

*Translation from Danish*

Nordic Ecolabelled  
**Floor care products**

**Background to ecolabelling**

**Consultative document for Version 4**

**October 2011**



**Nordic Ecolabelling**

<b>1. Summary</b>	<b>1</b>
<b>2. Basic facts about the criteria</b>	<b>3</b>
Polish removers/wax removers	5
<b>3. About the criteria development/revision process</b>	<b>10</b>
<b>4. Justification of the requirements</b>	<b>12</b>
The product group definition	15
Environmental requirements applicable to all floor care products	16
Description of the product and its use	17
Classification of the product	17
CMR substances	18
Volatile organic substances	19
Preservatives	20
Fragrance	21
Surfactants, aerobic degradability and anaerobic degradability	21
Environmentally harmful substances	22
Complexing agents	24
Residual monomers in polymers	26
Ingredient emulsifiers and levelling agents in base coat polish and floor polish	27
Fluorosurfactants and silicone surfactants	28
CDV calculation	31
Phthalates	31
Dyestuffs and pigments	32
APEO and LAS	33
Nanomaterials/particles	33

<b>Packaging requirements</b>		<b>35</b>
Chlorinated plastics and the labelling of packaging	35	
Weight utility ratio	36	
Requirements as to effectiveness	37	
Consumer information	38	
Quality requirements and the requirements of the authorities. Marketing	38	
<b>Changes relative to the previous version</b>		<b>39</b>
<b>New criteria</b>		<b>40</b>
<b>References</b>		<b>41</b>

Appendix 1 Overview of experts and licence holders involved in the criteria revision process.

## 1. Summary

The revision of Version 4 has attached emphasis to investigations into which requirements it is possible to clarify, where applicable adapt, to products that are eligible for a Nordic Ecolabel. Accordingly, the requirements applicable to volatile organic substances, residual monomers and forms used in efficiency testing have been clarified. Investigations have been conducted into whether impregnation products for floor mops might be included in the product group, whether there are differences between the environmental impacts associated with using wax and polish products, respectively, and wax and polish remover. Furthermore, the status of any changes to the risk assessment and use of phthalates, ingredient emulsifiers, fluorosurfactants and silicone surfactants have been investigated as has the question of whether the CDV requirements are timely and focus sufficiently on the life cycle of the products. The question of whether the criteria will be harmonised with Version 4 of the Detergent Criteria has been considered – wherever possible and relevant the criteria have been harmonised. Finally, translations of classifications specified in the individual requirements have been introduced.

The following changes have been made between Version 3 and the consultation process for Version 4.

The order of the requirements has been amended and there are no longer sections for each individual product. Exceptions applicable to products are specified in the individual requirement. This has been done to make the criteria more accessible and easier to read.

The requirements applicable to descriptions of the product have been adjusted so that the information corresponds to the information that is to be used during processing of the application.

Classifications have been translated to GHS.

The CMR requirement has been changed so that impurities in raw materials are encompassed by the requirement.

The requirements applicable to substances with a low boiling point have been combined with the requirements applicable to halogenated and aromatic solvents and are now referred to jointly as the requirements applicable to volatile organic solvents. The requirement has been altered so that impurities in raw materials are encompassed.

Nordic Ecolabelling  
Nordic Ecolabelled floor care products –  
Background document, consultative process, Version 4.0, 2011

The requirement applicable to residual monomers has been changed and clarified and now applies to residual monomers in polymers that are classified as harmful to health and the environment. The level of the requirement has not been changed, but the requirement has been altered to encompass impurities in raw materials.

The requirement applicable to CDV calculation has been changed as a result of which CDV calculations must be available for all products. The level has been set at 14 000 litres per litre of in-use solution for chronic data.

The requirements applicable to dyestuffs have been extended to include pigments.

A new requirement relating to nanomaterials/particles has been introduced.

A form containing a declaration to be completed and signed by the producer of the floor care product has been extended.

A form for a declaration to be completed and signed by the raw material producer has been drafted.

The forms for user testing have been clarified.

## 2. Basic facts about the criteria

### 2.1 Products that are eligible for an ecolabel

In this context, floor care products are products intended exclusively for indoor use, which lay a film of polymer or wax on the floor in order to facilitate maintenance and protect the floor. Furthermore, products that remove this film/polish from the floor have been included in the product group. Thus the product group encompasses basecoat polish, floor polish, wash polish and wash care products containing wax as well as polish remover and wax remover.

The criteria for floor care products encompass products for professional users as well products intended for ordinary consumers.

The product group does not include products that have cleaning properties (e.g. wash care products that do not contain wax), or products in which the film formation comes about as the result of a reaction between fatty acids and lime.

### 2.2 Constituent substances in floor care products

#### **The constituent substances in basecoat polish, floor polish, wash polish and wash care products include:**

- *Polymers* are the main components in the film formed by the floor polish. Polymers also occur in wash polishes. A polymer will often contain zinc which cross-binds the polymer. Usually the monomer is acrylic acid and acrylates in combination with e.g. styrene.
- *Wax* is present in floor care products inter alia to soften the polymer film and to make it elastic. Polyethylene or polyester wax are the most common.
- *Softeners* are added to soften the polymer film. In the past, dibutylphthalate (DBP) was the most widely used softener, but this has largely been replaced by tributoxyethylphosphate (TBEP) or other softeners.
- *Resin* in the polish helps to add gloss and make the product more readily dispersible as well as improving properties relating to removal of polish e.g. styrene malleic acid resin or acylate polymer.

Nordic Ecolabelling  
Nordic Ecolabelled floor care products –  
Background document, consultative process, Version 4.0, 2011

- *Surfactants* are the name of a large group of surface active substances. Surfactants mainly function as emulsifying agents and moistening agents in floor polish. Fatty alcohol ethoxylates and alkyl ether sulphates are frequently used. The primary function of surfactants in wash care products and wash wax is to loosen soils and grease from the substrate and to keep it suspended in the wash water.
- The *solvents* used are water soluble and have a film-forming effect. In addition, they regulate the drying time of the floor care product. The main group of solvents used is glycol ethers, e.g. diethylene glycol monoethyl ether) (ethyl diglykol).
- Preservatives are added in order to extend the useful life of the product.
- *Perfume* is added for aesthetic reasons. Polishes are often unfragranced whereas wash polishes may contain perfume.
- *Dyestuffs* are added for aesthetic reasons and to ease identification. Polishes normally contain no colouring, whereas wash polishes frequently contain colourings.
- *Complexing agents*, such as EDTA, NTA and phosphonates are found in small quantities and are used to bind impurities in the product and to bind ions such as  $\text{Ca}^{2+}$  and  $\text{Mg}^{2+}$  in hard water.
- *Ammonia* dissolves the resin and forms complexes with zinc which make the polymer resistant to detergents and extend its life by providing increased wear resistance (hardness).

Polish products intended for the professional market have an active content of the order of 18 – 35 %, whereas wash polish and wash care products have an active content of the order of 10 – 20 %. The active content of consumer products is of the order of 10 – 20 %. Active content means the total content of ingoing components excluding water in the product. The content of active components is optimised in terms of function and practical dosage.

**Constituent substances in polish remover and wax remover include:**

- *Glycol ethers* as auxiliary substances. Glycols ethers in removers are often more short chained than glycol ethers in polish products. There

Nordic Ecolabelling  
Nordic Ecolabelled floor care products –  
Background document, consultative process, Version 4.0, 2011

are certain glycol ethers that should not be used since they may be toxic for reproduction. Glycol ethers contain polar groups such as hydroxyl groups which are water soluble and carbon chains, which make them soluble in organic solvents. These solubility properties in different fluid phases enable glycol ethers to be used as solvent enhancers since they adhere on non-mixable substances in e.g. cleaning emulsions.

- *Alcohols* as solvents, e.g. isopropanol, phenoxyethanol, benzylalcohol (phenoxyethanols can also be used as preservatives).
- *Preservatives* may be necessary in low alkaline removal products but are not necessary in alkaline removal products. The use of preservatives in polish removers/wax removers is limited.
- *Corrosion inhibitors* may occur in polish removers/wax removers if the product contains NaOH. NaOH is a highly corrosive substance, as a result of which corrosion inhibitors are required.
- *Complexing agents* are used in polish removers/wax removers. Phosphates, polyacrylates, NTA, EDTA and phosphonates, amongst other substances, are widely used in polish and wax removers.
- In addition, the following substances may occur in polish removers/wax remover: methyl-2-pyrrolidone, surfactants, for example fluorosurfactants, low-foaming surfactants, dispersal agents e.g. acrylates, hydrotropes (e.g. cumene/xylene sulphonate, phosphate esters), small quantities of EDTA (ethylene diamine tetraacetic acid), NTA (nitrilo triacetic acid) or MGDA (Methylglyoxal dimethyl acetal), fragrance.

The pH of a concentrated polish remover is between 8-13 pH.

### **Polish removers/wax removers**

There are two types of polish remover:

- Those that work on the polish film with organic solvents such as glycol ethers such as DEGBE (diethylene glycol monobutylether), EGBE (ethylene glycol butyl ether); EGPE (ethylene glycol monopropylether) (2-phenoxyethanol) or benzyl alcohol.

Nordic Ecolabelling  
Nordic Ecolabelled floor care products –  
Background document, consultative process, Version 4.0, 2011

- Those that have a greater or smaller alkaline content in combination with a lower content of organic solvents. The pH of a concentrated polish remover is between 8-13 pH.

During scrubbing, the polish-removing product reacts with the polish and the scrubbed polish ensures that it has a far lower pH value than the polish-removing agent had at the outset. This is significant since the scrubbed particles will then be released via the waste system to the treatment plant where it may cause problems if the pH value is too high.

The frequency with which a polish remover/wax remover is used will depend on the type of floor polish used and the type of maintenance method chosen for the floor. Generally it can be said that polish remover should be used as infrequently as possible. This is because scrubbing (= removal of polish from the floor surface with the aid of a scrubbing machine and a polish removal product) with subsequent application of new polish is a very costly process and moreover polish remover may have a negative impact on floor materials.

### **2.3 Motivation for Nordic Ecolabelling floor care products**

One of Nordic Ecolabelling primary objectives is to guide consumers in the direction of choosing the least environmentally harmful products or systems.

A qualitative assessment has been conducted into the impact on health and the environment of floor care products from a life cycle perspective, from raw material production to waste stage. Further information can be found under "Justification for the requirements".

### **2.4 The version and validity of the criteria**

The first generation of criteria for the ecolabelling of film-forming floor care products was adopted on 12 December 1996. Version 1 of the criteria was revised in 2000 and the second generation of the criteria was adopted on 14 December 2000. Between Version 1 and Version 2, the primary change was to performance testing, although in addition the requirements applicable to surfactants were made stricter, as a result of which surfactants must be anaerobically degradable.

Nordic Ecolabelling  
Nordic Ecolabelled floor care products –  
Background document, consultative process, Version 4.0, 2011

The following changes were subsequently made to Version 2 of the criteria:

- On 9 October 2003 the criteria were extended by two years until 11 December 2006 and the weight utility requirements for wash polish/wash care products were eased
- On 15 December 2003 requirements applicable to fragrance in wash polish/wash care products were added
- On 8 March 2004 adjustments were made to environmentally harmful components and softeners.

The evaluation of the criteria for the Ecolabelling of Film-Forming Products date from 16 June 2003. The conclusion of this evaluation was that there was no immediate need to revise the criteria.

Contrary to the previous evaluation, the evaluation of Version 2.3 of the criteria conducted in March 2005 proposes a revision of the criteria in 2005.

The third generation of the criteria document was adopted on 28 September 2006.

After the evaluation of Version 3.2 of the criteria in April 2009 it was decided that the criteria should be revised.

The revision for Version 4 was conducted in 2010 and 2011. Changes introduced between Version 3 and Version 4 are detailed in "Changes relative to the previous version" at the end of this document.

## **2.5 The Nordic Market**

Denmark has many small and large producers of floor care products as well as certain international dealership. On the Finnish market there are few manufacturers and a number of international dealerships. The situation in Norway is that there are a limited number of major importers that cover the entire market. In Sweden as in Denmark there are a large number of producers.

Nordic Ecolabelling  
 Nordic Ecolabelled floor care products –  
 Background document, consultative process, Version 4.0, 2011

As at May 2011 the number of Nordic Ecolabelled licences and registrations in the Nordic countries were as follows:

	Denmark	Finland	Norway	Sweden	Total
Licenses	4	4	1	8	17
Registrations	6	6	9	5	26

The number of licences and registrations has fallen since the last revision. The number of licences has dropped from 24 to 17 and the number of registrations from 38 to 26. The reduction may be due to the combination of licences. In Denmark, 2x2 licences have been combined to 2x1 licences because of the new fee system that was introduced in 2009.

Examples of operators on the Nordic market include Johnson Diversey, Ecolab, Nilfisk, Lilleborg and Gipeco.

The evaluation of Version 3.2 of the criteria found that only a limited number of the Nordic Ecolabelled products are aimed at the retail/consumer market, whereas all the other products were sold to the professional market. Demand for ecolabelled floor care products is highest amongst public sector buyers. However, there is also interest in the ecolabelled products amongst hotels and cleaning companies. At Nordic level 15 licences have been issued to cleaning service providers. The evaluation conducted in 2005 assumed that demand for floor care products would increase if the number of licences issued to cleaning services rose. The number of licences has risen from 2 to 14. Whereas no specific information is available on whether or not demand for floor care products has increased.

Products for the professional market are sold directly from the producer to the end user or via private label holders and wholesalers to the end user. Most producers display the Nordic Ecolabel on their websites, labels and in leaflets. The Swan is also used in advertising and in sales of products to customers. In a few cases, advertisements are placed in trade journals. A couple of producers do not use the Nordic Ecolabel actively in their marketing at all.

No figures are available for overall market share in the Nordic countries. In Denmark, sales relating to the two licences and 8 registrations total less than DKR 500 000, which probably represents a very small portion of the

Nordic Ecolabelling  
Nordic Ecolabelled floor care products –  
Background document, consultative process, Version 4.0, 2011

market. In Finland, Nordic Ecolabelled floor care products make up approximately 25% of the market, which has a turnover of approximately. € 5 million. No specific information is available on the total Norwegian market although one supplier states that interest in Nordic Ecolabelled floor care products is increasing. In Sweden, total sales of Nordic Ecolabelled products were approximately SKR 22 million in 2010 and are expected to increase to SKR 25 million in 2011. One Swedish producer specified that they have approximately 85% of the market for wax, the second Swedish producer states that they have approximately 30% of the market for wash polish, whereas a third Swedish producer states that they have approximately 20% of the market in Sweden and Norway, 3% in Finland and approximately 1% in Denmark for floor polish and floor wax. (This section is reproduced from the evaluation of Version 3.2).

The project group which evaluated Version 3.2 of the criteria, and the licence holders, concluded that considerable potential exists for recruiting additional floor care products to the Nordic Ecolabel since there is a general increases in demand for environmentally and health-friendly products. If the use of Nordic Ecolabelled products is rewarded within our service criteria, e.g. cleaning services and hotels, this will also have a beneficial effect on floor care products in general. Potential is also considered to exist for recruiting additional licences for wax removers and polish removers, since they will, obviously, be necessary to clean wax and polish treated floors.

### **Other labelling schemes**

The Swedish ecolabel "Bra Miljövalg" (Good Environmental Choice) has a general set of criteria for chemical/technical products, which encompasses floor care products. In addition, the "Green Seal" organisation in the United States launched criteria for floor care products in November of 2004.

### **3. About the criteria development/revision process**

The revision of the criteria document from Version 3 to Version 4 has been conducted as an internal Nordic Ecolabelling project, without an expert group. Experts and licence holders will be contacted as required during the revision process (See Appendix 1). In addition, miscellaneous reports and technical information were read in order to increase the available information on developments within floor care products and their constituent substances (see the list of references). The following Nordic Ecolabelling personnel took part in the criteria development process:  
Denmark: Trine Pedersen (Project Manager) succeeded Lene Møldrup (Project Manager).

Sweden: Svetlana Sopa (Product Group Manager)

Norway: Ingvild Kvien (Product Group Manager) succeeded  
Randi B Rødseth (Product Group Manager).

Finland: Hanna Korhonen (Product Group Manager) succeeded  
Terhi Uusitalo (Product Group Manager).

#### **3.1 The goals of the criteria development/revision process**

The revision of the criteria from Version 3 to Version 4 focused on the following areas:

1. The definition of the product group must be clarified to make it clear that the criteria apply only to indoor products.
2. The requirements previously numbered R3 substances with a low boiling point and R10 Halogenated and aromatic solvents have been clarified to make it clear that lightly volatile substances/VOCs mean organic substances with a vapour pressure > 0.010 kPa at 20°C. In addition, the possibility of increasing the requirements applicable to solvents in general has been considered.
3. The requirements previously numbered R17 Monomers has been difficult to understand and it has been difficult to secure the correct information from polymer suppliers. The level of the requirement has been found to be relevant and the wording has been clarified.
4. The requirements previously numbered R18, R19 and R20 Ingredient emulsifiers, fluorosurfactants and silicone surfactants: Investigations have been conducted into whether the requirements applicable to ingredient emulsifiers, fluorosurfactants and silicone surfactants should be adjusted in order to secure a reduction in the impact of the products on health and the environment. Since the last revision, a

Nordic Ecolabelling  
Nordic Ecolabelled floor care products –  
Background document, consultative process, Version 4.0, 2011

- number of new reports and accounts concerning PFOS and PFOA have become available which may provide the basis for adjustments. No documentation to substantiate a change of the requirements has been found.
5. The requirement previously numbered R21 CDV for wash polish and wash care products has been examined and the requirement level has been found to be appropriate.
  6. The requirement previously numbered R28 Performance: minor improvements have been made to the form to be completed by the test user.
  7. GHS: The revision has updated the criteria in relation to the Global Harmonised System (GHS).
  8. It has been decided that floor care products for impregnating floor mops in washing machines may be included in the product group.
  9. The question of whether the requirements applicable to phthalates should be altered has been considered. The requirement has been found to be appropriate, since phthalates were phased out during the 1990s.
  10. Investigations were conducted into whether the environmental impact is less when wax is used than when wash polish is used. It has not, on the present basis, proved possible to reach a conclusion.
  11. Investigations have been conducted into whether the composition of polish removers and wax removers are different. It has not proved possible to reach a conclusion.
  12. The relevance of the climate aspect of the product group has been investigated and its inclusion in the criteria has been secured by means of requirements for packaging, VOC, etc..
  13. Where possible and relevant, the criteria have been harmonised with Version 4 of the Nordic Ecolabel criteria for detergents.

## **4. Justification of the requirements**

### **4.1 Life cycle assessment of floor care products**

A qualitative, but not quantitative, assessment has been performed of the environmental and health effects of floor care products on the basis of an overall assessment of the products, from the production of raw materials to waste as well as transportation. The assessment was performed on the basis of studies of the literature and the technical group's knowledge of the products, their constituent substances and production.

In order for a product to qualify for an Ecolabel, the effects of the products on health and the environment, including packaging, must fulfil certain requirements. Furthermore, in order for ecolabelling to be effective, it is essential that there be differences between the products available on the market so that only the best products will attain the ecolabel. This means that potential for improvement must exist on the part of the majority of producers. The parameters in respect of which requirements have been imposed in this criteria document have been selected on the basis of the information on the main environmental effects and the potential for improvement. Table 1 illustrates the types of environmental impact on which the criteria focus. S means specific requirements, G means general requirements.

The use of floor care products may mean that the floors are easier to clean with the result that the resource consumption in the form of detergents, labour costs and energy will be reduced. Furthermore, the polish will protect the floor substrate and result in less wear and a longer useful life. Accordingly, when a floor care product is chosen, two factors are of major importance: 1) removal of the polish with a "normal" polish remover must be possible so that the environmental impact associated with polish removal is kept as low as possible, 2) the polish should be of high quality so that the resource consumption associated with removing the polish is kept as low as possible.

Polish applied to a floor will entail emissions to water, either directly via the treatment plant in that the polish will gradually be worn away during cleaning and/or because the polish film is removed in its entirety using polish removers. Wash polish and wash care products contain components that both clean and polish and will result in emissions when the wash polish/wash care product is applied and as the polish/wax is gradually worn away as a result of cleaning.

Nordic Ecolabelling  
 Nordic Ecolabelled floor care products –  
 Background document, consultative process, Version 4.0, 2011

The most important health effects occur during application of the product. The most important environmental impacts of floor care products occur when they are released in waste water.

Table 1. Focus of attention for criteria

<b>Product:</b>	<b>Raw material extraction</b>	<b>Production</b>	<b>Use</b>	<b>Waste</b>	<b>Transport</b>
<b>Resource consumption - Materials - Energy</b>			S	S	G
<b>Emission to air, water, ground</b>		G	S		
<b>Working environment</b>		G	S		
<b>Health</b>		G	S		
<b>Product packaging</b>	S	S		S	

S= Specific requirements, G = General requirements

### **Raw material extraction**

The production of constituent substances and the extraction/processing of raw materials used in the constituent substances probably accounts for a significant portion of the environmental impact of the products.

Most of the constituent substances in the products are synthetic (from petroleum-based products) or originate in the processing of substances from plants or animals. The extraction and processing of raw materials often takes place in remote countries from which it may be difficult to obtain information on resource consumption and emissions. Moreover, it is difficult to obtain information on origin and production methods when the extraction of raw materials and the final product are separated by multiple sales and production stages. The producers of floor care products have very little influence on the production of raw materials and constituent substances. The shipment of raw materials may make up a significant portion of the environmental impact of these products and this an area in which it is difficult to impose requirements. Accordingly, Nordic Ecolabelling has no control over this part of the life of the products. Moreover, most floor care products contain relatively similar groups of

Nordic Ecolabelling  
Nordic Ecolabelled floor care products –  
Background document, consultative process, Version 4.0, 2011

components and the overall environmental impact associated with raw material extraction and production of constituent substances will probably vary little from product to product. For these reasons, no requirements are imposed with respect to raw material extraction, processing and shipment of ingredients.

### **Production**

The production of floor care products largely takes the form of mixing the various ingredients together which involves very little environmental impact. In principle, the same procedure is used for most of the products available on the market. Requirements relating to emissions to the air, water and ground are imposed by the authorities in connection with production permits. In addition, requirements relating to the working environment and the use/content of substances that are harmful to health in production will be regulated by requirements imposed by the authorities.

### **Packaging**

The production of the packaging used on floor care products involves resource consumption and emissions. The shipment of small quantities of floor care product per packaging unit has a bearing on the overall environmental impact of the floor care product.

### **Use**

The most important health effects occur during application of the product. Accordingly, it is important that constituent substances which evaporate should have little impact on health and the environment and should be present in very small quantities.

The most important environmental impacts of floor care products occur when they are released in waste water. The environmental harmfulness of the products is determined by a number of different parameters. The parameters that must be assessed must include chronic toxicity in the aquatic environment, bioaccumulability and biodegradability (particularly in combination with toxicity and bioaccumulation) for all the constituent substances in the floor care product.

### **Functional unit**

In order to determine the overall effects on health and the environment of a product, the constituent substances in the product must be assessed on the basis of the quantity actually used or required in order to perform a defined piece of work. It is difficult to determine an overall functional dose for floor care products since different floor care products have different functions and because the quantity of floor care product required will depend on the floor substrate, composition, number of layers of polish, maintenance etc. As a consequence, most of the requirements applicable to the content of substances in the products that are harmful to health and the environment specified in this criteria document are related to the active content of the products, i.e. the total content of ingoing components less water. Although the active content of a product will not necessarily reflect the effectiveness/performance of the product, it is assumed that this parameter represents an indirect measure of the functional dose of the products.

Dose-related requirements entail that concentrated products will not encounter unintended problems as regards fulfilling the requirements compared with more diluted products. This is an advantage for concentrated products which will ensure that transportation of large quantities of water is avoided which again results in energy conservation. Furthermore, dose-related requirements mean that the environmental impact of the product must be viewed in relation to the quantity of floor care product actually used/required.

## **4.2 Justification of the individual requirements**

### **The product group definition**

Floor care products are in this context defined as products intended exclusively for indoor use that apply a film of polymers or wax to floors to ease maintenance and protect the floor. In this context, floor care products include polish removers and wax removers used to remove the film of polymer or wax from the floor.

Floor care products include base coat polish, floor polish, wash polish, washand-wax care products, polish removers and wax removers. You can read more about these types of floor care products in Appendix 1, definitions.

Nordic Ecolabelling  
Nordic Ecolabelled floor care products –  
Background document, consultative process, Version 4.0, 2011

Both products for professional users and products for consumers in general are included in the criteria for floor care products. A product is included in the group (professional/private) as which it is marketed. If sales are made to both user groups, it is assessed in the function test as a professional product.

Products that only have cleaning properties (e.g. non-wax wash care products) and products in which film formation takes place as a reaction between fatty acids and lime cannot be Nordic Ecolabelled according to this product group.

The product group definition has been adjusted to emphasise that the criteria apply only to indoor products, since a variety of products are now available on the market for outdoor use, for example products used to protect natural stone for both indoor and outdoor use. Since the criteria were originally developed on the basis of a life cycle assessment of indoor products in the categories basecoat polish, floor polish, floor wax, wash polish, wash care products with wax, polish remover and wax removers, the criteria do not apply to outdoor products.

### **Environmental requirements applicable to all floor care products**

Unless otherwise specified in the individual requirement, the requirements apply to all ingoing substances. Ingoing substances are all substances contained in the product, including additives in the ingredients (e.g. preservatives and stabilisers) and substances known to emit evaporation substances (e.g. formaldehyde) but not pollutants originating in raw material production unless the requirement states otherwise. Pollutants are traces from raw material production present in the product in concentrations of less than 0.0 v/v% (equivalent to 100 ppm), but not substances that have been added to a raw material deliberately and for a purpose.

Some requirements include pollutants in the raw material if they are present in quantities in excess of 0.01v/v% in the raw material. This is because Nordic Ecolabelling wishes to ensure that the most problematical substances, such as CMR substances, will at all times be excluded – even as pollutants in raw materials. In those requirements in which pollutants are encompassed by the requirement, the background for doing so is discussed.

Nordic Ecolabelling  
 Nordic Ecolabelled floor care products –  
 Background document, consultative process, Version 4.0, 2011

Obviously the product must at all times fulfil all mandatory requirements – an exemption specified in a particular requirement will therefore not represent a general exemption from all mandatory requirements.

### Description of the product and its use

In order to ensure that the product is encompassed by the product group definition, and subsequently to assess whether the criteria are complied with, Nordic Ecolabelling must be provided with a description of the product and its use as well as a complete formula. For each ingoing substance, the complete formula must include trade name, chemical name/names (if multiple ingoing substances occur under the same trade name), hazard classification (for each raw material and each ingoing substance), function, CAS number, DID number, worst case active percentage and ingoing quantity in "mixture formula" and "product formula" respectively. An example is provided below:

#### Complete formula

Trade name	Chemical name	Hazard classification	Function	CAS no.	DID no.	Active percentage (worst case) [%]	Mixture formula (%)	Product formula [%]
Name 1		Xi R36					10	
	Xxx	Xi R36	Surfactant	xx-x-x	X	10		1
	Xxx		Preservative	xx-x-x	X	0.02		0.002
Name 2		Xxx					2	
	Xxx	Xi R41	Surfactant	xx-x-x	X	5		0.1
	Xxx		Preservative	xx-x-x	X	0.02		0.0004

### Classification of the product

Nordic Ecolabelling's aim is that the effects of the products on health and the environment should be as limited as possible. For this reason, the requirement is imposed that products that hazard labelled in accordance with brand regulations on health, environmental, fire or explosion hazard cannot qualify for an ecolabel. The classifications apply in accordance with the Dangerous Substances Directive 67/548/EEC and the Dangerous Preparation Directive 1999/45/EC with subsequent amendments and adaptations or Regulation No. 1272/2008. See the translations of hazard classifications to CLP in Appendixes 5 and 6 to the criteria document.

Nordic Ecolabelling  
Nordic Ecolabelled floor care products –  
Background document, consultative process, Version 4.0, 2011

It is possible to ecolabel floor care products that are classified as local (Xi) irritants with risk phrases R36, R37 and R38. In the case of products intended for professional use, classification Xi with R41 is permitted. This exception has been included in order to permit highly concentrated products which will inter alia serve to reduce the environmental impact associated with transportation and packaging.

In the case of polish removers/wax removers for professional use, classification C with R34 (danger of corrosion) is also permitted. This exception has been included because polish removers/wax removers with this classification are highly effective, which means that a smaller quantity of chemicals is required in order to remove polish when compared with other removal products.

This means that a product labelled as harmful to the environment, highly toxic, harmful to health, corrosive, irritants with R41 (does not apply to products aimed at the professional market), or R43, allergenic, carcinogenic, toxic for reproduction or genetically harmful will not be eligible for an ecolabel.

There has been no change to the requirements Version 3 of the criteria document. In the criteria document, the classifications have been translated to GHS.

### **CMR substances**

In order to protect the people who produce, apply and use floor care products, requirements have been imposed for health reasons to the effect that ingoing substances must not be classified as carcinogenic, mutagenic or toxic for reproduction. Similarly, they must not emit substances that are classified as carcinogenic, mutagenic or toxic for reproduction.

Replacements for CMR substances are available.

Since CMR substances are especially problematical because of their harmful effects on health, Nordic Ecolabelling has decided that pollutants present in quantities in excess of 0.01 v/v% in the raw material must also comply with the requirement.

The requirement excludes preservatives such as formaldehyde, which is classified as Carc. Cat. 3; R40 - T; R23/24/25 - C; R34 - R43 (Carc3) and Bronopol, which may emit formaldehyde.

Nordic Ecolabelling  
Nordic Ecolabelled floor care products –  
Background document, consultative process, Version 4.0, 2011

The requirement was amended during the revision from Version 3 to Version 4, as a result of which pollutants are encompassed by the requirement.

### **Volatile organic substances**

Previously two requirements applied to volatile organic substances, R3 and R10. Whereas R3 specified only volatile organic substances, R10 specified volatile halogenated or aromatic substances. In reality, the two criteria coincide, and accordingly logic dictates that they be combined in a single requirement headed Volatile Organic substances.

The requirement specifies that the total concentration in the product of volatile organic substances, including halogenated and aromatic solvents, must not exceed 0.010 v/v%. Volatile organic substances, including halogenated and/or aromatic solvents, should be understood as substances that in accordance with 1999/13/EC are defined as VOC, in other words substances with a vapour pressure >0,010 kPa at 20°C.

The requirement has been amended between Version 3 and Version 4: from permitting substances with a boiling point of less than 150°C, and not classifiable as a health hazard (Tx, T, C, Xn, Xi, Carc, Mut and Rep). Since a number of the ingredients used in floor care products contain ammonia, and since ammonia has a boiling point that lies far below 150°C and is classifiable as a health hazard (C, Xn or Xi, depending on concentration) an exemption previously applied in the case of ammonia. This exemption is no longer relevant in this requirement which applies to volatile organic substances – which is not a description that can be applied to ammonia.

Nordic Ecolabelling has decided that pollutants present in quantities in excess of 0.01 v/v% in the raw material must also comply with the requirement. This is because the threshold specified in the requirement is very low and because an exemption for pollutants could in reality result in a level of volatile organic substances in excess of 0.01 v/v% in the product. Given that the substances are in fact volatile, it is not unreasonable to expect raw material producers to be able to supply raw materials without pollutants in the form of volatile organic substances.

Halogenated and aromatic solvents have a considerable impact on health and the environment. Accordingly, the requirement is imposed that solvents of this nature must not occur in floor care products.

Nordic Ecolabelling  
Nordic Ecolabelled floor care products –  
Background document, consultative process, Version 4.0, 2011

The requirement was amended during the revision from Version 3 to Version 4 as described above and as a result of which pollutants are encompassed by the requirement.

### **Compliance with administrative standards for volatile substances**

Although the requirement applicable to volatile organic substances is being changed so that volatile substances must not be present in quantities in excess of 0.01 v/v%, the requirement as to compliance with administrative standards for volatile substances is not removed. As an example, a calculation has to be carried out when the product contains ammonia.

The requirement has not been amended during the revision from Version 3 to Version 4.

### **Preservatives**

Preservatives must not be bioaccumulable. The bioaccumulability of a substance can be tested on fish in accordance with OECD test protocols 305 A-E. If the bioconcentration factor (BCF) of the substance is  $\geq 500$  it is regarded as bioaccumulable, and if  $BCF < 500$  substance is regarded as non-bioaccumulable. Unless the contrary is proven, the substances will be regarded as bioaccumulable if  $\log K_{ow} \geq 4$  in accordance with OECD test protocols 107 or 117 or the equivalent. It should be noted that if a measured BCF value exists, the highest measured value must be applied instead of  $\log K_{ow}$ . This means that a substance with  $\log K_{ow} \geq 4$  is not regarded as bioaccumulable if the highest measured BCF is  $< 500$ .

OECD test protocol 107 cannot be applied to surface active substances with both fat and water soluble properties since this test determines whether a substance is fat or water soluble (results in a  $\log K_{ow}$  value). In the case of substances of this nature, proof must be presented to a high degree of certainty based on current knowledge that the substances and their degradation products do not represent a long-term hazard for organisms in the aquatic environment.

The above excludes preservatives such as Triclosan ( $\log K_{ow} = 4.76$  og  $BCF = 2530$ ).

Preservatives classified as environmentally hazardous are encompassed by the requirements related to substances classified as environmentally hazardous.

Nordic Ecolabelling  
Nordic Ecolabelled floor care products –  
Background document, consultative process, Version 4.0, 2011

In order to minimise the quantity of preservatives, the requirement is imposed that a Challenge Test must be performed. A Challenge Test is a general term covering tests used to determine the required quantity of preservatives in a product. The test is performed on a number of samples of a test product to which different concentrations of preservatives have been added. After seven days, the samples are tested for growth of a number of bacteria, yeast and mould. The products are inoculated again with a mixture of bacteria, yeast and mould and the samples are retested for growth seven days after inoculation. This continues for a minimum of 28 days (some test require a minimum of six week). The lowest concentration of preservative at which no growth occurs is the optimum quantity of preservative for the product.

Different producers and suppliers of preservatives apply different challenge tests/methods to determine the correct concentration of preservative. The Challenge Tests used include the following: Koko Test (test method SM 021), USP Challenge Test (US Pharmacopoeia) and CTFA Challenge Test (Cosmetic Toiletries and Fragrance Association).

The requirement has not been changed during the revision from Version 3 to Version 4.

## **Fragrance**

During the revision from Version 3 to Version 4 it was decided to exclude fragrance from all floor care products. Fragrance may be slowly degradable, bioaccumulable or allergenic. If fragrance serves no cleaning or care function in a floor care product, fragrances are not permitted in these products. In Version 3 fragrance was permitted in wash polish and wash care products.

## **Surfactants, aerobic degradability and anaerobic degradability**

The requirement as to the biodegradability of surfactants is a standard feature in Nordic Ecolabelling criteria documents and is imposed because the use of surfactants is important from an environmental perspective. The DHI Report "Anaerobic biodegradability of surfactants" published in September 2002 (source 5) stresses the importance of the anaerobic degradability of surfactants. Non-readily degradable surfactants and non-anaerobically degradable surfactants may accumulate in sewage sludge, sludge-enriched soil and sediments in lakes and waterways and have a negative effect on organisms. Surfactants are bipolar and, as a

Nordic Ecolabelling  
Nordic Ecolabelled floor care products –  
Background document, consultative process, Version 4.0, 2011

consequence, have a toxic effect in all aquatic environments. The requirement is therefore imposed that all surfactants used must be aerobically degradable and anaerobically degradable. However, exceptions apply in the case of fluorosurfactants and silicone surfactants as well as ingredient emulsifiers and levelling agents in products with non-cleaning effects, i.e. in floor polish and base coat polish. These are not added to the products for cleaning purposes but rather to provide the floor care product with certain other functions. Other requirements are imposed with respect to these substances, see above.

It should be noted that all floor care products with a cleaning effect are subject to the Detergent Regulation, which requires all surfactants in these products to be aerobically degradable. However, floor care products that do not form a direct part of a cleaning regime but are solely intended to lay a protective layer on the surface are not encompassed by the Detergent Regulation (source 4). The project group has therefore concluded that it is relevant to impose the requirement that surfactants in floor care products must be both aerobic and anaerobic.

The requirement has not been amended during the revision from Version 3 to Version 4.

### **Environmentally harmful substances**

Substances that do not break down readily may cause problems now and in the future. The effects can be particularly serious if the substance is also acutely toxic. Accordingly, the requirement is imposed that substances that fulfil the criteria for environmental harmfulness (classified as N with or without a symbol (R52/53 and/or R53) in accordance with EU Directive 67/548/EEC must not be present in the product in concentrations greater than 100 mg/g of active content in total. This corresponds to 2% of a product with an active content of the order of 20% (professional products) in the case of products with an active content of 10% (consumer products) the threshold corresponds to 1%. Exempted from this requirement are polish removers and wax removers where the total quantity of substances that fulfil the criteria for environmental harmfulness (classified as N with or without a symbol (R52/53 and/or R53) in accordance with EU's Directive 67/548/EEC must not be present in the product in concentrations greater than 2.0 v/v% active content in total. The available data for determining the level of environmentally harmful substances in polish remover and wax remover is limited, but it seems clear that many products will have to be adjusted in order to fulfil the requirements because of their content of complexing agents (including NTA and EDTA). The requirement concerning

Nordic Ecolabelling  
Nordic Ecolabelled floor care products –  
Background document, consultative process, Version 4.0, 2011

environmentally harmful substances involves a reverse burden of evidence – if documentation cannot be presented showing that a substance is not environmentally harmful, it will be assumed to be environmentally harmful. The requirement also applies to substances that have been shown to form persistent environmentally harmful degradation products under the relevant conditions.

In this requirement softeners/plasticisers (with the exception of phthalates) are exempted from the general requirement applicable to environmentally harmful substances and may be added in limited quantities. Softeners are a very important component of many floor care products. If the product contains softeners (this does not apply to phthalates) which fulfil the requirements applicable to environmental hazardness (Nor without symbol), the total quantity of chemical substances that fulfil the environmental hazardness criteria (N or without symbol) must not be present in the product in concentrations greater than 160 mg/g active content. Softeners must not be present in polish removers or wax removers in raw materials or in the product.

Substances with a high molecular weight, i.e. substances with a molecular weight greater than 700 g/mol, lowest calculated section of over 9.5 Å or a length greater than 5.5 nm are partially included in this requirement if their toxicity is less than 100 mg/l. It is possible to perform a toxicity test on high molecular substances in floor care products. High molecular substances are generally viewed as not readily bioaccessible or degradable. The fact that high molecular substances are exempted from testing for degradability and bioaccumulability means that they will only be classified as environmentally harmful if their toxicity is less than 1 mg/l and in this way they must be below the general requirement as to substances classified as environmentally harmful.

High molecular weight substances represent a very large component of floor care products and should therefore be subject to strict environmental requirements. High molecular weight substances that are toxic in concentrations of up to 100 mg/l will be classified as environmentally harmful if it is possible to test for degradability and they prove to be non-readily degradable. Accordingly, the requirement is imposed that only high molecular weight substances with a toxicity of over 100 mg/l are exempted from the requirement as to degradability and bioaccumulability.

Toxicity testing must be conducted on a minimum of one of the three trophic levels (fish, algae or daphne).

Nordic Ecolabelling  
Nordic Ecolabelled floor care products –  
Background document, consultative process, Version 4.0, 2011

The criteria document does not specify which test method must be used. This is because a normal toxicity test cannot be performed on substances with a molecular weight of over 700 because the substances are so large that they cannot penetrate the cell membrane of the test organisms. If the high molecular weight substance is soluble in water, a normal toxicity test can be performed.

Nevertheless, the requirement is included without a specification of test method because in the experience of the project group, various forms of toxicity testing are performed on high molecular weight substances. Toxicity testing of this type can provide an impression of how toxic high molecular weight substances can be and this in the view of the project group is relevant to this product group.

The requirement has not been amended during the revision from Version 3 to Version 4.

### **Complexing agents**

Complexing agents constitute a very heterogeneous group of substances having the function of binding compounds (primarily calcium) and keeping them suspended in the washing phase so that they are not deposited in undesirable places, e.g. laundry, washing machine, glass surfaces or other. An undesired effect of complexing agents is that the strongest agents are also able to neutralise metal ions and thereby make them mobile in the aquatic environment where they may cause harm to the environment or to health.

The use of the following complexing agents is restricted in Nordic Ecolabelled floor care products: NTA, EDTA and DTPA and phosphorous-based complexing agents.

*EDTA (ethylene diamine tetra acetate and salts thereof). NTA (nitrilotriacetate) and DTPA (diethylenetriamine penta acetate) are suspected of being able to mobilise heavy metals in certain environments due to their complex binding capacity. The problems of this property have, however, been questioned by the industry [CEFIC, 2003]. EDTA is not readily degradable, and the EU risk assessment states that given the conditions of municipal treatment plants, EDTA will not be degraded at all or be degraded only to a limited extent. [CETIF, 2002]. NTA has medium to low toxicity for aquatic organisms and is readily degradable aerobically, whereas no data are available for anaerobic degradability. In the latest*

Nordic Ecolabelling  
Nordic Ecolabelled floor care products –  
Background document, consultative process, Version 4.0, 2011

*amendment of the CLP Regulation, NTA has been classified as Carc3 with R40. DPTA has the same properties as EDTA.*

NTA may be present as a pollutant in complexing agents of the type MGDA and GLDA in concentrations of less than 1.00 v/v% in the raw material, but never in quantities greater than 0.100 v/v% in the final product.

Nordic Ecolabelling wishes to exclude NTA from ecolabelled products wherever possible. It has been decided that a small quantity of NTA (max. 0.10%) should be permitted in the concentrated product, since several of the alternative to EDTA and DETPA may contain a smaller quantity of NTA, typically < 1%. The level of 0.10% NTA in the concentrated cleaning product has been decided against the background of the Danish rules on the labelling of products as carcinogenic. A second reason for permitting 0.10% NTA in the concentrated product is that for environmental reasons Nordic Ecolabelling wishes to exclude the use of EDTA and DTPA. However, at the present time, it appears that there are relatively few alternatives available to EDTA and DTPA and that several of these contain a small quantity of NTA.

*Phosphonates* (DID no. 119) are a number of phosphides that are very good complexing agents. [Lindquist, 2002]. Phosphonates do not harm aquatic organisms, but are persistent and not anaerobically degradable. Phosphonates contain phosphorus and are therefore also a nutrient. On the other hand phosphonates are used in much smaller quantities than phosphorus as they are very strong complexing agents. SCHER estimates that phosphonates used in zeolite based, non-phosphate detergents can constitute a potential risk for the aquatic environment, and their long-term effects should be investigated further. [SCHER, 2007].

*Phosphate* (DID no. 113) is a reasonably good complexing agent. [Lindquist, 2002]. Phosphate has good environmental properties as it does not harm aquatic organisms and as phosphate is organic, it makes no sense to consider degradability. But phosphate is a nutrient and contributes to eutrophication of the aquatic environment. As a consequence phosphate is not unproblematic. Phosphate is subject to separate regulation in many countries in order to limit the emission to vulnerable aquatic environments.

Nordic Ecolabelling  
Nordic Ecolabelled floor care products –  
Background document, consultative process, Version 4.0, 2011

As phosphonates do not break down readily, Nordic Ecolabelling has decided that there must be no phosphonates in polish removers/wax removers.

Due to the fact that phosphates act as a nutrient in the recipient, which may lead to eutrophication and, as a result, oxygen loss in lakes and waterways, and the knowledge that waste water from floor polish removers/wax removers pass through a treatment plant where part of the phosphorus is captured before it reaches the recipient, Nordic Ecolabelling wishes to limit the use of phosphorous.

In polish removers and wax removers phosphorous may be present in a maximum quantity of 0.2 v/v% in the finished product. This is a tightening compared to Version 3 which allowed a maximum phosphorus content of 1.0 x/w%.

Complexing agents that may be used include the following:  
Citrate may function as a complexing agent in certain products. Citrate is not known to be associated with environmental problems and its use as a complexing agent is accordingly permitted. MGDA (methylglycinediacetic acid) and amino acetic acid may also be used, since these break down aerobically and anaerobically.

The requirement has been amended with respect to the requirement level for phosphorus in the revision from Version 3 to Version 4.

### **Residual monomers in polymers**

Residual monomers in polymers may have properties that are harmful to health and the environment. This impact is considered to be so serious that it is necessary to impose a specific requirement limiting the total content of monomers in the polymer. According to the requirement, the total content of residual monomers classified as harmful to health and the environment (in accordance with Table 6 of the criteria document) must not exceed 100 mg/kg of newly produced polymer.

The monomer content is reduced over time because many monomers are volatile compounds. Accordingly, the requirement is related to newly produced polymers since it is important to reduce the impact at source for which reason it is most practical for the polymer producer to perform the analysis.

Nordic Ecolabelling  
Nordic Ecolabelled floor care products –  
Background document, consultative process, Version 4.0, 2011

The requirement was amended during the revision from Version 3 to Version 4 in that it has been adjusted to emphasise that the requirement concerns residual monomers in the polymer classified as harmful to health in the environment. The stringency of the requirement has not been changed.

### **Ingredient emulsifiers and levelling agents in base coat polish and floor polish**

Ingredient emulsifiers are surfactants, the purpose of which is to ensure that wax and the like are kept in emulsion = "dissolved" in the product. The choice of ingredient emulsifier will depend on the substances that need to be emulsified. The purpose of the emulsifiers is to create very stable solutions in concentrated solutions, but as soon as they are diluted and applied, they will combine with the interface water/air thereby releasing the phase they emulsify – in this case typically wax.

Levelling agents are surfactants that are added to other polish to ensure that it disperses well on the floor when applied.

Many different types of ingredient emulsifiers and levelling agents are used – from classic alcohol ethoxylates to silicone-based and fluorine-based surfactants. Some producers still use nonylethoxylates. The quantity of emulsifier and levelling agents used will depend on a number of factors and may range from a few percent up to more than 25 percent.

Several emulsifiers and few levelling agents are biodegradable – perhaps not within 28 days because of their molecular weight (they are typically highly ethoxylated in order to make them more water soluble and stable – steric stability is increased with an increase in the quantity of ethylene oxide). However, it is by no means obvious which emulsifiers are anaerobically biodegradable. Some are, whilst others will have difficulties fulfilling this requirement. Most types of levelling agents are not readily degradable.

Depending on the type of floor care product in question, different types of ingredient emulsifiers and levelling agents will function. In the case of some floor care products it may be the case that emulsifiers that are not both aerobically and anaerobically degradable can be used in order for the product to function, whereas levelling agents typically are neither aerobically nor anaerobically degradable. For this reason, in the revision from Version 2 to Version 3 the product group introduced the exception

Nordic Ecolabelling  
Nordic Ecolabelled floor care products –  
Background document, consultative process, Version 4.0, 2011

that ingredients emulsifiers and levelling agents that are not readily degradable or anaerobically degradable may be used, but only in quantities of up to 10 mg/g active content (equivalent to 1% of the active content) in floor polish and basecoat polish. Since the consultative process levelling agents have been added to the exemption, since levelling agents are typically not aerobically and anaerobically degradable and cannot be omitted from polish products.

The requirement has not been amended during the revision from Version 3 to Version 4.

### **Fluorosurfactants and silicone surfactants**

This section is based on sources 1 and 2.

Fluorosurfactants are used in floor care products to increase the dispersability of the product without having a negative effect on the polish film. The use of fluorinated products is widespread in floor polish products. In Denmark, polish products accounts for up to 9% of total consumption of PFOS-related substances registered by the Danish Product Register. (PFOS = Perfluorooctanesulphonate). In Sweden, this figure is close to 6%. In Sweden the concentration of fluorosurfactants that break down into PFOS is between 0.005-0.01% in finished floor care products. In Norway the concentration is generally below 0.01%, whereas in Denmark it is between 0.06-0.1%.

Fluorosurfactants (with fluorinated carbon chains over 6) break down into highly stable PFOS and PFOA (Perfluorooctanoic acid) and similar related substances. The substances are found all over the world, from the major oceans to Arctic regions. PFOS has been found in, inter alia, birds and fish and in their egg. PFOS and related substances are easily absorbed in the body and bind to proteins, which lead to accumulation in, inter alia, the blood and liver. The half-life of these substances in the body is several years, and studies have shown that they cause endocrine disruption. Furthermore, PFOA and PFOS have caused cancer in laboratory animals.

It is not easy to find alternatives to fluorine based products that maintain a satisfactory polish result. Several attempts have been made using, inter alia, acrylates, but the results have not been satisfactory.

Nordic Ecolabelling has information on successful tests done to replace fluorosurfactants with silicone surfactants. However, silicone surfactants are also associated with environmental problems, since the siloxane part

Nordic Ecolabelling  
Nordic Ecolabelled floor care products –  
Background document, consultative process, Version 4.0, 2011

does not break down readily and the product is classified as environmentally harmful, R51/53 (toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment). In other words, it cannot be said that there are definite environmental gains to be made by replacing fluorosurfactants with silicone surfactants. On the other hand, it cannot be said definitely that silicone surfactants are worse than fluorosurfactants, for which reason the project group has decided that the two types of surfactants should be placed on the same footing.

A second alternative is the use of fluorine-containing substances with short fluorinated carbon chains (C chains from 5 and downwards). These short fluorinated carbon chains mean that the degradation product will not be PFOS or PFOA, which is the case for the fluorosurfactants that have longer fluorinated carbon chains (from 6 and upwards). However, at present, information is sparse on the environmental and health effects of substances with shorter fluorinated carbon chains. The few studies that have been conducted suggest that they are less toxic and less bioaccumulable. Even so, these short-chained fluorosurfactants will still leave some heavily degradable degradation products containing fluorine.

In the case of products that have both a wash effect and a floor care effect, fluorosurfactants can be replaced by non-ionic and anionic surfactants.

The consultative proposal for Version 3 required aerobic and anaerobic degradability in the case of all surfactants, as a result of which the use of fluorosurfactants in floor care products was excluded. This was because of the aforementioned environmental and health problems associated with fluorosurfactants and silicone surfactants.

The aforementioned consultative draft elicited a large number of comments concerning the exclusion of fluorosurfactants and silicone surfactants. In view of this the project group has decided against total exclusion of fluorosurfactants and silicone surfactants, since we appreciate the difficulties involved in replacing fluorosurfactants and silicone surfactants in polish products. The exemption applies to both fluorosurfactants and silicone surfactants, since the project group does not believe that in terms of the environment and health there are significant differences between the various types of surfactants if the fluorinated carbon chain length of fluorosurfactants is less than or equal to five.

The requirement is accordingly that fluorosurfactants are prohibited in wash polish and wash care products. In the case of basecoat polish and

Nordic Ecolabelling  
Nordic Ecolabelled floor care products –  
Background document, consultative process, Version 4.0, 2011

floor polish, fluorosurfactants are permitted in a concentration of a maximum of 0.025 weight percent of the product or silicone surfactants in a concentration of a maximum of 0.25 weight percent of the product. Moreover, fluorosurfactants must not have a fluorinated carbon chain of over 5 C atoms. These levels have been decided on the basis of information provided by a number of producers.

Studies of recent knowledge about fluorosurfactants during the revision of Version 3 to Version 4 aimed at including fluorosurfactants with a carbon chain of 6 or lower has not revealed unambiguous information to the effect that the requirement can be amended, for which reason it will not be amended.

Studies have shown (Conder 2008) that PFCAs with chain lengths of 8-13 are potentially bioaccumulable and may potentially be biomagnified. PFCAs with chain length of 7 have been found in animals in the wild and PFASs with chain length of 8 are bioaccumulable and are found in most animals in the wild. PFAS with chain length of 4 have not been found in animals in the wild, PFAS with chain length of 6 have been found in some animals in the wild, but are not regarded as bioaccumulable (fluorotelomer alcohols break down into PFCAs and PFASs of this nature).

Studies have shown [Joyce, 2004 and Ellis 2004] that fluorotelomer alcohols are broken down by microbes or in the atmosphere. During microbial degradation, the degradation products have shorter carbon chains than the original product. Fluorotelomer alcohols with a chain length <8 cannot be broken down into PFOS (C8). In the atmosphere C6 fluorotelomer alcohols may be converted to perfluoroheptanoic acid (i.e. six carbon atoms with fluoride + COOH group) and perfluorocarboxylic acid with shorter chain lengths that are not bioaccumulable or found in nature. Degradation products in the atmosphere have a chain length of C6 or less. All degradation products from C4 fluorotelomer alcohol have a chain length of C5 or less.

Omnova has products with a chain length of C1 and C2 and state that their products are better than those based on chain length C6 (Omnova 2007). Dupont have products with chain length C6 and state that C6 in some areas is better than chain length C4 or lower (Dupont 2010).

The requirement has not been amended in the revision from Version 3 to Version 4.

## **CDV calculation**

Requirements are imposed as to the critical dilution volume (CDV) of floor care products. CDV is a measure of the environmental impact of the ingredients in the aquatic environment. CDV is calculated on the basis of the quantity of ingredients in the floor care product per litre of solution and the toxicity and biodegradability of the ingredients. Wherever possible toxicity data and degradation data are taken from the DID list (Detergent Ingredients Database), where the toxicity value combined with a certainty factor expressing the degree of certainty of the toxicity data. The threshold value for CDV is fixed at 14 000 litres per litre of in-use solution for chronic toxicity.

Calculations must be conducted for all products. The calculation must always be based on a worst case situation, for which reason the calculation for all floor care products, including for example floor care products for impregnating floor mops, must be calculated using the highest recommended dosage. The purpose of the requirement is to reduce the toxicity impact in aquatic environments.

High molecular substances are not included in the calculation of CDV, cf. the justification in the section "Environmentally harmful substances".

The requirement has been amended in the revision from Version 3 to Version 4, according to which a CDV calculation must be provided for all products.

## **Phthalates**

Phthalates must not be present in ingredients/raw materials or the product. Nordic Ecolabelling has reviewed whether it is relevant to change the existing requirement that ecolabelled floor care products must not contain any phthalates. The study is based on interviews with producers of floor care products and analyses of inherent properties of phthalates as well as risk assessments. Interviews with producers of ecolabelled floor care products [Nilfisk Advance AB and Ecolab AB, 2010] do not provide grounds for amending the requirement, since according to their information phthalates were phased out as long ago as in the 1990s and replaced by tributhoxyethylphosphates. An analysis of the classifications and risk assessments of phthalates show that phthalates are still a problem with respect to health and the environment, and accordingly it remains relevant to continue to have requirements in place concerning

Nordic Ecolabelling  
Nordic Ecolabelled floor care products –  
Background document, consultative process, Version 4.0, 2011

phthalates since there is potential in their replacement by less problematical substances.

Tributhoxyethylphosphate has no hazard classification and can be used as a softener, as an alternative to phthalates. Tributhoxyphosphate contains phosphate and is accordingly encompassed by the Norwegian "Regulations on limitations on the use of chemicals and other products that are harmful to health and the environment" (the Product Regulation), according to which "producing, importing or selling detergents for use in Norway with a higher weight percentage of phosphorous than ... c) liquid detergents and washing-up detergents: 0.2% is prohibited". This is a legislative requirement, the existence of which Nordic Ecolabelling simply wishes to point out.

The requirement has not been amended during the revision from Version 3 to Version 4.

### **Dyestuffs and pigments**

Dyestuffs are added for aesthetic reasons, although it is argued in some quarters that adding colour makes it easier to measure the correct dosage. Very few studies of the effects of health and the environment of dyestuffs exist. Generally dyestuffs in floor care products are regarded as unnecessary additives. Accordingly the requirement is imposed that dyestuffs and pigments must not be added.

The requirement has been amended during the revision from Version 3 to Version 4 to specify which pigments or dyestuffs may be present in the products.

## **APEO and LAS**

APEO and LAS must not be added to the product. The background to the prohibition against APEOs is that a number of these substances are suspected of causing endocrine disruption, and the authorities in the Nordic countries have given priority to reducing consumption of the substances. LAS are a group of compounds with low anaerobic degradability. One reason for the ban is findings in Denmark of non-degraded LAS in sludge from treatment plants intended for agricultural use.

The requirement has not been amended during revision from Version 3 to Version 4.

## **Nanomaterials/particles**

Nanomaterials/particles, that is to say deliberately produced particles where at least one dimension is 1-100 nm, must not be present in ingredients/raw materials or the product. Nanoparticles include, for example, metal and mineral compounds, such as ZnO, TiO<sub>2</sub>, SiO<sub>2</sub> and Ag.

Nanoparticles have special properties and are increasingly used in a wide range of products to equip these products new and improved properties. Nanoparticles may represent an unintended risk to health and the environment. The form of the particle enables it to reach places in the body and the environment that would otherwise be protected, since the size results in increased reactivity because small structures have a very much more available surface than larger particles [Teknologirådet, 2008]. Research into the risks associated with nanomaterials has focused particular attention on health effects, and in some cases harmful effects have been shown to exist. It has for example been shown that nanoparticles can penetrate cells and damage DNA [Folkmann, 2009]. This does not mean that all nanoparticles will cause damage, but as at the present time knowledge is lacking about the effects of nanoparticles on health and the environment, particularly the long-term effects [Teknologirådet, 2008]. Based on the precautionary principle Nordic Ecolabelling's wish is that nanoparticles should be used only if evidence can be presented that they do not cause negative effects on health or the environment.

According to producers of floor care products [Lilleborg, RenSåpeIndustri, PremiereProdukter, 2011] no nanoparticles are used in floor care products. Nanoparticles of titanium dioxide are used on windows and in toilets in order to make them self-cleaning by means of a catalytic process [Nilsen,

Nordic Ecolabelling  
Nordic Ecolabelled floor care products –  
Background document, consultative process, Version 4.0, 2011

2009]. A surface-treated nanoparticle with a core of silicium dioxide is used in paint, inter alia to reduce the need for solvents, lower the drying time and to increase durability [Research Council, 2008]. The use of zinc oxide nanoparticles provides a similar effect [Degussa, 2006]. Nanometals, such as nanosilver, are used in a large number of products in order to provide an antibacterial function [Joner, 2011]. All of these properties could be of interest for floor care products, and Nordic Ecolabelling is accordingly of the view that it is appropriate to impose the requirement that nanomaterials/particles, for example of zinc oxide, titanium dioxide, silicium dioxide and silver, must not be used since documentation does not exist that their use will not entail negative effects on health and the environment.

There are products on the market that use nanotechnology [Nanopro, 2011]. One of these is NP liquid glass (known as water glass) produced by the German company Nano Pool GmbH. The product can be used on linoleum floors and consists of SiO<sub>2</sub> in water and applies a nanothick coat of SiO<sub>2</sub> on the surface [Nanopool, 2011]. By way of comparison, the thickness of a layer of polish is about 3 μm (= 0.003 mm) [Lilleborg, 2011]. According to the producer the product does not contain nanoparticles, the SiO<sub>2</sub> that is used accordingly does not contain deliberately produced particles. The term nanotechnology simply refers to the thickness of the coating. In chemical terms the product is pure glass which is applied in a very thin coat, as a result of which all pores are filled, thus preventing soils from getting trapped in the pores [Nanopro, 2011]. The film is easy to keep clean, offers a high degree of wear resistance and can last for several years [Nanopro, 2011]. The product is marketed as 100% environmentally-friendly, and the major advantage of this product compared to conventional floor products is that there is no need for solvents or other chemicals. The product has been available on the professional market in Denmark and Norway for a couple of years. A similar product for use on vinyl floors is Protect, which is a plastic product. This product is based on SiO<sub>2</sub> in ethanol [Nanopool, 2011].

The products do not protect linoleum or vinyl floors, but are applied in order to make it easier to clean the floors. The products cannot be applied on top of a film of polish since they will not adhere to the polish. Thus the products do not constitute floor care products and cannot be included in the existing product group definition.

The requirement was added during the revision from Version 3 to Version 4.

## **Packaging requirements**

Requirements for packaging are specified to safeguard against unnecessary consumption of resources and the use of packaging materials that are harmful to health and the environment.

### **Chlorinated plastics and the labelling of packaging**

PVC and other halogenated plastics are excluded from packaging for ecolabelled products. This is due to the fact that the disposal of these types of plastics have adverse environmental impacts and that they contain substances with adverse health effects. When PVC enters the flow of waste to incineration, one of the effects will be a larger quantity of chlorine in the flow of waste. Chlorine is a prerequisite for the formation of the more toxic dioxines in flue gas, but as there are several other chlorine sources than PVC, increased incineration of PVC does not necessarily result in an increased quantity of dioxine as chlorine is not the limiting factor for the formation of dioxine in the incineration plant [Hjelmar, 2002], [Erichsen & Hauschild, 2000]. The added quantity of PVC will, however, increase the formation of acid flue gases and the need for cleaning of flue gases, resulting in waste from the flue gas cleaning process. The incineration of 1 kg of PVC produces up to 1.7 kg of salt during the flue gas cleaning process [Hjelmar, 2002]. This means that the incineration plant may produce more waste than the input quantity of waste.

PVC waste also contains a number of heavy metals that can constitute an environmental problem, e.g. cadmium, which will be contained in the flue gases due to the volatility of the metal [Hjelmar, 2002]. With respect to the present ecolabelling requirements, this will hardly be relevant as the use of cadmium in PVC is no longer permitted [Hjelmar, 2002] and as the requirements that we stipulate refer to products manufactured after the prohibition took effect.

Lead compounds are often used as stabilizing agents in PVC [MST, 2000] which can also be regarded as a potential problem for health and the environment

In order to facilitate the sorting of the materials, packaging must be labelled in accordance with ISO 11 469 or an equivalent labelling system. The labelling requirement does not apply to caps and pumps. At the present time it is not normal for pumps and caps to be labelled, and labelling is far from easy. In other words this could result in a

Nordic Ecolabelling  
Nordic Ecolabelled floor care products –  
Background document, consultative process, Version 4.0, 2011

disproportionate increase in the costs associated with packaging relative to the environmental benefits that could be achieved from labelling pumps and caps.

The requirement has been amended during revision from Version 3 to Version 4 and is now harmonised with the requirement in the criteria for detergents.

### **Weight utility ratio**

The consumption of packaging per gram of active content decreases as the concentration and size of the product unit increases. Requirements are therefore imposed as to the weight utility ratio (WUR) of the product, according to which the weight of the packaging relative to the content of the product of active components must not exceed a given threshold. The requirement helps to reduce the energy needed for transportation and the quantity of packaging (thereby reducing resource consumption and emissions). Furthermore, the weight utility ratio requirement encourages the use of recycled materials, since non-recycled packaging components are allocated twice the weighting of recycled components. This contributes to a reduction in the overall requirement of materials and helps to increase the extent to which packaging materials are recycled.

X (the level of the WUR requirement) is five times lower for professional products than for consumer products. Consumption amongst ordinary consumers is significantly lower than amongst professional users. The products have a limited life and it is accordingly understandable that products for the professional market should be sold in larger sized packages than consumer products. The greater the content of product, the lower the quantity of packaging per product unit. If only a single threshold value is applied the consumer products will have difficulty in clearing the requirement, whereas the professional products will do so with ease. The objective of the criteria is that as many producers as possible should reduce their consumption of packaging. Accordingly it is appropriate to set different requirements for professional and consumer products.

The threshold value for the weight utility ratio for professional products has been set on the basis of a questionnaire circulated amongst six producers of floor polish for the professional market. For determining the threshold value for consumer products, information was taken from a single producer of floor care products as well as information on packaging consumption from five producers of universal cleaning products with many features in common with consumer products for floor care. The calculations

Nordic Ecolabelling  
Nordic Ecolabelled floor care products –  
Background document, consultative process, Version 4.0, 2011

for consumer products assumed that the products have an active content of approximately 10%.

The requirement has not been amended in connection with the revision since information from licence-holders has shown that the level of the requirement remains relevant.

The requirement was not amended during the revision from Version 3 to Version 4.

### **Requirements as to effectiveness**

It is not sufficient for ecolabelled products to satisfy the requirements applicable to environmental impact. The products must also perform satisfactorily. Requirements for effectiveness are specified to ensure that the performance of ecolabelled products is equivalent to that of similar products on the market.

During the drafting of earlier proposals for the criteria document considerable work was laid down on determining which tests should be performed in order to document the effectiveness of a product. The following test descriptions were considered:

- ASTM tests
- RAL-TG
- Federal Specification
- Qualitätsnormen für Fussbodenpflege- und reinigungsmittel
- Internal tests produced by producers of floor care products

The tests specified in Appendix 6 to the criteria document are the result of the work laid down on formulating requirements as to efficiency testing. Weight has been attached to ensuring that the products are tested in practice since this type of products cannot be developed without field testing/experience of practical use.

Requirements concerning heel marking, soil resistance and application properties have been removed from the laboratory tests. These parameters are now included in the field test.

In the case of consumer products requirements have now been introduced as to the performance of laboratory testing to determine the water resistance, slip resistance and removal properties of the products.

Nordic Ecolabelling  
Nordic Ecolabelled floor care products –  
Background document, consultative process, Version 4.0, 2011

The requirement has also been introduced that field testing must be performed.

There is also a function test for wash care products containing wax.

In this criteria document further detail has been introduced into the user reports and the testing of polish removers/wax removers has been included. In addition, the test period for user tests has been reduced from six months to three months, since feedback from several licence-holders has indicated that performing user testing was very difficult when the test period was so long.

The requirement has not been changed in the revision from Version 3 to Version 4. Additional detail has been introduced into the requirement and the test forms.

### **Consumer information**

In order to provide users with access to information on the composition of the product, the requirement is imposed that the products must carry an information text that complies with the EU's "Recommendation for the labelling of detergents and cleaning products" (89/542/EEC). In professional products this information may be supplied in the product data sheets for the product.

In order to avoid excess dosage the requirement is imposed that dosage ranges must be specified for the product. In addition, in the case of consumer products a dosage device is required.

The requirement has not been amended during the revision from Version 3 to Version 4.

## **Quality requirements and the requirements of the authorities. Marketing**

### **The requirements of the authorities as to safety, working environment and the external environment**

The requirement is imposed in order to ensure that the holder of the ecolabelling licence lives up to the legislative requirements as to safety, working environment and the external environment. This is a standard feature of all Nordic Ecolabelling criteria documents.

### **Recycling system for products and packaging**

This is a standard requirement in Nordic Ecolabelling documents.

### **Eco and quality management**

Requirements concerning eco and quality management are imposed in order to ensure that producers have satisfactory control over the production of their ecolabelled products and that the ecolabelling requirements are adhered to during the period of validity of the licence. This is a standard feature of all Nordic Ecolabelling documents.

### **Marketing**

No changes have been made to the marketing requirements.

Marketing requirements are imposed in order to ensure that the relevant persons within the organisation are aware of the rules applicable to the marketing of ecolabelled products. This is a standard requirement in all Nordic Ecolabelling documents.

## **Changes relative to the previous version**

The following changes have been made between Version 3 and the consultative process for Version 4:

The running order of the requirements has been changed and there are no longer sections for the individual products. Exemptions applicable to products are specified in the individual requirement. This has been done to make the criteria clearer and easier to read.

The requirements applicable to the description of the product have been adjusted so that the information corresponds to the information used during the application process.

Classifications have been translated into GHS.

The CMR requirement has been changed so that impurities are now encompassed by the requirement.

The requirements applicable to substances with a low boiling point have been combined with requirements applicable to halogenated and aromatic solvents and are now called the requirements as to volatile organic

Nordic Ecolabelling  
Nordic Ecolabelled floor care products –  
Background document, consultative process, Version 4.0, 2011

solvents. The requirement has been amended so that impurities are encompassed.

The residual monomer requirement has been adjusted since the requirement has been clarified to apply to residual monomers in polymers classified as harmful to health and the environment. The level of the requirement has not been changed.

The requirement applicable to CDV calculation has been altered so that a CDV calculation must exist for all products.

The requirement applicable to dyestuffs has been clarified so that it also encompasses pigments.

A new requirement has been added concerning nanomaterials/particles.

Forms for declaration for completion and signature by the producer of the floor care product have been extended.

Forms for declaration to be completed and signed by the raw material producer have been prepared.

The forms for user tests have been clarified.

## **New criteria**

A future revision will consider the following:

- - The possibility of prohibiting preservatives in floor care products
  - The possibility of extending the product group to include water glass products and outdoor products on the basis of new RPS for all products
  - Increasing the stringency of the requirements applicable to CDV and VNF
- Increasing the stringency of the requirement applicable to the environmental properties of silicone surfactants and fluorosurfactants  
Increasing the stringency of the requirements applicable to environmentally harmful substances
  - Consider the possibility of updating test requirements

## References

1. OSPAR Commission, 2005: "Hazardous Substances Series, Perfluorooctane Sulphonate (PFOS)".
2. Poulsen P.B. et al.: Danish Ministry of the environment, 2005: "More environmentally friendly alternatives to PFOS-compounds and PFOA" Environmental project No. 1013 2005.
3. Schultz, G. Johnson Diversey, 2005: "Teknisk Information angående Zink i gulvpolish".
4. SPT internt seminar, 13. juni 2005: "Spørgsmål – Hvilke produkter?", spørgsmål fra SPT til Miljøstyrelsen angående detergentforordningen.
5. DHI, September 2002: "Anaerobic biodegradability of surfactants"
6. Arbejdstilsynet, april 2005: "AT-vejledning, Stoffer og materialer – C.0.1"
7. <http://www.forbrug.dk/raad/arkiv0/familiearkiv/1/rengoering/indholdsstoffer/fosfonater/>
8. Green seal: [www.greenseal.org](http://www.greenseal.org)
9. Bra Miljøvalg: [www.snf.se/bmv](http://www.snf.se/bmv)
10. OECD: [www.oecd.org/home](http://www.oecd.org/home)
11. ASTM: [www.astm.org](http://www.astm.org)
12. IRAC: [www.irac.fr](http://www.irac.fr)
13. WHO: [www.who.int](http://www.who.int)
14. [www.kemi.se](http://www.kemi.se)

CEFIC, 2002: *Internetoplysninger om EDTA*, fundet på <http://www.cefic.be/files/Publications/C014.doc>, notat fra European Aminocarboxylates Committee (EAC), juni 2002

CEFIC, 2003: *Internetoplysninger om EDTA*, fundet på <http://www.cefic.be/files/Publications/B013.pdf>, notat fra European Aminocarboxylates Committee (EAC), marts 2003

Conder, 2008: Are PFCAs Bioaccumulative? A Critical Review and Comparison with Regulatory Criteria and Persistent Lipophilic Compounds, *Environ Sci Technol*, Volume: 42, Issue: 4, Date: 2008 Feb 15, Pages: 995-1003

Joyce 2004: Mary Joyce A. Dinglasan, Yun Ye, Elizabeth A. Edwards, and Scott A. Mabury, Fluorotelomer Alcohol Biodegradation Yields Poly- and Perfluorinated Acids, *Environ. Sci. Technol.*, 2004, 38 (10), pp 2857–2864

Ellis 2004: David A. Ellis, Jonathan W. Martin, Amila O. De Silva, Scott A. Mabury, Michael D. Hurley, Mads P. Sulbaek Andersen, and Timothy J.

Nordic Ecolabelling  
Nordic Ecolabelled floor care products –  
Background document, consultative process, Version 4.0, 2011

Wallington, Degradation of Fluorotelomer Alcohols: A Likely Atmospheric Source of Perfluorinated Carboxylic Acids, *Environ. Sci. Technol.*, 2004, 38 (12), pp 3316–3321

Erichsen & Hauschild, 2000: *Technical data for waste incineration – background for modelling of product specific emissions in a life cycle assessment context*. Department of manufacturing engineering, Technical University of Denmark, 2000.

Hjelmar, 2002: *Forbrænding af PVC: Påvirkning af massestrømmene gennem et forbrændingsanlæg*. DHI – Institut for Vand og Miljø

MST, 2000: Miljøprojekt nr. 917, 2004. *Massestrømsanalyse for bly 2000 - revideret udgave*. Miljøstyrelsen, 2000.

Omnova 2007: Fact Sheet: PolyFox™ Fluorochemicals, 2007

DuPont 2010: DuPont Surface Protection Solutions, DUPONT™ CAPSTONE® Repellents and Surfactants, Product Stewardship Detail

Teknologirådet, 2008: Nanomaterialer, risiko og regulering, rapport 2008

Folkmann, Janne K. mfl, 2009: Oxidatively Damaged DNA in Rats Exposed by Oral Gavage to C60 Fullerenes and Single-Walled Carbon Nanotubes, *Environ. Health Persp*, 117(5), 2009

Lilleborg, 2011: Møte med Lilleborg, Norge 1/2-11

RenSåpeIndustri, 2011: Telefonsamtale med RenSåpe Industri, Norge, 4/2-11

Premiere Produkter, 2011: Telefonsamtale med Premiere Produkter, Norge, 1/2-11

Nilsen, 2009: Selvrensende vinduer, Universitetet i Oslo, 2009.  
[https://wiki.uio.no/mn/kjemi/kjemportal/index.php/Selvrensende\\_vinduer](https://wiki.uio.no/mn/kjemi/kjemportal/index.php/Selvrensende_vinduer)  
(3/5-1-1)

Forskningsrådet, 2008: Nytt fra NANOMAT, Nr 4/2008, Forskningsrådet i Norge, [www.forskningsradet.no](http://www.forskningsradet.no) (1/2-11)

Nordic Ecolabelling  
Nordic Ecolabelled floor care products –  
Background document, consultative process, Version 4.0, 2011

Degussa, 2006: Zinc oxide, cerium oxide, indium tin oxide, just part of the growing nano product range from Degussa, 2006,  
<http://www.azonano.com/article.aspx?ArticleID=1603&lang> (3/5-11)

Joner, Bioforsk: Nanosølv,  
[http://www.bioforsk.no/ikbViewer/page/prosjekt/tema/artikkel?p\\_dimension\\_id=19876&p\\_menu\\_id=19888&p\\_sub\\_id=19877&p\\_document\\_id=49609&p\\_dim2=19880](http://www.bioforsk.no/ikbViewer/page/prosjekt/tema/artikkel?p_dimension_id=19876&p_menu_id=19888&p_sub_id=19877&p_document_id=49609&p_dim2=19880) (3/5-11)

Nanopro, 2011: Telefonsamtale med NanoPro 4/2-11

Nanopool, 2011: Intelligent overflatebehandling for linoleumsoverflater, np liquid glass linoleum

Nanopool, 2011: Produktinformasjon, Plastic Protect

## Appendix 1 Overview of experts and licence-holders involved in the criteria revision process

<b>Country</b>	<b>Name of expert</b>	<b>Affiliation</b>
Denmark	Lars Bøgeholm	Knud E Dan
Norway	Vivi Lindahl	Lilleborg Profesjonell
	Geir Utigard	Lilleborg Profesjonell
	Henrik Johannessen	NanoPro
Finland	Heidi Kähkönen	Kiilto Oy
	Tuija Salo	Farmos
	Johanna Sumelius	Johnson Diversey
	Riitta Leinonen	Säkerhets- och kemikalieverket
	Matti Verta	Finlands Miljöcentral
	Ernie Hamp och Bill Beers	Omnova Ltd
Sweden	Göran Schulz	Johnson Diversey
	Örjan Carlsson	Nilfisk-Advance
	Kåre Kilgren	HTC Sweden
	Ulrika Flodberg	IIH Brancheorganisation
	Peter Nohrstedt	EKU Svensk Miljøstyringsråd