation to the CE marking.
End of life		
	Service life R: High P: High S: High	RPS=high Short service life for wood designed for exterior use has a huge environmental impact. Strict requirements for documented durability in relation to intended use ensures that only wood with documented long durability can be Ecolabelled See above under use phase.
	Disposal/waste R: High P: High S: Low/Medium	Relevance and potential to ensure that disposed durable wood either be re-used or used for energy recovery instead of landfill. However, disposal of wood/wood waste presents challenges (steerability) due to difficulty in identifying specific wood products at the waste collection centres[51],[52]. Relevant to inform customers how the product should be handled in the end-of-life situation. Incineration of copper impregnated wood does not remove heavy metals, and the ash therefore still constitutes a potential environmental problem[53].

MECO scheme

A qualitative MECO analysis is presented in the table and text below. The purpose of the analysis is to show where in the life cycle the environmental impact occurs for different types of durable wood (technologies)and to assess whether there is any potential to reduce that environmental impact. The analysis is general and shows some of the most common processes used. The data presented in the MECO analysis is based on LCA studies, EPD's, production data from stakeholders and industry associations.

There are a wide range of products on the market with different intended use and degrees of durability. These products can be used for construction applications such as cladding, decking as well as posts or cladding in contact with ground or salt water. Products can also be used in outdoor furniture's, playgrounds and other part equipment. The overall environmental impact[54], [55], [56],[57] for all types of durable wood is related to:

- Resources/use of raw materials
- Energy consumption in the production of durable wood. Energy savings have an important role to play in reducing global warming and climate change,

[51] https://mst.dk/erhverv/groen-produktion-og-affald/affald-og-genanvendelse/affaldshaandtering/affaldsfraktioner/impraegneret-trae (visited March 2014)
[52] Norwegian Environment Agency: www.miljodirektoratet.no
[53] Livcycklusvurering af bahandling af imprægneret træaffald, Miljøstyrelsen, miljøprojekt nr. 1938, maj 2017
[54] Larsson Brelid P.: Benchmarking and State of the Art for modified wood, SP Technical Research Institute of Sweden, SP report 2013:54 ISSN 0284-5172
[55] Candelier K. and Dibdiakova J.: A review on life cycle assessments of thermally modified wood, published online August 14, 2020 (https://doi.org/10.1515/hf-2020-0102)
[56] Erlandsson M. et al (2018).: LCA on NTR treated wood decking and other decking materials, Report nr. 715202 IVL report C302.
[57] Hill, C., Hughes, M., & Gudsell, D. (2021). Environmental Impact of Wood Modification. Coatings, 11(3), Article 366. https://doi.org/10.3390/coatings11030366

- Use of chemicals in the production of durable wood such as biocides/preservatives and surface treatment
- Quality - intended use in relation to duration of its service life
- End of life

When assessing the environmental impact of durable wood, area of intended use and durability performance are important factors, since they are linked to the lifetime of the products. The environmental factors should be seen against this background.

Resources/use of raw materials

In the raw material phase, the environmental impact relates primarily to forestry and the processes of harvesting, debarking and processing the wood at the sawmill (including drying). In addition to this, there is the issue of transport for all materials.

A forest provides many ecosystem services such as timber, food, fuel, attractive recreational opportunities as well as carbon storage, maintenance of biodiversity, wildlife habitats, water and air purification and also daily necessities for local communities and indigenous peoples.

Much of the world´s forest loss is driven by conversion of natural forest to other land uses such as cattle farming, palm oil and soy plantations. Deforestation and degradation from illegal and unsustainable logging, fires and fuelwood harvesting can harm wildlife, jeopardize people´s livelihoods and intensify climate change.

Credible forest management certification such as FSC and PEFC contributes to a more responsible wood / timber product industry by helping create market conditions that support forest conservation. Such conditions also provide economic and social benefits for local communities, workers and the environment.

Drying sawn timber entails the greatest energy consumption, and in the Nordic region it accounts for around 80-90% of the environmental impact from processing[58],[59]. The climate impact tends to be low, however, since the energy source in the Nordic region is based chiefly on renewable materials such as bark and wood chips. Extraction and transport usually account for around 10% of the energy consumption involved before finishing in the Nordic region. The environmental impact from transport can vary considerably depending on transport distance, while the climate impact may range from 1% to approx. 15% of the total climate impact over the life cycle[60] (see MECO table).

Due to variation in the production technologies and the individual production sites, the process of drying timber often takes place at the production site after the impregnation/modification process. The impact of energy use is therefore described in the production phase.

[58] Environment | ThermoWood Association (ITWA)
[59] Erlandsson M. et al (2018).: LCA on NTR treated wood decking and other decking materials, Report nr. 715202 IVL report C302.
[60] Erlandsson M. et al (2018).: LCA on NTR treated wood decking and other decking materials, Report nr. 715202 IVL report C302.

Raw material extraction for the chemicals used in impregnation or modification may increase the environmental impact through increased energy consumption (10-20% cradle to gate) and higher greenhouse gas emissions (10-50% cradle to gate).

Production phase

The greatest environmental impact during the production phase is associated with the chemicals used to treat the wood (potential emissions to the outdoor environment and working environment), and with the energy used during production.

The production phase can differ greatly for different products and the environmental impact varies significantly in this part of the life cycle. Unsurprisingly, solid wood products with natural durability generally fare best, since no chemicals are added, and the products do not undergo any form of thermal or pressure treatment. If a surface treatment, in the form of a stain or paint, is applied to the finished sales product, this will, however, increase the environmental impact considerably in the production phase[61].

Preservative treated wood (BPR PT-8 approved preservatives) generally has a lower climate and energy impact compared to chemically or thermal modified wood due to the nature of the process[62],[63]. The thermal process of Thermo-S requires slightly more energy compared to preservative treated wood while the process of Thermo-D is more energy intensive[64]. Chemical modification using known technology such as furfurylation or acetylation has a much higher energy consumption compared with impregnated wood and thermally modified wood (up till 4 times as high).

When it comes to the carbon footprint of durable wood in the production phase, this is, as in the raw material phase, primarily determined by the kind of energy source used. In general terms, manufacturers in the Nordic region mainly use electricity in combination with propane or natural gas in the production phase. This often leads to a high carbon footprint where fossil energy sources are used in production. There is considerable potential here for a reduction in greenhouse gas emissions by switching to bio-based energy sources (bark, wood chips, pellets, etc). The environmental impact from transport can vary considerably depending on transport distance, while the climate impact may range from a few percent to around 15% of the total climate impact over the life cycle.

A study[65] of wood facades conducted by SINTEF Byggforsk in 2013 shows that greenhouse gas emissions vary a great deal for different treatment methods. Maintenance (type of chemicals and frequency) also plays a substantial role in emissions of greenhouse gases, see figure below.

[61] Hill, C., Hughes, M., & Gudsell, D. (2021). Environmental Impact of Wood Modification. Coatings, 11(3), Article 366. https://doi.org/10.3390/coatings11030366
[62] Executive summary – ThermoWood: Life cycle assessment (LCA) of Finnish thermally modified wood cladding, Finnish ThermoWood Association, Publishing House Koivuniemi Ltd., Finland. 2008
[63] https://www.thermowood.fi/ymparisto
[64] https://www.thermowood.fi/ymparisto (visited June 2024)
[65] Silje Wærp et al., Livsløpsanalyser av norske treprodukter, MIKADO, SINTEF Byggforsk, 2009. Norway.

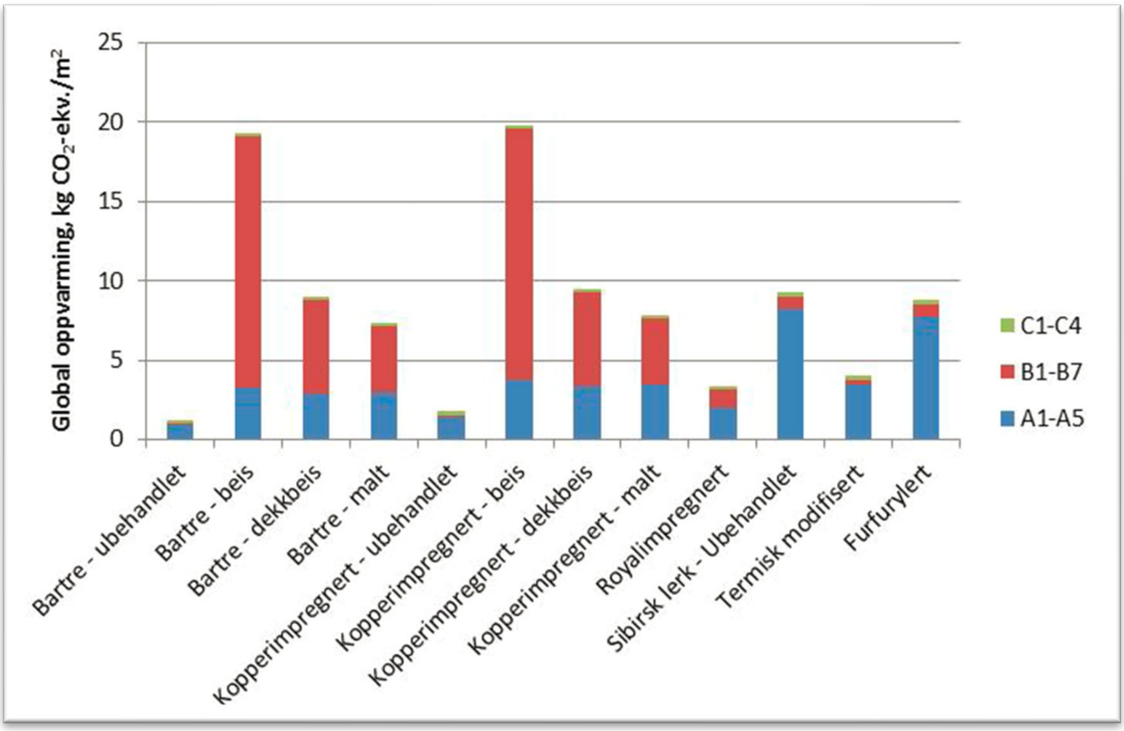

Figure 1: Emissions of greenhouse gases for each type of cladding. Total for the production, installation and use phases. The figures are from the report "Miljøanalyse av trefasader" (Environmental analysis of wood facades – SINTEF Byggforsk, the Norwegian Institute of Wood Technology and the Norwegian Forest and Landscape Institute)66. Phases A1-A5 include raw material extraction, production and installation of the cladding including transport. Phases B1-B7 include the use phase (emissions from the surface treatment and maintenance). Phases C1-C4 include demolition and waste management. According to the report, the results for Royal impregnated wood are too low, since energy use during impregnation with oil is not taken into account due to lack of data.

The environmental and health risks associated with wood preservatives are evaluated by the EU Biocidal Products Regulation (BPR)[67] and REACH. At the same time, the EU Taxonomy Regulations encourage the phase-out of hazardous chemicals. The range of hazardous chemicals to be avoided is very broad and includes not only established "substances of very high concern" (SVHC) but also SVHC candidates and a large number of substances falling within a variety of CLP Classification categories, including preservatives used in wood treatment. The process of chemically and thermal modified wood does not require the use of biocides/preservatives.

The use of biocides/preservatives in wood treatment are very complex and it's very difficult to designate certain assessed biocides and usage quantities in relation to the overall environmental and health performance (lack of potential). Even though the environmental and toxic impact on humans and animals has been investigated within the BPR (PT8)

[66] Plesser, Thale Sofie Wester et al., Miljøanalyse av trefasader, SINTEF Byggforsk, ISBN 978-82-536-1339-0, 2013
[67] https://health.ec.europa.eu/biocides/regulation_en

approval of biocides, leaching from preservative treated wood products still occurs[68],[69] (variation in results in different studies).

Use phase

Most LCA studies concludes[70], [71], [72],[73] that the durability of a wood product and the duration of its service life constitute the biggest impact in a life cycle perspective. Impact from potential leaching of impregnation agents from the wood and the need for maintenance, particularly surface treatment, has a huge impact on the wood products overall resistance to biological agents over time. The fact that durable wood lasts a long time is very important since the material does not have to be replaced as often.

The use of durable wood is complex and cannot be assessed solely on the properties of a wood material property. The intended use of the wood product is also very important as well as technical properties, different exposure parameters (climate), installation quality and maintenance. Documented conducted durability testing (combination of both laboratory and field testing) provides an objective and reliable assessment for the products performance. Requirement for detailed costumer information on product specifications, instructions for use/installation, maintenance and waste handling provides the customers with information to ensure long service life of the product.

The use of biocides/preservatives in wood treatment embodies a fundamental conflict of objectives that must be carefully balanced. On one hand, extending the service life of wood through biocidal treatment enhances sustainability by reducing the need for resource-intensive replacements and minimising waste. On the other hand, the use of chemical treatments introduces potential risks to human health and the environment, which require diligent management. Achieving this balance involves weighing the long-term benefits of durability and reduced environmental impact against the necessity of mitigating chemical risks.

The environmental and health risks associated with wood preservatives are evaluated by the EU Biocidal Products Regulation (BPR)[74] and REACH. At the same time, the EU Taxonomy Regulations encourage the phase-out of hazardous chemicals. The range of hazardous chemicals to be avoided is very broad and includes not only established “substances of very high concern” (SVHC) but also SVHC candidates and a large number of substances falling within a variety of CLP Classification categories, including preservatives used in wood treatment.

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68 Morsing et. Al, 2010.: "Comparison of laboratory and semi-field tests for the estimation of leaching rates from treated wood - part 1: above ground (UC 3). IRG/WP 10-50274

69 Rapport U 6481 - Förstudie – kopparurlakning från impregnerat virke jämfört med övriga kopparflöden i Sverige. IVL Svenska Miljöinstitutet 2021

70 Larsson Brelid P.: Benchmarking and State of the Art for modified wood, SP Technical Research Institute of Sweden, SP report 2013:54 ISSN 0284-5172

71 Candelier K. and Dibdiakova J.: A review on life cycle assessments of thermally modified wood, published online August 14, 2020 (https://doi.org/10.1515/hf-2020-0102)

72 Erlandsson M. et al (2018).: LCA on NTR treated wood decking and other decking materials, Report nr. 715202 IVL report C302.

73 Hill, C., Hughes, M., & Gudsell, D. (2021). Environmental Impact of Wood Modification. Coatings, 11(3), Article 366. https://doi.org/10.3390/coatings11030366

74 https://health.ec.europa.eu/biocides/regulation_en

The use of biocides/preservatives in wood treatment are very complex and it's very difficult to designate certain assessed biocides and usage quantities in relation to the overall environmental and health performance (lack of potential). Even though the environmental and toxic impact on humans and animals has been investigated within the BPR (PT8) approval of biocides, leaching from preservative treated wood products still occurs[75],[76] (variation in results in different studies).

Results from a long-term leaching study[77], which had been carried out with horizontal and vertical exposed preservative treated wood, showed an up to 5% copper leaching (of the initial retention) 1 year exposure. Based on these results, the leaching after 20-year were predicted to be 8-15%. A study from Sweden (IVL report U6481) focusing on previously used biocides (Wolmanit CX-8 and Tanelith E3491) also show similar leaching quantities.

Leaching is not a problem for thermally modified wood since it does not use chemicals. It is also not a problem for furfurylated or acetylated wood, where the polymer is permanently bound into the wood.

The environmental impact from surface treatment over the life cycle of wood is documented in the report from SINTEF Byggforsk et al., as mentioned above. The study shows the significance of surface treatment on untreated wood, compared with impregnated wood and a range of other durable facade products. The types of chemicals and the frequency of the treatment are decisive factors in the environmental impact, including climate impact of different claddings.

In the majority of cases, untreated wood and impregnated wood will be given a number of surface treatments over the course of the use phase.

Traditional impregnated wood does not need any surface treatment for the purpose of durability, but surface treatment is many times done for decorative purposes. Durable wood like acetylated and furfuryl alcohol treated wood are surface treated in a lesser extent, something that can give an environmental benefit.

The report also clearly shows the significance of emissions to soil, air and water in the form of ecotoxicity and human toxicity. It is here, in particular, that many of the environmental gains offered by durable wood become apparent. Sintef Byggforsks comments below in chapter 4.2 in their report[78]:

"Focusing on greenhouse gas emissions and energy consumption can make other equally important environmental aspects of products and processes such as emission of harmful chemicals into the air, water and soil as well as the impact of these emissions on all living beings, less in prioritized. These are issues that traditionally belong to the core area of environmental consideration, but have, in relation to the construction sector and building materials, received less attention than energy use and greenhouse gas footprint".

[75] Morsing et. Al, 2010.: "Comparison of laboratory and semi-field tests for the estimation of leaching rates from treated wood - part 1: above ground (UC 3). IRG/WP 10-50274

[76] Rapport U 6481 - Förstudie – kopparurlakning från impregnerat virke jämfört med övriga kopparflöden i Sverige. IVL Svenska Miljöinstitutet 2021

[77] Morsing et. Al, 2010.: "Comparison of laboratory and semi-field tests for the estimation of leaching rates from treated wood - part 1: above ground (UC 3). IRG/WP 10-50274

[78] Plesser, Thale Sofie Wester et al., Miljøanalyse av trefasader, SINTEF Byggforsk, ISBN 978-82-536-1339-0, 2013

Disposal/waste phase

The environmental aspects of the waste phase are primarily associated with the treatment of end-of-life wood due to the chemical substances in the wood. In addition, the possibility of recycling the materials is an important aspect.

Preservative treated wood that only contains copper salts (since 2004) is not defined by the Swedish or Norwegian authorities as hazardous waste but has to be taken to a recycling centre[79] for incineration in furnaces with sufficient flue gas cleaning technology. Copper can act as a catalyst in the formation of dioxins and furans during incineration. It is therefore important that the plant which will be destroying the wood has optimised the process to prevent this happening. Ash with metal content must also be processed correctly. After CCA (Copper, chrome and arsenic) impregnated wood was banned, theoretically the waste problem from pressure impregnated wood was reduced. Unfortunately, it is often not possible to tell the difference between Cu impregnated wood and other types that are hazardous waste, and therefore all types of pressure impregnated waste are generally treated as hazardous waste. This issue is also valid for modified wood. In Finland, copper impregnated wood is still treated as hazardous waste, and in Denmark it is collected and sent for incineration in Germany (it was previously sent to landfill).

The durable wood alternatives (thermally modified and chemically modified) have the advantage that they can be processed in the same way as ordinary untreated wood and can be recycled into new products or sent for energy recovery.

[79] Norwegian Environment Agency: www.miljodirektoratet.no (March 2014)

MECO scheme

Type of durable wood (DW)*	Raw material extraction	Production	Use	Waste	LCA (total)
*** CM = Chemically Modified with furfuryl alcohol (FA), acetylation, silicon treatment and linseed impregnation, TW = ThermoWood, Thermally modified wood, IW = Impregnated Wood (copper impregnation), SW=supercritical CO_2 impregnation with biocides.**					
Materials	CM, TW, SW and IW = pine/spruce/maple/ashes Felling, debarking, sawing, drying, processing.	CM, IW =various chemicals/heavy metals	Surface treatment in use phase can have major impact. Fuel for transport of wood from forest to sawmill and then to manufacturer.	End-of-life DW can be incinerated or have material recovered. In practice, most DW sent to the recycling centres is incinerated.	Materials based on solid wood have a low footprint, See point on climate.
Energy MJ/m3** **** The figures are generally highly uncertain, and many factors cause a major bias. The choice of energy mix in the electricity supply, for example, will be a decisive factor for CO_2 emissions.**	Raw material extraction – solid wood[80] (transport +): approx. 200 MJ/m3 Drying of solid wood[81,82,83,84,85]: approx. 1100 -1500 MJ/m3 CM, WPC, SW, IW: Raw material extraction – chemicals:	CM: FA = approx. 2500-300 MJ/m3 depending on wood type[88], gas (propane) accounts for almost 90% and electricity just over 10%. TW[89,90] = approx. 2000 - 2500 MJ/m3 for all production and transport. Gas (LPG) accounts for 80% and electricity 20% in production. It is assumed that drying is included in the figure, and	Indications are that for solid wood products use and waste may account for just over 10% of the life cycle. Surface treatment and other maintenance is not normally included in the LCA and may be significant over the lifetime of the product, depending on the quantity of the chemical	Energy from incineration or energy saved in production through recycling. In general, conventional wood and durable wood can be recycled, and this has a positive effect on the life cycle, but in practice durable wood is often processed as specialist waste.	For solid wood products, energy use relates mainly to drying and processing the wood. Energy consumption is approx. 2000 MJ/m3 over the life cycle. For Norwegian exterior cladding surface treated with water-based paint, energy consumption over the life cycle is approx. 6000 MJ/m3.

[80] http://www.klimatre.no/uploads/KlimaTre/Presentasjoner/101111%20Fagdag%20biprodukter/101111%20Henning%20Horn.pdf
[81] Silje Wærp et al., Livsløpsanalyser av norske treprodukter, MIKADO, SINTEF Byggforsk, 2009. Norway.
[82] Jungmeier, G. et al, Allocation in Multi Product Systems – Recommendations for LCA of Wood-based Products
[83] Andersson, B-I, (1996) Environmental declaration for sawn timber, Trätek.
[84] Jarnehammar, A. (2000): LCA for multi-layer parquet flooring in Life Sys Wood. Trätek.
[85] Adebahr, 1995, Energy consumption for roof building related to 1 m³ structural timber
[88] Correspondence with manufacturer. March 2024.
[89] Executive summary – ThermoWood: Life cycle assessment (LCA) of Finnish thermally modified wood cladding, Finnish ThermoWood Association, Publishing House Koivuniemi Ltd., Finland. 2008.
[90] Candelier K. and Dibdiakova J.: A review on life cycle assessments of thermally modified wood, published online August 14, 2020 (https://doi.org/10.1515/hf-2020-0102)

Type of durable wood (DW)*	Raw material extraction	Production	Use	Waste	LCA (total)
*** CM = Chemically Modified with furfuryl alcohol (FA), acetylation, silicon treatment and linseed impregnation, TW = ThermoWood, Thermally modified wood, IW = Impregnated Wood (copper impregnation), SW=supercritical CO_2 impregnation with biocides.**					
	FA[86,87]= 661 MJ/m3 IW = 255-400 MJ/m3	that energy for drying amounts to approx. 1500 MJ/m3 of the total. SW = approx. 900 MJ/m3 [91] IV = approx. 400 - 600 MJ/m3 (Figures uncertain). Thermally modified wood with linseed oil = approx. 500 MJ/m3 [92] Royal impregnated wood = approx. 2200 MJ/m3 [93]	product and frequency of use. Must be assessed separately. The MIKADO study indicates that where water-based paints are applied to exterior cladding, the use phase may account for 67% of energy consumption.	According to the manufacturers, WPC can be recycled into new composite, but this has not been documented.	Chemical modification has relatively high energy consumption.
Climate** **** The figures are generally highly uncertain, and many factors cause a major bias. The choice of energy mix in the electricity supply, for example, will be a decisive factor for CO2 emissions.**	CM: Transport of wood (0.06) + chemicals FA (0.07) + production of FA and auxiliary chemicals (0.22) = Total 0.36 kg CO2eq/ kg	The energy sources in production account for most of the climate impact. It is still common in the Nordic region to use propane/natural gas alongside electricity. There is potential to switch to bio-based energy sources.	Surface treatment and other maintenance is not normally included in the LCA and may be significant over the lifetime of the product, depending on the quantity of the chemical product and frequency of use. Must be assessed separately.	In general, conventional wood and durable wood can be recycled, and this has a positive effect on the life cycle, but in practice durable wood is often processed as specialist waste. .	CM (FA)= 0.5-0.7 kg CO2eq/kg CM (Ac)[94],[95] = 0.4-1.1 kg CO2eq/kg SW[96] = IV = ± 0.05 kg CO2eq/kg

[86] Christian Rostock, Nicole Lambert. Carbon footprints of Ipê vs. Kebony Southern yellowpine – A comparative study. Published: Oslo, NORWAY /September 2010. Bergfald Miljørådgivere, Kongens gate 3 NO-0153 Oslo.
[87] Christian Rostock, Nicole Lambert. Carbon footprints of Burmese teak versus Kebony Maple – A comparative study Published: Oslo, NORWAY/April 2010. Bergfald & Co as, Kongens gate 3 0153 Oslo, NORWAY.
[91] EPD (https://www.superwood.dk/app/uploads/2022/09/NEPD-3703-2649_Exterior-cladding-of-Superwood-Fully-impregnated-.pdf) and dialog with manufacturer. April 2014 and march 2024.
[92] Correspondence with manufacturer. April 2014.
[93] Correspondence with manufacturer. April 2014.
[94] Vogtländer, J.G. Life Cycle Assessment of Accoya, Final 21 March 2010.
[95] https://www.accoya.com/app/uploads/2022/05/Environmental-Product-Declaration-Accoya-wood-EN-15804-A2.pdf, visited March 2024
[96] EPD (https://www.superwood.dk/app/uploads/2022/09/NEPD-3703-2649_Exterior-cladding-of-Superwood-Fully-impregnated-.pdf)

Type of durable wood (DW)*	Raw material extraction	Production	Use	Waste	LCA (total)
*** CM = Chemically Modified with furfuryl alcohol (FA), acetylation, silicon treatment and linseed impregnation, TW = ThermoWood, Thermally modified wood, IW = Impregnated Wood (copper impregnation), SW=supercritical CO_2 impregnation with biocides.**					
			Surface treatment with a stain, decking stain or paint increases the climate impact by a factor of 10, 5 and 4 respectively (see figure 4, section 4).		
Chemicals and emissions	Chemical raw material extraction and associated emissions. See climate impact in row above.	Biocide, furfuryl, acetylation, silicon treatment and other additives.	Leaching of chemicals from impregnated wood. Stain and paint in the use phase. Emissions of greenhouse gases and particulates.	Leaching of chemicals.	
Other	Sustainable forestry, biodiversity.	Working environment. Closed-loop process.	Ease of cleaning has impact on quality.		

4 Changes compared to previous generation

Figure 1 Overview of changes to criteria for biological durable wood generation 3 compared with previous generation 2.

Gen. 3	Gen. 2	Same req.	Change	New req.	Comment
O1 Description of the product	O1		x		Adjusted, e.g. referring to the Construction Products Regulation (EU/2024/3110).
Raw materials					
O2 Prohibited and restricted tree species	O11		x		Updated with Nordic Ecolabelling's requirement concerning tree species that are prohibited or restricted (exempt for recycled wood material).
O3 Traceability and certification	O13		x		Updated with Nordic Ecolabelling's requirement concerning certified wood.
Chemicals in production and surface treatment					
O4 Ecolabelled products – surface treatment				x	New requirement for surface treatment.
O5 Classification of chemical products	O4		x		Prohibition of chemicals classified as environmentally hazardous has been added.
O6 Classification of ingoing substances	O5		x		Updated, e.g. a new classification has been added.
O7 Prohibited substances	O6		x		Updated, e.g. referring the requirement for endocrine disruptors to other lists, and the substances that are prohibited have also been expanded.
O8 Nanomaterials	O7		x		Synthetic Amorphous Silica (SAS) is added as an exemption.
O9 Preservatives/biocides	O3	x			Biocides may only be use for in-can preservation.
O10 Volatile organic compounds	O8		x		Adjusted and maximum level of VOC is updated.
O11 Occupational exposure limit	O9	x			Levels of exposure are still relevant.
O12 Chemical residues in the final product	O10	x			Levels of chemical residues are still relevant.
Quality					
O13 Durability performance	O14		x		Introducing minimum durability class according to use class. Requirement for bote laboratory and felt test are still very relevant.
O14 Documentation of fire classification				x	New requirement to document durability of fire performance.
Energy and climate					
O15 Energy consumption	O15			x	Introduction of new absolute requirement for energy use.
O16 Fossil fuels				x	Introduction of new requirement for excluding and/or limiting use of fossil fuels.

Costumer information					
O17 Product specification, instruction for use and maintenance	O16		x		Updated for further focus on a circular material flow at the end-of-life.
Licence maintenance					
O18 Customer complaints				x	New requirement.
O19 Traceability	O23		x		Updated and partly rewritten.
Removed requirement from gen. 2					
Chemicals used	O2				Implemented in O1.
Waste management	O17				Removed.
Nordic Swan Ecolabel licence person	O18				Removed.
Documentation	O19				Removed.
Quality of durable wood	O20				Removed.
Planned changes	O21				Removed.
Unforseen non-conformities	O22				Removed.
Take-back system	O24				Removed.
Laws and regulations	O25				Removed.

5 Future criteria generation

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

- Product definition – new types/technologies for durable wood.
- Chemicals used in production and any surface treatment of durable wood.
- Energy consumption in the production of durable wood.
- Test for the durability of wood in relation to the intended use.
- End of life.

6 Criteria version history

Nordic Ecolabelling adopted version 3.0 of the criteria for biological durable wood on 7 March 2025. The criteria are valid until 31 March 2030.