About Nordic Ecolabelled

Chemical building products

Version 2.0

Background to ecolabelling
14 October - 9 December 2013
Consultation version

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1 Summary

In the product group chemical building products there are many different kinds of products. The products are used in large volumes[1] approx. 562,000 tonnes per year in the Nordic region plus 325,000 tonnes per year of industrial paint and varnish),[2] which makes influencing the chemical content of the products a highly relevant action to take.

A survey of chemical building products has shown that many of the products [3], [4] and their constituent substances are classified as harmful to the environment and/or health[5]. Nordic Ecolabelling has therefore chosen to focus on requirements that control the content through limits on various substances depending on their inherent properties, and also that limit emissions of substances such as VOC.

In this revision, the greatest focus has been on expanding the product group to include industrial paints and varnishes, tightening the VOC requirements for outdoor paints, tightening the VOC requirement for all groups through requirements concerning test reports, tightening the requirement concerning substances harmful to the environment, introducing an updated nano requirement, evaluating how limits on preservatives can be tightened and introducing a clear RPS.

Nordic Ecolabelling has come to the conclusion that the most relevant parameters for chemical building products are that they:

- Contain low levels of substances that are harmful to health and the environment
- Have low emissions to air and water
- Are effective and meet tough performance standards

There are currently around 100 ecolabelled chemical building products, which means that Nordic Ecolabelling has generated an environmental gain by limiting the use of undesirable chemicals in society within this large product group.

It is difficult to measure the environmental gains from ecolabelling. Nordic Ecolabelling is, however, aware that the licensees in this product group have widely been forced to change their formulations in order to meet the requirements set out in the Criteria for Nordic Ecolabelling of Chemical Building Products. This fact, coupled with the aforementioned relatively large volumes of chemical building products, gives a strong indication that a significant environmental gain has been generated.

2 Basic facts about the criteria

Products that can be labelled

The product group definition below has been updated compared with version 1. Paints and varnishes for industrial applications have been added as a new subcategory. This

[1] Official Statistics of Sweden; Statistiska Meddelanden MI 45 SM 1001: pp 25-26.
[2] Evaluation of Nordic Ecolabelled Chemical Building Products, 14 September 2012: pp 7-8.
[3] Inneklimakrav til kjemiske byggprodukter, TI, (February 2008).
[4] Official Statistics of Sweden; Statistiska Meddelanden MI 45 SM 1001: pp 25-26.
[5] Inneklimakrav til kjemiske byggprodukter, TI, (February 2008).

category includes paints (in liquid and powder form) that are applied through spraying, curtain coating and dipping.

Adhesives for industrial use have not been included in this version, but will appear as a point in future versions. The focus at this time has been on formulating sound requirements for industrial paints and varnishes.

Chemical building products refers to liquid or non-hardened products for use in building work both indoors and outdoors, and on different substrates. Until further notice, the product group covers the following products for manual and machine application:

- Adhesives*
- Sealants
- Fillers
- Outdoor paints and varnishes**
- Indoor paints and varnishes only for industrial application***

** Here adhesives refer to products such as wood adhesive, grab adhesive and wallpaper paste. The product group does not include adhesives for industrial use for purposes such as furniture production or panelling.*

*** Outdoor paints and varnishes cover products that are applied manually and by industrial processes.*

**** Criteria already exist for the Nordic Ecolabelling of indoor paints and varnishes, and thus these cannot be ecolabelled under the criteria below. Industrial indoor paints and varnishes refers here to paints that are used and manufactured for industrial applications such as painting furniture/panels.*

Solid building products such as insulation materials and plastic products, pure concrete, etc. cannot be Nordic Ecolabelled under these criteria. Criteria already exist for Nordic Ecolabelling, for example, houses, windows and external doors, floors, furniture and fixtures and fittings (including internal doors and stairs), building panels, sustainable wood etc.

Justification for Nordic Ecolabelling

This product group was set up on the basis of experiences that Nordic Ecolabelling had of ecolabelling houses, which led to an evaluation of Relevance, Potential and Steerability for chemical building products being developed in 2004.

To achieve environmental gains, each individual requirement must be relevant to the environmental objectives of Nordic Ecolabelling[6]. There must also be a proven potential to differentiate between the environmentally better products and others (there must be a difference and it has to be large enough that it "pays" to set the requirement). There must also be scope to steer the environmental problem in question via ecolabelling requirements. These three parameters are to be seen together and as such are referred to as Relevance-Potential-Steerability, RPS. Choosing the requirements that together have the greatest relevance, potential and steerability in terms of the product's life cycle achieves the greatest environmental gain.

Experiences from the licensing work were drawn on in combination with a light RPS, and a MECO analysis (which looks at the combined impact of materials, energy, chemicals and other aspects such as waste, transport and so on) was conducted as part of

[6] Nordic Ecolabelling's environmental objectives: http://www.nordic-ecolabel.org/about/the-mission/

the assessment of the product group in 2012. The conclusion was that this remains a highly relevant product group for which to set ecolabelling criteria.

The MECO analysis showed that the key parameter for chemical building products is the properties of the constituent substances. See also section 4 for more about the MECO analysis.

Relevance (R)

There are a number of chemical building products, including fillers, sealants, adhesives, outdoor paints and varnishes and industrial paints and varnishes. These products can in turn contain a number of subcategories for different functions and applications. What links the four product types (fillers, sealants, adhesives and paints & varnishes) is that they contain chemicals that may be harmful to the environment and/or health, such as: binders, solvents, catalysts, hardeners, monomers, flame retardants and preservatives/biocides. The same types of ingredient also tend to appear in different chemical building products.

A consultant studied the classification of chemical building products based on information in safety data sheets, and the study showed that many of the constituent ingredients in these products are classed as harmful to the environment and/or health[7]. It has also become apparent that many of the finished chemical building products may be classed as harmful to the environment and/or health[8],[9]. Chemical building products are used in large volumes[10] (approx. 562,000 tonnes per year in the Nordic region of the products within the product group "Chemical building products" and approximately 325,000 tonnes per year of industrial paint and varnish)[11], which makes influencing the chemical content of the products a highly relevant action to take.

Potential (P)

Through active choices of ingredients or the formulation/reformulation of their recipe, producers are often able to reduce the environmental/health impact of their products (although there are critical factors surrounding the choice of ingredients, as described in section 4 “Critical factors”).

Even minor adjustments to the product formulation (such as replacing an ingredient with one that is not as harmful to the environment and/or health, or one with less VOC) can generate a real environmental gain, because the products sell in such large volumes.

The useful life of the products also plays a major role in that increasing the lifespan for these products directly results in raw material and production savings. The quality requirements in this product group are therefore also directly associated with environmental gains.

Steerability (S)

There are many large manufacturers of sealants, fillers, adhesives and paints & varnishes, as well as numerous raw material suppliers for them to use. This creates a competitive situation which means that Nordic Ecolabelling can work well in stimulating the development of more environmentally friendly products.

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[7] Inneklimakrav til kjemiske byggprodukter, TI, (February 2008).
[8] Official Statistics of Sweden; Statistiska Meddelanden MI 45 SM 1001: pp 25-26.
[9] Inneklimakrav til kjemiske byggprodukter, TI, (February 2008).
[10] Official Statistics of Sweden; Statistiska Meddelanden MI 45 SM 1001: pp 25-26.
[11] Evaluation of Nordic Ecolabelled Chemical Building Products, 14 September 2012: pp 7-8.

Reports from public authorities and the industry itself indicate that ecolabelling can be a tool for steering development towards more environmentally aware products. The construction industry in general is highly competitive and price can often be a more important factor than the environment in procurement processes. However, there is an increasing demand for sustainable construction, which means that demand is also rising for products with a good environmental and health profile, giving them a stronger position in the market.

Version and validity of the criteria

The first version of the criteria document was adopted by the Nordic Ecolabelling Board on 29 May 2008 and was to remain valid until 30 June 2011.

Amendments were made on three occasions during the validity of the criteria. On the first occasion (2009), requirements R4 and R5 were amended, and text was added to Appendices 1 and 2. 2011 first saw a change to R7 and R11 and later that same year came amendments to R2, R4 and R22.

The period of validity of the criteria has also been extended, such that the current version is now valid until 31 October 2014.

The Nordic market

The companies that manufacture chemical building products come in all sizes, from sole traders to multinational companies and groups. Several parallel marketing stages exist simultaneously within the industry. New products are constantly being developed within chemical building products.

The industry is not currently undergoing any significant structural changes. What can be noted generally is that the large groups (such as Saint Gobain and Tikkurila) often buy up smaller companies with good potential for development. There are also major multinationals in this industry such as Jotun, AkzoNobel, Henkel and Sika Group.

Nordic Ecolabel licences

Over the four years that the Criteria for Chemical Building Products have been in existence, 14 licences have been granted (note that some of the licenses have products from more than one category in the table below), covering a total of around 100-150 products. The licences are distributed as shown in Table 2.1 below.

Table 2.1. Summary of licences in each product category (Feb 2013)

	Outdoor paints and varnishes		**Adhesives**		**Fillers**	
	Licences	**Reg**	**Licences**	**Reg**	**Licences**	**Reg**
Denmark	2	3	1	2	1	2
Finland	1	2	0	2	0	1
Iceland	0	0	0	1	0	0
Norway	1	2	1	1	2	2
Sweden	3	1	1	1	4	2

Other labels

There are many different labels and steering instruments for chemical building products that focus on different parameters such as health, quality and the environment.

Since the number of labels in itself constitutes a problem, we have chosen only to present the most significant (largest) systems below, see also Appendix 1.

EPD (Environmental Product Declaration)[12], M1 (the Finnish indoor climate label)[13], Danish indoor climate label, the Joint Council for Creative and Hobby Materials' A, B, C or D label[14], CE marking[15], ECOproduct[16] [17], the P symbol[18] (a scheme operated by SP Technical Research Institute of Sweden and the Swedish Institute for Technical Approval in Construction), VTT[19] (Technical Research Centre of Finland), the Danish MAL codes[20] (concerning inhalation hazards) and the EU Ecolabel (criteria for outdoor paints[21]).

3 About the criteria review/revision

Goals of the criteria review/revision

To put forward a revised version (version 2.0) of the Criteria for Chemical Building Products, expanded to include industrial paints and varnishes.

About this criteria review/revision

The project was planned and run as a Nordic project. In January 2013, the project moved over into the new project organisation, which meant new roles and so on. The revision ran through autumn 2012 and on into 2013.

Project participants:

	2012	**2013/2014**
Project Manager	Svante Sterner (Sweden)	Terhi Uusitalo (Finland) / Susanna Vesterlund (Sweden)
Nordic Product Adviser/Nordic transitional team member	Randi Rødseth (Norway)	Svante Sterner (Sweden)
Nordic Area Coordinator/ Nordic Product Development Manager	Karen Dahl Jensen (Denmark)	Karen Dahl Jensen (Denmark)

During the project external input was sought on an ongoing basis from the likes of licence holders and manufacturers, and through an external consultation during the period October-December 2013.

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12 About the EPD system, Swedish Environmental Management Council, Sweden. Available at: http://www.msr.se/sv/epd/ (visited 26.04.12)
13 FiSIAQ, Finland. Available at: http://www.sisailmayhdistys.fi/portal/fisiaq_in_english/ (visited 27.04.12)
14 Survey of Chemical Substances in Consumer Products, No. 93 2008.
15 CE marking, European Commission. Available at: http://ec.europa.eu/enterprise/policies/single-market-goods/cemarking/index_sv.htm (visited 27.04.12)
16 Integrated product policy and eco-product development; Martin Charter, et al: The Centre for Sustainable Design, UK. Greenleaf Publishing Ltd (2001).
17 Integrated product policy and eco-product development; Martin Charter, et al: The Centre for Sustainable Design, UK. Greenleaf Publishing Ltd (2001).
18 P symbol (SP), Available at: http://www.sp.se/sv/index/services/p_mark/sidor/default.aspx (visited 27.04.12)
19 Technical Research Centre of Finland (VTT). Available at: http://www.vtt.fi/?lang=sv (visited 27.04.12)
20 MAL codes. Available at: http://www.mst.dk/Borger/Temaer/Gor_det_selv/Faktaark/Fakta_om_malkoder.htm (visited 27.04.12)
21 EU Ecolabe: http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:32009D0543:EN:NOT

The most significant changes made in this version are:

- The product group definition has been expanded to include industrial paints and varnishes
- New classifications (CLP) introduced
- New calculation of environmentally harmful substances
- New nano requirement
- New VOC limits for outdoor paints, and requirements concerning test reports
- New quality requirements for industrial paints and varnishes
- Updated consumer information
- A new requirement on sorting waste has been introduced

4 Justification of the requirements

Nordic Ecolabelling bases its work on three parameters when setting the requirements within the criteria.

These three parameters are to be seen together and as such are referred to as Relevance-Potential-Steerability, RPS. Choosing the requirements that together have the greatest relevance, potential and steerability in terms of the product's life cycle achieves the greatest environmental gain.

Relevance is assessed based on which environmental problems the product group causes and how extensive those problems are.

Potential is assessed based on the potential environmental gains within the specific product group and for each area in the criteria where requirements are set.

Steerability is assessed based on the scope to set requirements concerning the relevant environmental parameters with potential for improvement.

We have also applied a method for life cycle assessment as described in "Handbook on environmental assessment of products"[22]. Using this method, we conducted a MECO analysis, which looks at the combined impact of materials, energy, chemicals and other aspects (such as waste, transport and so on) for chemical building products. It was drawn up in conjunction with the assessment of the criteria in 2012 in order to update the product group's RPS (Relevance, Potential and Steerability) analysis. The MECO analysis can be viewed in Appendix 2.

The MECO analysis was used to identify which areas pose the greatest environmental and health challenges for chemical building products, and therefore where it is most relevant to set requirements. The chemicals section of the MECO analysis is extremely important for the product group chemical building products. It is possible to improve the MECO analysis by adding energy data, but it is difficult to establish energy data for chemical substances and their environmental impact, so we have chosen not to do so. Manufacturers have difficulty in switching from one sort of raw material (e.g. paraffin) to a completely different type of raw material (e.g. methanol) to reduce their energy

[22] Miljöstyrelsen, 2001: www.mst.dk

consumption. Raw materials of the same type are considered to have similar manufacturing processes and energy consumption.

There are many chemical building products and constituent substances that have a harmful effect on the environment and/or health. The MECO analysis indicates that discharges and emissions from various raw materials during production and use are the most significant parameters. The working environment during production and during use of the end product is also a point where there is an RPS.

Below is a more specific/detailed RPS for the product group in question, with reference to the raw materials phase, the production phase, the usage phase, waste and transport.

4.1.1 Relevance

Survey of substances that are harmful to the environment and health in chemical building products – National Institute of Technology (TI)

As part of the feasibility study for chemical building products, before development of the criteria began, the National Institute of Technology in Norway[23] conducted a survey of chemical building products on behalf of Nordic Ecolabelling. The study was completed in February 2008. It covered products on the Norwegian market, but was taken as being representative of the whole Nordic region, since the products in the various countries are more or less of the same type.

The conclusion of the report was that emphasis should be placed on the following general considerations when setting criteria for the Nordic Ecolabelling of chemical building products.

- Prioritise polymers with the lowest emissions
- Avoid ecolabelling the most harmful products (T, Xn, C, Xi and N)
- Focus on environmentally harmful additives
- Reduce the content of volatile organic compounds (VOC)
- Look at the performance of the product
- Ensure good information for the end user

Raw material phase:

It is relevant to set requirements concerning constituent substances, since there are often different variants of these raw materials which have differing impacts on health and the environment. The manufacturers of the products are largely able to influence which raw materials are chosen for each product.

Minerogenic raw materials are mined and processed before they are used in chemical building products (function in the products: filler, binder, pigment, etc).

Fossil raw materials are mined and processed before they are used in chemical building products (function in the products: solvent, binder, filler, pigment and preservative).

[23] National Institute of Technology, Miljøkrav til kjemiske byggprodukter, 2007

Generally speaking, over 300 raw materials go into manufacturing paints. Of those, around 70% are based on petroleum, but renewable oils can/could be used instead of petroleum. In the raw materials phase, in which raw materials for the chemical building products are produced, there are several clear and relevant environmental problems (associated with: mining operations, open-cast mining, oil drilling, oil palm growing, etc).

Plant raw materials are harvested/extracted before they are used in chemical building products (function in the products: rheology modifier, filler, pigment, polymer, etc).

Binders are the main/key component in all subgroups, and also control the products' areas of use.

Fillers have an important function in determining the products' mechanical properties. Common fillers include chalk, calcium carbonate and talc.

Viscosity regulators are used to enable smooth application of the products onto surfaces without running/dripping and to give the product the right consistency. Substances commonly used include vegetable oils, resins, starches and polyamide wax.

Solvents are organic substances used in relatively small quantities to allow easier application.

Plasticisers are added to certain products to give the "dried/hardened" end product the right elasticity. Phthalic acid esters and benzoic acid esters have previously been common, but rapid advances are being made in the area and other substances are also commonly used.

Pigments are used to give the product the desired colour and may make up 0-30% of these products. The most common pigments are probably titanium dioxide (TiO_2) and carbon black. Pigments are a wide-ranging and heterogeneous group of substances comprising inorganic compounds (usually metal oxides), organic compounds and mixtures of organic and inorganic compounds in the same pigment molecule.

Preservatives and fungicides are used because the contents of the chemical building products are generally fodder for microorganisms, plus raw materials are used that are already hosts to microorganisms. Preservatives are therefore highly necessary in this context and usually the raw materials already come preserved. There are major health differences between different preservatives.

Additives such as hardeners and accelerators are also used to varying degrees.

Production phase:

During the manufacture of chemical building products, raw materials are blended together to create finished chemical building products, which are then packaged before they leave the factory. The greatest risk of exposure to substances that are harmful to health is via the airways. This risk is minimised in factories where the majority of production takes place in closed systems, but since it is not always possible for the whole production line to be a closed system, it remains relevant to limit the use of substances that are harmful to health in the products.

Energy consumption during manufacture is judged to be relatively low in terms of energy consumption per litre of product without water, since the process primarily involves raw

materials being mixed to form the finished product, which is then packaged in plastic, metal or paper packaging. There is therefore less relevance in setting requirements concerning energy consumption in the process.

The "Other" section in the MECO analysis includes the working environment, and in this context dust-producing raw materials are a consideration. It is relevant to set requirements concerning these, since dust-producing raw materials pose a health risk.

Usage phase:

The products are applied manually or using a machine and this subjects the user and the environment to exposure and/or risk of exposure to substances that are harmful to health and the environment in the products, and to emissions of various volatile organic compounds (VOC) and allergens. During hardening/drying, the products may emit "new" substances arising from the hardening reaction, including methanol and formaldehyde (carcinogenic substances). It is therefore relevant to set requirements concerning the impact on health and the environment of the raw materials and the end products.

During the usage phase, chemical building products have an important secondary function in that they must last/perform for many years, perhaps 10-30 years depending on the subgroup. This makes it relevant to set requirements concerning quality and performance.

Waste phase:

It is common to both recycle and reuse building materials. This is, however, governed by the building material itself and not the surface treatment of paint, varnish, adhesive, sealant or filler. The building material may comprise a number of different materials. It is therefore hardly practical to consider whether the chemical building product is recycled or reused, since it is the building material itself that steers the whole recycling process. This phase is therefore extremely difficult to assess within the MECO analysis and thus the relevance of setting direct requirements for this waste phase is low.

It is, however, relevant to consider the residues that remain in tins/packs of used chemical building products. These can vary in quantity and content, depending on how they are used.

Transport:

Transport in the raw material production phase from mining to manufacture of finished chemical building product is often extensive. Raw materials tend to be transported by rail and road within Europe, but also by sea from other continents.

The manufacture of chemical building products involves almost no vehicular transport, with transport primarily via pipeline and conveyor.

From the factories, the products will usually be distributed to retailers/builder's merchants, but may also be transported directly to a building site. Transport will usually be by lorry.

Transport in the usage phase occurs between the stores/builder's merchants and the "building site" and transport of empty packaging from the site to the recycling station by lorry or car.

In the usage phase, waste material is removed by lorry from "large" demolition projects and by car for "small" DIY projects.

It is not relevant to set requirements concerning transport that the manufacturer of chemical building products cannot influence, i.e. raw material transport and transport to the customer.

4.1.2 Potential and Steerability

Potential and steerability are considered here according to the structure of the MECO analysis, which divides the environmental impact of the various life cycle phases into the subgroups materials, energy, chemicals and other (MECO).

The text below outlines the various constituent parts in the MECO analysis for each phase according to the MECO model.

Appendix 2 contains more on how the RPS is assessed for each part of the life cycle, structured according to the MECO model, as presented in the evaluation report from 14 September 2012.

Raw material phase:

When it comes to machinery and permanent factories, we see no direct potential. However there are differences in how the raw materials are extracted/produced and how much of an impact on the environment/ecosystem the raw material production causes. Some raw materials are plant extracts, such as raw materials used for rheology, fillers and polymers, and when extracting them in large scale they effect the biodiversity. Nordic Ecolabelling does not consider this to be done in a very large scale for chemical building products and will therefore not add separate requirements regarding plant extracts. There is also potential when it comes to emissions from factories, as well as choice of energy source.

These differences in themselves indicate potential to set ecolabelling requirements. However, the problem is that this often lies far beyond the licensee's control; perhaps 3-4 stages back in the production chain (see Figure 1). This means that in the current situation, it is difficult to see how it would be steerable/controllable to set requirements concerning extraction and production of raw materials.

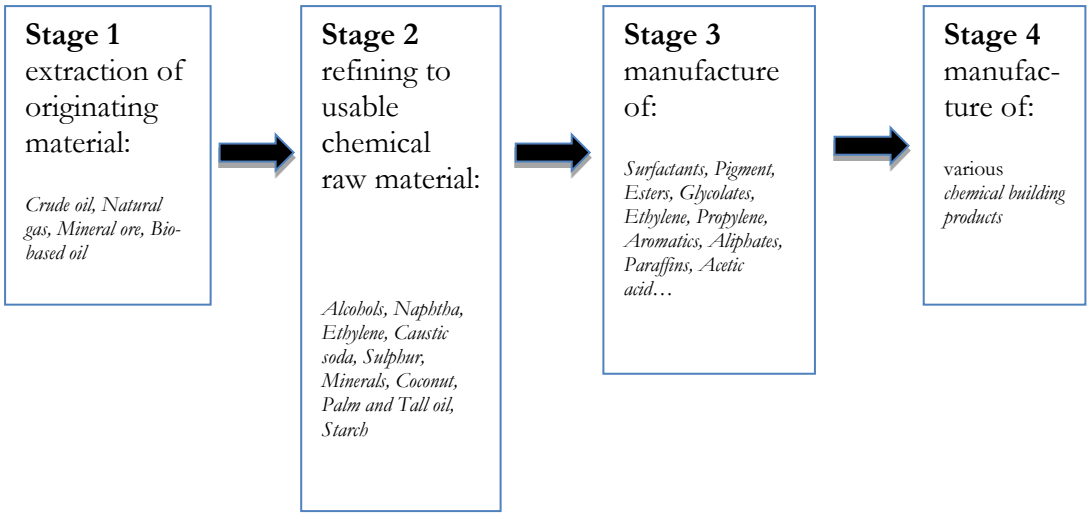


Figure 1: Examples of common stages in the production chain[24].

When it comes to the manufacture of TiO_2, we currently have requirements concerning emissions associated with the production of this raw material. The process of manufacturing TiO_2 takes an extremely heavy toll on the environment and has long been a focus of concern within the paint industry. However, due to the oligopoly that exists in the manufacture of TiO_2 it is hard to determine the steerability in this area.

In terms of polymer production, it is extremely difficult to judge whether a polymer manufactured in a more energy efficient process can be used instead of a polymer manufactured in a more energy demanding process (and there is thus a lack of both potential and steerability). It may, however, be the case that the "same sort" of polymer has been manufactured with greater energy efficiency in one factory than in another (in which case only the steerability is difficult).

Production phase:

In the production phase, the raw materials are mixed together to form finished chemical building products. The factories and machines already in existence have a long lifetime and the process technology to manufacture paints, varnishes, adhesives, fillers and sealants is not particularly energy heavy. The process largely involves storage and internal transport of raw materials that are then batched and mixed to form finished products. The products are packaged and transported internally to a warehouse, before being sent for sale. We therefore see no potential or steerability for Materials and Energy in the production phase.

The "Other" category in the MECO analysis includes the working environment, where there is also potential for setting requirements and for steerability. It is possible for the producers to influence the raw materials used (they can choose raw materials that are better for the environment and health). They can also influence how the raw materials are added to the products (i.e. their form, enclosed systems, etc) and can ensure that safety equipment is used where necessary (e.g. with dust-producing raw materials). Setting requirements concerning raw materials can therefore steer improvements in the working environment during manufacturing.

[24] Evaluation of Nordic Ecolabelled Chemical Building Products, 14 September 2012

Usage phase:

In the usage phase, the finished chemical building products are used by tradesmen and private individuals. The steerability of material and energy use in this phase is non-existent.

The chemicals used in this phase are directly linked to what is contained in the chemical building products, and here there is potential to replace raw materials that are harmful to health and the environment with less harmful or non-classified raw materials. Emissions from the chemical building products used may also pose an environmental or health risk. This can be influenced by means of requirements concerning the product in question.

In the usage phase, it is also important that the products are used correctly and with the correct safety equipment where necessary. Requirements concerning instructions for the end user on usage and safety therefore have both potential and steerability, since correct adherence to the product and safety instructions reduces the risks during usage and improves the quality of the painting/filling/glueing, etc.

Waste phase:

The waste phase is the stage during which used chemical building products are disposed of. The steerability of what happens in the waste phase is non-existent for everything except effects associated with the chemical content of the products, for which there is both potential and steerability. Chemical building products do not influence the recycling/reuse of old building materials and therefore we see no potential or steerability in this context.

The way packaging and any remains of the products are handled and disposed of or recycled is, however, steerable and has the potential to make a difference. Nordic Ecolabelling sets requirements that information concerning the handling of residues and empty packaging is made available to the user of the product.

There is also potential to reduce how much remains of the products in the discarded packaging by emptying/scraping out the packaging thoroughly. However, there is very little steerability when it comes to verifying and documenting this.

Transport:

A great deal of transport is involved in the life cycle of chemical building products, which means that there is potential to make savings on transport. However, the majority of the transport remains outside the control of the manufacturers. Steerability is therefore almost non-existent for all transport except for the transport that takes place in the manufacture of the chemical building products, i.e. within the factory (e.g. from receipt of raw materials to warehousing). The amount of transport that takes place within the factories is, however, negligible in overall terms, and there is therefore no great potential or relevance.

4.2 Chapter 1 – General environmental requirements

The requirements in Chapter 1 "General environmental requirements" apply to all constituent substances unless otherwise stated.

Constituent substances/impurities

The term constituent substance refers to all substances in the product, including additives in the ingredients (such as preservatives and stabilisers) but does not include impurities from primary production. Impurity refers to residues from primary production which may be found in the finished product at concentrations below 100 ppm (0.0100% by weight, 100 mg/kg), but not substances that have been added to a raw material or the product actively and for a particular purpose, irrespective of quantity.

Impurities of over 1.0% concentration in the primary product are, however, regarded as constituent substances. Substances known to be degradation products of the constituent substances are also themselves considered to be constituent substances.

The limit of 1.0% impurities in the raw materials has been set to encourage manufacturers to choose goods of high quality that contain very small quantities of trace substances from primary production of the raw materials. The level has been chosen in consideration of the working environment and the classification of the raw material.

O1 Information about the product

The product is to be described such that it can be determined that the product falls within the product group definition and that it is thus relevant to show compliance with the other requirements in the criteria document. It is also important the Nordic Ecolabelling has good knowledge of the Nordic Ecolabelled chemical building products. Without this knowledge, it is not possible to determine which criteria are relevant and what requirements should be set for the product in the future. Nordic Ecolabelling would therefore like to have information on the formulation of the product and what application method it is intended for. In cases where products are part of a multi-component product with a base and a hardener, such as Araldite adhesive, where the components are mixed together before application it is important that the whole multi-component product is both checked and ecolabelled. This makes it possible to clearly communicate what is ecolabelled and what is not. In other words, the requirement applies to individual products and not products in the same range with different functions.

Requirement text:

> The applicant must give detailed information on the chemical building product to which the application relates. The following information is required:
>
> - Describe the product and its application method and the way in which it fulfils the definition of a product that qualifies for a Nordic Ecolabel
> - If the product forms part of a component system that jointly ensures the functioning of the product, the entire product must be Nordic Ecolabelled and not simply parts of it (e.g. two-component varnishes comprising a base and a hardener). The requirement thus refers to the individual product and not to products in the same range with different functions (e.g. systems for exterior painting comprising primer, undercoat and paint).
> - Formulation detailing complete composition with a specification of all constituent substances (see definition of constituent substances in Chapter 1). The description must include:
>
> - The chemical name, trade name and CAS no. of the constituent substances
> - The function of each constituent substance

- The boiling point (for constituent organic substances, where relevant)

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

☒ Description of how the product is to be used to achieve functionality (as a single component or part of a multi-component system) and what application method it is intended for.

☒ Formulation detailing complete composition with a specification of all constituent substances, as set out in Appendix 3.

O2 Classification of the product

Nordic Ecolabelling strives to ensure that the health and environmental impact of the products are as low as possible. The requirements therefore make it clear that products classified as harmful, very toxic, toxic, harmful to health, corrosive, sensitising, carcinogenic, mutagenic, toxic for reproduction, explosive, oxidising and/or highly flammable cannot be ecolabelled.

Classifications are to be given in accordance with the prevailing CLP Regulation EC (No) 1272/2008 and in accordance with Dangerous Preparations Directive 1999/45/EC as amended in 2008.

This requirement excludes products that are classified as sensitising with the following classification*:

- category 1, H334
- category 1, H317
  and/or
- Products that contain substances in quantities that result in being labelled "Contains (name of sensitising substance), may cause an allergic reaction."

This last point is new compared with the previous version of the criteria.

***Exemptions**

The criteria document exempts isothiazolinones and IPBC (iodopropynyl butylcarbamate, see below) which are classified as H317 or require the warning phrase "Contains xxx, may cause an allergic reaction", as these substances are considered necessary preservatives for this type of product.

IPBC (iodopropynyl butylcarbamate, CAS no. 55406-53-6)

IPBC is a fungicide primarily used in paint products as the sole fungicide (or in combination with other fungicides) to give increased and longer lasting protection against fungal growth. The substance is often used to provide surface protection at levels below 1%. IPBC is mainly used in wood paints, wetroom adhesives and to some extent in fillers. The warning phrase "Contains IPBC, may cause an allergic reaction" may be necessary for these paints (if IPBC content is 0.1-1%) or classification as H317 (if IPBC content is > 1%). The hazard class H317 is never appropriate for adhesives and fillers. An exemption for IPBC that triggers a classification of H317 or the risk phrase "Contains IPBC, may cause an allergic reaction" in outdoor paints has therefore been

introduced into the requirement. This also appeared in the previous version of the criteria. See also requirements concerning IPBC under O5.

IPBC was assessed as part of the development work for REACH and the EU's Biocidal Products Directive (98/8/EC). The majority of suppliers have come to the conclusion that the substance should be classified as H302, H318, H331 and H400. H317 has also been proposed as a classification for IPBC. The substance remains a self-classification substance, which means that it is not listed in Annex VII to the CLP, but an initiative for harmonised classification has been launched.

Isothiazolinones

Isothiazolinones are used as a preservative in many products, where they act as fungicides, biocides and algal growth inhibitors. They are, however, toxic to aquatic organisms and they have varying degrees of sensitising effect, see also requirements under O5.

Since some isothiazolinones, such as DCOIT (4,5-dichloro-2-octyl-2H-isothiazol-3-one: CAS no. 64359-81-5), are used in paints, for example, as an alternative to IPBC, due to their similar technical properties, isothiazolinones are exempted on the same grounds as those given for IPBC above.

Requirement text:

> The product must be classified in line with current legislation (CLP Regulation (EC) No 1272/2008 or the EU's Dangerous Preparations Directive 1999/45/EC as amended in 2008 or later) and must not be classified/labelled as listed in Table 1 below.

Table 1 Classification of the product

Classification	**Hazard category and hazard phrase/Hazard symbols and risk phrases**	
Hazard class	**CLP Regulation 1272/2008**	**EU's Dangerous Preparations Directive 1999/45/EC, 2008**
Toxic to aquatic organisms	Category acute 1 H400, Category chronic 1 H410, Category chronic 2 H411, Category chronic 3 H412, Category chronic 4 H413	N with R50, R50/53, R51/53, R52, R53, R52/53 without N
Hazardous to the ozone layer	H420	R59
Acute toxicity	Category 1-4: H300, H310, H330, H301, H311, H331, H302, H312, H332, H370, H372	Tx (T+ in Norway) with R26, R27, R28, R39, T with R23, R24, R25, R39, R48, Xn with R20, R21, R22
Specific target organ toxicity (STOT) with single and repeated exposure	STOT SE category 1 with H370, category 2 with H371, STOT RE category 1 with H372, category 2 with H373	Tx (T+ in Norway) with R39, T with R39,R48, Xn with R68
Aspiration hazard	Category 1 with H304	Xn with R65
Airway or skin sensitising	Category 1 with H334, Category 1 with H317, and the product must not contain constituent substances in quantities that result in the label "Contains (name of sensitising substance), may cause an allergic reaction"*	Xn with R42, Xi with R43, and the product must not contain constituent substances in quantities that result in the label "Contains (name of sensitising substance), may cause an allergic reaction"*
Skin corrosion or irritation	Skin corr. 1A/1B/C with H314	C with R34, R35

Carcinogenic	Carc 1A/1B/2 with H350, H350i or H351	T with R45 and/or R49 (Carc 1 or Carc 2) or Xn with R40 (Carc 3)
Mutagenic	Mut 1A/B/2 with H340, H341	T with R46 (Mut 1 or Mut 2), Xn with R68 (Mut 3)
Toxic for reproduction	Repr 1A/1B/2 with H360, H361, H362	T with R60, R61, R64, R33 (Repr 1 or Repr 2), Xn with R62, R63, R64, R33 (Repr 3)
Explosive	Category 1.1-1.6 with H200, H201, H202, H203, H204 or H205	E with R2 and R3
Oxidising	H240, H241, H242, H270, H271, H272	O with R7, R8 and/or R9
Highly flammable	H220, H221, H224, H242	Fx (F+ in Norway) with R12

** Outdoor paints and varnishes are exempted from this where they are classified as H317 (Xi with R43) or require the label "Contains (name of sensitising substance), may cause an allergic reaction" if this is due to the use of isothiazolinones or iodopropynyl butylcarbamate (IPBC) – see further details on this exemption in O5.*

Note that responsibility for correct classification lies with the manufacturer.

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

O3 Classification of constituent chemical substances

For the same reasons described under requirement O2, there is a requirement that none of the constituent substances are classified as carcinogenic, mutagenic or toxic for reproduction. Formaldehyde is exempted from this requirement, with special requirements stated in O6 – the reason for the exemption is described under "formaldehyde".

Nordic Ecolabelling wishes to limit the health effects of chemical building products and therefore excludes from use any constituent substances that are classified as acutely toxic, airway sensitising and/or having specific target organ toxicity. Classifications are to be given in accordance with the prevailing CLP Regulation EC (No) 1272/2008 and in accordance with Dangerous Preparations Directive 1999/45/EC (as amended).

Naphtha[25]

Naphthas are refined from crude oil, coal tar or other primary sources[26]. Naphtha cannot be defined with a unique CAS number, since there are many variants under the same CAS no. Nordic Ecolabelling has no separate requirement excluding naphtha from use, as most naphthas are excluded by this requirement, since they are very toxic, toxic or harmful to health/classified as Acute Tox. Cat. 1-4. Naphtha can also be carcinogenic and may contain various impurities that are harmful to the environment and/or health. The raw material producer, or the manufacturer of the chemical building product based on the raw material producer's information, must certify that there is no naphtha classified as Acute Tox. Cat. 1-4 in the product. Naphtha is used in chemical building products such as paints and varnishes.

[25] Wikipedia.org - http://en.wikipedia.org/wiki/Naphtha
[26] http://en.wikipedia.org/wiki/Naphtha

Naphthas are largely excluded by requirements concerning classification of constituent substances and restricted by the VOC requirement (boiling point lies between 20ºC and 75ºC).

Bisphenol A

Nordic Ecolabelling has chosen not to set a separate requirement that bisphenol A (CAS no. 80-05-7) must not appear in raw materials or products, since bisphenol A is excluded from use in this requirement due to its classification as toxic for reproduction – H361f (R62). Bisphenol A is also classified as H335 (Xi R37), H318 (Xi R41), H317(R43) as well as being included on the 2009 "effect list" from the Danish Environmental Protection Agency[27], a list of undesirable substances, and on the EU's list of endocrine disruptors, and is therefore not permitted in ecolabelled chemical building products. Bisphenol A combined with epichlorhydrin* (CAS no. 106-89-8) may be found in some sealants together with epoxy resins such as bisphenol A epichlorhydrin epoxy resin (CAS no. 25068-38-6) classified as H319 (Xi R36), H315 (Xi R38), H317 (R43), H411 (R51/53). Epoxy resins are not directly excluded by the requirements for constituent substances or other unique requirements concerning constituent substances, but have a starter substance that is covered by these requirements and are thus excluded by this.

** Epichlorhydrin/1-chloro-2,3-epoxypropane (CAS no. 106-89-8) is classified as H226, H350, H331, H311, H301, H314, H317.*

Toluene

Nordic Ecolabelling has chosen not to set a separate requirement excluding toluene from use in raw materials or products, since toluene is excluded in this requirement due to its classification. Toluene is classified as H225 (R10), H361d (R63), H304 (R65), H373 (R33, R48), H315 (Xi R38) and H336 (R67). Toluene must therefore not be added to chemical building products.

Preservatives

Preservatives are used in the products to avoid microorganisms growing in the product and also later to protect the finished surface. Protecting products and surfaces from microbial growth is one way of ensuring that the products have a long lifetime both on the shelf and later when paints, for example, are on a house wall.

Preservatives are exempted from this requirement when they are used to preserve the product and they are not subject to any of the risk phrases H373, H334, H370, H341(R33, R42, R39, R68) or combinations of these. It is necessary to have an exemption for preservatives, since in the experience of Nordic Ecolabelling preservatives for paints and so on commonly have these risk phrases and cannot be replaced. One example of a preservative used in the paint industry is IPBC (iodopropynyl butylcarbamate), whose classifications include H302 (see the ECHA website for detailed information). See also restrictions on preservatives under O5, where IPBC, isothiazolinone and CMIT/MIT are restricted.

[27] http://www.mst.dk/Virksomhed_og_myndighed/Kemikalier/Stoflister+og+databaser/effektlisten/ (visited 14.01.2013)

Formaldehyde (CAS no. 50-00-0)

Formaldehyde is a toxic and allergenic substance (H317/Xi with R43) that has carcinogenic effects (H351/R40) and should therefore be avoided as far as possible. Formaldehyde is exempted from the requirement where the formaldehyde appears in the form of impurities in newly produced polymers. The reason for this is that, in Nordic Ecolabelling's experience, newly produced polymers may contain impurities in the form of formaldehyde. Products must not, however, have actively added formaldehyde or formaldehyde-releasing substances, see more under O6.

Methanol

Methanol (CAS no. 67-56-1) is an alcohol that is classified as acutely toxic – H301, H311, H331 and H370 (R23, R25, R39). Certain types of sealant require methanol as a constituent substance and/or as a degradation product. A low level of methanol in the constituent raw materials or in the form of a degradation product in the sealant is considered a better option than permitting alternatives such as organotin compounds, bisphenol A, isocyanates and so on, which other sealants without methanol tend to contain. In this version, Nordic Ecolabelling has therefore made an exemption for methanol in sealants, in order to allow sealants to meet this requirement. Sealants make up a very small proportion of the material in a room, which naturally keeps the quantities low. A filler used on a whole wall, for example, would represent a much larger surface for degradation and the exemption is therefore restricted exclusively to sealants. See also O5 for adjustments made for sealants in the area of preservatives.

The methanol content and quantity of methanol formed during hardening (as a degradation product) are restricted such that sealant may contain up to 0.10% methanol. The limit of 0.10% has been set on the basis of discussions with the industry on how much methanol can be found in the products and how much is produced during hardening.

Requirement text:

> The product must not contain chemical substances that are or may degrade into substances that are classified as carcinogenic (Carc), mutagenic (Mut) or toxic for reproduction (Rep), according to CLP Regulation (No) 1272/2008 or the EU's Dangerous Substances Directive 67/548/EEC as amended, see Table 2.

Table 2 Classification of constituent substances

Hazard class	**Associated hazard symbols and risk phrases**	
	CLP Regulation 1272/2008	**EU's Dangerous Preparations Directive 1999/45/EC, 2008**
Carcinogenic	Carc 1A/1B/2 with H350, H350i or H351	T with R45 or R49 or Xn with R40
Mutagenic	Mut 1A/B/2 with H340, H341	T with R46 or Xn with R68
Toxic for reproduction	Repr 1A/1B/2 with H360, H361, H362	T with R60 or R61 or Xn with R62 and/or R63
Airway sensitising	H334	Xn with R42
Acute toxicity	Acute Tox 1-4: H300, H301, H302, H310, H311, H330, H331,H370, H372	Tx (T+ in Norway) with R26, R27, R28 and/or R39 T with R23, R24, R25, R39 and/or R48

Specific target organ toxicity with repeated exposure	STOT RE 1 H372 STOT RE 2 H373	Xn with R48, R68 R33 (may accumulate in the body)

Exemptions:

- Preservatives that are used to preserve the product and that are not assigned any of the hazard phrases H373, H334, H370, H341 (R33, R42, R39, R68) or combinations of these (further requirements concerning preservatives are stated in O5).
- Formaldehyde as an impurity in newly produced polymers, see separate requirement O6.
- Sealants may contain methanol to a maximum level of 0.10%.

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

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

O4 Environmentally harmful substances

Many chemical building products contain substances that are classified as toxic to aquatic organisms – H410, H411 and/or H412 – as supported in a study by Norway's National Institute of Technology[28]. Such substances are restricted and may only appear in small quantities in ecolabelled products. The purpose of restricting environmentally harmful substances is to reduce the ability for such substances to be emitted to water, for example when washing brushes and tools.

The evaluation conducted in 2012 pointed out that the limit for environmentally harmful substances could be tightened in version 2, since the licence data proved to be considerably lower than the previous limit of 0.7 (version 1). For the revision, the project group has chosen to tighten the limit, since the levels if the raw materials that previously been handled within the Nordic Ecolabelling indicates the possibility to tighten this requirement. The new requirement mainly relates to CLP (new classification in the EU) which makes the formula look a little different in this context. The choice not to tighten the requirement even more was also made against the background that aquatic toxicity is not as relevant for chemical building products as it is for many other chemical products (such as laundry detergents and cleaning products) that always end up in the aquatic environment after use. Chemical building products end up in the aquatic environment when brushes, tools and suchlike are cleaned in water and when products in outdoor environments slowly leach out/evaporate, but a large proportion of the residues of chemical building products end up in the waste management system and are incinerated. The new limit is more in line with how much environmentally hazardous substances there are in the chemical building products on the market today.

The formula for calculating environmentally harmful substances is based on the classification rules for environmentally harmful substances[29], but with a tougher limit value. The formula is as follows:

$M*100*H410 + 10*H411 + H412 \leq 11\%$

Or

[28] National Institute of Technology, Miljøkrav til kjemiske byggprodukter, 2007
[29] CLP Regulation (Table 4.1.2): http://echa.europa.eu/documents/10162/13562/clp_en.pdf

M*100*(R50/53) + 10*(R51/53) + (R52/53) ≤ 11%

Since classification is continuing to use risk phrases, a variant including risk phrases is included in the requirement in this version.

Where M is the multiplying factor[30] for H410 linked to the substance's LC50 or EC50 value, in accordance with Table 4.2.1 below. I.e., if a substance is classified as H401 and has LC50= 0.05, then M=10.

Table 4.2.1. Concentration limits and multiplying factors for substances classified as H410

L(E)C50 value	Concentration limit	Multiplying factor
0.1 < L(E)C50 ≤ 1	0.25%	1
0.01 < L(E)C50 ≤ 0.1	0.025%	10
0.001 < L(E)C50 ≤ 0.01	0.0025%	100
0.0001 < L(E)C50 ≤ 0.001	0.00025%	1000
0.00001 < L(E)C50 ≤ 0.0001	0.000025%	10000
(the table then continues in factor 10 intervals)	…	…

According to the classification rules, if the result of the formula is 25%, the substance is classified as environmentally harmful – H410. Nordic Ecolabelling's limit of 11% amounts to 44% of the classification limit. In version 1, the corresponding limit was 70% of the classification limit. The requirement is made about 35% more stringent than in version 1.

For clarification on how this formula works, see the following example:

A raw material contains substances classified as environmentally harmful as follows:

0.01% H410, where LC50=0.05

0.05% H411

0.1% H412

For H410 you can then see in the table in the requirement that the classification limit at LC50 between 0.01 and 0.1 is 0.025%, i.e. M (multiplying factor)=10. The result of the calculation using the formula is thus:

*((10*100*0.01)+(10*0.05)+0.1) = 10,6%*

The raw material fulfils the requirement.

As well as a weighting formula, version 1 also had a limit for how much of each substance classed as environmentally harmful was permitted and the sum of the substances. However, since the weighting formula and the other requirement overlap each other, in this version Nordic Ecolabelling has chosen only to set the requirement relating to the weighting formula, as the new limit restricts levels that may be found in the products by more than the previous version.

Requirement text:

[30] Table 4.1.3 in the CLP Regulation, http://echa.europa.eu/documents/10162/13562/clp_en.pdf

Constituent chemical substances classified as environmentally harmful with risk phrases H410, H411, H412 (N R50/53, N R51/53 and R52/53), according to CLP Regulation (No) 1272/2008 or the EU's Dangerous Substances Directive 67/548/EEC as amended, are limited in the product according to the following formula (calculation model taken from current classification rules, except that here the limit value is tougher):

M*100*H410 + 10*H411 + H412 ≤ 11%

Or

M*100*(R50/53) + 10*(R51/53) + (R52/53) ≤ 11%

Where M is the multiplying factor for H410 linked to the substance's LC50 or EC50 value, in accordance with Table 3 below.

Table 3 Concentration limits and multiplying factors for substances classified as H410 (and similarly for R50/53)

L(E)C50 value	Concentration limit	Multiplying factor
0.1 < L(E)C50 ≤ 1	0.25%	1
0.01 < L(E)C50 ≤ 0.1	0.025%	10
0.001 < L(E)C50 ≤ 0.01	0.0025%	100
0.0001 < L(E)C50 ≤ 0.001	0.00025%	1000
0.00001 < L(E)C50 ≤ 0.0001	0.000025%	10000
(the table then continues in factor 10 intervals)	…	…

If information about a substance's harmfulness to the environment (in the form of data concerning toxicity and degradability or toxicity and bioaccumulation) is not available, the substance is treated as a worst case, i.e. as environmentally harmful – H410.

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

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

☒ Calculation clearly showing that the requirement is fulfilled.

O5 Preservatives

Preservatives are added to liquid products to prevent bacterial growth in the products. The composition of the product may also affect the need for preservatives.

Levels of preservatives such as MIT (methyl-isothiazolinone) and other isothiazolinones are largely driven by the kind of preservation the unique raw materials in the product require. In this product group, the preservation of binders has proven to have a crucial effect on the concentration of preservatives in the end product. Quantities of preservatives depend on the type of binder that is needed for the specific product.

Bioaccumulation

Preservatives are generally toxic to aquatic organisms and can cause hypersensitivity and allergies. Preservatives may be used in the products and in constituent substances only if they are not bioaccumulative.

Bioaccumulative substances collect in the fat tissue of living organisms and can cause long-lasting damage to the environment.

Unless otherwise proven, substances are considered to be bioaccumulative if:

- logKow ≥ 4.0, in line with the OECD's guidelines 107 or 117 or equivalent.
- If the substance has a biological concentration factor (BCF) ≥ 500, when testetd according to OECD 305 A-E, the substance is considered to be bioaccumulative, and if the BCF < 500 the substance is considered not to be bioaccumulative.

If there is a measured BCF value, it is always the highest measured BCF that is used in assessing a substance's bioaccumulative potential.

The limit values for logKow and BCF have been amended in line with GHS.

Isothiazolinone compounds

Isothiazolinones are used as a preservative in many products, where they act as fungicides, biocides and algal growth inhibitors. They are, however, toxic to aquatic organisms and they have varying degrees of sensitising effect. Nordic Ecolabelling wishes to limit the use of isothiazolinones on the grounds of their environmental and health profile. In general terms, it has been common to preserve chemical building products using formaldehyde and/or formaldehyde-releasing substances. From this perspective, MIT and other isothiazolinones are more part of the solution than they are a problem, since the sensitising risks of isothiazolinones are considerably less than the risks of using carcinogenic formaldehyde and formaldehyde-releasing substances.

Isothiazolinones such as MIT are self-classification substances, although in the majority of cases MIT is classified as Skin sens 1 with H317. Product classification will come into force on 1 June 2015, with a transition period up until 1 June 2017. Products placed on the market before 1 June 2015 can thus be classified in accordance with the Dangerous Preparations Directive until 2017, if the manufacturer so wishes. The limit of 100 ppm for gaining the labelling with "Contains isothiazolinone, may cause an allergic reaction" applies only to products classified under CLP (and not the Dangerous Preparations Directive).

Isothiazolinones are often used in blends, where several different variants go into the same products. The requirement therefore steers the total amount of isothiazolinones and not individual isothiazolinone compounds (e.g. MIT). The requirement limits in version 1 are generally seen (by manufacturers) as tough and several manufacturers have had difficulty fulfilling the preservatives requirement.

5-chloro-2-methyl-2H-isothiazol-3-one and 2-methyl-2H-isothiazol-3-one (3:1)

The isothiazolinone blend of 5-chloro-2-methyl-2H-isothiazol-3-one (CAS no. 26172-55-4) and 2-methyl-2H-isothiazol-3-one (CAS no. 2682-20-4) (3:1) has been more strictly limited because this blend is highly allergenic (H314 and H317) and environmentally harmful (H400 and H410). The limit is 15 ppm (0.0015% by weight, 15 mg/kg) in Nordic Ecolabelled chemical building products for all categories. The limits are taken from the criteria for the EU Ecolabel for Indoor and Outdoor Paints and Varnishes, plus the fact that compulsory labelling is required at 15 ppm. There has been a debate about

adjusting the limit for classification to 1.5 ppm, but since this has not yet been decided, Nordic Ecolabelling will be continuing to permit 15 ppm of this blend in the products.

Adhesives and sealants

There are currently no Nordic Ecolabelled sealants and the reason for that appears to be too strict a requirement concerning isothiazolinones and reference to a poor TVOC measurement method. Since binders (the raw materials that contain most isothiazolinones) used in sealants are also often the same as in adhesives, it makes most sense to set similar requirements for adhesives and sealants when it comes to preservatives. The limit of 100 ppm[31] means that sealant (and adhesive) packaging is not labelled "Contains isothiazolinone, may cause an allergic reaction" at the moment, nor will it be when CLP for products enters into effect in June 2015. Under requirements for classification of products, the label "Contains isothiazolinone, may cause an allergic reaction" is also prohibited, see O2.

In addition, sealants are predominantly used in guns/applicators that reduce skin contact and it is therefore reasonable for the limit to be the same as for adhesives, as an easing of the requirement will not affect the end user to a greater degree than when applying adhesive. Many sealants come with a recommendation that a finger can be used to finish the sealant. However, this can also be done using a sealant smoother, or a damp sponge or cloth. See requirement O31 on consumer information and recommendations.

Fillers

Fillers have a great deal in common with indoor paints in terms of polymers and the fact that they contain natural materials that actively add microorganisms to the product. The limit of 500 ppm isothiazolinone compounds is the same as in the requirements for indoor paints.

Outdoor paints and varnishes, industrial paint (manual and industrial application)

For products in the category outdoor paints and varnishes, the content of isothiazolinone compounds in the product may be up to 1500 ppm, which is because there is a need to preserve both the product and the dry film. This may mean that the product is classified as H317 or that the following text is required on the packaging: "Contains (name of sensitising substance), may cause an allergic reaction". If the product is classified as H317 or "Contains (name of sensitising substance), may cause an allergic reaction" and is based on the use of isothiazolinones, the manufacturer must show that the product and the dry film pass microbial growth tests as set out in O23. The level of isothiazolinones permitted in outdoor paints is also higher due to the risk of allergies being less during application and later than in an indoor environment. In this context, preservatives refers both to "in can" preservatives (i.e. in the paint in the tin) and film preservatives.

IPBC (iodopropynyl butylcarbamate, CAS no. 55406-53-6) is used in paint products either as a single fungicide or in combination with others for increased and long-lasting protection against growth. The substance is used for surface protection at levels <1%, mainly in wood paints, wetroom adhesives and to some extent in fillers. IPBC is often used instead of the isothiazolinone DCOIT (4,5-dichloro-2-octyl-2H-isothiazol-3-one,

[31] The limit at which the label must carry the warning "Contains isothiazolinone, may cause an allergic reaction" is 1000 ppm (0.1%) for substances classified as Skin Sens 1 or 1b, and 100 ppm (0.010%) for Skin sens 1a.

CAS no. 64359-81-5) or instead of formaldehyde-releasing preservatives, which have similar technical properties. The fungicide IPBC was assessed as part of the development work for REACH and the EU's Biocidal Products Directive (98/8/EC). Out of this assessment, the majority of suppliers have come to the conclusion that the substance should be classified as H302, H318, H331 and H400. The substance is a self-classification substance, which means that it is not listed in Annex VII to the CLP, but an initiative for harmonised classification has been launched. Exemptions are made for preservatives in O3.

The limit is based on the fact that although more IPBC is required than isothiazolinone to achieve the same preservative effect, IPBC is less allergenic than isothiazolinone. The limit for IPBC is therefore higher than for isothiazolinone. The limit of 4500 ppm remains unchanged from version 1.

There is, however, an addition limit of 5000 ppm for the total amount of isothiazolinone and IPBC for outdoor paints. This limit was also in version 1 of the criteria and means that a product cannot be labelled if it has the maximum level of isothiazolinone and IPBC.

Indoor paints and varnishes and varnishes for industrial use

Products in the category industrial paints and varnishes (indoor) may contain preservatives in the form of isothiazolinones. The level is restricted to 500 ppm, which is the same limit as for fillers and for EU Ecolabelled indoor paints. The amount of preservative required in indoor paints is lower than for outdoor paints, as it generally takes less preservative to prevent growth in the finished film indoors.

Requirement text:

- No preservatives added to the product or its ingredients may be bioaccumulative.

The bioaccumulative properties of a substance can be tested on fish in line with OECD test method 305 A-E. If the bioconcentration factor (BCF) is ≥ 500, the substance is considered to be bioaccumulative. If there is no BCF for a substance, that substance is considered to be bioaccumulative if logKow ≥ 4 under the OECD's guidelines 107 or 117 or equivalent.

Note that if there is a measured BCF value and a logKow value, it is always the highest measured BCF that is used, rather than the logKow value.

- The total levels of isothiazolinone compounds, iodopropynyl butylcarbamate (IPBC) and 3:1 blends of 5-chloro-2-methyl-2H-isothiazol-3-one and 2-methyl-2H-isothiazol-3-one must not exceed the limit values in Table 4 below:

Table 4. Restrictions on preservatives

	The total level of isothiazolinone compounds must not exceed:	**The total level of iodopropynyl butylcarbamate (IPBC) must not exceed:**	**The total level of IPBC + iso-thiazolinone must not exceed**	**The total level of blended CMIT+MIT (3:1)* must not exceed:**
Adhesives	100 ppm (0.01% by weight, 100 mg/kg)	-	-	15 ppm (0.0015% by weight, 15 mg/kg).
Sealants	100 ppm (0.01% by weight, 100	-	-	15 ppm (0.0015% by weight, 15

	mg/kg)			mg/kg).
Fillers	500 ppm (0.05% by weight, 500 mg/kg).	-	-	15 ppm (0.0015% by weight, 15 mg/kg).
Outdoor paints and varnishes	1500 ppm (0.15% by weight, 1500 mg/kg). If the use of isothiazolinone compounds results in a classification of H317 or "Contains (name of sensitising substance), may cause an allergic reaction", the requirements concerning the weathering test for growth in O23 must be fulfilled.	4500 ppm (0.45% by weight, 4500 mg/kg). If the use of iodopropynyl butylcarbamate (IPBC) results in a classification of Xi R43 or the label "Contains iodopropynyl butylcarbamate (IPBC), may cause an allergic reaction", the requirements concerning the weathering test for growth in O23 must be fulfilled.	5000 ppm (0.50% by weight, 5000 mg/kg).	15 ppm (0.0015% by weight, 15 mg/kg).
Industrial paints	500 ppm (0.05% by weight, 500 mg/kg).	-	-	15 ppm (0.0015% by weight, 15 mg/kg).

**5-chloro-2-methyl-2H-isothiazol-3-one (CAS no. 26172-55-4) and 2-methyl-2H-isothiazol-3-one (CAS no. 2682-20-4) in a 3:1 blend.*

The term preservative refers to both preservatives for tinned products and preservatives for the surface finish.

✉ Documentation that none of the added preservatives are bioaccumulative, cf. OECD test method no. 305 A-E or 107, 117.

✉ Duly completed declaration, see Appendix 2, from the manufacturer of each raw material.

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

O6 Formaldehyde

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

Formaldehyde is permitted as an impurity in newly produced polymers since, in Nordic Ecolabelling's experience; newly produced polymers may contain residual monomers in the form of formaldehyde. Products must not, however, have actively added formaldehyde (CAS no. 50-00-0) or formaldehyde-releasing substances.

For paints and fillers, the permitted impurity is maximum 200 ppm (0.02% by weight, 200 mg/kg) formaldehyde, on condition that the content of free formaldehyde in the end product does not exceed 10 ppm (0.001% by weight, 10 mg/kg). For adhesives and sealants, the permitted impurity is maximum 250 ppm (0.025% by weight, 250 mg/kg), on condition that the content of free formaldehyde in the end product does not exceed 10 ppm (0.001% by weight, 10 mg/kg). The limit values are related to the licence data that Nordic Ecolabelling has on the different subgroups.

The detection limit for the Merckoquant method is 10 ppm, while the VdL-RL 03 method ("Concentration of free formaldehyde determined using the acetyl-acetone

method") has a detection limit of 100 ppm. It is therefore stated that use of the VdL-method must prove there is less than 100 ppm in the product.

Requirement text:

> Products must not contain actively added formaldehyde (CAS no. 50-00-0) or formaldehyde-releasing substances.
>
> The level of free formaldehyde (from formaldehyde not intentionally added or from formaldehyde-releasing substances) in the end product must not exceed 10 ppm (0.001% by weight, 10 mg/kg)*.
>
> In fillers and paint products, formaldehyde is permitted as an impurity in newly produced polymers at a concentration of no more than 200 ppm (0.02% by weight, 200 mg/kg)**, on condition that the content of free formaldehyde in the end product does not exceed 10 ppm (0.001% by weight, 10 mg/kg)*.
>
> In adhesives and sealants, formaldehyde is permitted as an impurity in newly produced polymers at a concentration of no more than 250 ppm (0.025% by weight, 250 mg/kg)**, on condition that the content of free formaldehyde in the end product does not exceed 10 ppm (0.001% by weight, 10 mg/kg)*.
>
> **Measured with the Merckoquant mehtode (appendix 2 to RAL-UZ 102) or other equivalent test method.*
>
> ***Measured with the VdL-RL 03-methode "In-can concentration of formaldehyde determined by the acetyl-acetone method" or the Merckoquant methode (appendix 2 to RAL-UZ 102) or other equivalent test method.*

- ✉ Declaration in line with Appendices 1 and 2 from the manufacturer of the product and the supplier/manufacturer of each raw material.
- ✉ Statement on the levels in the product (if any) as measured using the Merckoquant method (see appendix 2 to RAL-UZ 102), the VdL-RL 03 method ("Concentration of free formaldehyde determined using the acetyl-acetone method"), or other equivalent test method.

O7 Residual monomers in polymers

Residual monomers in polymers can cause negative health effects, for example due to the allergic and carcinogenic properties of the monomers. This risk is considered so great that it necessitates a separate requirement to limit the total level of residual monomers in the polymer. The requirement states that newly produced polymers may contain a maximum of 100 ppm residual monomers if these have properties that are very toxic, toxic or harmful to health, and are classified as Acute Tox. Cat. 1-4. Monomers tend to reduce over time, as many monomers are volatile compounds. The requirement relates to the newly produced polymer since it is important to reduce the impact at source and to this end it is most practical for the polymer manufacturer to perform the analysis.

The limit is set at 100 ppm based on licence data. The limit remains unchanged from version 1.

Requirement text:

> The total level of residual monomers in polymers may be no more than 100 ppm, where they are very toxic, toxic or harmful to health and classified as Acute Tox. Cat. 1-4.
>
> The quantity of residual monomers is to be stated for newly produced polymers.

The classifications is in accordance with the prevailing CLP Regulation EC (No) 1272/2008 or the Dangerous Preparations Directive 1999/45/EC (as amended).

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

O8 Heavy metals

Nordic Ecolabelling restricts heavy metals ("heavy metals" refers in this case to heavy and particularly environmentally harmful metals as specified in the text) because they are toxic to people and other organisms, both on land and in the aquatic environment. On forested land, metals can end up in microorganisms in such a way that the degradation of dead organic material and thus the release of nutrients, is slowed[32].

On agricultural land, metals can disrupt the organisms in the soil, or have a directly toxic effect on plants. Metals on agricultural land can also be taken up by crops to varying degrees, leading to human exposure[33].

Mercury, cadmium, arsenic and lead are toxic to the human nervous system and kidneys, amongst other things, and the metals can accumulate in living organisms[34].

Chromium^{VI} is classified as: very toxic, CMR and harmful to the environment.

The metals and their compounds – cadmium, lead, chromium^{VI}, mercury, arsenic, barium (with the exception of barium sulphate, and other equally insoluble barium compounds), selenium and antimony – must therefore not be included in the product or in its constituent substances. It is, however, accepted that constituent substances may contain traces of the substances in the form of impurities. Trace amounts of each heavy metal must not exceed 100 ppm (0.1 mg/kg, 0.01% by weight) as specified in the definition of constituent substances.

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

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

Requirement text:

The following heavy metals or heavy metal compounds must not be present in the product or in its constituent chemical substances:

- Cadmium
- Lead
- Chromium VI
- Mercury
- Arsenic

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[32] SOU 2000:53
[33] SOU 2000:53
[34] Ahlstedt, 1999

- Barium (with the exception of barium sulphate, and other equally insoluble barium compounds)
- Selenium
- Antimony*

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

☒ Duly completed declaration, see Appendix 2, from the manufacturer of each raw material.

☒ For pigment that contains antimony integrated into a TiO2 rutile lattice, documentation must be submitted to show that the molecular structure is inert and that the environmental and health effects of the pigment are on the same level as, or better than, the results for C.I Pigment Brown 24 CAS no. 68186-90-3 and C.I Pigment Yellow 53 CAS no. 8007-18-9 in the report: UNEF Publications, OECD SIDS Initial Assessment Profile (www.inchem.org).

O9 Titanium dioxide

Chemical building products containing more than 3.0% by weight titanium dioxide may cause significant pollution, since the production of titanium dioxide has a major greenhouse effect counted per kg TiO_2[35] and is particularly associated with emissions of sulphates, SO_2 and chloride. For this reason we have set requirements concerning emissions from the production of titanium dioxide.

Nordic Ecolabelling has chosen to focus on emissions, since it is important that the requirement has potential, relevance and steerability. In this context, it should be clarified that the requirement applies to the titanium dioxide process, and not the titanium dioxide pigment process.

The requirement level has been been calculated based on the 38 g TiO_2/m^2 with 98% opacity on a standard reference surface (in the same way as for indoor paints) that has been used in the EU Ecolabel criteria for outdoor paints[36]. This has been done since Nordic Ecolabelling does not consider the functional unit m^2 to be relevant for outdoor paints and varnishes since the painted substrates varies so much and therefore effect the amount of paint needed, ie TiO^2 /m^2 will not be a fair way of setting such a requirement.

Requirement text:

If the product contains more than 3.0% by weight titanium dioxide, emissions from production of the titanium dioxide must not exceed the value stated below under the sulphate process and the chloride process.

Sulphate process:

SOx expressed as SO_2: 7.0 kg/tonne TiO_2

Sulphate waste: 500 kg/tonne TiO_2

Chloride process:

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[35] IVL Report B 1338-A

[36] 2009/543/EC: Commission Decision of 13 August 2008 establishing the ecological criteria for the award of the Community eco-label to outdoor paints and varnishes.

When using natural ore: 103 kg chloride waste/tonne TiO_2

When using synthetic ore: 179 kg chloride waste/tonne TiO_2

When using titanium ore: 329 kg chloride waste/tonne TiO_2

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

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

✉ If the product contains titanium dioxide, a description and calculation from the titanium dioxide producer is to be submitted, clearly showing that the requirement is fulfilled.

O10 Constituent powdered substances

A requirement has been set that substances in powder form must be added in a closed system, in a suspension or by means of a method, e.g. protective equipment that ensures a "low-dust" working environment. The protective equipment/method should heavily reduce or completely remove the dust from the rawmaterials. The aim of the requirement is to ensure that the working environment is as dust-free as possible for those involved in manufacturing the chemical building products.

Requirement text:

Substances in powder form must be added in a closed system, in a suspension or by means of a method that promotes a "low-dust" working environment e.g. using protective equipment which heavily reduce the dust or completely remove the dust from the raw materials.

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

O11 Nanoparticles

There remains a great deal of uncertainty about how nanoparticles affect health and the environment[37]. Based on the precautionary principle, Nordic Ecolabelling wishes to adopt a restrictive stance on the use of nanoparticles in Nordic Ecolabelled products. Chemical building products use many raw materials that may contain components of nanosize according to the European Commission's definition of nanoparticles[38]. The nano definition is as follows: "A nanomaterial is a natural, incidental or purposely manufactured material containing particles, in an unbound state or as an aggregate or as an agglomerate and where, for at least 50% of the particles in the number size distribution, one or more external dimensions is in the size range 1-100 nm."

In chemical building products it is possible to differentiate between traditional and new nanomaterials. The traditional nanomaterials are widely used in chemical building products and include carbon black (furnace black, lamp black) and amorphous silica (SiO_2). The new nanomaterials include nano-titanium dioxide, nano-zinc oxide, fullerenes and nanosilver. The new nanomaterials are used to give the products new properties depending on particle size, as described in "Nanoteknologiske overflader og nye

[37] European Council, Recommendation 2017 (2013), Provisional version, Nanotechnology: balancing benefits and risks to public health and the environment. Available at the address: http://assembly.coe.int/ASP/Doc/XrefViewPDF.asp?FileID=19730&Language=EN (21.05.13)

[38] COMMISSION RECOMMENDATION of 18 October 2011 on the definition of nanomaterial (2011/696/EU)

kvalifikationskrav" (Nanotechnological surfaces and new qualification requirements – 2010) from the Danish Technological Institute[39].

Nanoparticle exposure in chemical building products

Various studies have been conducted on nanoparticles in building products and their effects. A long-running Danish research project "Nanopartikler i farve- og lakindustrien" (Nanoparticles in the paints and varnishes industry) conducted a study of the dust generated when sanding paint with and without nanoparticles. The study related to TiO_2 (nano and pigment), aluminium silicate, nanosilica sol and axilat. The study showed that sanding dust from paints affected human cells less than free nanoparticles did.

Another study of nano-TiO_2 as a coating on windows has shown that the photocatalytic effect is reduced and that TiO_2 is released from the surface into the environment when subjected to ageing tests (water, salt, UV light)[40]. It is, however, not entirely clear whether it is nano-TiO_2 that is released or larger TiO_2 particles. The study shows that the fotocatalytic effect is reduced by ageing without being concluded with what the cause is.

A European Commission report from 2012 states that there is an ongoing debate on whether leaching from outdoor paints and/or the waste phase can lead to a significant quantity of nanoparticles.

Pigment

In this context, paint pigments are considered to be pigments produced as a more or less finely ground powder, where the powder particles comprise individual crystals up to aggregates of multiple crystals[41]. In paint it is generally more effective to use pigments with smaller particles than larger ones to achieve the same colour.

Inorganic pigments used in the paint industry that may occur in nano size include carbon black, iron oxides and titanium dioxide[42]. The carbon black used in paint is very finely ground and has a particle size of around 10-30 nm[43]. Iron oxide pigment may entirely comprise particles of nano size, or only a fraction of the particles may be nano.

A discussion with Kronos International[44], a producer of titanium dioxide (TiO_2), established that none of their regular grade TiO_2 counts as a nanomaterial under the EU's definition of nanomaterials (where at least 50% of the particles should be in nanosize to be considered a nanomaterial). According to Kronos, around 25% of the particles in their regular grades are less than 100 nm.

Nano-titanium dioxide is not considered a pigment, but a new nanomaterial that is added to give the products new properties, such as a self-cleaning effect in paints. These are not exempted from the requirement and therefore must not be used in Nordic Ecolabelled chemical building products.

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[39] H. V. Kristensen et al, Nanoteknologiske overflader og nye kvalifikationskrav, Danish Technological Institute, 2010
[40] J. Olabarrieta et al, Aging of photocatalytic coatings under a water flow: Long run performance and TiO_2 nanoparticles release, Applied Catalysis B: Environmental, Volumes 123-124, 23 July 2012
[41] Coatings Handbook; Thomas Brock, Michael Groteklaes, Peter Mischke; 2000
[42] Industrial Organic Pigments; W. Herbst, K. Hunger; Third edition 2004; pp 120-124
[43] Coatings Handbook; Thomas Brock, Michael Groteklaes, Peter Mischke; 2000; p 128
[44] Email correspondence with the SHE Director at Kronos International, INC, 12.11.12

There are many organic pigments that may comprise or contain fractions of nanoparticles. Examples of such pigments are: pigment yellow 1, 13 and 83, pigment orange 5 and 34 and pigment red 3[45].

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

Amorphous silica (SiO_2)

As mentioned above, synthetic amorphous silica is considered a traditional ingredient in chemical building products. Since amorphous silica is a nanomaterial, under the European Commission definition, synthetic amorphous silica (only in bulk) is exempted from the requirement concerning nanomaterials.

Surface treated nanosilica particles are not permitted in Nordic Ecolabelled chemical building products.

Consequences of the requirement

The requirement means that nanomaterials produced with the intention of containing nanoparticles must not be used. Examples of such nanoparticles are fullerenes, carbon nanotubes, nanosilver, nanogold and nanocopper. Traditional fillers on the other hand are permitted, as long as they are not produced in extremely small particle sizes. Pigments are exempted from the requirement, such that TiO_2 may be used in pigment form.

Requirement text:

Nanoparticles (from nanomaterials*) are not permitted in the product.

The following are exempted from the requirement:

- Pigments**
- Synthetic amorphous silica***

** The definition of nanomaterials follows the European Commission's definition from 18 October 2011 (2011/696/EU): "A nanomaterial is a natural, incidental or purposely manufactured material containing particles, in an unbound state or as an aggregate or as an agglomerate and where, for at least 50% of the particles in the number size distribution, one or more external dimensions is in the size range 1-100 nm."*

*** Nano-titanium dioxide (nano-TiO_2) is not considered a pigment.*

**** This applies to traditional synthetic amorphous silica in bulk form. Surface-treated silica is not permitted.*

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

O12 Other substances excluded from use

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

Substances of Very High Concern and the Candidate List

[45] W. Herbst, K. Hunger, Industrial Organic Pigments, Third edition 2004

Substances of Very High Concern (SVHC): SVHCs are, as the name suggests, substances that require great caution due to their inherent properties.

They meet the criteria in Article 57 of the REACH Regulation: Substances that are CMR (category 1 and 2 under the Dangerous Substances Directive 67/548/EEC or category 1A and 1B under the CLP Regulation), PBT substances, vPvB substances (see section below) and substances that have endocrine disruptive properties or are environmentally harmful without meeting the criteria for PBT or vPvB. SVHCs may be included on the Candidate List with a view to them being inscribed on the Authorisation List, which means that the substance becomes regulated (ban, phasing out or other form of restriction). Since these substances face being phased out or banned, it is only logical for Nordic Ecolabelling not to permit this type of substance in ecolabelled products.

A substance may meet the criteria for SVHC without being included on the Candidate List, so there is no direct equivalence between SVHC and the Candidate List.

To avoid cross-references between PBT, vPvB, CMR and endocrine disruptors, instead of excluding SVHC (which does cover some CMR, PBT, vPvB, etc) Nordic Ecolabelling chooses to exclude from use the substances on the Candidate List and to separately exclude PBT, vPvB and endocrine disruptors. This should still cover all SVHC substances.

"Persistent, bioaccumulative and toxic (**PBT**) organic substances" and

"Very persistent and very bioaccumulative (**vPvB**) organic substances"

are substances whose inherent properties are not desirable in Nordic Ecolabelled chemical building products. PBT and vPvB are defined in Annex XIII of REACH (Regulation (EC) No 1907/2006). Materials that meet or substances that form substances that meet the PBT or vPvB criteria can be found at: http://esis.jrc.ec.europa.eu/

Substances "deferred" or substances "under evaluation" are assumed not to have PBT or vPvB properties.

Potential endocrine disruptors are substances that may affect the hormone balance in humans and animals. Hormones control a number of vital processes in the body and are particularly important for development and growth in humans, animals and plants. Changes in the hormone balance can have unwanted effects and here there is an extra focus on hormones that affect sexual development and reproduction. Several studies have shown effects on animals that have been traced to changes in hormone balance. Emissions to the aquatic environment are one of the greatest sources for the spread of endocrine disruptors[46]. Nordic Ecolabelling bans the use of substances that are considered to be potential endocrine disruptors, category 1 (there is evidence of a change in endocrine activity in at least one animal species) or category 2 (there is evidence of biological activity related to changes in hormone balance), in line with the EU's original report on "Endocrine disruptors" or later studies[47], see http://ec.europa.eu/environment/endocrine/documents/final_report_2007.pdf.

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[46] Miljøstatus i Norge, 2008:

[47] http://ec.europa.eu/environment/endocrine/documents/final_report_2007.pdf
http://ec.europa.eu/environment/endocrine/documents/bkh_report.pdf#page=1
http://ec.europa.eu/environment/endocrine/documents/wrc_report.pdf

This entails a ban on substances such as bisphenol A, several phthalates and certain alkylphenols.

Organotin compounds: Nordic Ecolabelled chemical building products or raw materials may contain organotin compounds. In addition, organotin compounds were on the Danish Environmental Protection Agency's list of undesirable substances[48], but were subsequently removed since they are used in quantities of less than 100 tonnes per year. They have a number of inherent properties that are not desirable in Nordic Ecolabelled chemical building products.

Organotin compounds are used as a catalyst in sealants that harden through cross-linking. The level of tin catalyst depends on the cross-linking system, and the quantity of silicone or polymer. The quantity of tin catalyst is also tailored to the individual product. Add too much and the skin on the sealant develops too quickly, making it difficult for the user to ensure a fine, glossy finish before the product hardens. Add too little and the sealant will harden incorrectly, giving it poorer mechanical properties and a shorter functional lifespan. The sealant will be sticky on the surface and attract dirt. Organotin compounds are commonly found in silicone sealants.

Tributyltin (TBT, CAS no. 688-73-3) is usually self-classified as H301, H312, H315, H319, H372, H400 and H410[49], dibutyltin (DBT, 1002-53-5) is usually self-classified as H302[50] and triphenyltin (TPT, 668-34-8) is usually self-classified as H301, H311, H331, H400 and H410[51]. Tributyltin (TBT) is the organotin compound that has been most thoroughly studied. TBT has been proven to have endocrine disruptive effects on marine organisms. Raised TBT concentrations have been recorded in various species of marine mammal, and research results show that the substance penetrates the blood-brain barrier and the hepatic barrier, and suppresses the immune system of mammals[52].

Plasticisers – Phthalates: Many phthalates have negative effects on health and the environment. Some phthalates are inscribed on the EU's priority list of substances that should be investigated more closely for endocrine disruption – and some have already been identified as endocrine disruptors. Phthalates have also received a great deal of coverage in the media, due to their properties. Phthalates are for several reasons not desirable in ecolabelled products. Some phthalates can be found on the Danish "Listen over Uønskede Stoffer" (List of undesirable substances). These are: Diethylhexyl phthalate (DEHP), dibutyl phthalate (DBP), butyl benzyl phthalate (BBP), dimethoxyethyl phthalate (DMEP) and diisobutyl phthalate (DINP). DEHP, DBP and BBP are also inscribed on the EU's priority list of substances that should be investigated more closely for endocrine disruption. To ensure steerability for the requirement on phthalates, we are excluding phthalates from use in Nordic Ecolabelled chemical building products.

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http://ec.europa.eu/environment/docum/pdf/bkh_main.pdf

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

[49] ECHA: www.echa.eu (http://clp-inventory.echa.europa.eu/SummaryOfClassAndLabelling.aspx?SubstanceID=3635&HarmOnly=no?fc=true&lang=en, 24.06.2013)

[50] ECHA: http://clp-inventory.echa.europa.eu/DetailsOfNotifAndLabelling.aspx?SubstanceID=154766&NotificationID=10600814

[51] ECHA: http://clp-inventory.echa.europa.eu/SummaryOfClassAndLabelling.aspx?SubstanceID=228892&HarmOnly=no?fc=true&lang=en (24.06.2013)

[52] http://www.havet.nu/dokument/Havet2007-tbt.pdf (visited 14.01.2013)

APEO[53],[54],[55]: Alkylphenol ethoxylates and alkylphenol derivatives, i.e. substances that release alkylphenols on degradation, must not be used in ecolabelled chemical building products. APEO may occur in: binders, dispersants, thickeners, siccatives, anti-foaming agents, pigments,waxes, etc. APEO have a number of problematic environmental and health properties. They are not readily degradable according to standardised tests for ready degradability, they tend to bioaccumulate, they have been found in high concentrations in waste sludge, degradation products of APEO, alkylphenols and APEO with one or two ethoxy groups are very toxic to aquatic organisms and certain alkylphenols are suspected of being endocrine disruptors. Alkylphenols and bisphenol A are among the more potent chemicals with oestrogen effects that may occur in wastewater.

APEO-containing raw materials may be replaced with APEO-free raw materials that are based on three groups of surfactants: alkyl sulphates, alkyl ether sulphates and alcohol ethoxylates. These three groups of surfactants are readily degradable under aerobic and anaerobic conditions, and they are toxic or highly toxic to aquatic organisms.

Alkyl sulphates and alkyl ether sulphates are not considered to be bioaccumulative, but certain alcohol ethoxylates (in long chains with few ethoxylate units) have the potential to bioaccumulate. Even if the substituted surfactants are toxic or highly toxic to aquatic organisms, there is an environmental benefit to the substitution, since they are readily degradable. A further advantage of replacing APEO is that the degradation product nonylphenol is avoided. This product may be an endocrine disruptor.

Halogenated organic substances: Organic substances that contain halogenated substances such as chlorine, bromine, fluorine or iodine must not appear in Nordic ecolabelled chemical building products, with the exception of the preservatives that fulfil O5. Halogenated organic substances include many substances that are harmful to health and the environment, in that they are very toxic to aquatic organisms, carcinogenic or harmful to health in some other way. Halogenated organic substances persist in the environment, which means they pose a risk of having harmful effects. There is therefore a requirement that halogenated organic compounds must not appear in chemical building products. This means that substances such as brominated flame retardants, chlorinated paraffins, perfluoralkyl compounds and certain plasticisers are not permitted in Nordic Ecolabelled chemical building products.

Isocyanates: Isocyanates cause allergies and asthma and some, including TDI (toluene diisocyanate), are also carcinogenic. There are therefore special regulations governing work with material containing 0.5% isocyanates. Isocyanates are toxic to organisms in the environment.

Nordic Ecolabelling has chosen to exclude the use of isocyanates, based on their problematic properties, not least the following: "The harmfulness of isocyanates is reflected in the limit value set for their use. Most people are aware that organic solvents are harmful. However, if we compare the limit value for the solvent toluene with the

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[53] Substitution af alkylphenolethoxylater (APE) i maling, træbeskyttelse, lime og fugemasser, Working report from the Danish Environmental Protection Agency, No. 46/2003

[54] Nonylphenol og nonylphenolethoxylater i spildevand og slam, Miljøprojekt nr. 704/2002

[55] Feminisation of fish, Environmental Project no. 729, Danish Environmental Protection Agency, 2002

limit value for isocyanates, the latter is 100,000 times lower. Isocyanates are 100,000 times more dangerous than toluene."[56]

Nordic Ecolabelling has chosen to exclude water-based polyisocyanates with a chain length of more than 10 since they are used in water-based paints, for example in binders. These long-chain polyisocyanates are considered non-reactive since they are fully polymerised, which means fully reacted and stable. They are therefore unlikely to react and release isocyanates when used, for example when paint is applied. (Polymerisation: a reaction where two or more molecules bond and make a polymer. The polymer thereby comprises many identical units, with each unit called a monomer).

Fragrances: Fragrances must not be present in Nordic Ecolabelled chemical building products since fragrances do not have a function in the use of any chemical building products. Nordic Ecolabelling is not aware of any fragrances being used in chemical building products but, since fragrances are gaining a foothold in many products, Nordic Ecolabelling wishes to prevent future use of fragrances in chemical building products.

Note that naphtha and bisphenol A have been deleted from this list, since their classification excludes them from use under requirement O3.

Requirement text:

The product must not contain:

- Substances on the Candidate List*.
- Persistent, bioaccumulative and toxic (PBT) organic substances**.
- Very persistent and very bioaccumulative (vPvB) organic substances**.
- Substances considered to be potential endocrine disruptors in category 1 or 2 on the EU's priority list of substances that are to be investigated further for endocrine disruptive effects. See link: http://ec.europa.eu/environment/chemicals/endocrine/strategy/being_en.htm
- Organotin compounds
- Phthalates
- APEO – alkylphenol ethoxylates and alkylphenol derivatives (substances that release alkylphenols on degradation).
- Halogenated organic substances with the exemptions of preservatives that fulfil R4 and paint pigments that meet the EU's requirements concerning colourants in food packaging under Resolution AP (89).
- Isocyanates– water-based polyisocyanates with a chain length of more than 10 are exempted, where the concentration of isocyanates with a chain length of less than 10 as an impurity is documented.
- Fragrances

** The Candidate List can be found on the ECHA website at: http://echa.europa.eu/candidate-list-table*

PBT and vPvB substances are defined in Annex XIII of REACH (Regulation (EC) No 1907/2006). Substances that meet, or substances that form substances that meet, the PBT or vPvB criteria are listed at http://esis.jrc.ec.europa.eu/index.php?PGM=pbt. Substances that are "deferred" or substances "under evaluation" are not considered to have PBT or vPvB properties.

[56] http://www.leksikon.org/art.php?n=3600

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

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

4.3 Volatile organic and aromatic compounds (VOC, VAH and TVOC)

This section relates to the requirements concerning adhesives (O13, O14), sealants (O16, O17), fillers (O19, O20), outdoor paints and varnishes (O22) and industrial paints and varnishes (O24). All these requirements concern VOC, VAH and TVOC, and the background to these is therefore collected here.

4.3.1 Definition of VOC and VAH

Evaluation of a product's impact on the indoor environment depends on the type and quantity of gases and particles that are released (emissions, evaporation) into the air. Emissions are gases that are released from chemical building products, and others, and can be studied in special climate chambers. These can in turn be split into two groups, organic or inorganic, depending on the chemical composition. The group of volatile organic compounds (VOC) contains thousands of different chemicals. Examples of typical volatile organic compounds are isocyanates (hardeners), phthalates (plasticisers) and formaldehyde.

Volatile organic compounds (VOC) are defined here as follows:

Any organic compound having an initial boiling point less than or equal to 250°C measured at a standard pressure of 101.3 kPa (the same definition that appears in the VOC Directive 2004/42/EC).

These are measured according to the methods given in the VOC directive, i.e. as follows:

- Levels of volatile organic compounds are measured in g/l, according to the method ISO 11890-2 2002.
- Levels of volatile organic compounds where reactive diluents are present are measured in g/l, according to the method ASTMD 2369.

Volatile organic compounds are to be considered particularly concerning 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.[57]

Volatile aromatic hydrocarbons (VAH) are volatile organic compounds where one or more benzene rings are contained within the molecule, e.g. toluene, benzene and xylene. VAH are very stable. VAH are a subset of VOC.

[57] Miljoevejledninger.dk - http://www.miljoevejledninger.dk/index.aspx?articleid=+808+808

4.3.2 Requirements concerning VAH and VOC

Volatile aromatic compounds (VAH) must not be actively added to any chemical building products, but may occur as a residue or impurity at a maximum of 100 ppm (0.01% by weight, 100 mg/kg). This applies to all volatile aromatic compounds, e.g. toluene.

Different requirement levels have been set for the maximum permitted quantity of VOC for each subgroup of chemical building products. This is because the various subgroups have different functions and thus a differing need for volatile organic compounds as a means of ensuring the function of the product. All requirement limits are based on product information that Nordic Ecolabelling has received via licensing and/or industry contacts.

The requirement concerning adhesives has been set such that adhesives that need to be frostproof are permitted to contain up to 6.0% by weight volatile organic compounds, so that they can function at low temperatures. Other adhesives are permitted to contain no more than 1.0% by weight volatile organic compounds. Wallpaper paste must not contain any volatile organic compounds.

The requirement concerning sealants and fillers has been set such that they are permitted to contain a maximum of 3.0% by weight volatile organic compounds in each product.

The requirement for outdoor paints and varnishes has been set at a stricter level than the legal requirements defined in the VOC Directive 2004/42/EC, with a tightening compared with 2010 – see Table 4.3.2 below. In comparison with the EU Ecolabel's requirements, Nordic Ecolabelling's requirements are the same as or somewhat tougher than those proposed for the EU Ecolabel[58], see Table 4.3.2. The proposal in the EU Ecolabel's criteria is a tightening compared with the previous version of the requirement. These new limits have been set based on data that Nordic Ecolabelling has gathered as part of the licensing process and during discussions with various manufacturers.

Table 4.3.2 below also contains new limit values for industrial paints and varnishes. These limits were drawn up with the help of data from the BAT report[59], communication with the industry and information from Nordic Ecolabelling's furniture licences. In this version of its criteria, Nordic Ecolabelling has chosen to divide industrial paints along the same lines as outdoor paints, i.e. with the subgroups specified in 2004/42/EC[60].

Industrial powder paints and varnishes are exempted from this requirement, since powder paints comprise powder-based raw materials with very low levels of VOC, a fact that Nordic Ecolabelling has confirmed in communication with various paint manufacturers.

Table 4.3.2. VOC limits for outdoor paints and industrial paints in each subgroup

Product classification, cf. 2004/42/EC	2004/42/EC limit values from 2010, stated in g/l	Proposed limits in the EU Ecolabel criteria for indoor	Maximum permitted quantity in ecolabelled outdoor	Maximum permitted quantity in ecolabelled industrial

[58] EU Ecolabel draft criteria for indoor and outdoor paints and varnishes – June 2013
[59] BAT=Best Available Techniques, "Reference Document on Best Available Techniques on Surface Treatment using Organic Solvents", 2007
[60] 2004/42/EC http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2004:143:0087:0087:SV:PDF

		paints (May 2013)	paints, stated in g/l	paints and varnishes (indoor), stated in g/l
c. Exterior walls of mineral substrate	40	25	25	N/A
d. Interior/exterior trim and cladding paints for wood and metal including undercoats	130	80	75 (outdoor)	40 (indoor)
e. Interior/exterior trim varnishes and woodstains, including opaque woodstains	130	65	65	40
f. Interior and exterior minimal build woodstains	130	75	50	40
g. Primers	30	50	10	10
h. Binding primers	30	12	10	10
i. One-pack performance coatings	140	80	65	40
j. Two-pack reactive performance coatings for specific end use such as floors	140	80	65	40

N/A = Not applicable

The VOC requirement has been tightened in this version of the criteria such that it is now obligatory to supplement the VOC declaration/calculation with a test report. This has been added to ensure compliance with the given levels. It has previously been noted that test reports have included the VOC content of all constituent substances, where the calculations have not. In this version, Nordic Ecolabelling therefore wishes to receive both test reports and calculations as documentation for this requirement.

4.3.3 Emission of total volatile organic compounds (TVOC)

Nordic Ecolabelling has also chosen to set requirements concerning the emission of total volatile organic compounds (TVOC).

Emicode, M1, Blue Angel

The requirement means that the highest permissible quantity of emissions after 4 weeks, as TVOC, is 0.2 mg/m^{2}h converted into toluene equivalents. This limit means that the product fulfils the M1[61] indoor climate scheme.

Alternatively it is acceptable to test according to EMICODE EC1 (adhesives, sealants, fillers)[62] or Blue Angel[63], since the results are considered equivalent for these methods. This is based on a comparison conducted by Eurofins in 2010[64].

The EMICODE limits have been updated so that EMICODE now refers to test results after 28 days instead of the previous 10 days. EMICOD EC1+[65] is the toughest limit in the EMICODE tests, but EMICODE EC1 is the one most in line with the previous

[61] Emission classification M1. Available at: https://www.rakennustieto.fi/index/english/emissionclassificationofbuildingmaterials.html (visited 15.05.2012)
[62] http://www.emicode.de/
[63] http://www.blauer-engel.de/en/index.php
[64] Eurofins comparison: "Comparison Emicode EC1 Plus, Emicode EC1, Blue Angel RAL UZ 113, AgBB, CDPH Section 1350", 14 October 2010
[65] http://www.eco-institut.de/en/from-analysis-to-quality-assurance/national-marks-of-conformity/gev-emicodeR/

version of the Criteria for Chemical Building Products on the subject of TVOC, so Nordic Ecolabelling is retaining the limits in accordance with EMICODE EC1.

In this version of the criteria, the option of documenting TVOC for sealants using M1[66] has been removed, so as not to encourage applicant companies to use a test method that is generally considered poorly suited to the sealants that can be ecolabelled. This is because the application method used in the M1 standard makes it unreasonably difficult for aerobic sealants to meet the requirement limit.

TVOC limit values

When planning this revision, it was decided that the TVOC requirement for sealants in particular should be reviewed to establish whether the requirement limit was reasonable. This limit has been checked with the industry and has been judged to be at a good level. The requirement level has therefore not been adjusted. What has changed with regard to TVOC is that M1 has been removed from the test method options, as it is not considered relevant for sealants.

The requirement levels for fillers and adhesives also remain at the same levels as in version 1, since these are still judged to be reasonable.

During the consultation, Nordic Ecolabelling will gather information concerning the need also to introduce a TVOC requirement for industrial paints and varnishes.

TVOC exemptions

Products sold in packs of 125 ml or less are exempted from the TVOC requirement. The reason for this is that users who buy a small pack are not expected to use up the whole pack in one go. This in turn means that they are not exposed to emissions from the total volatile organic compounds in the pack, and thus they will not be affected to as great an extent as those who use large quantities. EMICODE exists as a test method for sealants and is more relevant for these products than M1.

Requirement text:

O13 Adhesives – Volatile organic compounds (VOC) and volatile aromatic hydrocarbons (VAH)

Volatile aromatic hydrocarbons (VAH) must not be actively added to the product, but may occur as residues or impurities to a maximum of 100 ppm (0.01% by weight, 100 mg/kg).

Adhesives that are intended for frostproof use during the winter may contain maximum 6.0% by weight volatile organic compounds.

Other adhesives, with the exception of wallpaper paste, may contain a maximum of 1.0% by weight volatile organic compounds.

Wallpaper paste must not contain any volatile organic compounds.

Note that if, during use, volatile organic compounds form, these must meet all applicable obligatory requirements.

Volatile organic compounds (VOC) are defined here as any organic compound having an initial boiling point less than or equal to 250°C measured at a standard pressure of 101.3 kPa. VOC content is measured according to the methods in the VOC Directive (2004/42/EC).

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[66] Emission classification M1.
https://www.rakennustieto.fi/index/english/emissionclassificationofbuildingmaterials.html (visited 15.05.2012)

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

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

✉ Specification of the level of volatile aromatic hydrocarbons and calculation of VOC in the product.

✉ Test report confirming that the level of volatile organic compounds (VOC) in the adhesive does not exceed the limit value in the requirement above, for each type of adhesive.

O14 Adhesives – Emission of total volatile compounds (TVOC)

The total level of volatile organic compounds in adhesives must not exceed the following (depending on which test is used):

- M1: 0.2 mg/m²h converted into toluene equivalents after 4 weeks

  Or

- EMICODE EC1: 100 µg/m³ after 28 days

  Or

- Blaue Engel RAL UZ 113: 100 µg/m³ after 28 days

Note: If the product is intended for both outdoor and indoor use, it must meet the requirements concerning indoor adhesives.

Adhesives for indoor use sold in packs of less than 125 ml are exempted from this requirement.

✉ Specification of pack size.

✉ Test report in line with ISO EN 16000, parts 1, 3, 6, 9, 10, 11 for products sold in packs greater than 125 ml. The test laboratory must be accredited for the test method in line with standard EN ISO/IEC 17025.

O15 Adhesives – quality requirements

See quality requirements in Chapter 4.4.

O16 Sealants – Volatile organic compounds (VOC) and volatile aromatic hydrocarbons (VAH)

Volatile aromatic hydrocarbons (VAH) must not be actively added to the product, but are permitted as residues or impurities to a maximum of 100 ppm (0.01% by weight, 100 mg/kg).

Sealants are permitted to contain no more than 3.0% by weight volatile organic compounds.

Note that if volatile organic compounds form during the use of the sealant, these must meet all applicable obligatory requirements.

Volatile organic compounds (VOC) are defined here as any organic compound having an initial boiling point less than or equal to 250°C measured at a standard pressure of 101.3 kPa. VOC content is measured according to the methods in the VOC Directive (2004/42/EC).

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

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

✉ Specification of the level of volatile aromatic hydrocarbons and calculation of VOC in the product.

✉ Test report confirming that the level of volatile organic compounds (VOC) in the sealant does not exceed 3.0% by weight.

O17 Sealants – Emission of total volatile compounds (TVOC)

The total level of volatile organic compounds in sealants must not exceed the following (depending on which test is used):

- EMICODE EC1: 100 µg/m³ after 28 days

  Or

- Blaue Engel RAL-UZ 123: 300 µg/m³ after 28 days

If the product is intended for both outdoor and indoor use, it must meet the requirements concerning sealants for indoor use.

Sealants for indoor use sold in packs of less than 125 ml are exempted from this requirement.

✉ Specification of pack size.

✉ Test report in line with ISO EN 16000, parts 1, 3, 6, 9, 10, 11 for products sold in packs greater than 125 ml. The test laboratory must be accredited for the test method in line with standard EN ISO/IEC 17025.

O18 Sealants – quality requirements

See quality requirements in Chapter 4.4.

O19 Fillers – Volatile organic compounds (VOC) and volatile aromatic hydrocarbons (VAH)

Volatile aromatic hydrocarbons (VAH) must not be actively added to the product, but are permitted as residues or impurities to a maximum of 100 ppm (0.01% by weight, 100 mg/kg).

Fillers are permitted to contain no more than 3.0% by weight volatile organic compounds in ready-mixed filler.

Note that if, during use, volatile organic compounds form, these must meet all applicable obligatory requirements.

Volatile organic compounds (VOC) are defined here as any organic compound having an initial boiling point less than or equal to 250°C measured at a standard pressure of 101.3 kPa. VOC content is measured according to the methods in the VOC Directive (2004/42/EC).

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

✉ Specification of the level of volatile aromatic hydrocarbons and calculation of VOC in the product.

✉ Test report confirming that the level of volatile organic compounds (VOC) in the filler does not exceed 3.0% by weight.

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

O20 Fillers – Emission of total volatile compounds (TVOC)

The total level of volatile organic compounds in fillers must not exceed the following (depending on which test is used):

- M1: 0.2 mg/m²h converted into toluene equivalents after 4 weeks

  Or

- EMICODE EC1: 100 µg/m³ after 28 days

If the product is intended for both outdoor and indoor use, it must meet the requirements concerning fillers for indoor use.

Fillers for indoor use sold in packs of less than 125 ml are exempted from this requirement.

✉ Specification of pack size.

✉ Test report in line with ISO EN 16000, parts 1, 3, 6, 9, 10, 11 for products sold in packs greater than 125 ml. The test laboratory must be accredited for the test method in line with standard EN ISO/IEC 17025.

O21 Fillers – quality requirements

See quality requirements in Chapter 4.4.

O22 Outdoor paints and varnishes – Volatile organic compounds (VOC) and volatile aromatic hydrocarbons (VAH)

Volatile aromatic hydrocarbons (VAH) must not be actively added to the product, but are permitted as residues or impurities to a maximum of 100 ppm (0.01% by weight, 100 mg/kg).

Outdoor paints and varnishes may contain the amount of volatile organic compounds stated in Table 6.

Note that if, during use, volatile organic compounds form, these must meet all applicable obligatory requirements.

Volatile organic compounds (VOC) are defined here as any organic compound having an initial boiling point less than or equal to 250°C measured at a standard pressure of 101.3 kPa. VOC content is measured according to the methods in the VOC Directive (2004/42/EC).

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

Table 6 VOC limits for outdoor paints and varnishes

Product classification, cf. 2004/42/EC	Maximum permissible quantity of VOC stated in g/l (incl. water)
c. Exterior walls of mineral substrate	25
d. Exterior trim and cladding paints for wood and metal including undercoats	75
e. Exterior trim varnishes and woodstains, including opaque woodstains	65
f. Exterior minimal build woodstains	50
g. Primers	10
h. Binding primers	10
i. One-pack performance coatings	65
j. Two-pack reactive performance coatings for specific end use such as floors	65

Powder paints are exempted from this requirement.

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

✉ Specification of the level of volatile aromatic hydrocarbons and calculation of VOC in the product.

✉ Test report confirming that the level of volatile organic compounds (VOC) in the outdoor paint or varnish does not exceed the limit value in the requirement above, for each type of outdoor paint or varnish.

O23 Outdoor paints and varnishes – quality requirements

See quality requirements in Chapter 4.4.

O24 Industrial paints and varnishes – Volatile organic compounds (VOC) and volatile aromatic hydrocarbons (VAH)

Volatile aromatic hydrocarbons (VAH) must not be actively added to the product, but are permitted as residues or impurities to a maximum of 100 ppm (0.01% by weight, 100 mg/kg).

Industrial paints and varnishes may contain the amount of volatile organic compounds stated in the table.

Note that if, during use, volatile organic compounds form, these must meet all applicable obligatory requirements.

Volatile organic compounds (VOC) are defined here as any organic compound having an initial boiling point less than or equal to 250°C measured at a standard pressure of 101.3 kPa. VOC content is measured according to the methods in the VOC Directive (2004/42/EC).

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

Table 7 VOC limits for industrial paints and varnishes

Product classification, cf. 2004/42/EC	Maximum permitted quantity of VOC in ecolabelled industrial paints and varnishes, stated in g/l
d. Interior trim and cladding paints for wood and metal including undercoats	N/A
e. Interior trim varnishes and woodstains, including opaque woodstains	40
f. Interior and exterior minimal build woodstains	40
g. Primers	40
h. Binding primers	10
i. One-pack performance coatings	10
j. Two-pack reactive performance coatings for specific end use such as floors	40

Industrial powder paints and varnishes are exempted from this requirement.

✉ Specification of the level of volatile aromatic hydrocarbons and calculation of VOC in the product.

✉ Test report confirming that the level of volatile organic compounds (VOC) in the industrial paint or varnish does not exceed the limit value in the requirement above.

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

4.4 Quality requirements

This section describes the background to requirements O15 (adhesives), O18 (sealants), O21 (fillers), O23 (outdoor paints) and O25-28 (industrial paints and varnishes).

Nordic Ecolabelling sets requirements on product quality, because the aim of the criteria development process is to draw up a criteria document for chemical building products that will allow the consumer – professional as well as DIY – to choose chemical building products that have the least negative impact on the environment and health and that are of a high quality.

Since during the usage phase, chemical building products have an important secondary function in that they must last/perform for many years, perhaps 10-30 years depending on the subgroup, it is relevant to set requirements concerning performance and quality.

The text on what is required of a test laboratory has been moved to Appendix 6 to the criteria in order to gather all the information in one place.

O15 Adhesives – Quality requirements

Adhesives are tested in line with the test methods stated in the requirement in order to show that the products meet the quality standards in the tests. An adhesive that performs well stops the user having to use unnecessary amounts of the product and this can "save" on raw materials compared with less good adhesive, where glueing must be done several times to achieve the same effect.

Requirement text:

Adhesives are to be tested in accordance with the standards stated in the table below.

Table 5 Quality tests for adhesives

Types	Test method
Adhesives for wall and floor coverings	EN 1372, EN 1373, EN 1902 or equivalent methods. At least one comparable reference product is to be tested.
Ceramic tile adhesive	EN 1324 or equivalent methods – the adhesive must meet the minimum requirements in standard EN 12004.
Wallpaper paste	Comparative test (see Appendix 5) that clearly shows the quality of the adhesive.
Wood adhesive	EN 205:2003 or equivalent methods. At least one comparable reference product is to be tested.
Other adhesives	Methods that apply for these products or comparative test (see Appendix 5) that clearly shows the quality of the adhesive.

✉ Test report from a laboratory in line with Appendix 6 or comparative test in line with Appendix 5, which clearly shows that the requirement is fulfilled.

O18 Sealants – quality requirements

The quality of the sealant is to be tested in accordance with ISO 11600. To ensure that it is possible to test sealant quality, an alternative to the standardised test method is given in the form of a comparative test that clearly shows the quality of the sealant. In drawing up the first version of the criteria, Nordic Ecolabelling contacted various suppliers and reviewed product sheets and MSDS to determine the standardised method and to allow for a comparative test. These requirements also appear in this version of the criteria.

Requirement text:

The sealant must, where appropriate, be tested in accordance with ISO 11600. Other sealants are to be subject to a comparative test (see Appendix 5) that clearly shows the quality of the sealant.

✉ Test report from a laboratory in line with Appendix 6 or comparative test in line with Appendix 5, which clearly shows that the requirement is fulfilled.

O21 Fillers – Quality requirements

Under the requirement, the manufacturer has to describe how the filler has been tested to ensure good, consistent quality with a special focus on: viscosity, adhesion, gap-filling properties, shrinkage, minimal sinking and durability. Tests of filler for plasterboard must be conducted in accordance with the standard EN 13963. Other fillers are to be tested in accordance with EN 15824 or with a comparative test that clearly shows the quality of the filler.

The requirement remains unchanged from version 1.

Requirement text:

> The manufacturer must describe how the filler is tested in order to ensure good, consistent quality, particularly in terms of viscosity, adhesion, gap-filling properties, shrinkage, minimal sinking and durability.
>
> Test of filler for plasterboard conducted in accordance with the standard EN 13963. Test of other filler in accordance with EN 15824 or using a comparative test (see Appendix 5) that clearly shows the quality of the filler.

☒ Test report from a laboratory in line with Appendix 6 or comparative test in line with Appendix 5, which clearly shows that the requirement is fulfilled.

O23 Outdoor paints and varnishes – Quality requirements

The quality requirements for outdoor paints and varnishes are based on the requirements set out in the EU Ecolabel criteria for outdoor paints and varnishes[67]. There are, however, certain differences. This version of the criteria also contains an addition for powder paints for outdoor use.

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

Nordic Ecolabelling has been informed that the test for abrasion is only relevant for indoor floor products and the requirement from the EU Ecolabel criteria for outdoor paints and varnishes has therefore not been transferred to this version of the Nordic Ecolabelling criteria.

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

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

[67] http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2009:181:0027:0038:EN:PDF (dated 13 August 2008)

different test for this on condition that the test is equivalent to what is required in the criteria document and that the requirement level is fulfilled.

There is also a requirement that if, due to use of isothiazolinone compounds or IPBC, the product is classified as Xi R43 or "Contains (name of sensitising substance), may cause an allergic reaction", the product must also meet the relevant fungal growth test.

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

Table 4.4.1 Summary of test methods and assessment standards

1	**Weathering**	Masonry paints are to be tested according to	ISO 11507:2007
		Metal finishes are to be tested according to	ISO 11507:2007
		Wood paints, wood stains and wood varnishes are to be test according to	EN 927-6
2	**Results to be reported from weathering test:**	Flaking is assessed according to	ISO 4628-5:2003
		Cracking is assessed according to	ISO 4628-4:2003
		Blistering is assessed according to	ISO 4628-2:2003
		Colour change is assessed according to	ISO 7724-2
		Decrease in gloss is assessed according to	EN ISO 2813
		Chalking is assessed according to	EN ISO 4628-6:2007
		General appearance is assessed according to	EN ISO 4628-1:2003
3	**Water vapour permeability, Class II**	Masonry and concrete paints marketed as water vapour permeable are to be tested and assessed according to	EN ISO 7783-2
4	**Liquid water permeability, Class III**	Masonry and concrete paints marketed as water repellent are to be tested and assessed according to	DIN EN 1062-3:1999
5	**Fungal growth; 1**	Products intended for mineral substrates are to be tested and assessed according to	BS 3900:G6
	Fungal growth; 2a	Products intended for wood are to be tested according to	EN-927-3
	Fungal growth; 2b	Products intended for wood are to be assessed according to	EN ISO 4628-1
6	**Powder paints**	Powder paints for outdoor use are to be tested according to Qualicoat or GSB	Qualicoat 13th edition GSB AL 631 GSB ST 663

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

- Masonry paints shall be exposed to test conditions for 1000 hours (6 weeks) (UVA 4t/60ºC + humidity 4t/50ºC) according to ISO 11507: 2007.
- Metal finishes shall be exposed to test conditions for 500 hours (6 weeks) (UVA 4t/60ºC + humidity 4t/50ºC) according to ISO 11507: 2007.
- Wood paints, wood stains and wood varnishes shall be exposed to test conditions for 2000 hours (12 weeks) according to EN 927-6.

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

- Flaking (according to ISO 4628-5:2003). Product is to have a flake density of 2 or less, and a flake size of 2 or less.
- Cracking (according to ISO 4628-4:2003). The product is to have a crack quantity of 2 or less and a crack size of 3 or less.
- Blistering (according to ISO 4628-2:2003). The product is to have a blister quantity of 3 or less and a blister size of 3 or less.
- The colour change (according to ISO 7724-2) shall not exceed $\Delta E^*=4$ with respect to the initial value.
- Decrease in gloss (according to EN ISO 2813) shall not be greater than 30% of initial value – matte paints and varnishes with an initial gloss value less than 60% are exempted from the requirement.
- Chalking (according to EN ISO 4628-6:2007) for masonry paints and metal finishes. The product shall achieve at least 1.5 or more, i.e. 0.5 or 1.0. In the standard there are pictorial reference standards.
- General appearance (according to EN ISO 4628-1:2003).

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

☒ Test report from a laboratory in line with Appendix 6 which clearly shows that the requirement is fulfilled.

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

☒ Test report from a laboratory in line with Appendix 6 which clearly shows that the requirement is fulfilled.

4. Liquid water permeability, Class III: If masonry and concrete paints are marketed as water repellent/hydrophobic or similar claims are made, the paints are to be classified as Class III, i.e. with low liquid water permeability according to DIN EN 1062-3: 1999. Due to large numbers of possible tinting colours, this criterion will be restricted to testing of the base paint.

☒ Test report from a laboratory in line with Appendix 6 which clearly shows that the requirement is fulfilled.

5. Fungal growth: If the product is classified with Xi R43 or "Contains (name of the sensitising substance), may cause an allergic reaction" because of the use of isothiazolinones or iodopropynyl butylcarbamate, IPBC, the product must pass the relevant fungal growth test, see below. If the product is marketed as "resistant to fungal growth" or similar, a test must be conducted that documents this.

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

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

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

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

✉ Test report from a laboratory in line with Appendix 6 which clearly shows that the requirement is fulfilled.

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

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

Quality requirements for industrial paints and varnishes

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

O25 sets out quality requirements for paints and varnishes for furniture, and O26 covers products for wall panels, floors and similar. O27-O28 are requirements concerning surfaces subject to heavy wear such as floors.

For all the tests specified below, the test laboratory must fulfil the general requirements in the standard EN ISO/IEC 17025 or be an officially GLP-approved laboratory. Alternatively the company's own laboratory can be accepted as the test laboratory, if the laboratory is included in the company's certified quality management system.

O25 Quality requirements for industrial paints and varnishes for furniture

Paints for use on furniture must meet the Möbelfakta criteria[68], which are the same as those in the criteria for furniture. As such the chemical building products and furniture are harmonised in this requirement.

The Möbelfakta criteria are a measure of how resistant the paint film is to scratches, heat, water, grease, coffee and alcohol. The requirement levels vary depending on the intended application for the paint. For example, a paint intended for worktops needs to meet higher standards than a paint for kitchen drawer bottoms.

Requirement text:

Industrial paints and varnishes for furniture must fulfil the requirements as set out in the Tables 8 and 9 below.

[68] Möbelfakta http://www.mobelfakta.se/

Table 8 Requirement levels for varnished surfaces in different furniture groups.

Seating	Seat and armrest	Requirement level 2
Storage units	External horizontal surfaces (up to 1.25 m), shelves and bases	Requirement level 3
Tables	Private use and normal public use	Requirement level 4
	Intensive public use (restaurant/café)	Requirement level 5
Kitchen	Internal surfaces, including drawer bottoms, excluding shelves and bases	Requirement level 1
	External horizontal surfaces, shelves and bases	Requirement level 3
	Worktops (table tops)	Requirement level 6

Table 9 Test methods and requirement levels for furniture tests

Requirement category			**Requirement levels**					
Test:		**References:**	**1**	**2**	**3**	**4**	**5**	**6**
Water	1)	EN 12720	6h	16h	16h	24h	24h	24h
Grease	1)	EN 12720	24h	24h	24h	24h	24h	24h
Grease + scratches	1)	SS 83 91 22	-	-	-	24h+3N	24h+3N	24h+3N
Scratches	2)	SS 83 91 17	-	3N	3N	5N	5N	5N
Alcohol	1)	EN 12720	-	-	-	1h	1h	1h
Coffee	1)	EN 12720	-	1h	1h	1h	1h	1h
Heat, dryness	1)	EN 12722	-	-	-	70˚C	70˚C	-
Heat, dryness	1)	EN 12722	-	-	-	-	-	180˚C
Heat, moisture	1)	EN 12721	-	-	-	-	-	85˚C
Heat on edge	1)	NS 8061	-	-	-	-	-	85˚C
Water on edge	1)	SS 83 91 20 NS8062 DS2175	-	-	1h	-	-	-
Sweat, acid and alkaline	1)	ISO 105E04	-	1h	-	-	-	-

1) = A result of 4 is a pass score in the assessment. Assessment after 24 h.

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

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

*** = Applies to armrests.*

**** = Applies to doors and drawer fronts.*

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

O26 Quality requirements for industrial paints and varnishes for panels, floors and similar

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

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

Scratch resistance ASTM D2794 (http://www.astm.org/Standards/D2794.htm)

"Sheen Automatic Scratch Tester" according to ISO 1518 (1992)

Requirement text:

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

- Scratch resistance ASTM D2794 (http://www.astm.org/Standards/D2794.htm)
- "Sheen Automatic Scratch Tester" according to ISO 1518 (1992)

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

O27 Abrasion/wear for surfaces subject to heavy wear, e.g. floors and sheeting

Surfaces subject to heavy wear, e.g. floors, need to be painted/coated with paints or varnishes that are highly resistant to abrasion. One way of testing wear resistance of paints is by performing an abrasion resistance test according to EN ISO 7784-2:2006.

The requirement mirrors the requirement for the EU Ecolabel, i.e. to be approved a paint/varnish must have an abrasion resistance not exceeding 70 mg weight loss after 1000 test cycles with a 1000 g load and a CS10 wheel.

Requirement text:

Floor paints, floor coatings and other products subject to an equivalent level of wear must have an abrasion resistance not exceeding 70 mg weight loss after 1000 test cycles with a 1000 g load and a CS10 wheel according to EN ISO 7784-2:2006.

☒ The applicant must submit a test report showing that this requirement has been fulfilled in accordance with EN ISO 77842:2006.

O28 Water resistance (floors)

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

Requirement text:

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

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

4.5 Requirements concerning packaging, labelling, consumer information and recycling

O29 Packaging

The requirement has been set that packaging must be re-sealable in order to ensure that the products can be used on multiple occasions, unless documentation can be submitted that the product will always be used all at once.

Moreover, the type of plastics used must be documented by the manufacturer to ensure that neither the labels nor the product packaging contain halogenated plastics. This is because the incineration of PVC and other halogenated plastics can give rise to problems during disposal.

Packaging may sometimes (in our experience) be treated with a surface coating that contains halogens such as fluorine in order to prevent the product from sticking to the packaging and not releasing. Nordic Ecolabelling therefore also sets the requirement that the surface coating on the packaging must not contain halogens.

Metal packaging is heavy to transport. However, because some products may require metal packaging, the requirement is set that metal packaging must not be used for packs of less than 1 l unless particular health and environment-related arguments indicate otherwise. Products that will be pigmented/made up to a given colour such that their end volume is 1 l are considered to fulfil the requirement for metal packaging.

Requirement text:

- Packaging must be resealable, unless documentation can be provided that the entire product will always be used in one go.
- The type of plastic material must be documented by the manufacturer. Labels and product packaging must not contain halogenated plastic.
- Packaging and any surface coating must not contain halogens.
- Metal packaging must not be used for packs of less than 1 litre, unless this is justified by special health and environmental arguments.

✉ Packaging sample showing that the packaging can be resealed.

✉ Description of the packaging type and size.

✉ Descriptions of whether the entire product is always used in one go.

✉ Declaration from the packaging manufacturer that no halogenated plastics have been used or product data sheets clearly showing that the requirement is met by all parts of the packaging, including lids, caps, etc.

✉ Declaration from the packaging manufacturer that the packaging has not been surface coated, or that the surface coating does not contain halogens.

✉ Declaration from the label producer that no halogenated plastics have been used.

O30 Label/product packaging

In order to ensure that the Nordic Ecolabel logo is applied correctly, a sample of the label/print on the packaging must be submitted with the application – a PDF file is acceptable for this.

Requirement text:

The label/product packaging must carry the Nordic Ecolabel logo, licence number and product group designation.

✉ Label/product packaging – a PDF file is acceptable for this.

O31 Consumer information

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

Recommendations on how to store the products after opening, how to clean tools and how to handle residues in order to minimise the risk of incorrect handling is required to inform the user.

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

The packaging for sealants is to carry a recommendation that the sealant is smoothed/finished using a smoother/sponge or cloth, and not a finger, for example. The point of this is to avoid unnecessary skin contact with the product.

Requirement text:

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

- The purpose, substrate and other conditions of application for which the product is intended. This shall include advice on preparation and so on, e.g. correct preparation of the substrate, outdoor use (if relevant) or temperature.
- Estimate of "normal" coverage (e.g. l/m^2, g/m or equivalent).
- Recommended preventive safety measures for users, such as safety equipment and ventilation (particularly when working in enclosed spaces or similar, or when using industrial paints).
- Recommendations on cleaning used tools and how waste products from cleaning can best be disposed of (to limit water pollution). These recommendations are to be adapted to the product types and areas of application. Pictograms may also be used where appropriate.
- Sealants: A recommendation that the sealant should be finished using a smoother/sponge/cloth or similar is to be included in the product description and it is not to be recommended that this is done with a thumb/finger.
- Recommendations on how the product is to be stored after opening, including safety instructions where relevant.

- Recommendations on the disposal of residual product and packaging.

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

O32 Take-back system

The recovery of packaging is a key stage in the ecocycle of materials. Some Nordic countries have well developed take-back systems for used packaging, which Nordic Ecolabelling wishes to support in order to ensure greater recycling of packaging.

Relevant national regulations, legislation and agreements within the sector regarding take-back systems for products and packaging shall be complied with in all the Nordic countries where the Nordic Ecolabelled products are marketed. The relevant take-back systems in the Nordic region are:

- PYR in Finland
- Grønt punkt in Norway
- FTi AB (formerly REPA) in Sweden

Requirement text:

Relevant national regulations, legislation and agreements within the sector regarding take-back systems for products and packaging shall be complied with in all the Nordic countries where the Nordic Ecolabelled products are marketed. Relevant take-back systems are PYR (Fi), Grønt punkt (No) and FTi AB (Sw).

✉ Declaration from the applicant regarding affiliation to existing recycling/processing agreements.

O33 Sorting and handling of waste

The manufacturer must have a plan for the sorting and handling of waste. The quantity of hazardous waste is to be reported. This requirement previously existed in the criteria for adhesives, but is a new requirement for chemical building products. Nordic Ecolabelling wishes to support more optimal waste sorting and handling as a means of reducing the amount of unsorted waste in society.

Requirement text:

The manufacturer must have a plan for the sorting and handling of waste.

The quantity of hazardous waste is to be reported.

✉ Report on how waste is handled and sorted, including a sorting plan.

✉ Report on the quality of hazardous production waste.

4.6 Quality management, regulatory requirements and marketing

Nordic Ecolabelling sets these general requirements concerning quality management to ensure that the products always fulfil the set ecolabelling requirements. If the

manufacturer has an environmental management system that is certified under ISO 14 001 or EMAS and the following procedures are applied, it is sufficient if the accredited auditor certifies compliance with the requirements.

Requirement text:

O34 Laws and regulations

The requirement ensures that the holder of the Nordic Ecolabel licence takes responsibility for safety, the working environment and environmental legislation, as well as enforcing compliance with terms and conditions/conventions at the production facilities during the production of the ecolabelled products.

Requirement text:

The licensee shall ensure compliance with all applicable local laws and provisions at all production facilities for the Nordic Ecolabelled product, e.g. with regard to safety, working environment, environmental legislation and site specific requirements/concessions.

✉ Declaration from the licensee (signed application form) that the requirement is fulfilled, plus a report to the regulatory authority.

O35 Licence administrators

A clear description must be submitted (in the form of an organisational chart, for example) to show who is responsible for ensuring that the Nordic Ecolabelling criteria are fulfilled and who the Nordic Ecolabelling contact is, in order to ensure that Nordic Ecolabelling is informed of any changes or problems.

Requirement text:

The company shall appoint an individual responsible for ensuring the fulfilment of Nordic Ecolabel requirements, and a contact person for communications with Nordic Ecolabelling.

✉ Organisational chart showing who is responsible for the above.

O36 Documentation

The licence applicant must save a copy of the submitted documentation in order to be able to refer back to it at a later date, and so that it is available to personnel during the period of validity of the licence. On an inspection visit, the documentation must be available to Nordic Ecolabelling.

Requirement text:

The licensee must be able to present a copy of the application and factual and calculation data supporting the documents submitted with the application (including test reports, documents from suppliers and suchlike).

🔑 On-site inspection

O37 Product quality

To ensure that the ecolabelled products maintain an even quality routines on dealing with complaints and claims are necessary.

Requirement text:

The licensee must guarantee that the quality of the Nordic Ecolabelled product is maintained throughout the validity period of the licence.

✉ Procedures for collating and, where necessary, dealing with claims and complaints regarding the quality of the Nordic Ecolabelled product.

O38 Planned changes

A Nordic Ecolabelled building product is ecolabelled on the understanding that the formulation is exactly as approved by Nordic Ecolabelling. Any changes must therefore be reviewed and assessed by Nordic Ecolabelling before they are incorporated into the production. The licensee must have procedures in place to ensure that Nordic Ecolabelling is informed of any planned changes that have a bearing on the requirements.

Requirement text:

Written notice of planned product and marketing changes that affect the Nordic Ecolabelling requirements must be given to Nordic Ecolabelling.

✉ Procedures detailing how planned product and marketing changes are dealt with.

O39 Unforeseen non-conformities

Unforeseen non-conformities that affect the Nordic Ecolabelled product must be reported to Nordic Ecolabelling, and procedures for this must be in place at the factory to ensure that non-conformities are dealt with and that Nordic Ecolabelling is informed about them.

Requirement text:

Unforeseen non-conformities that affect Nordic Ecolabelling requirements must be reported to Nordic Ecolabelling in writing and logged.

✉ Procedures detailing how unforeseen non-conformities are handled.

O40 Traceability

Procedures for traceability of the Nordic Ecolabelled product are important in ensuring that, in the event of a complaint, the factory can trace back from the end product to the ingredients that went into it. In the case of problems in production, a traceability system can help ensure that all ingredients in the Nordic Ecolabelled product are the same and in the same quantities as at the time of application.

Requirement text:

The licensee must have a traceability system for the production of the Nordic Ecolabelled product.

✉ Description of/procedures for fulfilment of the requirement.

O41 Marketing

The Nordic Ecolabel is a very well-known and well-reputed trademark in the Nordic region. Nordic Ecolabelled products may be marketed using the Nordic Ecolabel so long as the associated licence is valid.

The label must be positioned so that there is no doubt as to what the label refers and so that it is clear that just the chemical building product is ecolabelled.

More information on marketing can be found in "Regulations for the Nordic Ecolabelling of Products" dated 22 June 2011 or later versions.

Requirement text:

Marketing of Nordic Ecolabelled chemical building products must comply with the "Regulations for the Nordic Ecolabelling of Products" dated 22 June 2011 or later versions.

☒ Duly completed Appendix 4.

5 Changes compared to previous version

The key changes compared with version 1 are listed in Table 5.1 below.

Table 5.1 Summary of key changes compared with version 1

Req. (no. in version 2)	Version 1	Version 2	Comments
Product group definition	Adhesives Sealants Fillers Outdoor paints and varnishes	Adhesives Sealants Fillers Outdoor paints and varnishes Industrial paints and varnishes	Expansion to include industrial paints and varnishes
O2 Classification of the product	Classification according to Dangerous Preparations Directive and reference to an appendix for translation to CLP.	Classification according to Dangerous Preparations Directive and CLP in the requirement.	
O3 Classification of constituent chemical substances	Classification in accordance with Dangerous Preparations Directive and reference to an appendix for translation to CLP.	Classification according to Dangerous Preparations Directive and CLP in the requirement. The documentation requirement has been expanded to require SDS for all raw materials.	
O4 Environmentally harmful substances	Was a part of requirement 3 with a complex formula	Simplified formula taken from classification rules according to CLP.	
O5 Preservatives	Isothiazolinones < 15 ppm in sealants Outdoor paints < 2000	Isothiazolinones < 100 ppm in sealants Outdoor paints < 1500 ppm isothiazolinones	The limit for sealants and adhesives is now the same. The limit for outdoor

	ppm isothiazolinones	New category for industrial paints	paints has been tightened. New limit values for industrial paints have been added.
O11 Nanoparticles	Nanometals, nanocarbon carbons and/or nanofluorine compounds must not be actively added to chemical building products, unless it is documented that they will not cause environmental and health problems. *Nanoparticles are defined here as microscopic particles, where at least one of the dimensions is less than 100 nm. Nanometals include nanosilver, nanogold and nanocopper.*	Nanoparticles (from nanomaterials*) are not permitted in the product. The following are exempted from the requirement: Pigments** Synthetic amorphous silica*** ** The definition of nanomaterials follows the European Commission's definition from 18 October 2011 (2011/696/EU): "A nano material is a natural, incidental or purposely manufactured material containing particles, in an unbound state or as an aggregate or as an agglomerate and where, for at least 50% of the particles in the number size distribution, one or more external dimensions is in the size range 1-100 nm."* *** Nanotitanium dioxide is not considered a pigment* **** This applies to traditional synthetic amorphous silica in bulk form. Surface-treated silica is not permitted.*	A new nano requirement has been introduced and the nano definition has been amended.
O13, O14, O16, O17, O19, O22, O24 **VOC and TVOC**		All requirements have gained an extra documentation requirement for a test report showing the levels.	
O17 TVOC sealants	EMICODE EC1: 300 µg/m^3 after 10 days	EMICODE EC1: 100 µg/m^3 after 28 days	
O20 TVOC fillers	EMICODE EC1 GEV testing protocol (newest available version): 200 µg/m^3 after 10 days	EMICODE EC1: 100 µg/m^3 after 28 days	
O22 VOC outdoor paints		Tightening of all limit values in the table.	
O24-O28 Industrial paints **New req.**	Industrial paints were not included in the criteria.	New requirements for industrial paints (VOC and quality).	
O29 Packaging		Packaging and any surface coating must not contain halogens.	Addition to the requirement that halogens must not be contained in surface coatings.
O31 Consumer information		New text: Estimation of "normal" coverage. Recommended safety measures have been	Two points have been added to the consumer information since version 1.6.

		extended to include industrial paints. Addition that a smoother/sponge or cloth should be used to apply sealant instead of a finger.	
O33 Sorting and handling of waste **New req.**		The manufacturer must have a plan for the sorting and handling of waste. The quantity of hazardous waste is to be reported.	A new requirement that previously appeared in the criteria for adhesives.
Appendices	Appendix 1 Manufacturer's declaration Appendix 2 Raw material declaration Appendix 3 Marketing declaration Appendix 4 Converting classifications	Appendix 1 Manufacturer's declaration Appendix 2 Raw material declaration Appendix 3 Formulation structure Appendix 4 Marketing declaration Appendix 5 Comparative tests Appendix 6 Test laboratories for quality tests	The raw material and manufacturer declarations have been amended to follow the requirements in version 2. A new appendix concerning the formulation has been added. Conversion between classifications is now contained in each requirement, and Appendix 4 from version 1 has been deleted. Appendix 5 has been added to show what is required in a comparative test. Appendix 6 sums up what is required of a test laboratory that conducts quality tests. This text previously appeared under each requirement.

6 New criteria

- Review the opportunity to expand the product group to include "Industrial adhesives".

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http://ec.europa.eu/environment/docum/pdf/bkh_main.pdf

Evaluation of Nordic Ecolabelled Chemical Building Products, 14 September 2012

Terms and definitions

Term	Explanation or definition
CLP	Classification, Labelling and Packaging of substances and mixtures – EU Regulation
CMIT/MIT	CMIT/MIT is a blend of 5-chloro-2-methyl-2H-isothiazol-3-one and 2-methyl-2H-isothiazol-3-one in a ratio of 3:1. The blend is used as a preservative.
IPBC	Iodopropynyl butylcarbamate, used as a preservative in products such as paints.
Isothiazolinones	Used as a preservative in products such as paints and sealants. This group includes MIT and BIT.
SVHC	Substances of Very High Concern
TVOC	Total VOC
VAH	Volatile Aromatic Hydrocarbons, which are a subset of VOC.
VOC	Volatile Organic Compounds

Appendix 1 Other labels

Ecolabelling type 1

There are a number of type 1 ecolabels in Europe and around the world that have criteria for outdoor paints, varnishes, etc. Those that are considered relevant in the Nordic countries are:

- EU Ecolabel (the EU's own ecolabel) which has criteria for: Outdoor Paints and Vanishes[69].
- Blue Angel (Germany) which has criteria for: Low-pollutant Paints and Varnishes[70].

EU Ecolabel Criteria for Outdoor Paints: The EU Ecolabel published its Criteria for Outdoor Paints[71] shortly after the release of the Nordic Ecolabelling Criteria for Chemical Building Products. The EU Ecolabel Criteria for Outdoor Paints largely sets requirements for the same things as the Nordic Ecolabelling Criteria for Chemical Building Products. There are, however, a few minor differences in the requirement levels – in some cases Nordic Ecolabelling has tougher requirements and in other cases the EU Ecolabel has tougher requirements. Nordic Ecolabelling has several requirements concerning the exclusion of substances and groups of substances (which may cause licence applicants to see the Nordic Ecolabel as having the toughest requirements). However, the EU Ecolabel has tougher requirement limits for preservatives and environmentally harmful substances. The EU Ecolabel requires more tests than the Nordic Ecolabel, but the Nordic Ecolabel requires testing over a much longer period than the EU Ecolabel.

A revision of the EU Ecolabel Criteria for Outdoor Paints is underway in 2012/2013. The most interesting proposed changes that have so far come out of the revision work are a tightening of the VOC limit value, see Table B1:1, and an amendment to the requirement concerning isothiazolinones.

Table A1:1, Proposed VOC limit values for paint categories C-J in line with Directive 2004/42/EC, showing current and proposed new requirement levels from the EU Ecolabel's revision work (May 2013)

Description	EU Ecolabel (g/l)	Proposed (May 2013) new levels (g/l) (EU)
C) Exterior walls of mineral substrate	40	25
D) Interior/exterior trim and cladding paints for wood and metal	90	80
E) Interior/exterior trim varnishes and wood stains, including opaque wood stains	90 outdoor	65 outdoor
F) Interior and exterior minimal build wood stains	75	75
G) Primers	15	12
H) Binding primers	15	12

[69] EU Ecolabel, Europe. Available at: http://susproc.jrc.ec.europa.eu/paints/ (visited 26.06.2013)
[70] Blaue Engel, Germany. Available at: http://www.blauer-engel.de/ (visited 26.04.2012)
[71] 2009/544/EC: Commission Decision establishing the ecological criteria for for indoor paints and varnishes.

Description	EU Ecolabel (g/l)	Proposed (May 2013) new levels (g/l) (EU)
I) One-pack performance coatings	100	80
J) Two-pack reactive performance coatings for specific end use such as floors	100	80

Nordic Ecolabelling will continue to monitor the EU's revision of the criteria for outdoor paints.

Asthma and Allergy Associations

In Sweden[72], Norway[73], Denmark[74] and Finland[75] the respective Asthma and Allergy Associations offer a label for products that meet their criteria, with a focus on asthma and allergies. When it comes to paints, their criteria focus on emissions (e.g. after 14 days, but it may vary from country to country). The Nordic market currently has some painted/varnished building materials (e.g. flooring, wall and ceiling panels and cladding) that have been labelled. The exception, however, is that the Danish Asthma and Allergy Association does not label products with which the user has no skin contact.

Environmental product declarations (EPDs)

Environmental product declarations (EPDs) give detailed environmental information without setting specific requirements for the products. The benefit of the declarations depends entirely on the purchaser's knowledge of the environmental conditions surrounding the product they are buying. There is no international system for environmental product declarations as yet, but work on this is underway. In order to create an environmental product declaration, relevant product category rules (PCR) must first be drawn up/agreed. Although EPDs are quite common within the construction industry generally, a search for EPDs on the website where all issued EPDs are listed (www.environdec.com) shows that EPDs are not as common for chemical building products[76].

ECOproduct

ECOproduct is a method and a database created in Norway to facilitate the choice of environmentally friendly materials and products on a building project, based on information from environmental product declarations. ECOproduct is a Norwegian collaboration between SINTEF Byggforsk, NAL, ECOBOX and Byggtjeneste, with support from Statsbygg, NCC, Byggemiljø, Husbanken, the Norwegian Defence Estates Agency, the National Office of Building Technology and Administration and others. ECOproduct is based on the product's environmental profile, or similar information, and assesses the quality of the product in terms of indoor air quality, content of substances harmful to health and the environment, resource consumption and impact on the greenhouse effect. The product is awarded a grade (red, white or green) for each of the

[72] Astma och Allergi Förbundet (Sweden), www.astmaoallergiforbundet.se (visited 05.12.2012)
[73] Norges Astma- og Allergiforbund (Norway), www.naaf.no (visited 05.12.2012)
[74] Astma-Allergi Forbundet (Denmark), www.astma-allergi.dk (visited 05.12.2012)
[75] Allergia-ja Astmaliitto (Finland), www.allergia.fi (visited 05.12.2012)
[76] The International EPD® System, Available at: http://www.environdec.com/en/Site-search/?query=plaster (visited 25.05.2012)

following areas: indoor air quality, substances harmful to health and the environment, greenhouse effect and resource consumption[77].

Green Public Procurement (GPP)

Green Public Procurement (GPP) is a voluntary instrument used to clarify and verify environmental criteria for public procurement of products and services.

EU: Has none at the moment, but is in the process of developing GPP requirements for the product group Outdoor paints.[78]

Swedish Environmental Management Council: refers to the industry labels BASTA, Byggvarubedömningen and to SundaHus assessed products.[79]

DIFI in Norway: Has construction criteria that include chemical requirements.[80]

Danish Environmental Protection Agency: Has criteria for procurement of paints.[81]

Requirements have also been drawn up for chemical building products in conjunction with the development of GBP requirements for houses.

Among public procurement officers there is great interest in various kinds of certification showing environmental and health properties of the products (e.g. low emissions, M1 classification) and these certifications clearly influence the purchasing decision. The Nordic Ecolabel has requirements for M1 or an equivalent level of emission measurement for the subgroups Fillers, Adhesives and Sealants, and therefore should be at least as good as anything else in public procurement processes.

Environmental management

ISO 14001[82] is common among the major companies that produce chemical building products. However, it is not something they use to market their products.

Industry labels

There are several databases to turn to, including Byggvarubedömningen which makes environmental assessments of building products and classifies them as Recommended, Acceptable or Avoid.[83] SundaHus also makes environmental assessments of building products, and classifies them with coloured arrows in the classes Black, Red, Orange, Yellow and White.[84]

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[77] http://www.byggtjeneste.no/WPpages/Produkter/Byggeportalen/ECOproduct.aspx?folder=WPpages/Produkter/Byggeportalen/ECOproduct.aspx (visited 26.06.2012)
[78] EU's Green Public Procurement, Available at: http://ec.europa.eu/environment/gpp/index_en.htm (visited 24.05.2012)
[79] Swedish Environmental Management Council, Information om upphandlingskriterier i Sverige. Available at: http://www.msr.se/ (visited 24.05.2012)
[80] Agency for Public Management and eGovernment (DIFI). Informasjon om offentlige anskaffelser. Available at: http://www.anskaffelser.no/tema/2009/06/miljokriterier (visited 24/05/2012)
[81] Danish Environmental Protection Agency, Informasjon om bæredygtige indkøb i Danmark. Available at: http://www.mst.dk/Virksomhed_og_myndighed/Gron_strategi/baeredygtige_indkoeb/ (visited 24.05.2012)
[82] Environmental management systems - Requirements with guidance for use. ISO 14001 (2004)
[83] Byggvarubedömningen. Available at: http://www.byggvarubedomningen.se/sa/node.asp?node=455 (visited 26.04.2012)
[84] SundaHus. Available at: http://www.sundahus.se/home.aspx (visited 26.04.2012)

BASTA is the Swedish construction industry's own initiative to help phase out harmful chemical substances in the construction sector. They have a database of registered products that, according to the companies, meet BASTAS's criteria.[85] "Norges Byggevarebase" NOBB[86] and "CoBuilders informationsdatabase[87]" are Norwegian electronic databases of all types of construction-related products, where the ecolabelled products are highlighted with the Nordic Ecolabel or EU Ecolabel symbol/logo. Denmark has developed systems equivalent to BASTA, with a product database available at "www.dansk-kemidatabase.dk", managed by ALECTIA.[88]

Others

The systems for ecolabelling houses/buildings BREEAM[89] and LEED[90] and the German Sustainable Building Council (DGNB)/World Green Buildings Council (WGBC)[91] also include building materials in their assessments. Compliance with the health and environment parameters that are required for approval in BREEAM and LEED can now be documented in Norway by presenting a Nordic Ecolabel licence, as long as the Nordic Ecolabelling requirements include the requirements specified in BREEAM and LEED.

These systems can be excellent partners where the national branches decide to reward Nordic Ecolabelled products.

M1

Finland has an emission classification for building materials called M1[92], which we refer to in the criteria requirements O14 and O20. M1 testing is conducted 28 days after the product has been installed. M1 sets requirements concerning emission levels of total volatile organic compounds (TVOC), formaldehyde (HCOH), ammonia (NH3), carcinogenic substances in category 1 of IARC 1987, and any odour/smell.

M1 is administered by Rakennustieto (The Building Information Foundation), a private foundation with representatives from 49 Finnish building organisations.

Some companies see M1 as a direct competitor of the Nordic Ecolabel and consider an M1 label sufficient to prove a product's environmental credentials. However other companies see them as entirely different entities and consider the Nordic Ecolabel as some sort of complement and final proof of the matter. M1 has become a recognised label that can be used in all the Nordic countries, although it is primarily used in Finland.

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85 BASTA. Available at: http://www.bastaonline.se/ (visited 26.04.2012)
86 NOBB. Available at: http://www.byggtjeneste.no/WPpages/Produkter/NOBB/Default.aspx?folder=WPpages/Produkter/NOBB (visited 27.04.2012)
87 CoBuilders informationsdatabase. Available at: http://www.cobuilder.com/Tjenester/ (visited 27.04.2012)
88 http://www.dansk-kemidatabase.dk/?q=front (visited 26.06.2012)
89 BREEAM. Available at: http://www.breeam.org/ (visited 27.04.12)
90 LEED. Available at: http://leed.se/ (visited 24.07.2012)
91 DGNB. Available at: http://www.dgnb-international.com/international/#poi11 (visited 04.07.2012)
92 Emission classification M1. Available at: https://www.rakennustieto.fi/index/english/emissionclassificationofbuildingmaterials.html (visited 15.05.2012)

Appendix 2 RPS, MECO table and requirement distribution

An assessment of Relevance, Potential and Steerability (RPS) for the environmental impact of the different life cycle phases is presented here divided into the subgroups Materials, Energy, Chemicals and Other (MECO).

Function and Functional unit:

Chemical building products mainly have the primary and secondary function of:

Primary: Treating a surface so that it has the required properties (e.g. adhesion, smoothness, water repellency, attractiveness…)

Secondary: They must function/remain effective for many years (maybe 10-30 years depending on the subgroup).

The secondary function has a considerable effect on the environmental impact of the products in that an increased useful life (with an inherent increase in quality) results in a lower environmental impact. This is due to the savings gained from not having to extract new raw materials and produce new products, and the effect relates to the entire life cycle.

It is difficult to specify a meaningful functional unit, since these products are designed to be applied to substrates with very different properties, e.g. wood, concrete, brick, stone, blocks, plasterboard or coarse wall surfaces.

It is therefore neither meaningful nor appropriate to use x litres product/m^2 area as a functional unit. The functional unit should instead be content/litre, without water. However, with regard to emissions and quality, the functional unit m^2 area can and should be used.

MECO and RPS

R, P or S written in bold indicates a positive outcome, and R, P or S written with no bold indicates a negative outcome, in terms of whether we can influence that area by means of ecolabelling criteria. In order to establish functional requirements, the assessment of all three parameters (R, P and S) must be positive, as indicated by a bold **R P S**. If one or more of them have a negative outcome in the assessment, e.g. **R** P S, R **P** S or R **P S**, ecolabelling criteria will not have the desired effect.

Table A2. MECO with RPS assessment and reference to the Nordic Ecolabelling requirements in version 1 of the criteria.

	Material	Production	Usage phase	Waste	Transport
Materials	Machinery for mining/extracting raw materials. **R** P S	Factories equipped to manufacture relevant chemical building products	Hand tools, e.g. brushes, rollers, filling knives, sealant guns.	Used brushes, rollers, filling knives. Protective gloves.	Crude oil
		R P S	**R** P S	**R P** S	**R P** S
	Factories equipped to refine and synthesise relevant raw materials.	Storage tanks, pipes, mixing tanks, weighing scales, conveyors, packaging machines.	Mechanical tools, e.g. filler bazooka, paint/filler spray.	Packaging	Electricity mix
	R P S	**R** P S	R P S	**R P** S	**R P** S
	Extraction, refining and synthesising of petrochemical materials.			Chemical residues	
	R P S			**R P** S	
	Planting, harvesting and refining plant raw material.			Material recovery	
	R P S			**R P** S	
	Mining/extraction of minerals (Zn, Fe, Ti, Chalk, Sand, Clay...) R P S				
	TiO_2 various production methods.				
	R P S or **R** P S				
Energy	Energy for closed/open-cast mining.	Energy consumption and CO_2 emissions during the process. Judged to be relatively low, as mainly relates to mixing raw materials and then packaging.	Electricity for lighting to during application	Packaging recycling	Transport of raw materials + end product by sea, rail and road.
	R P S	R P S	**R** P S	R P S	**R P** S
	Energy for extraction/cultivation, refining and synthesising of raw materials and packaging.		Possibly electricity for dryers.	Incineration/disposal of construction waste	
	R P S		**R** P S	**R** P S	
	Energy for burning of limestone		Electricity for paint/filler spray.		
	R P S		**R** P S		
	Energy for production of polymers				
	R P S/**R P** S				

	Energy for extraction of oil/vegetable oils. R P S/**R** P S				
Chemicals and emissions	Sulphate or chloride emissions from TiO_2 manufacture. **R P S** or **R** P S Any emissions and discharges from extraction and manufacturing processes. **R P** S	Classification T, Xn, C, Xi/Xn and N for constituent raw materials. **R P S** Nanoparticles **R P S** Emissions and discharges from the production of the chemical building products. **R P S** Purity of the raw materials and exposure risk. **R P S** Cleaning water (in pipes and tanks) is often recycled in the next blending batch as the water component in the formulation. (Steered by open/closed process) **R P S** / R P S	Classification: T, Xn, C, Xi/Xn and N for products. **R P S** Emissions: VOC, allergens and emissions from "new" reactive products (e.g. formaldehyde and methanol). **R P S** Purity of the raw materials and exposure risk. **R P S**	Substances from the chemical building products may end up in terrestrial, limnic and marine ecosystems. **R P** S Emissions from incineration of demolition material that includes the chemical building products. **R P** S Recovered products end up, for example, as filler. **R P** S Good environmental and health properties plus purity of raw materials and exposure risk. **R P S**	NOx and SOx **R P** S
Other	Working environment **R P** S Effect of mining on ecosystems. **R P** S Effect of open-cast mining, oil drilling and plantations on ecosystems. **R P** S	Working environment **R P S**	VOC and allergen emissions during hardening/drying. **R P S** indoors Working environment for professional products. **R P S** Product quality/life time on substrate. **R P S**	Material recovery or reuse R P S	Eco Driving, logistics **R P S** or **R** P S