

# Nordic Ecolabelling

***Background document for the proposal  
circulated for comment***

Swan labelling of

**Textile detergents for professional use**

Version 1.0 • 14 October, 2005



Nordic Ecolabelling

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**Textile detergents for professional use** – Background to the proposal  
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## **1. Summary**

This report sets out the background for the development of criteria for the ecolabelling of textile detergents for professional use. The aim of the background document is to provide arguments and background information for the requirements of the document that are to be circulated for comment before the Nordic Ecolabelling Committee can take a decision. The project has been conducted as an accelerated criteria development process in which the preliminary study has been formulated at the same time as the criteria were developed.

The preliminary study for this product group was approved by the Nordic Ecolabelling Committee in October 2005. The work on the preliminary study was conducted as joint secretariat work with the aid of outside experts in the various Nordic countries. During the criteria development phase in autumn 2005, interested pilot enterprises were consulted to test how the criteria will function and to get these to be user-friendly and suitable for most.

Textile detergents for professional use are used in laundries, hotels, study centres, restaurants, hospitals, joint property company laundries, etc. and occur both as powder and in liquid form. Dosing may be manual or automatic. Certain detergents are similar to those for consumer use, in which all the ingredients are present in a complete powder or liquid. Other detergents are divided into various additives that are mixed together automatically on the spot and thus the composition of the detergent can be varied to a certain extent depending on the type of articles to be laundered. Professional laundering takes place at higher temperatures with more effective, highly alkaline detergents and with larger and more effective washing machines than consumer laundering.

The requirements have been laid down in order to be able to reduce clear environmental pollution from detergents, which are emissions of chemicals that can be toxic, non-readily degradable and originate from the toxic products formed during biodegradation of the substance. Substances with poor degradability may cause environmental problems at the present time or in future. The effects can be extremely serious if they display acute toxicity at the same time. A restriction on substances with these unwanted properties reduces the risk of harm in the environment. The flow of chemicals from nature can be reduced via requirements governing the total quantity of chemicals (TC). Detergents may also cause certain health problems such as allergy, and so certain requirements in the criteria document are also geared to the use of chemicals that are harmful to health.

The complete detergent or multi-component system must have satisfactory effectiveness with the recommended dosage on lightly, normally or heavily soiled articles to be laundered. The primary washing effects of the detergent such as dirt removal, stain removal capacity and bleaching effect must be documented by the manufacturer/applicant with the aid of artificially soiled test pieces or by the user test. The purpose of the requirements concerning customer visits is that it should be capable of being guaranteed that dosing instructions are followed that overdoing is avoided. The comprehensive service also includes monitoring of dosage programmes and servicing of dosing equipment.

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## **2. Background and object**

On behalf of the secretariat leader group at Nordic Ecolabelling, Ulrika Witte from SIS-Miljömärkning AB conducted a light RPS (in accordance with a new method, 'XKI') to assess the controllability of the "Detergents for professional use" product group. [1] Even before this was assessed, the relevance and potential of this product group had already been considered significant. The results of the Light RPS and the preliminary study confirmed these assessments. The conclusion of the preliminary study was that there are good reasons to proceed and introduce ecolabelling of textile detergents for professional use. The Nordic Ecolabelling committee therefore decided on 12 October 2005 that the criteria development project should be initiated for textile detergents intended for industrial laundries, institutions and large households.

The current Swan label criteria document for textile detergents is limited to products used in domestic machines or in larger machines in property laundries. The criteria already cover certain elements of professional detergents, but the product must meet the same requirements as the consumer products. This has meant that Swan licences only exist for professional and complete powder detergents resembling detergents for consumers. However, the present criteria do not include industrial detergents for professional laundries or special detergents. The Swan also has criteria for laundries at which special requirements are imposed on detergents and the hotel criteria, where Swan-labelled detergents may help meet the requirements. The requirements for machine washing are also interesting in that this also represents a product group consisting of several elements: detergents, rinsing agents, various types of special agent and customer visits.

As there are related Swan criteria and Good Environmental Choice and Flower criteria, the costs of developing criteria could be kept at a reasonable level. It is also an advantage that we have established contact with manufacturers from before.

The criteria development process has been carried out on behalf of Nordic Ecolabelling under the project management of SFS-Miljömärkning in Finland. Participants in the work have been:

### **The secretariat group:**

Leena Nyqvist-Kuusola, SFS-Miljömärkning, Finland, (project manager)  
Arne Godal, Stiftelsen Miljømerkning, Norway  
Anja Keller, Miljømærkesekretariatet, Denmark  
Marie Fahlin and Malin Möller, SIS Miljömärkning AB, Sweden

The information in the report on markets and products is mainly based on information from the Internet. Information on Nordic market trends has been obtained in interviews with sector representatives, supplier companies, public and private buyers, supervisory authorities and ecolabelling bodies. Pilot enterprises have been consulted during the criteria work. Information has been obtained from all Nordic countries apart from Iceland.

## **3. Scope**

Textile detergents for professional use are used in laundries, hotels, study centres, restaurants, hospitals, joint property company laundries, etc. and occur both as power and in liquid form. Dosing may be manual or automatic.

Products of this kind may include substances such as surfactants, alkalis, bleaching agents, enzymes, fillers, colour-protecting substances, colouring agents, complexing agents, preservatives, corrosion inhibitors, optical brighteners, fragrances, protective colloids and antifoaming agents.

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There are also various kinds of professional detergents – acid and alkaline detergents, with or without enzymes, bleaching agents and optical brighteners. There are also special detergents or auxiliary detergents such as antistatic and rinsing agents, special detergents for prewashing, washing strengtheners for heavily soiled laundry (e.g. work clothes), impregnating agents for water-repellent textiles, particularly mop detergents, detergents for mats, detergents for microfibres and bleaching agents.

Certain detergents resemble those for consumer use in which all the ingredients form a complete powder or liquid. Other detergents are divided into various additives that are mixed together automatically on the spot and thus the composition of the detergent can be varied to a certain extent depending on the type of laundry to be cleaned. For formulation reasons, it is not possible to add as many additives (alkali, phosphate, etc.) in liquid detergents as in powder. With automatic dosing systems, chiefly liquid agents or powders are used, which are mixed into liquid products on the spot in the laundries, but there are also certain washing machines that are dosed manually with powder detergents.

It is proposed that the product group be restricted to products intended for large consumers and professional use. The product group should encompass both complete powder and liquid detergents and also a detergent system comprising subcomponents from which a washing programme is built up. This system is called a multi-component system. The following principles are proposed for the development of criteria.

- In the case of the multi-component system, each subcomponent must meet the Swan requirements for containing chemicals.
- The total chemical content of a detergent system of this kind must also meet the requirements laid down for the total quantity of chemical matrix calculations.
- A multi-component system must incorporate, as a minimum, the subcomponents required so that the multi-component system washes completely and meets the requirement for effectiveness in order to be Swan-labelled.
- This should exclude a number of special after-treatment agents such as impregnating agents for water-repellent textiles and flame retardants.

## **4. Other players on markets**

### **4.1. Ecolabelling schemes**

Detergents for professional use attract little attention and do not figure in the media. There are other ecolabelling schemes in the Nordic region with criteria for the product group.

#### **4.1.1 Good Environmental Choice**

The Swedish Society for Nature Conservation (SNF) has for many years adopted criteria for ecolabelling of detergents covering both private use and large consumers [2]. Good Environmental Choice currently has 46 licences in Sweden (each variant is assigned a licence) for detergents for large consumers distributed between 11 manufacturers (or licensees): Aksab Kemi, Nilfisk Advance, JohnsonDiversey AB, Ecolab, Topex AB, Chemische Fabrik, Emanco Direktservice, Gipeco AB, Topcare DK Aps and Taslis AB. It is estimated that more than half of all professional detergents in Sweden are currently ecolabelled, and probably a lot more than that. Farnos Lumene Group has a number of Good Environmental Choice-labelled detergents for professional use in Finland and products made by JohnsonDiversey are also sold in Finland and Denmark.

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#### **4.1.2. Swan labelling of detergents**

Swan labelling has four different criteria entailing requirements for textile detergents:

- Nordic Ecolabelling of textile detergents and stain removers, 06/4.6
- Nordic Ecolabelling of water laundries, 75/1.2
- Swan labelling of systems for cloth towel rolls, 38/2.1
- Swan labelling of hotels and youth hostels, 72/2.1

Swan labelling of textile detergents already covers a certain proportion of professional detergents, but the product must meet the same requirements as consumer products. This has meant that Swan licences only exist for professional powder detergents that resemble consumer detergents. However, the current criteria do not cover industrial detergents for professional laundries or special detergents for, for example, mat washing.

The Swan scheme also has criteria for laundries at which special requirements are imposed on detergents and the hotel criteria that may help. The criteria for Machine washing for professional use are also interesting in that this is also a product group consisting of a number of elements: detergents, rinsing agents, various types of special agents and customer visits.

#### **4.1.3. European Ecolabelling**

The Flower criteria for textile detergents cover all textile detergents in powder or liquid form that are mainly intended for domestic machines but do not exclude laundries and joint laundry rooms. There are a total of 18 Flower licences, two of which exist in the Nordic region, more specifically Denmark. [6]

### **4.2. Other voluntary systems**

#### **4.2.1. The Swedish Environmental Control Council and EKU**

The EKU tool is designed as an aid for public procurement in Sweden. EKU lays down basic requirements for various products and services that guide buyers in the public sector. The organisation responsible for EKU is the Swedish Environmental Management Council. Criteria for chemical products for professional cleaning are being revised and are expected to be ready by December 2005.

The EKU Environmental Criteria [7] for laundry services are intended for the procurement of laundry services – leased goods, own goods and towel cabinets. The document has been produced as part of a broad anchoring process with various interested parties. The specification of environmental requirements covers:

- A. Requirements concerning what chemicals are used in cleaning and bleaching
- B. Requirements concerning distribution
- C. Quality assurance of environmental requirements
- D. Performance conditions for Distribution
- E. Requirements concerning the textiles owned by the laundry
- F. Requirements concerning towel cabinets

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#### **4.2.2. The DTI Model**

In 1997, the Danish Technological Institute developed a model for relative assessment of the environmental pollution from detergents used in large-scale industrial laundries. The background to this was a method for assessing which detergents or constituent substances in detergents resulted in the greatest environmental pollution and, where appropriate, in which parts of the cleaning process the pollution occurred. At that time, methods had been developed for the assessment of domestic washing, but the method could not be used by large-scale/industrial laundries. Against the background of a request for such an assessment from the Swedish Association of Laundries and Dry-Cleaning Establishments in 1996 (which was itself based on the Swan criteria for cloth towel rolls, version 1.0), a Danish model was therefore developed (the DTI model). The model took account of how soiled the laundry was (its degree of soiling) and classified the laundry into three categories. The reason for this was that the items for laundering handled in industrial laundries are usually more heavily soiled than standard domestic laundry. The model and a consolidation with other assessment tools and the background to the model in the first version are described in Larsen et al. (1998). The DTI model in the revised form (DTIvask\_2) is from now on based on spreadsheets, but has been modified in connection with a classification so that it would become more comprehensive. In addition, further development has taken place so that there is a DTI model that follows the criteria in the Swan labelling scheme. This model has been designated DTIvask\_3. DTIvask\_3 covers, among other things, phosphorus and operates with 4 levels of soiling.

The DTI model was used in the project implemented over the period February 2001 - August 2002. [8] The Institute of Technology, the Centre for Environmental and Waste Technology and Clothing and Textiles with the detergent manufacturers, Henkel-Ecolab and Novadan, which are the leaders on the Danish market. The project has been supported by the Danish Environmental Protection Agency and financed by the three project partners.

The main results of the project are:

- Development of less environmental polluting detergents
- Development of test methods
- Adaptation and further development of environmental assessment methods

Four commercial detergents were developed, which currently replace more environmentally polluting products used in industrial laundries for washing work clothes, colour washing and white washing. During the development work, the two detergent manufacturers all investigated the active substances used and dispensed with the most environmentally polluting substances.

Based on the Danish Technological Institute's earlier work on testing washing power, a method was developed that makes it possible to compare the effectiveness of 2 products. The washing test was later used to test the products included in the DTI's development work. [8]

#### **4.2.3. Environmental management system**

Nearly all manufacturers of detergents adopt environmental policies or certified environmental management systems to stand out against the others. All major cleaning companies in the Nordic region have environmental management systems. In Denmark, there are a number of Danish laundries that use their environmental certification (ISO14001) for promotional purposes.

The environmental management systems ISO 14001 and EMAS can be viewed as major competitors, but ecolabelling can also be a simple way of achieving an objective. As a result of more and more customer enterprises adopting ISO certification, the purchase of ecolabelled detergents might be a step on the way to improved environmental work.

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### **4.3. Official and sectoral regulations**

Detergents and cleaning agents are already covered by certain EU Community regulations relating to manufacturing, correct handling and use, particularly in Commission Recommendation 89/542/EEC and Commission Recommendation 98/480/EC of 22 July 1998 concerning good environmental practice for household laundry detergents. Directive 1999/45/EC of the European Parliament and of the Council of 31 May 1999 concerning the approximation of the laws, regulations and administrative provisions of the Member States relating to the classification, packaging and labelling of dangerous preparations applies to detergents. The latest regulations, Regulation (EC) No 648/2004 of the European Parliament and of the Council of 31 March 2004 on detergents, were published on 8 April 2004 (OJ L104, 8/4/2004, p.1)<sup>1</sup>

#### **Work protection regulations**

There are many national regulations and EU Directives relating to the protection of workers' health and safety against risks connected with chemical agents at work. According to Council Directive 98/24/EC, which is the fourteenth special Directive according to article 16.1 of Directive 89/391/EEC, minimum requirements are laid down for the protection of workers against risks to their health and safety that may arise either owing to the effect of chemical agents present in the workplace or as a result of tasks involving chemical agents. The requirements in this Directive are to be applied where dangerous chemical agents may occur in the workplace without this affecting the application of the regulations concerning chemical agents for which radiation protection measures apply pursuant to Directives adopted pursuant to the Treaty establishing the European Atomic Energy Community.

In relation to carcinogens at work, the provisions of this Directive are to be applied without this affecting the application of more stringent and/or detailed provisions of Council Directive 90/394/EEC of 28 June 1990 on the protection of workers from the risks related to exposure to carcinogens at work (Sixth individual Directive within the meaning of Article 16 (1) of Directive 89/391/EEC).

With regard to the transport of hazardous chemical agents, the provisions of the Directive are to be applied without this affecting the application of the more stringent and/or more detailed provisions of Directive 94/55/EC and Directive 96/49/EC, the provisions of the IMDG code, the IBC code and the IGC code, according to the definition in article 2 of Directive 93/75/EEC, the provisions of the European Convention on the international carriage of dangerous goods on internal waterways and the Order relating to the transport of hazardous materials on the Rhine, as incorporated in the Community legislation and in the technical instructions for the safe transport of hazardous foods issued by the International Civil Aviation Organisation when the Directive comes into force.

Manufacturers must follow all work protection and environmental legislation and regulations that apply to the manufacture, storage and handling of dangerous chemicals in the country of manufacture.

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<sup>1</sup> This Regulation come into force on 8 October 2005. The Regulation lays down rules for bringing about the free movement of detergents and detergent surfactants on the internal market at the same time as guaranteeing a high level of protection for the environment and human health. To this end, the following rules concerning the release on the market of detergents and surfactants for detergents are harmonised in this Regulation:

- Biodegradability of surfactants in detergents
- Restrictions or bans on surfactants owing to poor biodegradability
- Additional labelling of detergents, including fragrance allergens
- The information to which the Member States' competent authorities and medical personnel must be granted access by manufacturers.

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### **Special national regulations**

Manufacturers must follow the rules adopted in Norway that apply to textile detergents containing more phosphorus than what is allowed for sale and use in Norway under the Norwegian regulations. *Product Regulation: FOR 01/06/2004 no. 922: Regulation relating to the restriction in use of chemicals and other products that are harmful to health and the environment. Chapters: 3-9. Detergents – phosphorus content.*

Manufacturers must also be aware of the restrictions that exist in Danish legislation for NTA. *Order no. 140 of 17 February 1997 from the Danish Working Environment Service on the prevention of cancer risks.*

### **Other projects and sectoral agreements**

Good Chemical Choice is a project initiated by a number of local authorities in western Sweden. Good Chemical Choice consists of a publication providing recommendations for the intrinsic characteristics of chemicals in chemical products. Good Chemical Choice is aimed at procurement staff within the public sector.

"Good Environmental Practice – Detergent use" – voluntary undertaking by the European trade association AISE.

## **5. Professional laundering – background**

The market for industrial laundries and institutional laundries [9] can be subdivided into the following segments:

- Large commercial laundries and textile leasing companies
- Hospital laundries
- Large OPLs (On-Premise Laundries)<sup>2</sup>
- Small OPLs (On-Premise Laundries)

### **5.1. Large commercial laundries and textile leasing companies**

Laundries of this kind normally deal with between 3 and 50 tonnes of dry washing a day. Most of these laundries specialise in:

- Heavier work cloths, such as blue clothing from the engineering industry, white work clothes from food factories and personal protective clothing
- Linen from hospitals and hotels
- Cleaning textiles for industry

The types of machinery are chiefly CBW machines (Continuous Batch Washers) and larger WE machines (Washer Extractors) – between 90 and 300 kg of laundry per wash. The detergent is normally dosed from a central store of concentrated liquid detergent or a storage solution consisting of concentrated powder.

The large commercial laundries make the water softer with a view to reducing the use of detergent and achieve optimal washing results. As the water is made softer, most industrial washing systems use 60–70% less complexing agent compared with a corresponding product for domestic use.

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<sup>2</sup> The OPL system (On Premise Laundry) denotes washing in laundries in which the main activity is something other than the washing itself, e.g. hotels, study centres and property laundries.

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Large systems of washing machines that can each handle 50–100 kg washing. The large commercial laundries are operated in most European countries with licences issued by the regional or local environmental authority. The requirements concerning emission characteristics vary, but most large commercial laundries must meet clear requirements in terms of maximum authorised temperature, pH, emissions of chemicals containing phosphorus, nitrogen, BOD and/or COD, suspended matter and heavy metals. If the limit values quoted are breached, this may result in additional charges or fines.

## **5.2. Hospital laundries**

Laundries of this kind normally deal with between 3 and 30 tonnes of hospital-type laundry each day. The system may be in the hospital area or located at a central point from which a number of hospitals are operated within a region, e.g. a healthcare region. The engineers used by hospital laundries are similar to those used in large commercial laundries.

The mechanical equipment is also similar to that used in large commercial laundries (CBW machines and WE machines), but there is usually equipment for packaging and sterilisation of surgical textiles. Just like the commercial laundries, large hospital laundries are in most European countries operated with licences issued by the regional or local environmental authority. If the specified limit values are breached (as described above), this may result in additional charges or fines.

## **5.3. Large OPLs (on-premise laundries)**

Laundries of this kind are usually to be found in food factories, large hotels and hospitals. Daily production normally varies between 0.5 and 3 tonnes. The mechanical equipment is mainly WE machines (18–90 kg per wash), which are automatically fed with detergent from a central store. The water is usually softened to reduce the consumption of detergent.

## **5.4. Small OPL laundries**

OPL laundries of this kind are usually found in nursing homes and smaller hotels and clean less than 500 kg a day. The mechanical equipment consists mainly of WE machines (between 6 and 25 kg per wash), which are fed manually with detergent or with the aid of automatic dosing equipment. Equipment for softening the water is used, where appropriate.

# **6. Description of the product group**

## **6.1 Markets for professional detergents in Europe**

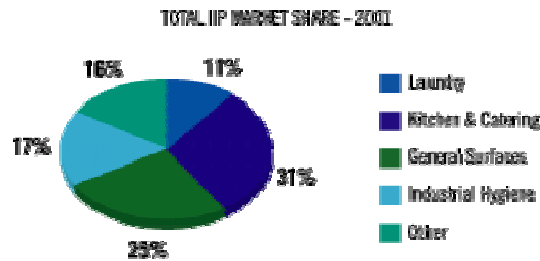
Information on European market volumes for professional areas is based on A.I.S.E. product categories and the market volumes presented here encompass 15 EU Member States, Norway and Switzerland. [10]

The Industrial & Institutional Product (IIP) area achieved a total market value of approx. 4.8 billion euros in 2001, split between different sectors as shown in the diagram below. The proportion of detergents for professional use corresponded to about 528 million euros.

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## 6.2. **Markets for professional detergents in the Nordic region**

There are at least 30 manufacturers who manufacture textile detergents for industrial and institutional applications. There are two large companies, JohnsonDiversey and Ecolab, which operate in virtually all Nordic countries. The information below is based on information obtained from manufacturers or national trade associations.

### 6.2.1. **Denmark**

The source within the sector recognises that turnover in textile detergents for professional use in 2004 represented about DKK 100 million (EUR 13.2 million), equivalent to about 6000 tonnes of production. Other sources put consumption slightly higher.

In Denmark, there are many manufacturers for professional markets. Among the largest are Ecolab, danlind, ITW Novadan and JohnsonDiversey. There are also many smaller producers such as Knud E. Dan, Stadsing Danmark and Simi.

### 6.2.2. **Sweden**

Turnover in Sweden is estimated to be about SEK 100 million (EUR 10.4 million). The largest players on the market in this product area are JohnsonDiversey and Ecolab. Other manufacturers are Diskteknik (Jasico tillverkar), Rekal and Aksab Kemi. Members of the IIP trade association that manufacture professional detergents are Ecowest, Gipeco, JohnsonDiversey, Nilfisk-Advance, Rekal, Strövelskemi and PLS. Other manufacturers are Topex AB, Chemische Fabrik, Emanco Direktservice, Topcare DK Aps, Taslis AB, RIAB, Apels Cheminvest and Texogen, which currently also hold licences for Good Environmental Choice.

### 6.2.3. **Norway**

Turnover in Norway is assumed to be approx. NOK 60 million (EUR 7.4 million), divided between Ecolab and Lilleborg Storforbrukere. The market share of products for professional laundries and OPL laundries is assumed to be equally large.

### 6.2.4. **Finland**

The Teknokemiska association in Finland quotes turnover figures of EUR 10.8 million per annum and the production volume is approx. 5,000 tonnes per annum.

JohnsonDiversey, Farnos (Lumene Group Oy) and Oy Ecolab Ab are the three largest operators on the market in Finland. However, JohnsonDiversey has no manufacturing in the country. The largest domestic producer is Farnos. Other manufacturers are Kemvit Oy and Berner Oy Ab. Diskteknik has sales and operations in Finland, but no production. There may be isolated small enterprises that only mix their products in the country.

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### **6.2.5. Iceland**

There are no statistical data from Iceland or information on Icelandic producers; however, according to information obtained via the internet, Novadan and Ecolab probably have sales in Iceland as well.

### **6.2.5. Nordic summary**

If it is assumed that consumption of detergents for professional use in all the Nordic countries per inhabitant is as high as the figures we have for Denmark and Finland, the figure for the Nordic region should be approximately: 6,000 tonnes (DK) + 5,000 tonnes (FI) + 4,000 tonnes (NO) + 9,000 tonnes (SE) + 270 tonnes (IS) = 24,270 tonnes per annum. The figures may be slightly high for Sweden in view of the quantity in SEK, which is estimated to be lower in Sweden than in Denmark.

If the information on turnover levels in Sweden and Norway, Finland and Denmark is instead assumed and the same price level for Iceland is estimated, the total turnover level should be around EUR 110 million per annum in the Nordic region.

## **6.3. Product summary**

Detergents for professional use are used in laundries, hotels, study centres, restaurants, hospitals, joint property laundries, etc. and occur both as powder and in liquid form. Dosing may be manual or automatic. The products may include substances such as surfactants, alkalis, bleaching agents, enzymes, fillers, colour-protecting substances, colouring agents, complexing agents, preservatives, corrosion inhibitors, optical brighteners, fragrances, protective colloids and antifoaming agents.

There are also various kinds of professional detergents – acid and alkaline detergents, with or without enzymes, bleaching agents, optical brighteners, fragrances and colouring agents. There are also special detergents or auxiliary detergents such as antistatic agents and rinsing agents, special detergents for prewashes, washing strengtheners for heavily soiled laundry (e.g. work clothes), impregnating agents for water-repellent textiles, particularly mop detergents, detergents for mats, detergents for microfibres and bleaching agents

Certain detergents resemble those for consumer use in which all the ingredients form a complete powder. Other detergents are divided into various additives that are mixed together automatically on the spot and thus the composition of the detergent can be varied to a certain extent depending on the type of laundry to be cleaned and the degree of soiling of the washing. For formulation reasons, it is not possible to add as many additives (alkali, phosphate, etc.) in liquid detergents as in powder. Both liquid agents and powders are used, which are mixed into liquid products on the spot in the laundries, but there are also washing machines that are dosed manually with powder detergents.

Rinsing agents are used for virtually all types of washing and are considered to fulfil an important function. Not only do they neutralise the detergent residues, which are often alkaline, but they also have an effect on the surface tension of the articles for laundering so that the laundry dries more quickly and the energy costs thus decrease. Rinsing agents mean that the material is smoother so that ironing and mangling are faster. Antistatic and acidification agents provide a good antistatic effect combined with suitable neutralisation of the rinsing water with all kinds of textile washing. This improves draining and results in faster drying. These products often contain fragrances, which give the garment a fresh and pleasant fragrance, though fragrance-free rinsing agents also occur.

Professional detergents can be divided into two groups depending on the user:

There are detergents intended for professional laundries. These use large washing machines or long pipe systems through which the laundry passes. They often have complex, high-technology, computer-controlled dosing equipment with a control system. Often liquid, highly concentrated detergents are used here, which exist in several components with various additives that are adjusted and mixed together on the spot. However, powder detergents can also be mixed to form a stock solution for use in the laundry. The powder then needs to be free-flowing, lump-free and readily soluble.

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The OPL system (On Premise Laundry) is for washing in laundries in which the main activity is something other than the washing itself, such as hotels, study centres and property laundries. Here, laundering is carried out on a smaller scale in more traditional washing machines. Laundering of cleaning material such as mops also occurs. Here, powder detergents or automatically dosed, often liquid detergents are often used. It is thought that the OPL system will grow in future as a result of privatisations of previously local authority activities. The system for laundering in property company laundries seems to be a potentially growing market. Training is provided for property personal and help is given with installation.

The benefits of automatic dosing are that the dosing is optimal, which results in controllable costs, saves water, energy and chemicals and increases the life of the textiles as they are always laundered properly. Customer visits take place regularly at least twice a year and also when there are problems or when the customer purchases new machinery.

Energy consumption, chemical content and chemical consumption are affected by the type of washing machine, the type of articles to be laundered, the type of soiling, the level of soiling and how the machine manufacturer's and the detergent supplier's instructions are followed. Compared with detergents for consumers, greater demands are made of the cleanliness of the wash for professional detergents, which must also cope with heavily soiled washing. In addition, the washing times are much shorter. The wash temperatures vary between 30 – 85 degrees, depending on the articles to be laundered.

## **6.4. Information on constituent substances**

### **6.4.1. Surfactants**

#### ***Non-ionic***

The commonest non-ionic substances are alcohol ethoxylates (AE). As an example of good environmental practice, the IIP sector has to a large extent replaced products that use alkyl phenol ethoxylates as raw material.

#### ***Anionic***

Common anionic surfactants are linear alkyl benzene sulphonates (LAS), alkyl sulphates (AS) and soap.

#### ***Cationic***

Most of the softening of the laundry is carried out during the final phase of the washing or when the washing is dried without softeners being used. Softeners containing cationic surfactants can be used if there are specific requirements that the washing must be soft or when this facilitates continued handling such as mangling.

### **6.4.2. Complexing agents, chelating agents**

Complexing agents in laundries have several principal functions:

- to reduce the hardness of the water caused by calcium and magnesium salts originating from the water and from soiled textiles,
- to bind metals and dirt from the textiles and the wash water,
- to create an inhibitory effect that prevents the bound dirt/metals from being deposited (during the washing process) on the textiles,
- to provide an adequate level of alkalinity and buffer effect during the laundering.

Certain complexing agents have a number of these properties (such as phosphates), while other complexing agents are used in combination.

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The use of complexing agents and chelating agents reduces the quantity of detergents that must be used. In addition, the life of the textiles can be extended by chelating agents being used via bleaching agent stabilisation.

**NTA**

NTA is used for a limited number of IIP applications, chiefly when a complexing agent with high water solubility is required and when phosphate cannot be used.

**Zeolite**

Unlike in the case of detergents for household use, certain chemicals cannot be used in all commercial laundry activities. An example of a chemical of this kind is zeolite, as it has an adverse effect on mangling and can result in problems with storage solutions. In the case of partially commercial activities (e.g. smaller washing machines), mangling is not carried out and the detergent may contain zeolite as complexing agent.

**Phosponates**

Phosponates may be used in low doses in the wash, either as a reagent or to stabilise bleaching agents against premature breakdown (in the product and the wash) and to prevent fibre damage during the bleaching process. This may extend a garment's life and reduce the quantity of bleaching agent required.

**EDTA**

Only a very limited number of detergent products within the industrial segment use EDTA as a complexing agent to remove metal ions and dirt from the wash. Zeolite cannot be used in liquid agents, and so EDTA is often used in Norway owing to phosphorus restrictions.

**6.4.3. Bleaching agents**

**Percarbonate and perborate**

These are used in powder compounds as they are available in solid and not in liquid form. Perborate is used more often as it is more stable than percarbonate. The wash temperatures are normally over 60°C, so long as they are not activated by a bleaching activator.

**Peroxide and peracetic acid**

These are used in dosed, liquid compounds and are added separately as these products are not stable in the detergent system. They are activated via a combination of temperature and pH and cause the textiles little damage.

**Hypochlorite**

Hypochlorite is generally used when the textiles are heavily stained. It may, however, cause damage to the textiles. Hypochlorite also tends to be used on non-dyed garments as the substance may also damage the dye. The use of hypochlorite is diminishing owing to restrictions introduced in national legislation.

**Bleaching activators (chiefly TAED)**

These are used in combination with perborate and percarbonate to form a more active bleaching component, which means that the washing and bleaching temperatures can be reduced.

**6.4.4. Enzymes**

The use of enzymes has grown in recent years as progress on research and development has meant that they can be used in many different areas, such as breakdown of proteins. This was previously done by other chemicals, e.g. hypochlorite bleaching. The detergent products, including commercial ones, include enzymes in the compounds. To be able to adapt the use of chemicals to the specific requirements within various industrial applications, the enzymes are used chiefly in washing strengtheners and are not included in the composition of the detergent.

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#### **6.4.5. Alkalis (Silicate, metasilicate, caustic soda)**

The use of alkaline compounds increases pH values, facilitating protein breakdown and dirt removal and increasing the effectiveness of the bleaching agent and other detergent ingredients. Overall, this optimises the use of chemicals as washing at lower pH values would require a higher dosage of the other chemicals. The neutralisation step at the end of the washing process prevents waste water with a high alkali content from being released into the environment.

#### **6.4.6. Sulphate**

Sulphate is used in small quantities to ensure a good flow of powder detergent in the case of automatic dosing. Sulphate is still used in some commercial laundering operations (e.g. smaller machines, similar to those used in households) despite the fact that concentrated products without sulphate exist on the market.

#### **6.4.7. Acids**

Acids such as formic acid and acetic acid are used to neutralise the wash water at the end of the process and also to adjust the pH of the textiles so that it matches the pH of the skin, thus preventing skin irritation when the garment is worn.

#### **6.4.8. Fragrances and colouring agents**

Fragrances are used to give garments a fresh and pleasant odour. Fragrances can be found in all detergents and multi-components, but are generally used in rinsing agents.

Colouring agents do not have a washing effect but are used for safety reasons. In the case of liquid multi-component systems, colouring agents are needed to avoid mixing of bleaching agents with alkaline products, which can cause a reaction and spurting of corrosive substances. In systems with automatic dosing, the colouring agents help to see when there is agent in piping or when more product needs to be added.

Sometimes optical brightener is also used, which is actually not a white dyestuff, but a substance which means that ultraviolet light is perceived more keenly by the eyes and the garment looks whiter.

#### **6.4.9. Protective colloids**

Protective colloids are added to prevent soil redeposition on laundry. They therefore counteract the greying of textiles. Common protective colloids in wash chemicals are carboxymethyl cellulose, carboxyethyl cellulose and starch compounds or other polymers. Protective colloids are also used to retain colours in garments and to prevent colour bleeding from one garment to another. Colour-retaining protective colloids may be polymers or copolymers.

### **6.5. Packaging**

Two physical forms of products are chiefly used, covering all applications: powder detergent and liquid detergent. Special products with alternative physical characteristics such as blocks or pastes (which entail specific packaging requirements) represent a relatively small segment of the total packaging volume and can therefore be disregarded in this context. The same applies to special packs such as small bags for liquid detergent/powder and to subpacks such as packaging plastic. The use of Intermediate Bulk Containers (IBC) for powder ('big-bags') and liquid detergents is an application that is becoming increasingly important. [9]

The following main types of packs can be identified:

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### **6.5.1. Packs for liquid detergents**

Bulk, i.e. supplies of liquid products by road tanker in load sizes of 3 tonnes or more to the customer's storage tanks

- IBC containers containing volumes between 200 l and 1000 l
- Drums in volumes between 80 l and 200 l
- Cans with volumes between 10 l and 80 l
- Bottles with volumes between 1 l and 10 l

Bulk supplies mean complete (virtually infinite) filling/reuse of packs. Where IBC containers are concerned, filling/reuse is generally involved. In the case of drums and cans, this depends on the situation that applies in/to the country/enterprise/distribution. Bottles are not reused. The material types used are chiefly HD-PE for drums/cans/bottles. IBC containers are compounds of HD-PE and metal/PE.

### **6.5.2. Packs for powder**

- Big-bags are used in sizes of between 100 kg and 1000 kg.
- Bags also exist in sizes of 10 - 50 kg.
- Cardboard boxes may also contain drums in sizes of about 10 kg.

Big-bags are made from **PES** and are usually filled and reused. The bags may be made of paper or PE or laminated paper with PE and can be reused. Boxes are generally made of cardboard, which may be PE-laminated and can be reused.

### **6.5.3. Subpackaging**

Cardboard boxes are generally used as subpackaging and are therefore not indicated in different sizes and cannot therefore be subsumed under powder or liquid detergents. Packing plastic is used to a large extent to stabilise packs during transport and storage. The proportion of the total weight of the packaging material accounted for by the packing plastics is negligible.

### **6.5.4. Legal considerations**

The construction and design/labelling of the packaging material within commercial washing operations is the object of extensive legal requirements. This is due to the fact that large product quantities are included in the packaging units and to the need to take account of humans and the environment.

### **6.5.5. Packing quantities**

According to a limited study from 1997, the product range consists of 33.7% liquid detergents and 66.3% powder detergents. In the case of around two thirds (68.3%) of the liquid detergent measured in tonnes, drums and cans were used, with one quarter (25.1%) being in bulk form and IBC containers. Only 6.5% was in small pack sizes. In the case of powder detergent, the distribution was nearly 80/20 between production volumes in bags and big-bags. Other packaging materials such as cardboard boxes, packaging plastic and small bags played only a very limited role.

## **7. Environmental pollution**

### **7.1. Environmental impact of industrial washing processes**

Detergents, energy and water are used in laundering. Emissions of pollutants and residues of washing chemicals from the laundering process to the treatment plant and to the aquatic environment, together with emissions of CO<sub>2</sub>, NO<sub>x</sub> and SO<sub>2</sub> from energy production, represent the main forms of

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environmental pollution. Noise, emissions of fluff from drying equipment into the air and waste also occur.

Evaluations of the environmental impact of the products (Life Cycle Assessments) conducted by members of A.I.S.E. with regard to domestic laundering have shown that:

- the phase that has the greatest impact on energy use is the laundering process as most of the energy consumed is used to heat the water during each wash
- the next most energy-intensive phase is the production or extraction of raw material
- the user phase accounts for the highest proportion of waste and emissions in the air
- electricity production generates waste, and pollutant gases such as CO<sub>2</sub>, SO<sub>2</sub> and NO<sub>x</sub> are released
- the greatest impact on the water is connected with BOD (biological oxygen demand) and toxic effects of washing chemicals and of dirt released via the waste system.

The variables and the relative values will be equivalent for the laundering processes for both households and industry. If we compare the professional laundering sector with laundering in households, we can see that the commercial laundries use considerably less water (-50%) and detergent (-56%) than households. Commercial laundries, which operate in a competitive environment, have realised the importance of using water, energy and detergent effectively. They are aware of the importance of reducing the wash temperature, optimising the conditions for the washing machine and dosing the detergent precisely.

Nordic Ecolabelling has already laid down requirements for many of the above areas of the lifecycle in other documents such as Ecolabelling of water-based laundries, version 1.1 and Swan labelling of cloth towel rolls, version 2.0. Additional environmental savings that can be achieved in this area may come from more advanced washing machines, extra equipment and improvement of the chemicals' environmental properties. The last of these is of most importance in this report, which is designed to describe the background to developing criteria for textile detergents intended for industrial laundries, institutions and large households. The environmental impact of the detergent is explained in more detail in the next section.

## **7.2. Environmental impact of detergent**

### **7.2.1. Environmental pollution from detergents**

Since, in terms of content, detergents for professional use resemble textile detergents for consumer use and chemical product groups, the environmental pollution may be assumed to be broadly the same, i.e.

- toxic and/or barely degradable surfactants/other groups of substances
- consignments with fossil fuels that increase carbon dioxide emissions
- high energy consumption during washing, particularly at high wash temperatures
- packaging responsible for generating waste
- eutrophication owing to phosphorus content and overdosing that is still important in areas where there are no treatment plants.

### **7.2.2. Emissions of chemicals**

One evident source of environmental pollution from detergents is provided by emissions of chemicals, which may be toxic, non-readily degradable and originating from the toxic products formed during biodegradation of the substance. Of the substances used, many are classed as harmful to the environment or health (for example, surfactants, NTA, phosphonates, polyacrylates, hypochlorite).

Most surfactants are readily degradable in an acid aquatic environment and there will soon also be requirements under the Directive. The toxicity of surfactants varies considerably. There are also sharp

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differences in the breakdown of the surfactants under oxygen-deficient conditions (anaerobic breakdown). The conventional cationic surfactants (DTDMAC) can be replaced by more biodegradable, ester-derived quaternary surfactants in rinsing and softening agents.

Antifoaming agents in detergents may be silicone compounds or surfactants with this particular property. Silicone compounds are not readily degradable, and nor are they toxic to aquatic organisms. Antifoaming surfactants can be readily degradable but may be more harmful to aquatic organisms than silicone compounds.

The perspective on complexing agents as an environmental problem varies. Which complexing agents are used in Nordic countries varies considerably, with phosphate, phosphonate, NTA, EDTA and zeolite being common. The use of NTA and EDTA is much discussed. These are both powerful complexing agents, can bind metal ions and therefore make them mobile in the aquatic environment. On the harmonised DID list, NTA is ranked as a substance that is completely degradable. In Denmark and Norway, the use of NTA is also unwanted in order to prevent the risk of cancer. EDTA is ranked as "toxic or with other adverse effects and not readily degradable". Other assessors assert that EDTA should not be considered environmentally hazardous.

Phosphate is a nutrient that can result in problems with increased algal growth, but that can be 90% removed from treatment plants. Zeolite cannot be used in liquid agents and so in Norway, owing to phosphorus restrictions, EDTA is often used. The manufacture of complexing agents also entails the consumption of raw materials and emissions of harmful substances. The issue of phosphorus as a finite resource is less relevant owing to the low level of its use within this product group.

Percarbonates, peracetic acid and hydrogen peroxide are bleaching substances that are broken down into non-hazardous substances. One problem is that they need to be stabilised to be storable for a long while. Percarbonates are converted in water to carbonates, which occur naturally in the aquatic environment. Perborates are converted to borate and boron and can affect vegetation, even in moderate concentrations. Borate is expected to be classified as harmful to reproduction (Rep2, Rep3) within the EU. Sodium hypochlorite is a highly reactive chlorine compound, which is toxic to aquatic organisms.

Enzymes are added to detergents or bleaching agents to break down particularly severe protein stains. Enzymes also help improve laundering results at low wash temperatures. Enzymes are readily degradable and non-toxic for aquatic organisms. They are therefore not considered to cause problems in the aquatic environment.

The alkaline substances sulphates, silicates and carbonates are inorganic compounds that to a large extent occur naturally around the world. Silicates and carbonates are not considered to result in an increased environmental danger, particularly as alkaline wash water is neutralised at the end of the process.

Preservatives are often added to liquid products to prevent bacterial growth in the product. There are preservative that are readily degradable in the aquatic environment, but their toxicity and potential for bioaccumulation varies. Preservatives can often cause allergy and sensitisation.

The use of certain chemicals can be beneficial in terms of other environmental effects, e.g. TAED is used save on the energy consumed during a washing process. The same applies to certain agents in connection with secondary treatment which facilitate ironing and mangling, resulting in reduced energy consumption.

Colouring agents can be very disparate chemical compounds. Certain compounds are highly toxic to aquatic organisms, but others are not. Colouring agents are generally not readily degradable, and so the toxicity of the colouring agent is very important.

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Optical brighteners are fluorescent substances that reflect UV light from the sun as white visible light. This gives the impression of increased whiteness and thus cleanliness. The traditional substances used as optical brighteners are both barely degradable and toxic to aquatic organisms. Alternatives have now emerged that are broken down in the environment if exposed to sunlight and that are non-toxic to aquatic organisms.

Most protective colloids are not readily degradable, but nor are they toxic in the aquatic environment. They are therefore considered unproblematic for aquatic organisms.

As strong alkaline agents are used in professional washing, the products are harmful to health and corrosive, resulting in risks from the work environment point of view. However, it can generally be considered that the professional products are handled in such a way that the risk of corrosive damage is small.

## **8.           RPC (Relevance, potential, controllability)**

Within its environmental philosophy, Nordic Ecolabelling has an overarching vision of a sustainable society. To make it possible to work specifically in accordance with this vision in connection with the development of criteria, the group has taken the four system conditions and the RPC model as the point of departure.

### **8.1.       Relevance**

Relevance is assessed on the basis of what environmental problems the product group causes and how extensive these are. The use of detergents, washing strengtheners and rinsing agents may lead to overfertilisation and the spread of toxic and barely degradable substances. Many of the substances that are present in the products, such as chlorine compounds, complexing agents and fragrances, are problematic. Energy consumption leads to emissions of, for example, CO<sub>2</sub>. Waste concentration is a further problem.

The wash water passes via the waste system, often via treatment plants, to receiving bodies of water, which makes it important that the wash water and sludge from waste water treatment plants have the lowest possible level of environmentally polluting substances. From the Nordic point of view, waste water treatment plants are common, but many of our producers also sell their products outside the Nordic region, where treatment plants are not taken for granted.

Professional detergents are dosed both manually and automatically. The correct dosing instructions are important, as is the maintenance of dosing facilities so that they operate correctly and dosing is optimal. Regular customer visits to the laundries are considered an important complement to the product. The comprehensive service also entails monitoring of dosing programmes and servicing of dosing equipment. Relevance is considered important for this product group owing to the environmental impact arising according to the experience and background that exists for closely related chemical product groups.

### **8.2.       Potential**

Potential is assessed in terms of potential environmental gains within the specific product group, e.g. differences between existing products or technical innovation considered realistic within the near future.

Can anything be done about the environmental problem? Differences in dosage, chemical content and effectiveness exist in this context. Requirements can be laid down to differentiate between poorer and better environmentally adapted products.

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According to a Danish study [8], it is possible to develop less environmentally polluting detergents with good or better washing effectiveness than the existing detergents. Energy consumption, chemical content and chemical consumption are affected by the type of washing machine, the type of articles to be washed, the type of soiling, the degree of soiling and how the machine manufacturer's and the detergent supplier's instructions are followed. Compared with detergents for consumers, greater demands are made of the cleanliness of the wash in the case of professional detergents, which must also cope with heavily soiled washing. In addition, the wash times are much shorter. The wash temperatures vary between 30 – 85 degrees, depending on the articles to be washed.

The benefits of automatic dosing are that dosing is optimal, resulting in controllable costs, savings on water, energy and chemicals, and extending the life of the textiles as they are always washed correctly. Customer visits take place regularly at least twice a year and when there are problems or when the customer purchases new machines.

Potential for being able to reduce environmental pollution is considered evident. The chemical composition of the agent varies. The water content varies, affecting transport quantities. Environmentally polluting chlorine compounds may be included in certain detergents. In terms of health requirements, allergenic substances – primarily fragrances – may be discussed. Customer visits and servicing affect dosing, which in turn affects chemicals consumption.

### **8.3. Controllability**

Controllability is a measure of how activity, the problem or the requirement may be affected by the ecolabelling. Can the Swan labelling scheme do anything about the environmental problem?

#### **8.3.1. Market**

SPT in Denmark assumes that there is generally interest among members in the Swan-labelling of chemical products as this is a "door opener" to the market. A manufacturer in Denmark has directly wanted to be able to Swan-label detergents. There are also other interested producers who contributed to the criteria development project.

A couple of the largest producers in Sweden are generally very positive about the Swan labelling scheme and regard professional detergents as an interest group for Swan labelling. One considers that customers have got used to having ecolabelled products even within this product area. Another manufacturer has already wanted to Swan-label his products to be able to sell them to Swan-labelled laundries.

According to the Swedish trade association, the picture seems a little fragmented, but there seems to be some interest for ecolabelling, primarily from customers. Nevertheless, the trade association considers it important to stress that the product range of detergents and cleaning agents, with the new decree relating to these products, is a very well regulated area under the law – in terms of both the environment and health (degradability requirements, labelling requirements, etc.). They consider that the question of whether ecolabelling could lead to something relevant needs to be studied carefully.

According to information, interest in the ecolabelling of professional detergents and cleaning agents is not generally great in Norway, but it is thought that the trend may be growing. One manufacturer was very positive on this, but another is more reserved until there is more demand on the market.

Interest in Swan labelling is not marked among manufacturers in Finland. According to the Technology Association, a general fatigue for labelling (overlabelling) on the whole can be identified. Over half of products on Finnish markets are already ecolabelled; JohnsonDiversey has virtually all its products ecolabelled with Good Environmental Choice at the present time, and Farnos has 5 products. The ecolabelling does not depend so much on customer desires as on company policy on supplying ecolabelled products in all product groups, where possible. If Swan labelling becomes possible, they

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can conceive of seeking licences, particularly if laundries adopt Swan labelling and competitors do the same. They see no special demand for ecolabelling on the part of customers at the present time.

There are no formal notifications of interest in any of the Nordic countries, but a number of enterprises and trade associations have expressed a certain interest. In addition, it can be assumed that there is interest in that Good Environmental Choice has a large number of licences for professional detergents in Finland and above all in Sweden.

### **8.3.2. Analysis of the outside world**

Detergents for professional use are not noticed much and do not figure in the media. In Sweden and Finland, there are a number of professional detergents ecolabelled with Good Environmental Choice, which means that we can assume that there is interest in ecolabelling within the product group.

The Swan is traditionally a consumer mark within the chemical sector, but the industry side is an area in which we ought to be able to expand. In Sweden, the Swan scheme already has a number of licences within the professional sphere, e.g. with regard to cleaning agents, floor care products and machine dishwashing products for professional use. In Denmark, interest in ecolabelled professional products seems to be generally higher. In this context, purchasers within local authorities lay down stringent environmental requirements, which may increase in other Nordic countries as well. The EKU tool that has been designed in Sweden is an aid in public procurement, lays down basic requirements which currently seem to be at a lower level for detergents and cleaning agents compared with the Swan criteria. In Finland, local authorities and enterprises are increasingly starting to lay down requirements stipulating that professional products must also be ecolabelled or meet similar requirements.

As more and more enterprises are adopting ISO certification, the purchase of ecolabelled detergents ought to provide a step towards improved environmental work. If the number of Swan-labelled laundries were also to increase, Swan-labelled detergents ought probably to become more interesting. There are currently only three Swan-labelled laundries in Sweden.

An increase in the currently more than 100 Swan-labelled hotels and study centres ought to be able to increase demand for ecolabelled detergents. In Sweden, study centres and major hotels (even those that are not ecolabelled) gauge the proportion of ecolabelled products as a measure of how far they have come in their environmental work. This has meant that they sought ecolabelled detergents from manufacturers.

### **8.3.3. What can the Swan labelling scheme provide and control?**

Developing criteria at Nordic Ecolabelling despite the existence of relevant laws and rules in this area and other ecolabelling schemes can be justified by the following argument.

The legislation in the form of the Detergents Directive [12] deals only with surfactants in detergents and, in the long term, phosphate. In the even longer term, the Directive is also intended to cover other organic ingredients in detergents and cleaning agents. The requirements governing surfactants apply only to aerobic degradability, although the Swan requirements concern aerobic and anaerobic degradability and also apply to organic ingredients other than surfactants. All the product's environmental effects not covered by the Detergents Directive can be controlled by Swan requirements.

The Preparations Directive and the Substances Directive [13] link up only with the classification of the product, i.e. a form of consumer information, but does not prevent the use of products or ingredients classified as harmful to health or the environment. The Swan may restrict the possible classifications of the product and control the chemicals content of the product with bans and limitations on ingredients that can be classified as harmful to health and the environment. The Swan may also apply preventive principles so that chemicals suspected of having hazardous characteristics can be replaced.

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With requirements concerning critical dilution volume ( $CDV_{tox}$ ), the Swan can control the total toxicity of the product and promote the use of less toxic chemicals. The flow of chemicals from nature can be reduced via requirements concerning the total quantity of chemicals (TC). Through requirements concerning customer visits, it can be guaranteed that dosage instructions and dosage arrangements are used and overdosing avoided. The comprehensive service also entails monitoring of dosing programmes and servicing of dosing equipment. With appropriate formulations and with the aid of certain chemicals, energy consumption during the washing process can also be reduced.

The current Swan and Flower criteria do not cover all detergents used in professional laundries. Good Environmental Choice criteria do not take account of the product's total toxicity, but operate with purely functional requirements – i.e. the function of the ingredient in the product – and impose requirements on that basis: ban or restriction. Good Environmental Choice does not lay down requirements concerning the effectiveness of the product, either.

The above shows that the Swan can be controllable in this area and can contribute to environmental improvements by laying down specific requirements for textile detergents for professional use.

#### **8.4. Conclusions of RPS**

The RPS analysis shows that environmental pollution from detergents for professional use is significant. In particular, energy use and the extensive use of chemicals make action interesting. There is also potential for improvement, for reducing the use of unwanted substances and prescribing more energy-efficient laundering. A reduced number of malfunctions should also result in a reduction in environmental pollution. To control this development, the Swan may introduce rules either purely for the compact detergent or for the entire system for detergents and servicing. The latter option seems the most favourable.

#### **8.5. Conclusions and recommendations of the preliminary study**

The conclusion of the preliminary study was that there is good reason to proceed and introduce ecolabelling of textile detergents for professional use, but that the question should be tackled from a broader system perspective. The following recommendations were made in the preliminary study:

1. Complete detergents and multi-component detergent systems should be catered for jointly and criteria considered for all constituent products. A number of special secondary treatment products should be excluded, such as impregnating agents for water-repellent textiles and flame retardants.
2. The classification "highly corrosive" and "harmful to health  $X_n$  with R22 (Harmful if swallowed)" should be allowed in the criteria, despite the work environment risks that this entails. The reason for this is the rigorous functional requirements concerning the products, which are justified from the energy point of view.
3. The Swan criteria system for wash chemicals in water-based laundries and in modified detergents for consumer use, with a points system for assessing chemical content, is very suitable as a reason for ecolabelling the product group. The system provides the flexibility for product development sought by many manufacturers.
4. Stringent requirements in terms of maximum content, degradability and toxicity levels should be laid down as new surfactants are available on the market, with better environmental properties than those traditionally used.
5. Requirements concerning dosing systems (in cases where these are sold/leased in connection with the sale of the detergent) should be considered as a way of minimising overdosing the products. A maximum level for dosing detergent and multi-component systems should be set, related to the degree of soiling and the number of articles to be laundered.

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6. Requirements concerning customer visits should be considered in order to guarantee that dosing instructions and dosing facilities are used and overdosing is avoided. The comprehensive service also entails monitoring of dosing programmes and servicing of dosing equipment.
7. A functional test should be included in the criteria for ensuring that ecolabelled agents have an adequate washing effect. It should be investigated more closely whether test methods are already being used in the sector.

These recommendations have been followed and assessed during the criteria development project.

## **9. Background to the requirements laid down**

### **9.1. What can be Swan-labelled?**

The phrase 'textile detergents for professional use' should be understood to mean products intended for laundering textiles in water by professional users like institutional/industrial users and other large-scale consumers.

The product group covers both powder-only and liquid-only detergents as well as detergent systems based on components used to build up a complete detergent, a stock solution or a laundering programme for automatic dosing. This system is called a multi-component system, which may incorporate a number of products such as prewash products, basic detergents, wash strengtheners, bleaching agents, rinsing agents and special detergents for delicate washes.

The criteria do not cover special impregnating agents for water-repellent textiles and flame retardants.

Products intended purely for consumer use and that are sold only in grocery shops and consumer non-durables stores cannot be ecolabelled in accordance with these criteria. These are governed by the criteria document Ecolabelling of textile detergents and stain removers, version 5.0. [12]

### **9.2. Environmental requirements and functional units**

The environmental requirements are divided into two parts. Section 1.1 of the criteria document contains general requirements, to be met by all products. The requirements that apply to the entire quantity of substances in a complete detergent or in multi-component systems are set out in section 1.2.

The requirements in Chapter 1 apply to all constituent substances, unless otherwise specified. Constituent substances are taken to mean all substances in products, including additives (e.g. preservatives or stabilising agents) in ingredients, but not contaminants from the production of raw materials. The term 'pollutants' should be taken to mean residues from production that are included in the finished raw material in concentrations of less than 0.01% (equivalent to 100 ppm), but not substances that have been added to a raw material deliberately for a certain function, regardless of the quantity.

In industrial laundries and professional laundering, various machine sizes are used, and the dosage of the detergent varies according to the degree of soiling of the wash. All requirements must therefore be calculated for a functional unit based on a recommended dosage as indicated in grams of detergent/kg of articles for laundering and that varies according to the level of soiling of the wash. All limit values in the document have been calculated as g/kg of articles for laundering, excluding water.

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The Swan criteria system in the proposal circulated for comment relating to the revised criteria document for textile detergents and stain removal systems, version 5.0 has provided the basis for the requirements in section 1.1 with certain modifications needed for commercial use. Formulations of the requirements in section 1.2 are based on a points system for assessing the chemicals content for which the Swan scheme has previously been used in the criteria document: Ecolabelling of water-based laundries, version 1.2 and Swan labelling of systems for cloth towel rolls, version 2.1. Any deviations concerning these Swan criteria are explained under the respective points.

### **9.3. Formulation (K2)**

To be able to ensure that all requirements concerning wash chemicals are met, the applicant must provide full details of the composition of the wash chemicals. The applicant must inform Nordic Ecolabelling of the entire formulation of the complete detergent or all subcomponents of a multi-component system. The entire formulation must include the trade name, the chemical name, the quantity, the CAS number and the DID number for each ingredient. The water content of ingredients is needed to be able to deduct water as limit values under section 1.2 exclude the water content of the substance.

### **9.4. Product classification (K3)**

The product must not be classified as highly toxic (T+), toxic (T), harmful to health (Xn), or irritating (Xi with R43) (May cause sensitisation by skin contact) or environmentally harmful (N). The product may, however, be classified as (Xn with R22) (Harmful if swallowed).

The Swan labelling scheme is intended to ensure that the health and environmental effects of the products are as limited as possible. Requirements concerning classification of the product are laid down which mean that items that are environmentally harmful, toxic, harmful to health and allergenic cannot be used. In the case of product groups for the professional market, it is usually permitted to use products that are corrosive or dangerous if swallowed.

### **9.5. CMR substances (K4)**

Biological effects occur in the environment and in humans that we cannot currently explain but for which one of the causes may be the spread of chemicals. One of the aims is that the environment should be free from substances formed in or derived from society and that may threaten human health. Requirements are therefore laid down stipulating that carcinogenic, reproduction-toxic and mutagenic substances must not be used.

This requirement has not been included in the criteria document for water-based laundries or cloth towel rolls.

### **9.6 Sensitising substances (K5)**

Substances classified as sensitising with R42 (May cause sensitisation by inhalation) and/or R43 (May cause sensitisation by skin contact) must not be included in the product. This requirement is laid down to limit the risk of consumers experiencing an allergic reaction after using textiles laundered with ecolabelled detergent. Allergies are a mounting problem, and people with increased sensitivity may experience allergic reactions when they come into contact with textiles laundered with detergents containing substances known to be sensitising. This requirement cannot, however, protect all allergic individuals from experiencing reactions, but removes the worst allergens from the products.

Enzymes are exempted from this requirement, although all enzymes are classified as sensitising with R42. Enzyme residues are not, however, left in the material as the enzymes are broken down during the laundering process.

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Fragrance substances are similarly exempted from this requirement, although a separate requirement has been laid down for fragrances (see section concerning requirements K12-K13).

This requirement is not included in the criteria document for water-based laundries or systems for cloth towel rolls.

### **9.10. Surfactants (K6 and K7)**

All surfactants must be readily degradable and anaerobically degradable. A very important property is the degradability of organic substances. Substances that are barely degradable accumulate in the environment and may pose a risk, both now and in the future, even if they do not display acute toxicity. Knowledge of the long-term effect of barely degradable substances in the environment is often deficient. Rapid degradation under both oxygen-rich (aerobic) and oxygen-poor (anaerobic) conditions is therefore of great importance from the environmental point of view. That surfactants are considered important in this context is due to the fact that they form a group of organic compounds that are present in the greatest quantities, and many surfactants are toxic for aquatic organisms. The requirement excludes surfactants such as linear alkyl benzene sulphonates (LAS).

### **9.11. Enzymes (K8)**

To be able to reduce dust when added, enzymes used must be encapsulated or mixed in slurry. The requirement is laid down in order to be able to reduce the occurrence of working environment problems with enzymes during the manufacture of detergents as enzymes are classified with R42 (May cause sensitisation by inhalation).

### **9.12. Substances not allowed to be included in the product (K9)**

Alkyl phenol ethoxylates (APEO), alkyl phenol derivatives (APD), perborates, reactive chlorine compounds, e.g. sodium hypochlorite or organic chlorine compounds, DADMAC (dialkyl dimethyl ammonium chlorides that are cationic surfactants comprising DTDMAC (ditallow dimethyl ammonium chlorides), DSDMAC (distearyl dimethyl ammonium chlorides), and DHTDMAC (di(hydrogenated tallow alkyl)dimethyl ammonium chlorides), optical brighteners, NTA (Nitrilotriacetate) and EDTA (Ethylenediamine tetra-acetate and its salts) must not be included in the product.

**Alkyl phenol ethoxylates (APEO)** are excluded as their breakdown products are non-degradable and are regarded as harmful to the environment and some have been declared by the EU as being substances that are disruptive to hormones (e.g. nonyl phenol). Alkyl phenol derivatives (APD) are substances that are derived from APEO, and are excluded because the latter is not readily degradable and is harmful to health.

#### **Reactive chlorine compounds and organic chlorine compounds**

Both sodium hypochlorite and hydrogen peroxide are used for bleaching in liquid products. The most used bleaching agent in powder products for professional use is percarbonates, although perborates are also often used.

Chlorine compounds: Sodium hypochlorite is harmful to health in contact with skin and if swallowed and also toxic to aquatic organisms. Chemical compounds containing active chlorine may at high temperature and in the case of heavy soiling form chloro-organic compounds that are harmful. Chloro-organic substances may also be formed in the sewage disposal system. They may be toxic, barely degradable and bioaccumulable. There are therefore good grounds for banning the use of active chlorine compounds.

The use of a limited quantity of chlorine-based bleaching agent is sometimes necessary in laundries to remove stains on white textiles that are difficult to bleach. Active chlorine is effective as a bleach, and so the use of products containing active chlorine is permitted according to the criteria of water-based laundries. As these criteria apply to the product itself and alternative bleaching agents that are less

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environmentally harmful are currently available, it is inappropriate for bleaching agents containing large quantities of chlorine to be ecolabelled.

### **Boric acid and borates**

Perborates: In Norway, Boric acid (CAS 10043-35-3) is included on the 'OBS list' kept by the Norwegian Pollution Control Authority (SFT) owing to the reproduction-toxic properties of the substance. According to SFT, it is likely that boric acid and perborates have the same properties. Authorities in Sweden and Denmark also consider borates/boric acid to be reproduction-toxic. Boric acid is also included on the Danish OBS list.

Perborates are converted in the aquatic environment to hydrogen peroxide and borate anion. Borate anion is further converted to boric acid. The reaction is reversible and dependent on pH in solution. In a draft risk assessment conducted by HERA (Human & Environmental Risk Assessment on ingredients of European household cleaning products) on perborates, it is concluded that, despite possible reproduction-toxic properties, no risks can be expected for the consumer with regard to chemical products.

Borates/boric acid have proven to have reproduction-toxic effects on mammals including male fertility and foetal development. Borates are expected to be classified as harmful to reproduction (Rep2, Rep3) within the EU. From the environmental point of view, an increase in the concentration of borates in receiving bodies of water with a high level of sewage pollution has been identified. A high level of borate in water used for watering may also result in problems with crops that are sensitive to boron, such as potatoes. The environmental effects are assumed to be less important with current pollution, but a further increase may have effects.

High-quality stable percarbonates currently exist that can replace perborates and many detergents on the market have already dropped perborates in favour of percarbonates. The Swedish Society for Nature Conservation ecolabelling scheme Good Environmental Choice has long banned perborates on environmental grounds and currently has about 46 licences for detergents for professional use. The ban on perborates is based primarily on the reproduction-toxic properties and on the fact that alternatives that are less harmful to health and the environment currently exist.

### **DADMAC (dialkyl dimethyl ammonium chloride)**

Dialkyl dimethyl ammonium chlorides are cationic surfactants that have been the main component of textile softeners and rinsing agents. They are considered to be highly toxic for aquatic organisms and not readily biodegradable. The Paris Convention (Ospar list) has recommended that the substance group should be phased out. The group comprises DTDMAC (ditallow dimethyl ammonium chlorides) DSDMAC (distearyl dimethyl ammonium chlorides) and DHTDMAC (Di(hydrogenated tallow alkyl) dimethyl ammonium chlorides), which therefore must not be used.

### **Optical brighteners**

The main brighteners in detergents are derived from bis-stilben-disulphonic acid (DASC) and distyryl biphenyls (DSPB). Optical brighteners are considered harmful to aquatic organisms such as fish and algae. Optical brighteners are now available that are more environmentally adapted, and there are optical brighteners that may undergo photochemical breakdown. The DID list classifies optical brighteners as persistent. On environmental grounds, more and more laundries are, after consulting their customers, refraining from using optical brighteners. Despite the fact that optical brighteners doubtless have a function, their use is nevertheless considered unnecessary to achieve satisfactory laundering efficiency.

**EDTA (ethylene diamine tetraacetate and its salts) and NTA (nitrilotriacetate)** must not be included in the product. The detergents sector uses the complexing agents NTA and EDTA on a very small scale. The complexing agents EDTA and NTA are suspected of being able to mobilise heavy metals as they may be substances that complex metals. Documentation relating to the degradability of EDTA is deficient. NTA has moderate to low toxicity for aquatic organisms. Variable results have

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been presented in degradability tests. NTA has specific restrictions in Denmark, where it is considered carcinogenic.

In the previous criteria document for water-based laundries and in the case of cloth towel rolls, restrictions were laid down that applied to the total quantity of NTA and phosphonates.

EDTA is often used as a complexing agent in detergents for professional laundering in Norway and in areas where restrictions or bans exist concerning phosphorus usage and where NTA cannot be used either. Many of these detergents are liquid, which does not allow for the use of zeolite. The use of EDTA is therefore excluded in limited amounts in Norway and in areas where rules and bans exist concerning phosphorus use. (*Product regulations: FOR 2004-06-01 no. 922: Regulations relating to the restriction in use of chemicals and other products that are harmful to health and the environment. Chapter: 3-9. Detergents – phosphorus content*).

### **9.13. Colouring agents (K10)**

The colouring agent may be added to liquid products if it is approved as a food additive or is not bioaccumulable. The colouring agent is considered not to be bioaccumulable if  $BCF < 100$  or  $\log Kow < 3$ . If there is information on both BCF and  $\log Kow$ , values for BCF must be used.

Colouring agents have no laundering effect, but are used on safety grounds. In the case of liquid multi-component systems, colouring agents are needed to avoid the mixing of bleaching agents with alkaline products, which may cause a reaction and spraying of corrosive substances. In systems with automatic dosing, colouring agents help to see when there is agent in piping or when this must be topped up. Colouring agents are normally incorporated in the product in quantities of about 0.001%.

According to many earlier Swan criteria, colouring agents have been banned as they do not affect the agent's ability to wash properly. As correct dosing of the products and avoidance of overdosing are very important in achieving environmental improvement, the working group has nevertheless considered that colouring agents have an important function in liquid agents. There are very few colouring agents that meet the requirements for degradability according to OECD 301 A-F. Colouring agents are on the DID list (no. 143) with the "default" value, which indicates that colouring agents are persistent. It is therefore difficult to lay down requirements concerning the degradability of colouring agents. A review of colouring agents approved for cosmetic products has, however, shown that there are sharp differences in the environmental properties of colouring agents. Colouring agents may be both toxic and bioaccumulating, and a link is often observed between both these environmental properties. The requirement for colouring agents not to be bioaccumulating at the same time excludes the colouring agents that are most toxic for aquatic organisms. According to the same study, colouring agents approved as food additives have proven not to pose major environmental problems.

### **9.14. Preservatives (K11)**

Preservatives can be added to liquid products if the preservatives are not bioaccumulable. This is a new requirement and is laid down because liquid products may require protection against bacterial growth in products. The formulation of the requirement follows a standard model at Nordic Ecolabelling. The requirement excludes preservatives that may have unwanted long-term effects in the environment as they may build up in fatty tissue in living organisms. Preservatives are toxic and these agents, which are bioaccumulating, may therefore have a major effect in the aquatic environment. This requirement prevents, for example, the use of Triclosan ( $BCF > 2500$ ).

Requirements K4 –K5 also exclude certain preservatives.

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### **9.15.        *Fragrances (K12-K13)***

Two requirements are laid down concerning fragrances. The first requirement applies to overall acceptance of fragrance mixtures, but the second requires a declaration on the product label/product data sheet or alternatively lays down restrictions on the quantity of fragrance in the product.

Fragrances can be added in accordance with IFRA's guidelines. This requirement is not new and equivalent requirements exist in many of the Swan chemical criteria documents. The requirement ensures that the fragrance mixture is assessed by the fragrance manufacturers' trade association and accepted by the latter.

Fragrances, which are covered by the requirements of the Detergents Order concerning declarations, must not be included in the product in quantities of more than 0.01% (100 ppm). Alternatively, fragrances covered by the requirements of the Detergents Order concerning declarations must be declared if they are included in the product in quantities exceeding 0.001% (10 ppm). This requirement was introduced in the proposal for the revised Swan criteria for detergents for consumer use. The aim of requirements concerning sensitising fragrances is for Swan-labelled products to have the least possible effect on the growing problem of allergies. However, many fragrances contain substances of this kind, which means that fragranced products are particularly affected by requirements concerning sensitising substances. The Swan scheme is intended in the longer term to restrict the content of allergenic fragrances by laying down a limit for maximum content. As this limit can, however, now be difficult to meet, an alternative requirement with a low declaration limit is introduced for a transitional period.

The Detergents Order also stipulates that selected fragrances must be declared if they are included in the product in quantities exceeding 100 ppm. These two alternative solutions, between which the applicant can choose, are thus more stringent than the legal requirement.

Requirement K3 also restricts the quantity of fragrance in the product as the fragrance mixture is often classified as harmful to the environment.

### **9.16.        *Packaging (K14-K16)***

Three different requirements are laid down concerning the packaging of laundering chemicals. The first requirement is that the product must be supplied either in returnable containers or in recyclable bag and cans. Packs of less than 100 kg may be made from combustible material. This requirement rewards the reuse of packs or ensures their exploitation as energy.

The second requirement applies to plastic material, which must be labelled in accordance with DIN 6120, Part 2 or equivalent. The purpose of the requirement is to ensure easier grading in connection with the recovery of plastic material after consumption.

The third requirement applies to PVC or other chlorinated plastics, which are not allowed to be present in the packaging or in the labelling. The requirement is intended to prevent the use of plastic material, which may result in problems in connection with combustion or the removal of packaging.

### **9.17.        *Dosing instructions (K17-K18)***

The contents declaration must follow the instructions given in the Detergents Regulation 648/2004/EC. The requirement for a content declaration is laid down to ensure that users are given minimum information on the content of the product. Even if the requirement can be viewed purely as a repetition of the legal requirement, it is meaningful from the supervisory point of view: it highlights the fact that the legislation must be followed and this should be checked when dealing with the application.

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The recommended dosage per kg of articles to be washed for various levels of soiling must be indicated in ml or g on the label. It must be clearly apparent for what type of laundering the dosage is recommended.

Water hardness must be quoted in German degrees of hardness (°dH). Water hardness must provide information on the ranges that are relevant for the product. The requirement is intended to ensure that users must be able to dose detergent correctly under prevailing circumstances.

### 9.18. Total content of laundering chemicals

The following requirements (K19 – K28) apply to complete detergents or the total combined quantity of laundering chemicals in a multi-component system that is used in a laundering system for laundering per kg of articles to be washed (g/kg articles for laundering). All subproducts that are to be ecolabelled are to be included in calculations. Note that complete detergents and all products included in a multi-component system must also meet all the requirements in section 1.1.

Dosing and limit values for parameters are dependent on the level of soiling of the articles to be washed. All limit values exclude water. Table 1 describes a common distribution of laundering textile groups according to levels of soiling.

**Table 1. Example of distribution of laundering textile groups according to levels of soiling**

Light	Medium	Heavy
Hotel items, bed linen	Table linen Industrial towels Work clothing from light industry Entrance mats Towel rolls	Kitchens White and coloured protective garments from slaughterhouses and butchers Work clothing from mechanical industry Mops
Care items (articles for washing from hospitals and care institutions)		
Bed linen Blankets Leather	Protective garments Personal clothing Patient clothing Sheets	Knitwear Surgical textiles

The table below lists the limit values laid down for the parameters according to the level of soiling of the washing. All these requirements are explained in the following paragraphs.

Parameter	Symbol (unit)	Level of soiling of the washing		
		Light	Medium	Severe
Total chemicals	TC (g/kg articles to be washed)	10	20	35
Critical dilution volume	CDV (l/kg articles to be washed)	150 000	300 000	450 000
Aerobic Non-Biodegradable Organics	aNBO (g/kg articles to be washed)	0.75	1.0	1.5
Anaerobic Non-Biodegradable Organics	anNBO (g/kg articles to be washed)	0.75	1.0	1.5
Quantity of phosphorus	P (g/kg articles to be washed)	0.75	1.5	2.5
EDTA	EDTA (g/kg articles to be washed)	0.3	0.4	0.5
Σ R50/R53+R51/R53	g/kg articles to be washed	0.015	0.015	0.015
Σ R52/R53	g/kg articles to be washed	0.02	0.02	0.02
Σ R50	g/kg articles to be washed	1.5	2.0	2.5

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### **9.19. Content and formulation of the multi-component system (K19-20)**

The Swan-labelled multi-component system must as a minimum cover the agents required for the multi-component system to launder correctly and meet the effectiveness requirement, cf. section 1.4 requirement K33 or K34.

A complete formulation with recommended dosages of complete detergent or complete formulations of the washing programme for multi-component systems must be quoted for laundering every level of soiling.

These requirements ensure that Nordic Ecolabelling has access to all necessary data to be able to perform calculations of the parameters set out below in the criteria document.

### **9.20. Restrictions concerning the content of chemical substances (K21-24)**

The requirements follow the same principles as already contained in the criteria document “Nordic Ecolabelling of water-based laundries, version 1.2” and “Swan labelling of Systems for cloth towel rolls, version 2.1”. However, as cloth towel rolls are usually classified as washing with normal soiling, only values for normally soiled washing have been included.

The criteria consist of a dynamic assessment system. They consist of systems for calculating all the components of detergents or multi-component systems and an assessment template with limit values for disqualification. The application of criteria is based on an assessment. Many of the commonest substances have been assessed by European and Nordic ecolabelling and are described in a separate DID list. Substances in laundering chemicals must be assessed in accordance with the DID list laid down at the application stage. The quoted parameter values must as a rule be used for all components in the chemicals list "Detergents Ingredients Database (version 30 June 2004 Part A)". An exception is made, however, for fragrances and colouring agents, where further test results are accepted (see the footnote in Part A). Other substances must be documented by the applicant. The data must be of scientific quality and relevance. The method adopted for components not included in the chemicals list is described in Annex 2.

The parameters that are relevant in this document are the total quantity of chemical substances (TC), the critical dilution volume (CDV), the total quantity of aerobic non-biodegradable organics (aNBO) and the total quantity of anaerobic non-degradable organics (anNBO) in complete detergents or in multi-component systems. All limit values exclude water. The levels of limit values have been set on the basis of Nordic Ecolabelling's experience of the two product groups referred to above and of the agents that have already been Swan-labelled in accordance with criteria for detergents for domestic use. In total, 17 different formulations were available, most of which have been ecolabelled in accordance with criteria for domestic use. On the basis of the relatively small number of formulations and the fact that criteria for the first generation are now involved, it has been chosen not to build up a points scoring system.

The requirements have been laid down in order to be able to reduce clear environmental pollution from detergents, which are emissions of chemicals that may be toxic, non-readily degradable and originating from the toxic products formed during biodegradation of the substance. The flow of chemicals into nature can be reduced via requirements governing the total quantity of chemicals (TC). The wash water passes via the sewage disposal system, often also via treatment works to receiving bodies of water, which is why it is important that the detergent and sludge from the sewage treatment works have low toxicity and the lowest possible level of environmentally pollutant substances.

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### **9.21. Phosphorus (K25)**

The total quantity of phosphates and other phosphorus compounds must not exceed the values set out below in P/kg of articles to be washed. The use of phosphorus is allowed in limited quantities. Overfertilisation is caused chiefly by the nutrients nitrogen and phosphorus. A consequence of overfertilisation of lakes, seas and watercourses is oxygen deficiency, which in turn leads to the death of bottoms of bodies of water. Norway has specific national restrictions on phosphorus that must be observed. (*The product regulations: FOR 2004-06-01 no. 922: Regulations concerning the restriction in the use of chemicals and other products that are harmful to health and the environment. Chapter: 3-9. Detergents – phosphorus content*).

Phosphorus is permitted chiefly owing to the Danish conditions of high water hardness which, even if softening of the process water is carried out, results in higher residual hardness in the wash water than in Sweden or Finland as the supply of water hardness (calcium and magnesium salts) from dirt and textiles is higher. Phosphate complexes lime and is an auxiliary chemical for surfactants. A small quantity of phosphate in laundering chemicals contributes to effective laundering in limy water without large quantities of active substances being required.

### **9.22. Complexing agents (K26 – K27)**

Phosphonates/phosphonic acids may be incorporated at the rate of no more than 0.05 g/kg of articles to be washed. The value is the same for all levels of soiling.

Phosphonates are as a rule barely degradable and can give heavy metals increased mobility in treatment plants and in nature. Phosphonates that are present are barely degradable, with relatively low acute toxicity to aquatic organisms. Low levels of strong complexing agents are needed to stabilise bleaching agents such as percarbonates and hydrogen peroxide. As the use of NTA is banned for other reasons, the Swan criteria permit the use of phosphonates/phosphonic acids in limited quantities.

Requirement K28 provides an exception for the use of EDTA for laundering in Norway and in areas where there are rules and bans on phosphorus in laundering chemicals. In these areas, the quantity of EDTA g/kg of articles to be washed must not exceed the limit values set out below.

EDTA is often used as a complexing agent in detergents for professional laundering in Norway and in areas where there are restrictions or bans on the use of phosphorus and where NTA cannot be used either. Many of these detergents are liquid, which does not allow for the use of zeolite. The use of EDTA in limited quantities in Norway and in areas where there are rules and bans on the use of phosphorus is therefore exempted.

### **9.23. Environmental danger (K28)**

Substances classified as harmful to the environment must not be present in limited quantities in total in complete detergents or in multi-component systems.

Substances with poor degradability may cause environmental problems now or in the future. The effects may be extremely serious if they display acute toxicity at the same time. A restriction on substances with these unwanted properties reduces the risk of damage in the environment. Requirements are therefore laid down concerning the maximum level of constituent environmentally harmful substances with the risk phrases

- R 50 (very toxic to aquatic organisms),
- R 50/53 (very toxic to aquatic organisms and may cause long-term adverse effects in the aquatic environment),
- R 51/53 (toxic to aquatic organisms and may cause long-term adverse effects in the aquatic environment), and

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- R 52/53 (harmful to aquatic organisms and may cause long-term effects in the aquatic environment).

### **9.24. Serviceability of the detergent (K29 – K32)**

Products must have good serviceability and be usable for the purposes for which they are intended. Particularly products in powder form must be readily dosable, soluble in stock solutions and must not produce blockages in dosing machinery. It must therefore be shown by the applicant that the product has good serviceability and conforms to the properties below. The product must:

- have good dosability in an automatic dosing system,
- not compact during storage in bags,
- be readily soluble for stock solutions,
- have good rinse-away characteristics from the washing machine or dosing machine's compartment.

### **9.25. Detergent effectiveness (K33 – K34)**

The complete detergent or the multi-component system must have satisfactory efficacy with recommended dosing for lightly, normally or heavily soiled washing.

The primary laundering effects of the detergent such as dirt removal, stain removal capacity and bleaching effect must be documented by the manufacturer/applicant with the aid of artificially soiled test pieces. Examples of what may be used as test pieces include the following:

- WFK-PCMS-55 for industrial laundering processes, consisting of 13 different small dirt patches (WFK-Cleaning Technology Research Institute, Germany)
- EMPA 102, consisting of 15 different fresh spots (Swiss EMPA-Testmaterials)
- or equivalent

Laundering effectiveness must be shown with the dosage for the same level of soiling as used in calculations.

The test must be conducted by an impartial laboratory or by the manufacturer's own laboratory to standard ISO 4312 and measurements must be performed on unlaundered and laundered test pieces. See requirements for test laboratory in Annex 3. Standard ISO 4312 describes performance of the test, but does not provide levels or a scale for assessing the test result. It is therefore difficult to set precise limit values for satisfactory effectiveness that must be met, although the interpretation of measurement results is based on the test institute's or the manufacturer's own experience.

Effectiveness tests used to document effectiveness in accordance with the Swan criteria for detergents and stain removers, 006/5.0 or later can be used for complete detergents that resemble detergents for domestic use.

There is potential for showing effectiveness with user tests as well. For customers to be guaranteed a product whose effectiveness and function are satisfactory, requirements are laid down for consumer testing in accordance with Annex 4.

At least 80% of test subjects need to be satisfied or very satisfied with detergents or the effectiveness of multi-component systems such as washing strengtheners, detergents and bleaching agents. Every test centre must assess the following characteristics of the product or multi-component system:

- Serviceability; dosability, compressibility, rinsing and solubility
- Ability to clean lightly, moderately or severely soiled articles to be washed
- Primary washing effects such as soil removal, stain removal capacity and bleaching effect must be assessed

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- Secondary washing effects such as greying of white washing and colour stability and staining of coloured washing
- The effect of the rinsing agent on drying, ironing or mangling of articles to be washed
- How satisfied the test subject is with customer visit arrangements

### **9.26. Customer visits/visit reports (K35 – K36)**

Energy consumption and dosage are important in the laundering process. We have no opportunity of laying down requirements concerning the type of washing machine, but we can lay down requirements concerning visit reports and what these should contain. It is extremely important that manufacturers make regular visits to customers who use automatic dosing systems. The purpose of the requirements concerning customer visits is for it to be capable of being ensured that dosing instructions and dosing facilities are used and that overdosing and underdosing are avoided. Overdosing causes more emissions, and insufficient dosing often means a fresh wash, resulting in more emissions and virtually double the energy and water consumption. The comprehensive service also entails monitoring of the dosing programme and servicing of dosing equipment.

The number of customer visits is regulated by an agreement between suppliers and customers and can vary, but is conducted as a rule 1-3 times a year. In isolated cases, no customer visits at all are paid, for example owing to long distances and minimal sales. The customer visit must be conducted in accordance with the supplier's routines and the number normally offered in the supplier's sales. The visit report is the supplier's ordinary visit report and must cover the following points:

- Information on the serviceability, dosability, compressibility, rinsing and solubility of the detergent.
- Information on the dosing machine model.
- Checks that maintenance instructions for dosing machines exist.
- Measurement value of water hardness if softening is not used.
- Information on dosages normally used for lightly, moderately and heavily soiled washing for water hardness levels of 0 – 6 °dH (reference value).
- Information on actual dosing for lightly, moderately and heavily soiled washing.
- Checks on the flow in automatic dosing system against the manufacturer's information.
- Servicing of dosing equipment.
- Any problems.

### **9.27. Quality and authority requirements**

The requirement ensures that holders of ecolabelling licences are responsible for ensuring that safety, working-environment and environmental legislation and system-specific conditions/concessions are followed during the manufacture of ecolabelled products.

The requirement exists to ensure that the requirements of the ecolabelling criteria are met during the term of the licence.

### **9.28. Marketing. Design of the Swan label. Sale in the rest of the Nordic area**

These sections are standard in the Nordic Ecolabelling criteria document.

The requirements ensure that the marketing of ecolabelled products takes place in accordance with "Rules for Nordic Ecolabelling of products 12/12/2001". It is described how the Swan label should look and instructions on the correct placement of the label are provided. It is also described how licence holders can utilise the Swan label in the rest of the Nordic area and what documentation is needed for registration.

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## **9.29.        *Annexes to the criteria document***

### **9.30.1.        *Annex 1A –B – Declarations of chemical content***

Annex 1 should be seen as a standard aid for the applicant with which manufacturers and/or their suppliers can declare the content of products and components in the raw material.

### **9.30.2.        *Annex 2 – Parameters in the DID list***

Annex 2 explains all the parameters and formulae needed for documenting the total content of detergents in accordance with section 1.2. Within Nordic Ecolabelling, CDV is calculated on the basis of the acute toxicity factor and the acute safety factor. Annex 2 provides a method to be used for components not included in the chemicals list for finding the correct value for the acute toxicity factor and the acute safety factor.

### **9.30.3.        *Annex 3 – Analyses and checks***

In order that sampling and testing are to be performed in a competent and impartial manner, requirements are laid down concerning requirements for testing institutes/analytical laboratories and ecotoxicology test methods.

### **9.30.4.        *Annex 4 – User test***

Performance of the user test is described in Annex 4.

### **9.30.5.        *Annex 5 – Marketing***

The annex should be regarded as a standard aid for the applicant whereby it can be shown that documentation for the marketing requirements is correct.

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## Annex 1

### Summary of abbreviations and description of definitions

The following two tables provide an overview of the abbreviations adopted, followed by a description of the concepts that apply in the criteria.

Abbreviation	Explanation
°dH	German degrees of hardness
aNBO	Aerobic Non-Biodegradable Organics
anNBO	Anaerobic Non-Biodegradable Organics
APD	Alkyl phenol derivatives
APEO	Alkyl phenol ethoxyls
DADMAC	Group of dialkyl dimethyl ammonium chlorides that are cationic surfactants, comprising:
DTDMAC	
DSDMAC	
DHTDMAC	
DASC	Bis-stilben-disulphonic acid, an example of an optical brightener
DSPB	Distyryl biphenyls, group of substances used as optical brighteners
BCF	Bioconcentration factor
CDV	Critical Dilution Volume
DID list	Detergent Ingredient Database List
DID no.	The number under which a substance appears on the DID list
DIN/EN/DS/ISO/IEC/OECD	Abbreviations for various standards
EDTA	Ethylene diamine tetraacetate
E number	The number under which substances can be registered in approval for food use
IFRA	International Fragrance Organisation
logK <sub>ow</sub>	Logarithmic distribution coefficient between octanol and water
NTA	Nitilotriacetate
ppm	Parts per million
TC	Total Chemicals

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<b>Term</b>	<b>Definition</b>
°dH	A measure of water hardness, with 1°dH being equivalent to 0.178 mmol CaCO <sub>3</sub> /l.
aNBO	Equivalent to ILN in the previous Swan criteria for chemical criteria. The factor describes how substances are broken down in an oxygen-rich environment.
anNBO	Equivalent to IAN in the previous Swan criteria for chemical products. The factor describes how substances are broken down in an oxygen-deficient environment.
APD	Chemical substances derived from alkyl phenol ethoxylates.
APEO	A group of substances classed as surfactants. When these break down, substances are formed that are problematic for the environment and health.
BCF	The factor describes how many times a substance accumulates in aquatic organisms (here, fish), and therefore reflects whether the substance is bioaccumulable.
CDV	Equivalent to a large extent to GN in the previous Swan criteria for chemical products. Critical dilution volume is a factor that describes how many times a substance must be diluted with water in order not to have a harmful effect on the environment.
DID list	Equivalent to the Swan Chemicals List. The DID list contains information on toxicity and degradability for a number of substances that may conceivably be used for products within the chemicals sector. The DID list should not be regarded as a list of approved substance or a list of substances present in ecolabelled products.
logK <sub>ow</sub>	The distribution coefficient describes whether a substance is most fat-soluble or water-soluble. This can be used as an alternative assessment of potential for bioaccumulation. If a substance is most fat-soluble (logK <sub>ow</sub> > 3), it may very likely accumulate in organisms.
ppm	Unit for concentration. 1 ppm is equivalent to 0.0001%
TC	Equivalent to parameter K in the previous Swan criteria for detergents for textiles.