

About Nordic Swan Ecolabelled Stoves



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Contents

1	Summary	4
1.1	Justification of the product group definition	5
2	Requirements and justification of these.....	5
2.1	General information of the production	5
2.2	Chemical products	6
2.3	Use and quality requirements.....	14
2.4	Extraction of natural stone	15
2.5	Supplementary heating system components.....	16
2.6	Operation of the Nordic Swan Ecolabelled solid fuel local space heater ...	17
2.7	Customer information.....	19
2.8	Information to distributors and installation technicians.....	21
2.9	Licence maintenance	22
3	Environmental impact of solid fuel local space heaters	22
4	Changes compared to previous generation.....	31
5	Future criteria.....	33

Appendix 1 Comparison of Nordic Swan Ecolabelling and EU Eco-design requirements for stoves/solid fuel local space heaters

078, Nordic Swan Ecolabelled Stoves, generation 5, 18 August 2026

Contact information

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

Denmark

Ecolabelling Denmark
www.svanemaerket.dk

Iceland

Ecolabelling Iceland
www.svanurinn.is

Finland

Ecolabelling Finland
www.joutsenmerkki.fi

Norway

Ecolabelling Norway
www.svanemarket.no

Sweden

Ecolabelling Sweden
www.svanen.se

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1 Summary

A Nordic Swan Ecolabelled stove/local space heater is designed for the combustion of solid biofuels such as wood, wood pellets and wood-briquettes and radiates heat in the room in which it is located. The combustion systems are relatively simple with a nominal heat output of 50 kW or less. This includes stoves, insert appliances, pellet stoves, slow heat release appliances and sauna stoves.

The burning of wood contributes significantly to air pollution with harmful particles, tar components (PAH: polycyclic aromatic hydrocarbons), dioxins and soot particles (carbon black). However, air pollution from wood burning can be considerably reduced through e.g. better combustion chambers, improved air control and cleaner burn technology.

The overall aim of this revision is to ensure that the Nordic Swan Ecolabel's criteria continue to secure environmental benefits via ecolabelling and that the criteria are viable and clear for the industry. The revision has mainly focused on introducing a new test method for emission of particulate matter, strengthen the requirements for emissions of organic gaseous compounds (OGC) and efficiency from stoves/insert appliances/slow heat release appliances, updating the chemical requirements with new classifications from ECHA, as well as updating standards and methods according to EU Ecodesign Regulation (EU) 2015/1185 for solid fuel local space heaters.

To obtain an overview of the key environmental impacts in the products' life cycle, an environmental assessment of the product group was performed as a qualitative MECO analysis. This was followed by an overall RPS (Relevance-Potential-Steerability) analysis for the product group.

High RPS was found for the following:

- Emissions to air from the use phase that are hazardous to health and the environment
- Efficiency from local space heaters
- Chemicals used in the production and surface treatment of the local space heater

The main changes in the revised criteria are:

- Introducing a new alternative test method and requirement level for emission of particulate matter from stoves and insert appliances according to EN 16510
- Strengthen the requirements for emissions of organic gaseous compounds (OGC) from 100 mg/ m³ to 70 mg/m³ and efficiency from min. 76% to 78% for stoves and insert appliances
- Strengthen the requirements for emissions of particulate matter from 50 mg/m³ to 25 mg/m³ for slow heat release appliances
- Strengthen the requirement for efficiency from min. 87% to 90% for pellet stoves
- Updating the chemical requirements with new classifications according to CLP Regulation¹

¹ Classification and excluded substances used in production and surface treatment of local space heaters.

- Updating all standards and methods referred to in the criteria according to EU Ecodesign Regulation (EU) 2015/1185

1.1 Justification of the product group definition

The product group includes different types of solid fuel local space heaters in accordance with the European Union's regulation (EU) 2015/1185² for solid fuel local space heaters. The regulation entered into force 1 January 2022. This is also the reason to the name of the product group is changed from stoves to solid fuel local space heaters.

Sauna stoves are not part of (EU) 2015/1185, but Nordic Ecolabelling has chosen to keep this product type in the criteria as this is widely used in the Scandinavian countries. As in generation 4 of the criteria cookers for solid wood and space heaters specified for outdoor use is excluded from the criteria as the main function isn't space heating. Solid space heaters specified for combustion on non-woody biomass or liquid fuels are also excluded as they use a different technology.

2 Requirements and justification of these

This chapter includes background information for the specific requirements in the criteria document.

2.1 General information of the production

Background to O1 Description of the product

Former requirement *O1 Description* of the production process and *O2 Materials* has been merged into one requirement. Due to the EU Ecodesign Regulation for wood burning stoves a new information requirement on Declaration of Performance and CE-label (intended to put on the stove) has been introduced in the requirement.

Requirement for national environmental permit to produce stoves has been removed as this is being regulated by legislation.

The purpose of the requirement is to give information on the product, material composition, description of the production method, treatment techniques and how it is marked in accordance with the Construction Products Regulation (EU/305/2011)³. Stoves can have different designs and be produced from different materials, using different techniques, and at various production sites. To provide traceability for the Nordic Swan Ecolabelled stove, all activities must be described. Technical drawings with measurements approved by the test laboratories in connection with testing of the stove must also be included in the application.

Nordic Ecolabelling focuses on quality and therefore requires the manufacturer of the stove/local space heater to provide a guarantee for stoves/local space heater with regards to

² [COMMISSION REGULATION \(EU\) 2015/ 1185 - of 24 April 2015 - implementing Directive 2009/ 125/ EC of the European Parliament and of the Council with regard to ecodesign requirements for solid fuel local space heaters](#)

³ <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32011R0305>

material and manufacturing defects under normal use. Wear parts, i.e. parts that wear out during normal use e.g. glass, grates, insulation materials (vermiculite bricks) are not part of the guarantee. The guarantee must be stated in operating and maintenance instructions (O18). The warranty period is calculated from the date of sale.

2.2 Chemical products

What do the chemical requirements cover?

The chemical requirements cover all chemical products used in the final production and surface treatment of solid fuel local space heaters such as coatings, adhesives, sealants and cleaning/decreasing products.

The requirement does **not** apply to chemicals:

- Chemicals used in the production of steel, cast iron, ceramic glasses and thermal insulation materials
- Process chemicals used in welding and metalworking
- Lubricants for hinges and other moving parts

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 O2 Classification of chemical products

Nordic Ecolabelling aims to minimize the health and environmental impact of chemical products. Therefore, products with the following classifications cannot be used in the Nordic Swan Ecolabelled product: Hazardous to the aquatic environment, hazardous to the ozone layer, very toxic, toxic, causes damage to organs, sensitising, carcinogenic, mutagenic, toxic for reproduction, endocrine disruptive, and persistent, bioaccumulative/mobile and toxic.

The updated CLP classifications now include endocrine disruptors, PBT/vPvB and PMT/vPvM substances, covering environmental toxicity, persistence, mobility and bioaccumulation. Including PMT and vPvM substances is essential due to their persistence, mobility and potential impact on water quality. The new rules entered into force 20 April

2023. From this date, the Member States may propose harmonized classification and labelling (CLH) with the new hazard classes and manufacturers, importers, downstream users and distributors may also self-classify their substances and mixtures accordingly.

There are transitional periods from the entry into force of the Delegated Regulation, during which manufacturers, importers, downstream users and distributors are not yet required to classify their substances or mixtures according to the new hazard classes. During these periods, the new hazard classes can be applied on a voluntary basis. If applied to an ingoing substance it is excluded in these criteria. However, any products classified according to these new hazard classes and used in a product will be excluded under these criteria.

This is a standard requirement, based on the precautionary principle and is only partially tailored to the specific product group. The requirement is intended to exclude problematic substances that are not necessarily found in products on the market today.

Paints or varnishes for surface treatment of local space heaters classified as H412 are exempt from the requirement, provided they are applied in a closed, ventilated room using appropriate personal protective equipment as specified in the safety data sheet.

Hardeners used in two-component coating products, often classified as H317, are also exempt, provided adequate protective equipment is used during mixing with the base component and the final product is applied in a closed, ventilated system.

The chemical requirements solely concern chemicals used in final production (painting, assembly and final inspection) and for surface treatment. Chemicals used in the production of steel, cast iron, ceramic glasses and thermal insulation materials, process chemicals used in welding/metalworking and lubricants for hinges and other moving parts, is not part of the requirements.

Background to O3 Classification of ingoing substances

Nordic Ecolabelling strives to ensure that the health and environmental impact of the products are as low as possible. The requirements therefore make it clear that ingoing substances with the following classifications cannot be used in the chemical product: Hazardous to the ozone layer, causes damage to organs, sensitising, carcinogenic, mutagenic, toxic for reproduction, endocrine disruptors, and persistent, bioaccumulative/mobile and toxic.

The new CLP classifications for endocrine disruptors, PBT/vPvB and PMT/vPvM (environmental toxicity, persistency, mobility and bioaccumulation) are included. The inclusion of PMT and vPvM substances is crucial due to their persistence, mobility and potential impact on water quality. The new rules are in force as of 20 April 2023. From this day on, the Member States can make proposals for harmonized classification and labelling (CLH) with the new hazard classes and manufacturers, importers, downstream users and distributors can self-classify their substances and mixtures accordingly.

There are transitional periods from the entry into force of the Delegated Regulation, during which manufacturers, importers, downstream users and distributors are not yet required to classify their substances or mixtures according to the new hazard classes. During these periods, the new hazard classes can be applied on a voluntary basis. If applied to an ingoing substance it is excluded in these criteria.

This is a standard requirement, that is set by the precautionary principle and is only partially adapted to the product group. The requirement is intended to exclude problematic substances that are not necessarily found in products on the market today.

Background to O4 Excluded substances

Certain problematic substances and substance groups are difficult to exclude through general chemical requirements. To address this, Nordic Ecolabelling has compiled a list of substances that must not be present as ingoing substances in the chemical product.

The purpose of this list is to prohibit substances that are not excluded by other requirements but are associated with environmental and health hazards. Some substances are included for clarity, even if they are already prohibited under other requirements.

This is a standard requirement, based on the precautionary principle and is only partially tailored to the specific product group. The requirement is intended to exclude problematic substances that are not necessarily found in products on the market today.

Alkylphenols (AP) (e.g. butylated hydroxy anisole (BHA, CAS No. 25013-16-5), butylated hydroxytoluene (BHT, CAS No. 128-37-0), alkylphenol ethoxylates (APEO) and other alkylphenol derivatives (APD)

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

Aziridine (CAS No. 151-56-4) and polyaziridines

Aziridine and polyaziridines have a broad range of applications, included in textile chemicals, adhesives, binders, lubricants, cosmetics and more. Furthermore, they are alkylating agents and is of specific concern due to their potential to link to DNA, therefore both toxic and carcinogenic.

Benzalkonium chloride, such as CAS No. 8001-54-5 and CAS No. 63449-41-2

Benzalkonium chlorides (BACs) is part of a group of chemicals with wide applications due to their antimicrobial properties against bacteria, fungi and viruses. There is a risk that frequent and widespread use of BACs in commercial products can generate selective environments for microbes and contribute to resistance to antibiotics. Furthermore, there is a risk to consumer exposure due to their toxicity and allergenic properties.

Bisphenols and bisphenol 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 were identified in need for further regulatory risk management in EU⁴.

⁴ Assessment of regulatory needs: Bisphenols. ECHA – 16 December 2021: Section 2.1: Bisphenols for which further EU RRM is proposed <https://echa.europa.eu/documents/10162/5e60f2fe-12d0-7f6b-5868-f199cfd7f984>

Ethylenediamine tetraacetate (EDTA, CAS No. 60-00-4) and its salts and Diethylenetriamine pentaacetate (DTPA, CAS No. 67-43-6) and its salts

Ethylenediaminetetraacetic acid (EDTA), diethylenetriamine pentaacetate (DTPA) and their salts are not readily degradable. Furthermore, DTPA is classified as toxic for reproduction and may potentially pose a risk to consumers. For EDTA, the EU's risk assessment states that under the conditions at municipal water treatment plants EDTA is either not broken down or only breaks down to a slight degree. To-date in Europe, EDTA has been replaced in virtually all consumer products by readily biodegradable alternatives such as MGDA (methylglycine diacetic acid) and GLDA (glutamic acid diacetic acid).

Halogenated organic compounds

Halogenated organic compounds, including short-chain chlorinated paraffins (C10-C13), medium-chain chlorinated paraffins (C14-C17), chlorophenols and dimethyl fumarate derivatives, is a large group of substances that are harmful to both the environment and human health. They are often carcinogenic, highly toxic to aquatic organisms and very persistent to degradation.

Metals and metalloids

Lead (Pb), Cadmium (Cd), Mercury (Hg), Chromium VI (Cr(VI)), Arsenic (As) are toxic to people and other organisms on land and in aquatic environments and may accumulate in living systems. Chrome plating of metals was previously widespread due to design but is used very rarely today (vintage stoves).

PBT and vPvB as defined in REACH Annex XIII, including those under ECHA PBT assessment

PBT and vPvB are abbreviations for substances that are persistent, bioaccumulative and toxic, and very persistent and very bioaccumulative, respectively, in accordance with REACH Annex XIII and CLP Annex I. This means that they are not biodegradable and that they accumulate in living organisms. Based on these adverse characteristics they pose a threat to the environment and human health. Substances under ECHA PBT assessment are excluded to limit their release into the environment while under review. Because of their persistence, exposure to PBT/vPvB substances is very difficult to reverse, even if emissions stop.

Per- and polyfluoroalkyl substances (PFAS)

Per- and polyfluoroalkyl substances (PFAS) are used in many types of products due to their water and dirt repellent properties. These compounds constitute a group of substances that have highly problematic intrinsic hazardous properties. They are extremely persistent and accumulate in the body. They are spread all over the globe, from the large oceans to the Arctic, and are found in e.g. wild birds and fish and their eggs. Also, shorter chain compounds (2–6 carbon atoms) have been discovered in nature. The substances in this group are suspected to be endocrine disruptors, carcinogenic and to have a negative impact on the human immune system.

Phthalates (Esters of 1,2-benzenedicarboxylic acid (orthophthalic acid, CAS No. 88-99-3))

A number of phthalates are identified as endocrine disruptors and some of them are classified as reprotoxic. For these reasons several phthalates are included in the Candidate

list. Based on their hazardous properties, phthalates pose a threat to the environment and human health and there is a ban on this group of substances.

Potential or identified endocrine disruptors, listed in any of the following "Endocrine Disruptor Lists" List I; II; and III

Endocrine disruptors (EDs) are chemicals that alter the functioning of the endocrine (hormone) system and consequently cause adverse health effects. The term potential EDs is used for chemicals with properties that make them suspected to be EDs. The hormone system regulates many vital processes in living organisms and when normal signalling is disturbed, adverse effects may result. EDs raise high concern for their risk of causing serious negative impact on the environment as well as on human health specifically. Special concern is raised for effects on reproduction and development and about possible links to increases in public health diseases. While effects in wildlife populations have been confirmed, evidence is pointing to effects also in humans. Substances listed under List II are excluded because they are under evaluation in an EU legislative process due to explicit concerns about possible endocrine-disrupting properties. Excluding them limits exposure while the evaluation is ongoing.

Quaternary ammonium compounds, that are not readily aerobic biodegradable such as DTDMAC (CAS No. 68783-78-8), DSDMAC (CAS No. 107-64-7), DHTDMAC (CAS No. 61789-80-8) and DADMAC (CAS No. 7398-69-8)

Quaternary ammonium compounds (QACs) are usually surface-active agents where some of them precipitate or denature proteins and destroy micro-organisms. QACs are toxic to a lot of aquatic organisms including fish, daphnids, algae, rotifer and microorganisms employed in wastewater treatment systems.

Substances on the REACH Candidate list of SVHC substances

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

Background to O5 Nanomaterials

Nanomaterials⁵ are a diverse group of materials under the size of 100 nm. Due to their small size and large surface area nanoparticles are often more reactive and may have other properties compared to larger particles of the same material. Further, different sizes, shapes,

⁵ <https://www.nordic-swane-colabel.org/nordic-ecolabelling/environmental-aspects/chemicals-nano-and-microplastics/nanomaterials/>

surface modifications and coatings can also change their physical and chemical properties. Nanoparticles can cross biological membranes and thus be taken up by cells and organs. One of the main concerns are linked to free nanoparticles, as some of these – when inhaled – can reach deep into the lungs, where the uptake into the blood is more likely.

There is concern among public authorities, scientists, environmental organisations, and others about the insufficient knowledge regarding the potential detrimental effects on health and the environment^{6,7,8}. Nordic Ecolabelling takes these concerns seriously and applies the precautionary principle to exclude potentially hazardous nanomaterials from products.

Pigments

Pigments are finely ground, insoluble particles that are used to give products a specific colour. There are no substitutes that can fulfil pigments' function as colourants in paints / coatings, and many pigments consist partly or entirely of nanoparticles. Thus, nano-sized pigments are exempted. Clear evidence-based conclusions of the safety of nano-pigments cannot be drawn, but "exposures to nano-sized pigments that are integrated into polymer, paint or coating matrices are not thought to be significant, and the risks to consumers from such uses are low", according to a literature study commissioned by ECHA⁹.

Nordic Ecolabelling does not consider titanium dioxide nanoparticles as pigments, and nano-TiO₂ is therefore not exempted.

Naturally occurring inorganic fillers

Naturally occurring fillers from e.g. chalk, marble, dolomite and lime are exempted from registration according to Annex V, point 7 in REACH¹⁰ as long as these fillers only are physically processed (milled, sieved and so on) and not chemically modified.

Synthetic amorphous silica (SAS)

SAS is an intentionally manufactured silicon dioxide (SiO₂) form that has been used in industrial, consumer and pharmaceutical products for decades. Primary particles formed during the manufacture of SAS are in the nanometer range. SAS is exempted from the requirement due to a lack of alternative substances¹¹.

Polymer dispersion

Polymer dispersions can technically fulfil the nanomaterial definition. The EU Commission has recommended that solid nanomaterials dispersed in a liquid phase (colloidal) should be

⁶ 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

⁷ Parliamentary Assembly of the Council of Europe (2013) Nanotechnology: balancing benefits and risks to public health and the environment. http://assembly.coe.int/CommitteeDocs/2013/Asocdocinf03_2013.pdf

⁸ 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

⁹ European Chemicals Agency, Nič, M., Kocurkova, L., Přichystalová, R. et al. (2018) Literature study on the uses and risks of nanomaterials as pigments in the European Union. European Chemicals Agency. <https://data.europa.eu/doi/10.2823/260688>

¹⁰ <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:02006R1907-20150925>

¹¹ ATSDR, Toxicological Profile for Silica (2019)

considered as nanomaterials^{12, 13, 14}. Non-solid (i.e. liquid and gaseous) particles are excluded from the definition.

Nano emulsions are not covered by the definition because they consist of liquid nano-objects suspended in a liquid phase and the term “particle” is intended to cover only solid nano-objects. Polymers exist in different phases and distinguishing between liquid, semi-solid and solid polymers can be very difficult. To treat all dispersed and suspended polymers alike and avoid confusion, we explicitly state that polymer dispersions are exempted from the requirement.

Background to O6 Surface treatment and VOC content in the surface paint/-varnish

Today, traditional varnishes with a high ratio of solvents are used. Both dry varnished and water-based varnishes are available. The primary reason is the high function requirements made of the varnish, which must be able to withstand strong temperature fluctuations. The product must, for example, be air-drying, repair-friendly and temperature-resistant, be able to expand and contract, and show long-term stability. For the same reasons, there are limited alternatives to traditional varnishes.

Several organic solvents have effects that are hazardous to health. Organic solvents can be absorbed via the lungs, skin and potential damage a number of organs. This damage may be acute or chronic.

Acute injury after inhaling vapours is apparent as headache, tiredness, etc. Organic solvents may also irritate the mucous membranes in the eyes, nose and throat. Organic solvents remove grease from the skin and may cause eczema. After prolonged exposure, organic solvents may lead to chronic damage to the brain and nervous system. Certain organic solvents may lead to other irreparable damage to health such as cancer and reproductive damage (foetal damage). Furthermore, some organic solvents contribute to the greenhouse effect, others to photochemical ozone formation, and others to the depletion of the ozone layer¹⁵.

Known methods/processes used for surface finishing of closed fireplaces:

- The fireplace is sprayed by hand in the room without a local fume extractor so that personnel are exposed to a health risk and the external environment is affected by emissions in the form of hydrocarbons that build up ground-level ozone (the person that undertakes finishing must use protective equipment/ mask). Today there are several fireplace manufacturers that have an "open system" without a local fume extractor, which can entail a health risk.

¹² European commission, COMMISSION STAFF WORKING PAPER, Types and uses of nanomaterials, including safety aspects, SWD(2012) 288 final. <https://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=SWD:2012:0288:FIN:EN:PDF>

¹³ Communication from the commission to the European parliament, the council and the European economic and social committee, Second Regulatory Review on Nanomaterials, COM(2012) 572 final. <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52012DC0572>

¹⁴ EU Commission recommendation on the definition of nanomaterial (2022/C 229/01) [https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32022H0614\(01\)&from=EN](https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32022H0614(01)&from=EN)

¹⁵ Miljoevejledning.dk - <http://www.miljoevejledning.dk/index.aspx?articleid=+808+808>

- The fireplace is spray painted by hand in a finishing room where emissions are collected via a local fume extractor that prevents personnel from being exposed to a health risk.
- The fireplace is spray painted by hand in a finishing room where emissions are collected via a local fume extractor for recovery and combustion (heat production). Major fireplace manufacturers use this technology.
- The fireplace is spray painted mechanically, and emissions are collected via a local fume extractor for recovery and combustion (heat production). Only few manufacturers use the mechanical technique and system for purification of emissions and heat production.

Nordic Ecolabelling wishes to continue to require that surface treatment/finishing and subsequent drying of the fireplace must take place in closed systems or in closed, ventilated rooms. The background to the requirement is to ensure that personnel are not exposed to health risk.

Products used for surface paint/-varnish must contain a maximum (VOC 60%). The consequence of the requirements is that it excludes the use of products for surface coating/finishing with a very high VOC content. Nordic Ecolabelling has knowledge of paints/varnish, which have a VOC content of 70-75% organic solvent. There are a number of similar products in the market, where the VOC content is somewhat lower.

The requirement will not result in major changes or investments in production by having to switch to products with lower VOC content and consequent higher dry matter content. Products to be mixed/diluted before they are ready for use, must comply with the VOC limit in the final mixture (ready to use). The VOC content in products ready to be used is to be calculated and the data for this can be found in the safety data sheets. Products used for surface paint/-varnish is exempted from the VOC content limit if the surface treatment process is using a technology that collects and subsequently burn of the VOC for internal heat generation. This is because the technology does not have VOC emissions to the environment.

Surface paint/-varnish in spray cans used exclusively for smaller repairs are exempted from the requirement for VOC. The requirement focuses on limiting the use of surface paint/-varnish with high VOC content in the actual production of stoves. This is where the large amounts of surface-coating/-lacquer is applied. Production-wise, you may accidentally make a scratch during final assembly/packing, and this is where spray cans with surface paint are used. That is, in very small quantities. Alternatively, the stove must go through blasting and surface treatment process again, which is not appropriate (higher emissions of VOC).

Background to O7 Product and transport packaging

Local space heaters are often transported on wooden pallets enclosed by a wooden skeleton to protect the fireplace. To further protect/stabilise the fireplace, cardboard and polystyrene, as well as plastic, are used to give protection from the wind and weather.

Biocidal-treated wood can be used for pallets according to Biocidal Product Regulation 528/2012. Most standard pallets in the EU use heat treatment for pest control and Nordic Ecolabelling therefore ban the use of biocide/impregnated wood in packaging.

A ban on PVC in both products and packaging is a requirement that Nordic Ecolabelling includes in many criteria. The environmental impact of PVC is associated primarily with waste management, the use of additives and dioxin emissions, for example in the manufacture and incineration of PVC. The latest membrane cell technology is considered to be the most environmentally-sound means of production, but the membranes are coated with PFAS and this represents a potential source of PFAS contamination to the environment^{16, 17}.

The ban on PVC is in line with requirements in other type 1 ecolabels such as EU Ecolabel and Blauer Engel in Germany. For more information on Nordic Ecolabelling's view on PVC, see www.nordic-swan-ecolabelling.org¹⁸.

To align with the EU Packaging and Packaging Waste Regulation (PPWR), plastic used for packaging must be able to be recycled in today's recycling systems.

2.3 Use and quality requirements

Background to O8 Presssure testing/leak measurement

By setting requirements of the internal control and pressure testing of all final produced fireplaces for leaks, the same high quality of the individual fireplaces is ensured as for the leak test performed by the laboratory. Today, all manufacturers of stoves continuously test their fireplaces for leaks as an element of their internal quality management system. Leak testing is part of the standards pr EN16510. However, the number of stoves that the individual manufacturer internally takes out for pressure testing varies considerably. Nordic Ecolabelling has experienced manufacturers that pressure test all their completed stoves, to manufacturers that pressure tests every 20th fireplace.

The testing laboratories Sintef and Technological Institute recommend a requirement for internal control and pressure test of at least 5% of the stoves (in the same stove series), ensuring the same high quality of each stove compared to the leakage test, which is performed by the testing laboratory. SINTEF NBL has in the last 10-12 years leak tested all stoves with Sintef approval. The stoves are tested for leakage in m³/hour at pressure of 25 Pa. This is a requirement Sintef has set without this written in NS 3058 standard or another regulatory framework. Testing laboratories accredited to the NS standard (for example, the Danish Technological Institute in Denmark or SP in Sweden) also pressure test the stoves as part of the NS test. As Nordic Ecolabelling requires testing of emissions of particulate matter by the Norwegian standard, it is natural to connect the pressure test reference value to the NS test. The licensee must have a routine in its quality management system that describes the method used for pressure/leak test, and the measures to be carried out if the requirement is not complied with (immediately changing the production, so the requirement is met).

¹⁶ Chlorine and Building Materials: A Global Inventory of Production Technologies, Markets, and Pollution, Phase 1: Africa, The Americas, and Europe

¹⁷ Chlorine and Building Materials: A Global Inventory of Production Technologies, Markets, and Pollution, Phase 2: Asia, Healthy Building Network, 2019

¹⁸ <https://www.nordic-swan-ecolabel.org/nordic-ecolabelling/environmental-aspects/circular-economy-and-resource-efficiency/pvc/>

The result of pressure measurements showing that the requirement is complied with must be archived by the licence holder during the licence term.

2.4 Extraction of natural stone

Background to O9 Extraction of natural stone, environmental requirements

Nordic Ecolabelling wishes the extraction of natural stone to take place on an environmentally and socially sustainable basis. The quarrying of natural stone presents several environmental and social problems¹⁹:

Environmental problems:

- Natural stone is not a renewable resource
- Destruction of habitats and land degradation
- Pollution of groundwater and surface water
- Dust emissions and noise pollution
- Energy consumption
- Water consumption
- Waste handling
- Regeneration and rehabilitation of abandoned quarries

Social problems:

- Use of child labour
- Working conditions
- Working environment (health and safety)
- Forced labour
- Discrimination, pay, gender, ethnic origin
- Impact on the social structure (migrant labour)
- Illegal mining

Natural stone is used primarily for design (cladding) and heat accumulation. The types of stone most used are soapstone and various types of sandstone. According to fireplace manufacturers, soapstone is used mostly in Finland and Brazil, where the finished stone is also processed.

The requirement focusses on environmental and social requirements e.g. to protect the groundwater, surface water from pollution as well as working conditions. The requirement is identical to the requirement made in the EU's criteria for "Hard coverings". To ensure that the requirement also applies outside the EU, there is added "or similar national legislation outside the EU." This is to ensure, that there is no interference with the protected waters.

Nordic Ecolabelling has good experience from setting social requirements for working conditions in the form of compliance with a number of UN and ILO Conventions. This applies, for example, to the Nordic Ecolabelling criteria for textiles and biofuel for transport.

¹⁹ OMO, Francis Weyzig: From quarry to graveyard, Crem and India Committee of the Netherlands, September 2006

The requirement must be documented via a declaration from the manufacturer (quarry) of the supplier of the natural stone. The selection of UN and ILO Conventions required under O11 adheres to the Nordic Ecolabelling criteria for biofuel.

TFT²⁰ is a global non-profit organisation that helps companies and society to deliver responsible products, including the extraction of stone.

In 2012, TFT developed a programme for sustainable stone production (Responsible Stone Program (RSP)) whereby its members are committed to complying with several ethical, social and environmental requirements, as a "Code of Conduct" for the extraction and processing of stone. The RSP programme has (1/11-2013) 18 members with representatives for quarries, producers, importers and retail chains. Nordic Ecolabelling monitors the development in TFT regarding the next revision of the criteria and closed fireplaces.

Background to O10 Extraction of natural stone, working conditions

See background to 09 above.

2.5 Supplementary heating system components

Background to O11 Solar collector

A solar collector delivered with a fireplace must be type-approved in accordance with the IEC 61215 standard.

A wood-burning stove with water tank combined with solar heating may be an alternative to the traditional heating system. The solar collector plant consists of a panel of solar cells and a combi water tank with a coil for the solar collector below and a coil for the wood-burning stove above. An electrical heating rod for emergency supply is also installed.

During the summer period, the solar collector alone heats domestic water. In the spring and autumn, this is supplemented with the wood-burning stove which gives a rapid supply of convection heating to the room and supplements the solar collector by heating the water in the top part of the combi tank. In the winter period, the wood-burning stove with the water tank handles most of the heat supply.

Background to O12 Fuel pellet hopper

The manufacturer of the pellet stove must inform the customer of how a hopper for the wood pellets should be designed for the recommended fuel.

²⁰ <https://transparencylab.org/Documentation/Industry-Related%20Actors/Industry%20Initiatives-%20Protocols-%20Standards/TFT%20Responsible%20Stone%20Program/TFT%20Responsible%20Stone%20Program.pdf>

2.6 Operation of the Nordic Swan Ecolabelled solid fuel local space heater

Background to O13 Emission to air and efficiency

Combustion of wood release significant quantities of various pollutants, including particulate matter (PM), soot, tar, polycyclic aromatic hydrocarbons (PAHs), carbon monoxide (CO), volatile organic compounds (VOCs) and other minor pollutants. A high RPS was identified for the reduction of emissions of CO, OGC and particulate matter in specific types of local space heaters compared to legislation and the performance levels declared in declaration of performance (DoP) from Scandinavian manufactures of solid wood local space heaters.

Commission Regulation (EU) 2015/1185 sets Eco-design rules for solid fuel local space heaters (<50 kW), requiring testing under harmonized EN 16510 standards series for conformity, covering emissions (particulate matter, OGC, CO and NO_x), efficiency and safety. The requirement has therefore been updated referring to the harmonized EN 16510 standard for all type of local space heaters. As in generation 4 of the criteria Nordic Ecolabelling does not set requirement for emission of NO_x. Formation of NO_x (oxidation of nitrogen in the air) requires high temperatures (over 1200 C), which are not achieved in small, closed space heaters. NO_x formation in closed space heaters is primarily linked to the fuel's NO_x, which is mostly found in the wood's bark²¹.

Solid fuel local space heaters (stoves) and insert appliances

The requirement for emission of OGC has been strengthened from 100 mg/m³ to 70 mg/m³ based on data found in declaration of performance (DoP) from Scandinavian manufactures of stove and insert appliances. Data shows huge variation which range from 120 mg/m³ to 20 mg/m³ of which the 120 mg/m³ correspond to EU Ecodesign regulation.

A new alternative test method for particulate matter according to EN 16510 has been introduced in the requirement. The Norwegian test method NS 3058/3059 is no longer obligate in Norway and both Norway and EU Ecodesign accept alternative particle test according to EN 16510. The requirement level for particulate matter using NS 3058/3059 is unchanged i.e. 2 g/kg. Alternatively, if particulate matter is tested according to EN 16510 the requirement level is 15 mg/m³. It is difficult directly to compare the requirement levels for the two different standard test methods. The requirement level of 15 mg/m³ is based on dialog with Technological Institute in Denmark and includes the expanded test procedure of 4 consecutive combustions cycles.

The requirement for efficiency has been strengthened from minimum 76% to 78% based on data found in declaration of performance (DoP) from Scandinavian manufactures of stove and insert appliances. Data shows a variation with range from 76% to 83%.

Slow heat release appliances

The requirement for emission of particulate matter is maximum 50 mg/m³ in generation 4 of the criteria i.e. above the new requirement level of maximum 40 mg/m³ in Regulation (EU) 2015/1185 (Ecodesign). The requirement has therefore been strengthened from 50 mg/m³ to

²¹ Verifikation og videreudvikling af biomasseovn med meget lave NO_x- og støv emissioner, Miljøprojekt nr. 1883, Miljøstyrelsen, september 2016.

25 mg/m³ based on data found in declaration of performance (DoP) from manufactures of slow heat release appliances.

Automatically operated stove designed for the combustion of wood pellets

The requirement for nominal efficiency is minimum 87% in generation 4 of the criteria i.e. under the new requirement level of minimum 89% in Regulation (EU) 2015/1185 (Ecodesign). The requirement has therefore been strengthened from 87% to 90% based on data found in declaration of performance (DoP) from manufactures of pellet stoves.

Manually operated sauna stoves

The requirements for sauna stoves are unchanged in generation 5.

Background to O14 Noise

The present requirement for the sound output from pellet stoves with automatic pellet feed may not exceed 55 d(B)A. In contrast to a traditional wood-burning stove, pellet stoves make a little noise.

For the stove to function, it usually has two fans. One fan to distribute heat from the stove into the room, and a fan on the smoke output (smoke extractor). There are several pellet stoves in the market that fulfil the Nordic Ecolabel's current noise requirements.

The Swedish energy authorities have tested ten different pellet stoves²² for noise, among other things, where the noise levels are 40-61 dB(A) at lowest outputs and between 47-61 dB(A) at highest outputs. The Norwegian "Jostedal" pellet stove has a noise level of 38 dB(A). The manufacturer "Thermorossi" markets several of its models with noise levels of 36 - 38 dB(A). As noise is an important parameter for a good indoor climate, Nordic Ecolabel has tightened the requirement in this version 4 from 55 d(B)A to 50 d(B)A.

Background to O15 Declaration – test of emissions, efficiency and noise

The requirement is unchanged compared to previous version of the criteria. Test laboratories do not always submit a complete official test report, but merely a description of their tests, which can be difficult to verify. The test conditions may have been different, or other methods may have been used. In such circumstances, further tests must be performed.

The local space heater industry and the test institutes have for a long time discussed the elements of the EN 16520-1:2022 standard that currently leads to poor reproducibility of test results when type testing Solid fuel local space heaters to the Ecodesign and CE labelling. This particularly concerns batch operated log wood appliances (over pellets) as the performance characteristics of batch operated stoves are more likely to be influenced by different manual operational habits.

Test according to EN 16510 consist of two consecutive combustion cycles and one add one. To increase the credibility of the test (more robust and reproducible tests) Nordic Ecolabelling request, that test for emissions as well as efficiency shall be carried out on 4 consecutive cycles with no pause or slip in-between. Nordic Ecolabelling sees a need for a

²² [Braskamin och pelletskamin](#)

separate declaration from the test institute stating that test and calculation have been carried out according to Nordic Ecolabellings instructions.

The test laboratories must declare that they have tested the local space heater in accordance with the specific requirements of the test methods stated in 13 and O14 as well as in Appendix 1.

In the event of uncertainty during case processing as to whether requirements in O13-O14 are fulfilled, the laboratory must declare that the fireplace in question fulfils requirements in O13-O14. Nordic Ecolabelling is entitled to require further documentation.

2.7 Customer information

Background to O16 Installation manual

Certain requirements in the criteria are documented in the installation manual. These requirements are primarily intended to ensure that the stove is installed and used in the correct way, to minimise the environmental impact.

Even if a stove yields good test values in the test laboratory, in practice its incorrect installation and use can entail major negative environmental impacts.

Requirements of competent installation technicians. The optimum situation would be that all Nordic Ecolabelled fireplaces were installed by certified installation technicians. From a market viewpoint, it has been impossible to make such a requirement. Instead, it is now emphasised that the manufacturer must recommend that the fireplace is installed by an authorised/competent fitter or distributor. There must also be a reference to where the customer can find competent installation technicians.

This is completely in line with the renewable energy directive (2009/28/EG), which requires that installation technicians for boilers and stoves for biomass must have sufficient knowledge to:

- Meet the customer's needs for efficiency and reliability
- Present qualified professional skills
- Comply with current acts and regulations

Requirements for the recommendation of chimney height (in meters chimney), from the fireplace flue. Chimney design is very important, especially since we require more efficient combustion. Availability of air circulation is another very important factor. In well-insulated low-energy buildings it may in some cases be necessary to create a combustion air system that ensures a constant air intake to the combustion site.

In the various stoves technical data sheet, there is provided a minimum chimney draft abandoned in PA (Pascal). This corresponds to a certain number of meter chimney, which is different from model to model. Nordic Ecolabelling requires that the chimney draft must now be expressed in meter chimney, as this makes more sense for the buyer than the figures provided in PA. The manufacturer can specify the height of the chimney based on an insulated steel chimney, as such is used when testing the stove.

When the smoke is going out through the fireplace flue/channels, it is meet by a flow resistance. This resistance must be compensated by the required chimney draft. The

chimney draft is generated by the difference in weight between the warm air, which is in the chimney, and a corresponding number of litres of atmospheric air. In operating instruction manuals, it is often said, that you need to make sure that there will be enough air for combustion, but a stove cannot suck in more air than the chimney can pull out. It is therefore important that the chimney draft (negative pressure) at least match the resistance of the stove, to ensure a clean burning as possible. It is also recommended to contact the chimney sweep for inspection of the existing chimney before a decision on the choice of fireplace is made. Chimney sweeps have pointed out how they are sometimes in a difficult situation when they visit a customer to inspect an installation and discover that the fireplace and chimney are not compatible.

Fuel: Correct wood burning requires that only clean, dry wood is used²³. If the wood is too wet, the stove will be cooled down and combustion will be incomplete. The fuel's water content should not exceed 18%.

This is because wet wood pollutes more and some of the energy and heat is spent on drying the fuel in the stove. This means that the fuel yields less heat. At the same time, the stove and chimney will fill up with soot, which in the final analysis can set the chimney on fire.

Newly felled wood contains approximately 60-70% water and is not suitable for combustion. As a rule of thumb, newly felled wood must be stacked to dry for minimum 1 year. Wood with a diameter of more than 10 cm should also be cleaved.

Private individuals are not permitted to burn waste (refuse). This also applies to waste wood such as pallets, chipboard residue, old fences, garden furniture and other types of treated wood. Refuse and waste wood are not firewood, but waste - and must be submitted to the local recycling station or the municipal collection scheme.

Information to the customer on how different types of fuel (types, materials, quality, moisture content) affect output and emissions is important, to ensure good combustion.

Lighting a fire - in a new way: A new fire lighting method, the "top down" method, can eliminate up to 42% of the particle emissions from wood-burning stoves and insert fireplaces^{24, 25}. The method is as follows: Place two pieces of firewood in the bottom of the fireplace. Add a pile of kindling stacked in layers with air in between, so that you can light the top. The flames must move downwards from the top, like a candle. Too much firewood, or pieces that are too large, can impede the air intake. It is therefore important to use smaller pieces of firewood, to get a good blaze. By lighting the top part of the fuel, you can eliminate up to 42% of the particle emissions from your wood-burning stove.

Nordic Ecolabelling recommends that the customer is informed about this new lighting method, as it is important to ensure good lighting with low emissions.

End-of life: Information relevant to disassembly, recycling and/or disposal at end-of-life. This information can potentially prolong the lifetime of the product and guide the customer to optimal recycling of the product at end-of-life. Support circular economy.

²³ <https://braendefyringsportalen.dk/>

²⁴ Miljøprojekt nr. 1478: 'Miljøråd - En samfundsøkonomisk analyse', udført af NIRAS 2013

²⁵ <https://braendefyringsportalen.dk/>

Background to O17 Operation and maintenance instructions

See background O16 above.

2.8 Information to distributors and installation technicians

Background to O18 Competence requirements

The European renewable energy directive (2009/28/EC), article 14, requires installation technicians for boilers and stoves (connected to a water system) and solar collectors to have sufficient knowledge to:

- Meet the customer's needs for efficiency and reliability
- Present qualified professional skills
- Comply with current acts and regulations

The directive also requires:

- Accredited training
- Personal certification with approved examination concerning both theory and practice
- Validity subject to time limitation

The requirement of competence and certification includes all boilers and stoves for biomass connected to a water system, as well as solar collectors. According to the renewable energy directive, each member states must have built up a functioning training and certification system by 31 December 2012 at the latest.

In Denmark the KSO scheme²⁶ is a quality assurance scheme for biofuel systems, solar heating plant and solar cell systems. The KSO scheme is directed at companies that work with installation and service of biofuel, solar heating and solar cell systems. The purpose of the scheme is to ensure that installed systems fulfil the quality requirements and that the companies in the scheme can document this. A company can achieve membership of the KSO scheme if the company has one or more employees with a KSO installer certificate. The installer certificate is issued by the KSO scheme to persons who complete a KSO course and pass the subsequent test.

In Sweden, the Sweden Energy Agency, together with the Swedish National Board of Housing, Building and Planning, has created a voluntary training and certification system for installation technicians in Sweden, in accordance with the renewable energy directive²⁷. The Swedish National Board of Housing, Building and Planning owns the specifications of requirements according to which the installation technicians can achieve certification.

Background to O19 Dimensioning and design of the heating system

As for other types of space heaters, the heating system must be dimensioned correctly in relation to the building's heating requirement. If the heating system is too large, the room(s)

²⁶ <http://www.kso-ordning.dk/>

²⁷ [Certifiering av installatörer ska hjälpa konsumenter att välja rätt](#)

will be too hot. If the problem is solved by turning down the combustion air to the fireplace, instead there is poorer combustion, with the risk of environmental hazards in the form of high emissions of particles, tar components and carbon monoxide, for example. Health and environmental hazards can therefore be reduced by dimensioning the heating system according to the customer's home.

Background to O20 Other information

To clarify the importance of the chimney must meet the stoves needs and concern for the environment.

2.9 Licence maintenance

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

Background to O21 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 O22 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 solid fuel local space heaters

To ensure that requirements are set in the entire life cycle of the service, a MECO (material, energy, chemicals and other impacts) analysis is performed for the following phases: raw material, production, use and end of life phase.

Nordic Ecolabelling sets requirements concerning the topics and processes in the life cycle that have a high environmental impact – also called hotspots. 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

Life cycle stages	Area and assessment of R, P, S (high, medium or low)	Comments
Raw materials		
	Raw materials extraction and production – Iron ore, steel and cast iron R: High P: Low S: Low	RPS = low R: Extraction of iron impact the environment through massive land use, habitat disruption/-fragmentation and extensive water consumption. Emission to air (dust from drilling, blasting and transport as well as greenhouse gas from diesel), soil degradation and noise/vibrations. In general, steel and cast-iron are responsible for most of the environmental impact of the material and manufacturing phase. Production of steel is more energy intensive than cast iron and hence steel appliances require twice as much energy to manufacture. There is high relevance (R) for reducing the environmental impacts from mining, refining and production of iron, the potential is low due to lack of steerability (long supply chain).
	Raw materials extraction – natural stone R: High P: High S: Medium/high	RPS = high Natural stone is used primarily for design and heat accumulation in slow heat appliances. The types of stone most used are soapstone and various types of sandstone. According to manufacturers of space heaters, soapstone is mostly extracted in quarries in Finland and Brazil, where the finished stone is also processed. There is high relevance (R) for reducing the environmental impact from mining. The steerability for extraction/processing of natural stone is medium/high due to Responsible Stone Program (RSP) which is widespread in the industry. RSP members are committed to complying with several ethical, social and environmental requirements, as a "Code of Conduct" for the extraction and processing of stone.
Production/distribution		
	Chemicals in production and surface treatment R: High P: Medium S: High	RPS = medium The chemical requirements apply to chemical products used in the production of stoves/local space heaters which involves a limited number of chemicals such as paint for surface treatment, degreasing agents, glue, sealants and clearing products. Reducing the quantity of health and environmental harmful chemicals and substances used during the production of local space heaters has high RPS. Due to the function "heat resistant chemicals" the potential to substitute to less harmful chemicals can be lower to specific types of chemicals.
	Emissions to air from solvent-based paint used in surface treatment. R: High	RPS = high Emissions to air from solvent-based paint have a clear environmental relevance and the steerability is good, which is

	P: High S: High	why Nordic Ecolabelling has a requirement for maximum VOC content in chemical products.
Use phase		
	Emissions from burning wood in closed local space heaters R: High P: High/Medium S: High	RPS = high Combustion of wood release significant quantities of various pollutants, including particulate matter (PM), soot, tar, polycyclic aromatic hydrocarbons (PAHs), carbon monoxide (CO), volatile organic compounds (VOCs) and other minor pollutants. Potential for reducing emissions of CO, OGC and particulate matter for specific types of local space heaters compared to legislation. Also, RPS for minimum order and number of test burn cycles to strengthen the test results. High steerability due to test/test reports and declaration from test institutes regarding the performance of the local space heater.
	Efficiency of the local space heater R: High/medium P: Medium S: High	RPS = high/medium The utilisation of the energy content for the biofuel (wood/pellet) thereby making the local space heater energy efficient is relevant. The potential for strengthen the efficiency requirement for some types of local space heaters is high. Obtaining a high energy efficiency is not always compatible with low emissions of OGC and particulate matter. The primary focus in these criteria is reducing emissions of OGC and particulate matter rather than very high energy efficiency. High steerability due to test/test reports and declaration from test institutes regarding the performance of the local space heater.
	Information for the installation, operation and maintenance of the local space heater R: High P: High S: Medium/low	RPS = medium Information about correct installation, operation, maintenance and competence of installation technicians are relevant and can affect the user's behaviour in a better way when using the local space heater. User behaviour such as moisture content of the wood, air settings and loading pattern have a major influence on the actual emission of particulate matter and OGC. Relevance and potential are high but the steerability on whether the user reads the information material is medium to low.
End of life		
	Recycling of steel and cast iron R: High P: Medium/Low S: Low	RPS = low Local space heaters often contain a high mass of steel/cast iron and are therefore coveted for recycling. Old/discarded local space heaters are already being recycled today – medium to low potential. The possibility to dismantle and separate less recyclable materials such as ceramic glass and vermiculite from the steel body increase the potential for recycling.

RPS summary

Raw material extraction and production

Raw materials extraction and production These phases of the life cycle are naturally relevant, but not as significant as the operational phase (R).

Life cycle analyses^{28, 29} show that the largest element of the environmental impact occurs during operation of the solid fuel local space heater, i.e. as emissions. The Norwegian study has considered "input-output" data where the main components was the production of birchwood (forestry and felling, transport, cutting and transport to the consumer), and the production and operation of wood-burning stoves. The results show that the operational phase represents more than 60% of the environmental impacts. The analyses also show that replacement from old to new stove technology leads to significant improvements (28-80%) for all environmental parameters studied.

The criteria make few requirements of production and materials, so that there is potential to develop them and thereby contribute to a reduced environmental impact. The more that the Nordic Ecolabel and the authorities tighten the requirements of the use phase, the more relevant it will be to make requirements of raw materials and production, viewed in an LCA perspective.

It is unclear how much potential there is for substitution of materials and items used in production. Regarding the use of chemicals in final production, there are significant environmental/health benefits from discontinuing the use of VOC products for surface finishing. Experience with the present criteria has also shown that it is possible to substitute CMR-classified chemical products with environmentally sounder products. (P)

Requirements of the coating of stone/stone production must be investigated more closely in a revision of the criteria. (R) (P) (S)

Operation/use face

Nordic Ecolabelling contributes by setting requirements so that only the best solid fuel local space heaters, with low emissions affecting health and the environment, and high efficiency, can be labelled. Emissions to air are measured in optimum laboratory/test conditions. The actual emission picture and the actual efficiency are often lower, due to chimney quality (sealing, draught conditions), the behaviour of the person lighting the local space heater, the wood's quality and moisture content, and whether other materials than wood are used as fuel. The Nordic Ecolabel has no control of these factors. However, we can seek to influence these factors with requirements of good and correct information in installation and operations manuals. (S)

Relevance (R), potential (P) and controllability (S) are good as information in installation and operating manuals, competence of installation technicians, and other information to customers that affects their behaviour when using the local space heater (lighting-up videos, etc.). The communication of the distributor/installation technician concerning the acquisition

²⁸ Solli Christian et al: "Life cycle assessment of wood-based heating in Norway – Norwegian University of Science and Technology 2025.

²⁹ European Commission DG Tren: "Preparatory study for Eco-design requirements of EuPS (II) – LOT 15 Solid fuel small combustion installations", task 5 – Final version December 2009.

of a local space heater (size of stove (kW), chimney, type of stove) may be of great significance to the customer's decision to buy. In summary, criteria should be developed for additional requirements of manufacturers to increase the competence of installation technicians/distributors, as well as the information they provide to guide the customer to take an environmentally-sound purchase decision.

There are several ways to reduce the actual emissions that occur when the homeowner lights the local space heater. Examples include local space heater equipped with automatic control of combustion (automatic control of air intake), electronic control of combustion (lambda probe or equivalent technique), afterburners or other smoke cleaning technique. In future revision of the criteria, the project group should consider the opportunity to set requirements to new technologies without at the same time controlling the technology. (P)

End-of-life

The degree of material recycling for wood-burning stoves and similar local space heaters is already very high today, so that the contribution from Nordic Ecolabelling is very limited. (P) Less use of materials that are hazardous to health and the environment in the production of the stove/local space heater can naturally contribute to a reduced environmental impact from waste. (R) The same applies to the labelling of materials used for the dismantling and separation of materials. (P)

Summary

RPS is found for the following:

- Requirements for extraction of natural stones
- requirements for classification of chemical products and unwanted substances in chemical products such as halogenated organic compounds, bisphenols and phthalates;
- to reduce VOC from paint used in surface treatment
- strict requirements concerning emissions that are hazardous to health and the environment to the air in the operating phase;
- strict requirements for the efficiency of the local space heater in the operational phase;
- information for the installation, operation and maintenance of the local space heater;
- information to distributors and installation technicians for competent installation;

MECO scheme

	Raw material	Production	Use	End of life	Transport
Material	Steel sheet (3 to 6 mm) and cast-iron parts are the main raw materials in all types of solid fuel space heaters. Typically, the appliance contains around 130–155 kg ferrous metals (steel/cast iron) for a standard wood or pellet stove, while slow heat release stoves can have ~55 kg ferrous metals plus large amounts of masonry (misc.), bringing total appliance mass up to about ~1,500 kg. Both steel sheet and cast iron contain recycled material. Vermiculite or chamotte are used for insulation in the combustion chamber (proxy: refractory ceramics). In typical wood and pellet stoves, non-metal “misc.” materials (incl. refractory/insulation, small parts, etc.) are about 8–12 kg, but they can be much higher in slow heat release designs where masonry dominates. Ceramic glass is used for windows in many space heaters (proxy: glass for lamps). This is part of the	Production is dominated by processing and assembly of steel sheet and cast-iron parts. Steel sheet parts are typically cut, bent and welded, generating sheet offcuts and punching scrap plus welding and grinding dust. Cast iron parts are melted and cast and often machined, generating gating and risers, swarf and slag and dross. Refractory insulation is formed and trimmed, giving breakage and cutting dust, and ceramic glass is cut and edge finished, giving offcuts and breakage. Surface treatment (often powder coating) adds pretreatment sludge or wastewater and filter waste and curing ovens can be a key energy use. Cardboard, plastic bags and wood pallets are used for protection and transportation of finished space heaters, creating packaging waste.	All combustion of solid wood releases greenhouse gas emissions (biogenic). Raw material selection (wood species) has an impact on function and quality parameters such as moisture content, size distribution, strength, etc. Wood consumption depends on appliance type (nominal output, efficiency and typical operating hours) For a mid-size wood stove (e.g. ~7 kW, ~70% efficiency, a few hundred hours/year), this is typically on the order of ~0.5–1.2 t logs/year but can be lower or higher depending on stove type and user behaviour.	Space heater bodies made from steel and cast-iron can be recycled (typically assumed at around ~95%, corresponding to roughly ~124–147 kg of recycled ferrous metals for a standard stove). Small fractions of non-ferrous metals are also largely recyclable (~95%, i.e. about ~1.0–1.9 kg recycled), while electronics are handled separately (WEEE) and are often not recycled together with the metal body. Ash from incineration can be used to return nutrients to the ecosystem if the ash is composted or spread on the ground. Ash is also handled as residual waste. Vermiculite/chamotte and ceramic glass have a very low recyclability and are often handled as residual waste/landfill.	

	"misc." fraction (typically within that ~8–12 kg range for standard stoves). Natural stones and other masonry ceramics can be used for design and heat accumulation, especially in slow heat release stoves (included in misc.). For these stoves, "misc." (masonry/stone/ceramics, etc.) can be on the order of ~1,450 kg, which is why total mass is much higher than for standard stoves. Wood raw materials (logs, pellets, and residual products) are the main fuel, but not part of the appliance bill of materials. Where relevant (e.g., pellet stoves), additional materials are small but present: roughly ~1–2 kg non-ferrous metals, ~1 kg electronics, and <1 kg coating.				
Energy	A relatively large amount of energy is in the raw material stage: • Steel sheet (galv.): 34.0 MJ/kg / 2.8 kg CO₂e/kg • Cast iron: 10.0 MJ/kg / 1.1 kg CO₂e/kg • Refractory ceramics (proxy for chamotte/vermiculite + stone): 5.6 MJ/kg / 0.1 kg CO₂e/kg	Energy is required for cutting and forming steel sheets, welding, sand/metal blasting (surface preparation) and final coating/curing of space heaters. Indicative factors are: • Cutting/forming (proxy: metal working machine): 17.9 MJ-eq/kg / 0.83 kg CO₂-eq/kg	Combustion efficiency measured under EN 16510-1 varies between type of solid fuel space heaters. Stove typically preforms between 70-85% while pellet stoves preform between 75-95% A minor part of the total energy used for pellets as domestic heating corresponds to use phase as combustion demands	Steel and cast-iron recycling saves energy and climate impact. Recycling 1 kg ferrous metal instead of producing primary steel saves about ~14 MJ-eq/kg / ~1.8 kg CO₂-eq/kg. With the metal body largely recycled (often modelled around ~95%), this becomes a major energy and climate saving in the end-of-life stage.	Transportation of iron ore to steel mills. In addition, transport of steel/cast iron to further processing, retailers and finally the production site. Transport is typically done by truck.

	• Glass (for lamps/windows): 16.2 MJ/kg / 0.8 kg CO₂e/kg • Copper tube/sheet (non-ferro parts): 50.9 MJ/kg / 2.7 kg CO₂e/kg • Powder coating (surface treatment): 357.2 MJ/kg / 17.8 kg CO₂e/kg • Controller board (electronics): 781.5 MJ/kg / 51.5 kg CO₂e/kg LDPE (plastic bags): 77.8 MJ/kg / 1.9 kg CO₂e/kg	• Welding (arc welding, steel): 2.45 MJ-eq/m / 0.185 kg CO₂-eq/m • Sand/metal blasting (blasting): 44.2 MJ-eq/kg / 4.61 kg CO₂-eq/kg • Curing oven energy (pure energy input): • Electricity, low voltage (EU mix): 5.23 MJ-eq/kWh / 0.088 kg CO₂-eq/kWh Natural gas industrial furnace heat >100 kW (EU): 1.36 MJ-eq/MJ / 0.075 kg CO₂-eq/MJ	electricity for feed screw and fans (1). The use phase of burning solid wood provides useful heat and is often considered “carbon neutral” in the sense that trees absorb CO₂ during growth. As an illustration, burning ~0.5–1.2 tonnes of logs (≈20% moisture) corresponds to ~1.4–4.1 MWh of useful heat at 70–85% efficiency. The same amount of wood releases ~0.7–1.8 tonnes of biogenic CO₂ during combustion, while additional CH₄/N₂O and upstream emissions (harvesting, processing, transport) can contribute to CO₂e. However, the carbon neutrality of wood pellets is debated. If forests are not sustainably managed, the carbon release could surpass the carbon absorbed. Compared to other local heating sources, wood burning emits higher levels of CO₂ as well as particle matter (2).		
Chemicals	N.a	Different types of paint/coating are used for surface treatment of space heaters. The products are often classified as environmentally hazardous and contains a relative high share of VOC (function: to be heat resistant).	The use phase. i.e. wood combustion, is responsible for over 60% of the overall impact from all type of space heaters (3). Another report(4) concludes: the use phase contribute 98% of the GER indicator,	N.a	

		Different types of glue and sealants (silicone heat resistant) as well as cleaning/decreasing product are used in the assembly and final inspection process.	86% of the PM indicator and 88% of GWP across all cases. Combustion of wood release significant quantities of various pollutants, including particulate matter (PM), soot, tar, polycyclic aromatic hydrocarbons (PAHs), carbon monoxide (CO), volatile organic compounds (VOCs) and other minor pollutants. The concentrations of air pollutants are determined by the simultaneous influences of various factors, including fuel quality, combustion conditions. Wood pellets tend to burn more cleanly than traditional firewood or coal, producing lower levels of harmful emissions.		
Other		Risk of bad working conditions (violation of human rights, slavery) mainly in the stone quarry in developing countries.	PM, CO, OGC, NOx measured under controlled conditions; real-life emissions vary strongly with user behaviour (4) User behaviour: Moisture content of wood, air settings, loading patterns; major influence on PM and CO. Durability firebox lining/stone replacement every 10 year		

Sources for MECO

1. CHEN S et al. "Life Cycle Assessment of Wood Pellet", Department of Energy and Environment - Division of Environmental System Analysis CHALMERS UNIVERSITY OF TECHNOLOGY, 2009.
2. Press-Kristensen K: "Pollution from residential burning – Danish experience in an international perspective", Green transition, 3rd edition 2022.
3. Solli Christian et al: "Life cycle assessment of wood-based heating in Norway – Norwegian University of Science and Technology 2025.
4. European Commission DG Tren: "Preparatory study for Eco-design requirements of EuPS (II) – LOT 15 Solid fuel small combustion installations", task 5 – Final version December 2009.

4 Changes compared to previous generation

Figure 1 Overview of changes to criteria for stoves generation 5 compared to previous generation 4.

Gen. 5	Gen. 4	Same req.	Change	New req.	Comments
Product group definition	Product group definition		X		Updated according to definitions in EU Ecodesign 2015/1185 for solid fuel local space heaters, however no change in types of local space heaters covered by the criteria.
O1 Description of the product and warranty	O1 Description of production process and O2 Materials		X		Editorial change. Former O1 and O2 has been merged into one requirement and new bullet point regarding the Declaration of performance (DoP) in accordance with regulation (EU/305/2011) and CE label/plate has been added
O2 Classification of chemical products	O3		X		The requirement has been strengthened. New classification of H317 (STOT SE 2) as well as updated CLP classification to align with the European Green Deal's goal of a toxic-free environment.
O3 Classification of ingoing substances				X	New requirement. Ingoing substrates classified as e.g. carcinogenic, mutagenic, toxic for reproduction must not be used in chemical products.
O4 Excluded substances	O4		X		The requirement has been strengthened. Several new substances have been added to the list such as bisphenols, endocrine disrupters (list I-III) and PFAS
O5 Nano materials	O4		X		Editorial change Moved from O4 Excluded substances to a separate requirement O5.
O6 Surface treatment and VOC content in surface paint/-varnish	O6	X			Unchanged

O7 Packaging	O7		X		Editorial change The text has been made clearer
O8 Pressure testing/leak measurement	O9	X			Unchanged
O9 Extraction of natural stones-environmental req.	O10	X			Unchanged
O10 Extraction of natural stones – Working conditions	O11	X			Unchanged
O11 Solar collector	O12	X			Unchanged
O12 Fuel pellet hopper	O13	X			Unchanged
O13 Emission to air and efficiency	O14 and O15		X		Requirement has been strengthened and edited Former O14 Emissions and O15 Efficiency has been merged into one requirement - OGC and efficiency from stoves and insert appliances has been strengthened. - New alternative test method EN 16510 and requirement level for emission of particles from stoves and insert appliances - Emission of particulate matter has been strengthened for slow heat release appliances - Efficiency from pellet stove has been strengthened
O14 Noise	O16	X			Unchanged
O15 Declaration concerning test of emissions, efficiency and noise	O17	X			Unchanged
O16 Installation manual	O18	X			Unchanged
O17 Operating and maintenance instructions	O19	X			Unchanged
O18 Competence requirement	O20	X			Unchanged
O19 Dimensioning and design of heating system	O21	X			Unchanged
O20 Other information	O22	X			Unchanged
O21 Customer complaints			X		Replaces the former requirements O23 to O31
O22 Traceability					Replaces the former requirements O23 to O31
Removed requirements					
O6 Metal coating of parts	O5				Removed from the criteria. Handled in requirement O4 Excluded substances
	O9 waste				Removed from the criteria Handled by legislation

5 Future criteria

Nordic Ecolabelling will, in future generations of the product group, assess the possibilities of implementing the following requirements:

- Product group definition – new types/technologies for solid fuel local space heaters
- Chemicals used in the production and surface treatment of the local space heater
- Emissions and efficiency from burning solid fuel (wood) in local space heaters.

Appendix 1 Comparison of Nordic Swan Ecolabelling and EU Eco-design requirements for stoves/solid fuel local space heaters

Table 1: NSE threshold values for emissions and efficiency from solid fuel local space heaters.

Test methods and test parameters	OGC	CO	Particulate matter (PM) Must be tested according to either EN 16510-1 or NS 3058/3059		Efficiency
	EN 16510-1	EN 16510-1	EN 16510-1	NS 3058 /3059	EN 16510-1
Solid fuel space heaters (stove)	70 mg/m ³	1250 mg/m ³	15 mg/ m ³	2 g/kg ($\bar{x}$ for up to 4 loads) 5 g/kg (for each load)	78%
Insert appliances	70 mg/m ³	1250 mg/m ³	15 mg/m ³	2 g/kg ($\bar{x}$ for up to 4 loads) 5 g/kg (for each load)	78%
Slow heat release appliances	100 mg/m ³	1250 mg/m ³	25 mg/m ³	n.a	83%
Automatically operated stove designed for the combustion of wood pellets	10 mg/m ³	200 mg/m ³	15 mg/m ³	n.a	90%
Manually operated sauna stove	150 mg/m ³	1700 mg/m ³	120 mg/m ³	n.a	60%

Table 2: Ecodesign regulation 2015/1185 threshold values for emissions and efficiency from solid fuel local space heaters.

Test methods and test parameters	OGC	CO	Particle matter (PM)		Efficiency	NOx
	EN 16510-1	EN 16510-1	EN 16510-1	NS 3058 /3059	EN 16510-1	EN 16510-1
Solid fuel space heaters (stove), Insert appliances and Slow heat release appliances	120 mg/m ³	1500 mg/m ³	40 mg/m ³	5 g/kg n.a for slow heat	75%	200 mg/m ³
Automatically operated stove designed for the combustion of wood pellets	60 mg/m ³	300 mg/m ³	20 mg/m ³	n.a	89%	200 mg/m ³
Manually operated sauna stove	Not part of EU Eco-design regulation					