

European Ecolabel

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Revision of Ecolabel Criteria for Laundry Detergents 2008-2010

Background report

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1. SUMMARY

The European Commission has assigned Ecolabelling Denmark with the task of updating the ecolabel criteria for laundry detergents as laid down in the Commission Decision 1999/476/EC. DHI has provided technical comments to the draft background report and the draft criteria under a subcontract with Ecolabelling Denmark.

The revised criteria address the issues pointed out in the preliminary report prepared for the Commission in June 2008 (Ecolabelling Denmark 2008) and further discussed at the Working Group meetings in the revision process during 2008-2009. Furthermore, the revised criteria address the issues that were recommended during the previous revision of the criteria (DHI 2003). See Appendix 1.

As described in the preliminary report and further summarised in brief in Appendix 2, the main environmental impacts related to the production and use of laundry detergents are related to the energy used for heating of the washing water in the use phase, the energy used for extraction and processing of raw materials and the emission of chemicals to the environment after use. The scope of the ecolabel criteria primarily relates to the chemical composition of the products, and thus the impact on the aquatic environment, and the promotion of products that can be used at lower temperatures ($\leq 30^{\circ}\text{C}$) compared to current average washing temperatures across Europe. It must be recognised that only certain parts in the product life-cycle may reasonably be controlled by ecolabel requirements.

The major changes introduced with the revised criteria are summarised as follows:

- The product group definition is expanded by inclusion of pre-treatment stain removers
- All ingoing substances present in concentrations $\geq 0.010\%$ (w/w) are encompassed by the ecological criteria. Compliance is required for preservatives, colouring agents and fragrances regardless of their concentration unless specific exceptions apply.
- Calculation of critical dilution volume (CDV) converted to latest version of the DID list
- More stringent requirements to dosage, CDV, biodegradability of organics
- Exclusion of phosphates
- Strict requirements for sensitising substances
- Revision of packaging requirements
- Introduction of a scoring system in favour of products with reduced energy consumption in the use phase (coldwater and low-temperature products)
- A separate revision of the performance test (tender launched October 2009) has been conducted (led by Leitat Technological Center). The revised performance test supplements the revised criteria document.

The revised criteria are expected to further reduce the environmental impact of laundry detergents, stain removers and fabric softeners. Imposing more stringent requirements on the total amount of chemicals and the toxicity and degradability of ingoing substances allows the impact on the external environment to be reduced. Furthermore, requirements in favour of reducing the energy consumption in the use phase (and to a minor extent also the packaging material used) will also reduce the overall impact on the environment. The revised criteria document has an increased focus on health aspects through minimising the content of sensitising substances.

In order to assess the impact of the revised criteria on existing ecolabelled products, the competent bodies in other European countries holding ecolabel licenses were contacted for assistance with information on ecolabelled product formulations. Thus, representative product formulations based on current ecolabel licenses in Denmark, UK and France have been tested and evaluated according to the revised requirements. These product formulations cover both powders and liquids. Ecolabelled formulations (EU Flower) originating in other European countries have not been available. Although a more complete data set covering Ecolabelled formulations from other countries was wished, the forwarded product formulations have provided some insight in geographical variations in ecolabelled product formulations. Additionally, more than 50 product formulations holding the Nordic Ecolabel (covering both heavy & low-duty laundry detergents and stain removers) have been used as a basis for setting and evaluating the revised criteria. Formulations of fabric softeners (non-ecolabelled) have also been made available by some of the Nordic manufacturers. Non-ecolabelled product formulations for market leading laundry detergents, fabric softeners and stain removers in Southern Europe have been supplied by UEAPME (European Association of Craft, Small and Medium-sized Enterprises) and ADEME (the French Environmental Agency). These formulations did not as a whole comply neither with the existing ecolabel criteria nor the revised criteria proposed. The access to this detailed information was, however, very useful with respect to obtaining knowledge on geographical variations in product composition for laundry detergents across Europe and in part also for validation of the revised criteria.

Comments forwarded by various stakeholders during the revision process have also been used to adjust the criteria and take into account the regional differences that apply to laundry detergent formulations as well as consumer needs/expectations across Europe.

2. MARKET REVIEW

A brief overview of the European market for laundry detergents, fabric softeners and stain removers is given below. The data are based on questionnaires sent out to relevant stakeholders (competent bodies, manufacturers, branch organisations etc.) in the initial phase of the revision.

2.1. European market for laundry detergents and additives

Table 2.1 shows estimates of the consumption of laundry detergents, fabric softeners and stain removers in Europe from 1995-2008. Data from 1995-2000 originate from the previous revision report (DHI 2003). It should be noted that the figures are rough estimates based on different sources of information. The figures are thus not directly comparable but give an idea of the overall consumption level.

Table 2.1 Estimated annual consumption of laundry detergents in Europe

Product	Estimated consumption in tonnes/year			
	1995 ¹	1998 ²	2000 ²	2008
Laundry detergents, powders	3,400,000	3,600,000	4,200,000	4,000,000 ³
Laundry detergents, liquids	550,000	620,000	780,000	
Fabric softeners	1,100,000	950,000	950,000	1,200,000 ⁴
Stain removers	100,000	100,000	93,000	110,000 ⁴

¹ AISE, 1996. 1994/1995 Statistical Tables (from DHI 2003)

² Danish consumption data used to estimate European consumption (from DHI 2003)

³ Data based on average German consumption of 8 kg/person/year (Umweltsbundesamt 2008) scaled up to the total European population of ~500.000.000 (www.wikipedia.org)

⁴ Data based on questionnaire received from UEAPME (UEAPME 2008)

2.1.1. Laundry detergents

The use of laundry detergents is estimated at 4,000,000 tonnes/year in EU in 2008 (Table 2.1). The consumption pattern has regional differences throughout Europe. In northern Scandinavia, the average consumption is approximately 4-5 kg/person/year (Nordic Ecolabelling 2008, CSTE 2003), while the average consumption in Germany approximates 8 kg/person/year (Umweltsbundesamt 2008) and about 12-13 kg/person/year in Southern Europe (Dansk Kemi 2005, CSTE 2003). The trend in Northern Europe is a decreased consumption (in tonnes) due to the use of compact and super-compact powders. The total value of the market for laundry cleaning in EU is estimated at 14,243 million Euro in 2008, corresponding to almost 50% of the total soap, detergent and maintenance industry (AISE 2008).

The composition of laundry detergents (typical ingredients and their function) can be seen in Appendix 3.

The European consumption also varies throughout the regions with respect to use of powder, liquids and tablets. Where traditional powders previously have dominated the market in most of Europe, compact and super-compact powders are now widespread, particularly in northern and central Europe (information from stakeholders, experience from Nordic Ecolabelling). Liquid laundry detergents have widespread use among e.g. British and Southern European consumers (Dansk Kemi 2005, UEAPME 2008, www.scienceinthebox.com), and it seems that this trend is also picking up in other countries. According to the information from UEAPME, liquid products account for

approximately 60% of the market in Southern Europe (UEAPME 2008). Liquid detergents are not widely used in northern Europe as yet but there may be a trend towards increased consumption for this product group. Laundry detergents in tablet form (both liquid and powder) have also entered the market.

The figure below shows figures regarding distribution in product type, washing temperature and consumer habits for laundry detergents and additives for the 5 biggest European countries (year unknown).

5 Biggest European Countries		GB 	Germany 	France 	Italy 	Spain 
Different Product forms used as % of total market	Regular Powder	49%	25%	38%	57%	66%
	Compact Powder	0%	40%	4%	0%	2%
	Tablet	28%	8%	17%	2%	9%
	Liquid	16%	26%	37%	41%	23%
	Liquitab	7%	1%	4%	0%	0%
% Loads washed at different temperatures	<40°C	4%	4%	30%	40%	87%
	40°C	69%	69%	36%	23%	9%
	50°C	9%	9%	4%	7%	1%
	60°C	15%	15%	21%	24%	2%
	>70°C	3%	3%	9%	6%	1%
% Consumers using:	Fabric Softener 	74%	46%	62%	67%	88%
	Bleach/Additives 	2%	4%	14%	33%	49%
	Pre-treating 	11%	8%	14%	14%	14%
	Pre-wash 	13%	18%	26%	31%	23%
	Soak or Scrub 	14%	13%	13%	39%	24%
Average load size 	2,8 kg	2,8 kg	2,8 kg	3,3 kg	/	
Washes per 2 weeks 		13,2 (Machine) 0,3 (Hand)	6,0 (Machine) 0,3 (Hand)	7,2 (Machine) 0,2 (Hand)	7,9 (Machine) 1,6 (Hand)	9,5 (Machine) 0,8 (Hand)

(source: www.scienceinthebox, 2008)

2.1.2. Fabric softeners

The use of fabric softener is estimated at 1,2 million tons/year in EU (UEAPME 2008) and estimated 90-95% of consumers use fabric softener (UEAPME 2008 and JohnsonDiversey 2008). Additionally, the figure above also suggests that the majority of the consumers in different regions of Europe use fabric softeners although the overall percentage may be smaller than 90%. Fabric softeners are always liquid products and are used in amounts varying from app. 30 ml up to 100 ml per wash depending on the concentration of the product.

Fabric softeners are based on easily degradable cationic surfactants – esterquats and also contain preservatives (e.g. thiazolinones, bronopol, formaldehyde, benzalkonium chloride etc.), colouring agents and fragrances (a few products are without colour and fragrance).

2.1.3. Stain Removers

The consumption of stain remover in EU is estimated at 110,000 tons per year (UEAPME 2008).

Stain removers are in all kinds of types from tablets (solid), powders, gels and liquids. They generally contain bleach, surfactants, enzymes preservatives, colouring agents and fragrance depending on type and usage.

2.2. Washing habits in Europe

In 2008, the International Association for soaps, detergents and maintenance products (AISE) commissioned a survey of consumer washing habits across Europe. In short, the survey showed the following figures (AISE 2008):

- Preferred type of detergent: Regular laundry powders. In addition, regional preferences for regular liquids/gels (western Europe), tablets (UK/Ireland) and compact laundry powders (Scandinavia) also apply
- Average washing temperature: 42.6°C (ranging from 40.1°C in Southern Europe to 54.5°C in Scandinavia)
- Amount of washes conducted at 30°C or lower: 30%
- Washing at full load: 49%
- Awareness of differences between regular and concentrated products: 43%
- 65% of the consumers dose according to the recommendation provided by the manufacturer

2.3. Ecolabel licenses and products today

As per November 2010, ecolabel licenses have been awarded for 26 companies for laundry detergents. The licences cover approximately 120 trade names for laundry detergents for sale in many countries (www.eco-label.com). The licences are distributed as follows:

Table 2.2 Number of EU Ecolabel licenses for laundry detergents (November 2010)

Country	No. of licenses
Belgium	1
Czech Republic	1
Germany	2
Denmark	2
Spain	1
France	5
Italy	10
United Kingdom	2
Netherlands	2
Total	26

In Denmark, the Flower labelled laundry detergents account for <1% of the total market value (ACNielsen 2007) and the Flower thus holds a quite small market share. In comparison, laundry detergents labelled with the Nordic Ecolabel (the Swan) account for approximately 19% of the total market value in Denmark (ACNielsen 2007), 8% in Finland, 50% in Norway and 80% in Sweden (unpublished data from Nordic Ecolabelling). Thus, there is a great potential for ecolabelled products as such, although the Flower is less widespread compared to the Nordic Ecolabel in Scandinavia. No data

regarding the market shares of Flower labelled laundry detergents have been obtained from other European countries.

3. PRODUCT GROUP DEFINITION

Article 2 of the revised criteria defines the product group as follows:

“The product group “Laundry Detergents” shall comprise: laundry detergents and pre-treatment stain removers whether in powder, liquid or any other form which are marketed and used for the washing of textiles principally in household machines but not excluding their use in laundrettes and common laundries.

Pre-treatment stain removers include stain removers used for direct spot treatment of textiles (before washing in the machine) but do not include stain removers dosed in the washing machine and stain removers dedicated to other uses besides pre-treatment.

This product group shall not comprise products that are dosed by carriers such as sheets, cloths or other materials nor washing auxiliaries used without subsequent washing, such as stain removers for carpets and furniture upholstery”.

The criteria do not specifically exclude products for professional use in laundrettes and common laundries – as such products may be equivalent to household products in their content and use. However, the criteria are not intended for professional products used for specific applications in institutions and industry in industrial washing machines. The project group has recommended that separate criteria are developed for professional products. In October 2009 the Commission launched a tender for development of ecolabel criteria for professional laundry detergents, taking into account the specialised use and composition of such products. Criteria development for these product groups is currently ongoing (February 2011).

At the 2nd and 3rd AHWGM the possible inclusion of fabric softeners and stain removers in the product group was discussed and several comments on this issue have also been forwarded to the project group during the revision process. According to the market survey, especially fabric softeners are used in high tonnages in Europe (> 1 mill. tonnes/year) and ecolabelled alternatives have been requested from various stakeholders. However, many stakeholders have also argued that fabric softeners and in-wash stain removers introduce an extra, unwanted chemical load in the wash process and that a general use of such products should not be encouraged. Auxiliary products like softeners and in-wash stain removers are generally not considered necessary for achieving clean laundry under normal conditions. Regardless, the market data reveal a substantial use of fabric softeners which is not likely to decrease. Some stakeholders argue that ecolabelling of such products could misguide the consumer to believe that the products are considered as being “green” or beneficial, that they are necessary in the wash process and that the detergents in themselves are insufficient. The Commission has clarified that the role of the ecolabel is to offer environmentally better products and that the ecolabel should drive the development of environmentally better products within heavy use product groups. The Commission furthermore argues that for products such as fabric softeners, the consumption on a volume basis is not expected to change regardless of whether ecolabelled products are available or not, whereas the overall chemical load may be affected positively by introducing ecolabelled alternatives. It was thus proposed to include fabric softeners and pre-treatment stain removers in the ecolabel criteria. As agreement could not be reached between the Member States about the inclusion of fabric softeners – this product category was finally omitted from the criteria proposal. It should be noted that pre-treatment stain removers are applied in limited doses directly on difficult stains, and are not expected to have a significant contribution to the overall chemical load.

At the 3rd working group meeting a discussion of the product group definition was also raised. The terms heavy-duty and low-duty detergents are related to the designated use according to the product group definition. Some stakeholders were in favour of a definition relating to the chemical composition of the different product types rather than a functional definition. However, it is chosen to retain the product definition related to the use in agreement with the definitions laid down in the Detergent Regulation (648/2004/EEC). Furthermore, the market is developing all the time and the chemical composition of the products is thus not a static parameter.

4. INTRODUCTION TO REVISED ECOLABEL CRITERIA

The revised ecolabel criteria for laundry detergents take into consideration the focus points pointed out in the preliminary report and also the issues recommended during the previous revision as summarised in Appendix 1. Appendix 2 summarises the main environmental impacts of laundry detergents in a life-cycle perspective, which forms the basis for the revised criteria.

The scope of the revised ecolabel criteria primarily relates to the chemical composition of the products (and thus the impact on the aquatic environment) and the promotion of products that can be used at lower temperatures ($\leq 30^{\circ}\text{C}$) compared to current average washing temperatures across Europe (chapter 2.2). One of the aims of the revision has been to create a simplified criteria document addressing the most important impacts of this product group on the environment in a life cycle perspective. The ecolabel criteria should thus provide a tool that enables distinction of products with an overall good environmental profile and good performance.

The revised ecolabel criteria are divided into

- Chemical requirements (no. 1-4)
- Packaging requirements (no. 5)
- Performance requirements (no. 6)
- Point system promoting products with reduced energy consumption in the use phase (no. 7)
- Requirements addressing consumer information (no. 8-9)

In table 4.1, an overview is given comparing the current ecolabel criteria versus the suggested revised criteria for laundry detergents. The product group definition has been expanded to include pre-treatment stain removers. The revised criteria are explained in detail in chapter 5.

Table 4.1 Overview of current versus revised ecolabel criteria (heavy-duty and low-duty detergents)

Requirement	Current criteria (2003)	Revised criteria (2009)
<i>Ingredient concentration imposing ecological requirements</i>	≥ 0,1 weight % of the preparation	≥ 0,010 weight % of the preparation for all ingoing substances. Compliance is required for preservatives, colouring agents and fragrances regardless of the concentration, except for req. no. 4a)
<i>Functional unit</i>	g/wash	g/kg wash
<i>Total Chemicals (“Maximum dosage” in revised criteria)</i>	Limit: 100 g/wash (heavy- and low-duty detergents)	Limit: 17 g/kg wash (~76,5 g/wash) for powders and 17 ml/kg wash (~76,5 ml/wash) for liquids. Limits introduced for new product types (no. 1)
<i>Insoluble, inorganic ingredients</i>	Limit: 30 g/wash	No requirements
<i>Toxicity to aquatic organisms (“Critical Dilution Volume, CDV” in revised criteria)</i>	Limit: CDV max 4,500 l/wash	Limit: CDV max 35,000 l/kg wash for heavy-duty detergents and 20,000 l/kg wash for low-duty detergents. CDV calculation based on new DID list (values not directly comparable). CDV limits introduced for new product types (no. 2)
<i>Phosphates</i>	Limit: 25 g/wash	Phosphates not allowed (no. 4a)
<i>Biodegradability of surfactants</i>	Aerobic and anaerobic biodegradability required	Aerobic biodegradability covered by legislation. Specific requirements for anaerobic biodegradability for surfactants replaced with a general requirement for the biodegradability of all organics (no. 3)
<i>Biodegradability of organics</i>	No requirements	A general requirement limiting the amount of organics that are not readily biodegradable or anaerobically biodegradable (no. 3)
<i>Dangerous, hazardous or toxic substances or preparations (“Excluded or limited substances and mixtures” in revised criteria)</i>	Exclusion and limitation of certain substances and classifications	Addition of limitations for toxic and sensitizing substances, exclusion of phosphate (no. 4a), and biocides used for other purposes than preservation (no. 4a)
<i>Purity of enzymes</i>	Absences of production microorganisms	No requirements
<i>Packaging requirements</i>	Weight of primary packaging: 3,7 g/wash for tablets 1,7 g/wash for others 7,0 g/wash for products incl. refill packaging ≥ 80% recycling of cardboard material	Revised requirement. Introduction of weight utility ratio (WUR): Powders: 1,2 g/kg wash Others: 1,5 g/kg wash or min. 80% recycling (no. 5)
<i>Washing performance</i>	Compliance with “Performance test of household detergents Version 4 December 2002	Compliance with new performance criteria for laundry detergents (adopted 2011).
<i>Point system (matrix)</i>	Not applicable	Point system introduced, in favour of coldwater and low-temperature products (no. 7)
<i>Consumer information</i>	Various specifications for mandatory information	Minor changes in text (no. 8)
<i>Information appearing on the eco-label</i>	Mandatory sentences	Minor changes in text (no. 9)

In order to assess the impact of the revised criteria on existing ecolabelled products, the competent bodies in other European countries holding ecolabel licenses were contacted for assistance with information of ecolabelled product formulations. Thus, representative product formulations based on current ecolabel licenses held by Denmark, UK and France have been tested and evaluated according to the revised requirements. (Some of the product formulations in the Danish ecolabel license are furthermore marketed outside Denmark, e.g. in France). These product formulations cover both powders and liquids. Ecolabelled formulations (EU Flower) originating in other European countries have not been available. Although a more complete data set covering Ecolabelled formulations from other countries was wishful, the forwarded product formulations have provided insight in geographical variations in ecolabelled product formulations. Additionally, more than 50 different product formulations holding the Nordic Ecolabel (covering both heavy & low-duty laundry detergents and stain removers) have been used as a basis for setting and evaluating the revised criteria. Non-ecolabelled product formulations for market leading laundry detergents and stain removers in Southern Europe have been supplied by UEAPME (European Association of Craft, Small and Medium-sized Enterprises) and ADEME (the French Environmental Agency). These formulations did – as a whole - not comply neither with the existing ecolabel criteria nor the revised criteria proposed. The access to this detailed information was, however, very useful with respect to obtaining knowledge on geographical variations in product composition for laundry detergents across Europe and in part also for validation of the revised criteria.

The analysed products cover the following product types (including products ecolabelled with the Nordic Ecolabel (the Swan), the EU Ecolabel and products without an ecolabel):

- > 60 heavy-duty product formulations (powders, liquids and tablets)
- 5 low-duty product formulations (powder and liquid)
- 3 pre-treatment stain removers (liquids)
- 10 fabric softeners (liquids)

In Regulation (EC) No 66/2010 of the European Parliament and of the Council of 25 November 2009 on the EU Ecolabel (Annex I) it is stated that the ecolabel criteria “shall be based on the best products available on the Community market in terms of environmental performance throughout the life cycle, and they shall correspond indicatively to the best 10-20 % of the products available on the Community market in terms of environmental performance at the moment of their adoption”. It is important to acknowledge that the ecolabel criteria are not supposed to encompass the majority of the product formulations on the market in any given country. At the working group meetings concern has been expressed by some competent bodies regarding compliance of current ecolabelled products with the revised criteria. It should also be emphasized that the current criteria date back to 2003 and that a tightening of the ecolabel requirements is an expected result of a revision process. Adjustments in the chemical composition and the overall performance are thus a natural outcome of transition to new requirements.

5. REVISED ECOLABEL CRITERIA

5.1. Revised criteria

5.1.1. General remarks

The concentration of ingoing substances in the product, which implies a requirement for documentation of compliance with the ecological criteria, is generally defined at ≥ 0.010 % by weight of the preparation. For preservatives, colouring agents and fragrance compliance with the ecological criteria are, however, required regardless of their concentration except for requirement no. 4b on excluded or limited substances and mixtures. Preservatives, colouring agents and fragrance often have a significant contribution to the overall environmental profile of the product (primarily the CDV), even in minute concentrations. Fragrances may be considered as mixtures for the calculation of the total chemicals, CDV and biodegradability of organics (using the data on the DID list). Pollutants (traces from the raw material production) present in concentrations $\geq 0.010\%$ by weight in the final product also have to comply with the criteria.

In requirement no. 4 where limitations or exclusion applies to substances with specific hazard classifications, the risk phrases have been converted to the new hazard statements introduced with the Globally Harmonised System for classification, labelling and packaging of substances and mixtures (GHS), as implemented in Regulation (EC) No 1272/2008 in January, 2009 (new regulation on classification, labelling and packaging of substances and mixtures). With the implementation of GHS, substances must be classified according to this regulation after 1st of December 2010. For classification of mixtures is the corresponding date the 1st of June 2015. In the transition period from 1st of December 2010 to 1st of December 2015 substances must be classified after both systems and labelled and packed according to the GHS regulation. Accordingly, the risk phrases used in the existing classification system as well as in the GHS system are presented.

5.1.2. Functional unit and reference dose

The functional unit, i.e. the quantity of product used in calculating the ecological requirements, has been changed. Instead of relating to g/wash (a standard wash being defined as the dosage per 4.5 kg load), the functional unit now relates to g/kg wash. The functional unit is an administrative unit used only for calculation of compliance with the ecological requirements.

This enables the setting of comparable and unambiguous limits for various product types, independent of the total dosage per wash. A functional unit expressed in g/kg wash also allows flexibility in selecting dosages related to different wash loads, e.g. one dosage for 4-5 kg and one dosage for 6-8 kg. The dosage used for calculation of the ecological criteria relates to the dosage for a standard machine load of 4.5 kg for heavy-duty detergents and 2.5 kg for low-duty detergents. Alternatively, the dosage used for the calculations shall correspond to the average load size stated on the dosage scheme. Thus, if the recommended dosage is 60 g for a load of 3-5 kg, the functional unit will be $60 \text{ g} / 4 \text{ kg per wash} = 15 \text{ g/kg wash}$.

The reference dose used for calculation of compliance with the ecological criteria and for the performance test is defined as the dosage recommended by the manufacturer to consumers for the water hardness of 2.5 mmol CaCO₃/l and 'normally soiled' textiles for heavy-duty detergents and a water hardness of 2.5 mmol CaCO₃/l and 'lightly soiled' textiles for low-duty detergents.

5.1.3. Dosage (1)

Proposed requirement:

The dosage corresponds to the recommended dosage in g/kg wash (powders/tablets) or ml/kg wash (liquids/gels). The recommended dosage for a water hardness of 2.5 mmol CaCO₃/l for normally soiled textiles (heavy-duty detergents) and lightly soiled textiles (low-duty detergents), respectively, should be used.

The dosage shall not exceed the following amounts:

Product type	Dosage, powder/tablet	Dosage, liquid/gel
Heavy-duty laundry detergent	17.0 g/kg wash	17.0 ml/kg wash
Low-duty laundry detergent	17.0 g/kg wash	17.0 ml/kg wash
Stain remover (pre-treatment only)	2.7 g/kg wash	2.7 ml/kg wash*

* Estimated average dose to be used in CDV calculations. Actual dosing will depend on number of stains in any given wash-load. The estimated dose is based on a dosage of 2 ml per application and 6 applications per wash-load of 4.5 kg (liquid stain remover).

Note: If recommendations for both prewash and subsequent wash apply, the total recommended dosage (prewash + subsequent wash) has to comply with the maximum dosage level.

Motivation:

The ecolabel criteria aim at providing sustainable products with minimum environmental impact for the consumer. By reducing the amount of total chemicals per dose the products become more concentrated and the amount of chemicals and packaging material used per wash is reduced to a minimum.

The International Association for Soaps, Detergents and Maintenance products (AISE) has launched “Laundry Sustainability Project No 2 (LSP2)” for heavy-duty detergents by 1st January 2009. LSP2 is a voluntary industry initiative. One of the goals of LSP2 is to lower the washing doses and optimising the use of packaging materials. AISE’s proposed maximum dose for heavy-duty laundry detergents (powders) is set at 85 g/wash or 135 ml/wash (corresponding to ~19 g/kg wash or 30 ml/kg wash). For liquid detergents a similar project has recently been launched. The “Laundry Sustainability Project for Heavy-Duty Liquids” (LSP-L) enters into force from July 2010 and proposes a maximum dosage of 75 ml/wash for liquid heavy-duty detergents (corresponding to ~17 ml/wash).

The suggested ecolabel criteria suggest an even lower limit for the maximum dose for heavy-duty powders. Even though liquids generally have a lower content of active ingredients per dosage compared to powders, equal dosage limits are set for powders and liquids as the ecolabel should not encourage use of dilute products with a high water percentage. Recognising regional differences for laundry detergents between Northern and Southern Europe, the maximum dosage in the EU criteria is set at 17.0 g/kg wash for powders and 17.0 ml/kg wash for liquids. The dosage limits are established with reference to the dosage levels for the available formulations and should ensure compliance for compact products on the market but exclude regular (non-compact) products. This is based on an analysis of:

- 8 product formulations holding the EU Ecolabel (Denmark, UK and France) (average dosage: 15.7 g or ml/wash)

- > 50 product formulations (heavy-duty) holding the Nordic Ecolabel (the Swan) (average dosage 12.6 g or ml/wash)
- 12 non-ecolabelled products originating in Southern Europe, both compact and regular products (average dosage 27.8 g or ml/wash).

According to comments from stakeholders, the average dosage for compact powder laundry detergents in Central and Southern Europe is in the range 70-80 g/wash (~16-18 g/kg wash).

The parameters that seem to differentiate the products the most are:

- The dosage (ranging from 17 ml/wash to > 100 ml/wash for a 4.5 kg load)
- The total chemicals content per wash (ranging from 0.6 g/kg wash to 1.4 g/kg wash for a 4.5 kg load)
- The content/presence of “minor ingredients” (on a weight basis) such as fragrance, silicone, and preservatives

The former criteria (2003) has a maximum dosage level (total chemicals) of 100 g/wash corresponding to 22.2 g/kg wash. The lowered dosage levels in the revised criteria reflect the general tendency of developing more concentrated and/or compacted products. Furthermore, the development of efficient and innovative enzymes has facilitated partial replacement of some of the traditional washing chemicals. This is already seen in several products on the market (in Scandinavia) and results of such replacements have also been published by Novozymes (Nielsen and Skagerlind 2007).

5.1.4. Toxicity to aquatic organisms: Critical Dilution Volume (CDV) (2)

Proposed requirement:

The critical dilution volume of the product must not exceed the following limits (CDV_{chronic}):

Product type	CDV _{chronic}
Heavy-duty laundry detergent (all types)	35,000 l/kg wash
Low-duty laundry detergent (all types)	20,000 l/kg wash
Stain remover (pre-treatment only)	3,500 l/kg wash*
Fabric softener	7,500 l/kg wash

* CDV limit based on an estimated dosage of 2 ml per application and 6 applications per wash-load of 4.5 kg for a liquid stain remover. Products dosed as e.g. powder or paste shall comply with the same CDV limit.

The critical dilution volume toxicity (CDV_{chronic}) is calculated for all ingredients (i) in the product using the following equation:

$$CDV_{\text{chronic}} = \sum CDV_{(i)} = \frac{\text{weight}_{(i)} \cdot DF_{(i)}}{TF_{\text{chronic}(i)}} \cdot 1000$$

where

weight (i) = the weight of the ingredient per recommended dose
DF = the degradation factor
TF = the chronic toxicity factor of the substance as stated in the DID list.

Motivation:

The CDV aims at setting a high standard and benchmark the ecolabelled products based on all ingredients in the final product. The method of calculating the CDV has been adjusted to fit the latest version of the DID list (2007 version). The formerly used parameters LF (loading factor) and LTE (long term effect) have been replaced with DF (degradation factor) and TF (toxicity factor). For further explanation of the calculation method and DID list parameter, reference is made to Detergents Ingredients Database Part A and B, 2007 (or later versions) available at the EU Ecolabel website.

Generally, the use of chronic toxicity data are preferred as long term toxicity data are considered of higher quality and are giving a more precise/reliable estimate of environmental effects compared to acute toxicity data. The CDV values are thus based on chronic toxicity factors. For many substances on the DID list the “chronic” toxicity factors are, nevertheless, based on acute toxicity values and certain substances (such as fragrances, silicates, various surfactants) get a higher weight in the CDV_{chronic} calculation than may be reasonable, due to the lack of chronic data. The proposed CDV values have taken this into account. It is, however, important that new chronic data are presented and made available. For substances for which the chronic TF values on the DID list are based on acute toxicity data, chronic ecotoxicity values presented to the competent bodies should be considered in order to correctly estimate the chronic TF for the substance.

The CDV levels for heavy-duty and low-duty laundry detergents and stain removers have been established with reference to the Nordic Ecolabel Criteria for laundry detergents, version 6.0 (from 2008) and are furthermore based on calculated CDV values for the available product formulations. Liquid products generally have a lower level of total chemicals per functional unit compared to powders due to the water content in liquids. However, liquid detergents typically contain a much higher level of surfactants per functional unit compared to powders. Surfactants have a high contribution to the CDV, whereas powders often contain high amounts of relatively “inert” substances like zeolite, carbonates and sulphates etc. which generally have a low contribution to the CDV. Thus, the CDV levels are identical for powders and liquids. This implies that liquids have a higher contribution to aquatic toxicity per gram active ingredient. The critical dilution volume per wash is, however, the same.

More than 50 different product formulations already on the market in Scandinavia (including heavy-duty detergents, low-duty detergents and pre-treatment stain removers) comply with the proposed CDV levels. A re-calculation of the available EU ecolabelled product formulations (8 different product formulations) shows that these products also comply with the proposed limits. Although a uniform correlation factor between the two calculation methods can not be derived, a comparison of the CDV values using the former and the new calculation method indicate, that the proposed CDV values are stricter compared to the old CDV requirement. Non-ecolabelled formulations supplied from southern Europe do not comply with the proposed CDV levels, indicating that regular products without optimised chemical profiles are not able to fulfil the ecolabel requirements.

As evident from the discussions on the working group meetings, the CDV criterion is seen as one of the most important criteria regulating the environmental properties of the products.

5.1.5. Biodegradability of organics (3)

Proposed requirement:

The content of organic substances in the product that are

- aerobically non-biodegradable (not readily biodegradable) (aNBO)
- anaerobically non-biodegradable (anNBO)

must not exceed the following limits:

aNBO

Product type	aNBO, powder	aNBO, liquid/gel
Heavy-duty laundry detergent	1.0 g/kg wash	0.55 g/kg wash
Low-duty laundry detergent	0.55 g/kg wash	0.30 g/kg wash
Stain remover (pre-treatment only)	0.10 g/kg wash	0.10 g/kg wash*

* aNBO limit based on an estimated dosage of 2 ml per application and 6 applications per wash-load of 4.5 kg for a liquid stain remover. The aNBO limit shall comply with the same limit for products dosed as e.g. powder or paste.

anNBO

Product type	anNBO, powder	anNBO, liquid/gel
Heavy-duty laundry detergent	1.3 g/kg wash	0.70 g/kg wash
Low-duty laundry detergent	0.55 g/kg wash	0.30 g/kg wash
Stain remover (pre-treatment only)	0.10 g/kg wash	0.10 g/kg wash*

* anNBO limit based on an estimated dosage of 2 ml per application and 6 applications per wash-load of 4.5 kg for a liquid stain remover. The anNBO limit shall comply with the same limit for products dosed as e.g. powder or paste.

Motivation:

A general requirement to the content of not readily biodegradable and not anaerobically biodegradable organics reduces the level of non-biodegradable organics to a minimum in ecolabelled laundry detergents and stain removers. The requirement for biodegradability of organics promotes ecolabelled products with an optimal biodegradation profile and that the possible accumulation of non-biodegradable substances in waste water sludge and other relevant environmental compartments is reduced.

Substances commonly used in laundry detergents that are not aerobically biodegradable (aNBO) are e.g. polycarboxylates, CMC, silicone, PVNO/PVPI, phosphonates, polymers, fragrance, colour, optical brighteners (fluorescent whitening agents).

Substances commonly used in laundry detergents that are not anaerobically biodegradable (anNBO) are e.g. surfactants (certain types), polycarboxylates, CMC, silicone, PVNO/PVPI, phosphonates, polymers, fragrance, colour, optical brighteners

(fluorescent whitening agents), iminodisuccinate, EDDS, polyaspartic and polyaspartic acid. Furthermore, data for anaerobic biodegradability are not available (according to the DID list) for a range of other substances commonly used, such as MGDA, various organic acids and glycol ethers etc. Note that TAED should be considered anaerobically biodegradable.¹

The levels for the content of aNBO/anNBO have been established with reference to the Nordic Ecolabel Criteria for laundry detergents, version 6.0 with some adjustments. Different levels of aNBO/anNBO thus apply for powder and liquid products, respectively, related to the difference in total chemicals for these products. More than 50 different ecolabelled product formulations already on the market in Scandinavia (both heavy-duty, low-duty and stain removers) comply with the proposed levels. A re-calculation of some of the products in the Danish and UK EU Ecolabel licenses shows that these 8 formulations currently holding the EU Ecolabel also comply with the proposed limits. Non-ecolabelled formulations supplied from southern Europe do not comply with the proposed aNBO/anNBO levels, indicating that regular products without optimised chemical profiles are not able to fulfil the ecolabel requirements.

With a general requirement to the biodegradability of the organic substances, the aNBO/anNBO criterion combined with the CDV criterion ensures that the overall content of not readily biodegradable and/or toxic substances is limited, while at the same time allowing some flexibility in the product composition. The focus of the ecolabel criteria should address product and ingredient properties rather than limiting specific types or functionalities of substances, although some exceptions apply (specified in requirement no. 4). With a general focus on biodegradability, the ecolabel criteria allow a certain content of substances that do not degrade under aerobic/anaerobic conditions. There should be no distinction between which aNBO/anNBO substances that are used – provided that they comply with the overall criteria document and that the CDV value ensures that the overall content of acutely toxic substances is reduced. As both anNBO surfactants and various other organics such as optical brighteners, colouring agents, phosphonates etc. have been discussed in the context of the ecolabel as ingredients of possible concern, a more detailed perspective is given below.

Surfactants

In contrast to the former criteria, no specific requirements apply to biodegradability of surfactants. Ready biodegradability of surfactants is already required for products sold on the European market according to the Detergents Regulation (Regulation 648/2004/EC). Manufacturers of surfactants and/or detergents for industrial and institutional use may ask for derogation if the ultimate biodegradability fails to meet the criteria in Annex III to the Regulation (at least 60% or 70% depending on the test method within twenty-eight days). Surfactants not meeting the level of primary biodegradability stipulated in Annex II (at least 80%) will not be granted derogation. Regulation 648/2004/EC does not define requirements to anaerobic biodegradability of ingredients in detergents. By 2009 the Commission shall carry out a review of the application of the Regulation, and, where justified, present legislative proposals relating to anaerobic biodegradation. The status regarding the regulation is that it is currently not recommended that anaerobic biodegradability is used as an additional pass/fail criterion for the environmental acceptability of surfactants (COM 2009a).

¹ The DID list (2007 version) indicates that there is no data regarding for anaerobic biodegradability for TAED (DID no 128). However, documentation for anaerobic biodegradability of TAED according to OECD 311 has been presented to Ecolabelling Denmark. The DID list should be revised accordingly and TAED should be considered anaerobically biodegradable in the calculation of anNBO.

In an opinion concerning the environmental risk assessment of non biodegradable Detergent Surfactants under Anaerobic Conditions, the Scientific Committee on Health and Environmental Risks (SCHER) concluded that a requirement of anaerobic degradation of surfactants is not in itself regarded as an effective measure of environmental protection. The opinion states that “a poor biodegradability under anaerobic conditions is not expected to produce substantial modifications in the risk for fresh water ecosystems as the surfactant removal in the WWTP seems to be regulated by its aerobic biodegradability”. Furthermore, it is stated that “there is evidence indicating that fulfilling the criteria for ready and ultimate aerobic biodegradability is essential for achieving a significant dissipation/removal of surfactants in the WWTP, while anaerobic biodegradation plays a minor role in the overall dissipation/removal”. The information reviewed by the SCHER also states that “fulfilling the criteria for ultimate biodegradation under anaerobic conditions leads to a significant reduction in the surfactant sludge concentration in those cases where anaerobic sludge digestion process is included in the overall treatment. However, the measured concentrations of anaerobically degradable surfactants in sludge are still significant...” (SCHER 2005).

It is recognised, that anaerobic biodegradability of surfactants is not the most important parameter influencing the overall environmental impact of laundry detergents. However, with the above limits for the content of anNBO combined with the CDV criterion, the level of non-anaerobically surfactants is in practice reduced to a few percent at maximum, as builders, co-builders, anti-foaming agents etc are expected to fill up the main part of the anNBO substances (based on the composition of available formulations). A general level for anNBO (as opposed to a pass/fail requirement for anNBO of surfactants) will allow some flexibility for the manufacturers of selecting the right balance for the content of anNBO substances such as builders, colouring agents, optical brighteners, surfactants etc. The major arguments for setting the anNBO limit at a level that effectively reduces the content of anNBO surfactants to a minimum are as follows:

- Surfactants are used in high concentrations in laundry detergents and are the key ingredients contributing to the overall aquatic toxicity, when these products are used and released ‘down the drain’ (see LCA reference in Appendix 2).
- The level of waste water treatment varies throughout Europe and some regions have poor or no treatment of waste water. The potential for surfactants and other organics to biodegrade ultimately under the redox conditions that prevail in the main environmental compartments are, therefore, a relevant inherent property for substances used in ecolabelled products. The environmental compartments include: (I) WWTPs: activated waste water treatment (aerobic) and sludge digestion (anaerobic); (II) aquatic systems: surface water and sediment-water interface (aerobic), and sediments (mainly anaerobic); and (III) soil systems: unsaturated soil (aerobic), saturated soil (mainly anaerobic), and sludge-amended soil (mainly aerobic with anaerobic hot spots).
- It is recognised that anaerobically biodegradable surfactants (like e.g. soaps) are present in anaerobic compartments (together with surfactants that resist anaerobic degradation). However, anaerobic biodegradation of surfactants having this potential is assumed to occur, when the substances are desorbed from particles in sludge, sediment or soil and become bioavailable to microorganisms (only substances that are bioavailable can cause toxic effects).
- Laundry detergents based on not anaerobically biodegradable surfactants are marketed Europe with estimated high market shares. Both authorities and consumer organisations several European countries are of the opinion that the use of non-anaerobically biodegradable surfactants should be limited in order to protect the environment (even though the opinion from SCHER and other parties indicate that anaerob biodegradability is not an effective measure of environmental protection).

- A large range of surfactants used in modern detergent products (primarily non-ionic surfactants) already fulfil the requirement of anaerobic biodegradability. Note that many of the anaerobically biodegradable surfactants have a higher aquatic toxicity compared to surfactants that do not degrade under anaerobic conditions (as e.g. illustrated by the DID list).

Non-surfactants

Regulation 648/2004/EC does not define requirements to the biodegradability of non-surfactant organic ingredients in detergents. Within the scope of the ongoing review of the Regulation, the relevance of biodegradability requirements of non-surfactant organics has also been evaluated. A report was elaborated for DG Enterprise regarding the human and environmental risk associated with non-surfactant ingredients and zeolite based detergents (RPA 2006). The report focuses on organic co-builders and other organic non-surfactants in detergents with particular attention to not readily biodegradable substances or substances with other properties of particular concern. Based on a list of 50 non-surfactant ingredients most commonly used (organics and inorganics, fragrances not included) the report identified 11 groups of substances of potential concern. Further analysis of these groups concluded that the following 6 substance groups were associated with a potential concern (some of them due to a lack of data):

- Phosphonates: concern regarding degradation and ecotoxicity
- EDTA/EDTA salts: concern regarding mobilisation of metals
- NTA: classification as carcinogenic
- Detergent Dyes: available data insufficient for conclusion of potential risks
- Fluorescent Whitening Agent FWA-5: degradation products of potential concern
- Triethanolamine: available data insufficient for conclusion of potential risks

Some of the above findings were further evaluated in an opinion by the Scientific Committee of Health and Environmental risks (SCHER). SCHER has thus indicated that there may also be a potential environmental risk associated with the use of polycarboxylates under worst case conditions, but further data are needed to validate this (SCHER 2007). The status regarding the review of Regulation 648/2004/EC is that it is currently not recommended that biodegradability requirements are introduced for non-surfactant organics in laundry detergents. Even though several substances are not readily biodegradable, the low toxicity of these substances indicates that there is no risk for either human health or the environment (COM 2009b).

The ecolabel criteria consider all the above substances (and other possible substances of concern such as fragrances) either through the general requirements to CDV and aNBO/anNBO and/or by specific substance requirements. EDTA/EDTA salts and NTA are excluded due to specific concerns (as described under requirement no. 4). Phosphonates, dyes, optical brighteners, solvents, fragrances etc are subject to regulations through the CDV and aNBO/anNBO criteria.

Optical brighteners

As optical brighteners were explicitly mentioned as a focus point after the previous revision (and as optical brighteners are excluded e.g. in the Nordic Ecolabel Criteria for laundry detergents), some further details are presented below regarding this substance group:

In Europe, the optical brighteners (or: fluorescent whitening agents, FWA) most commonly used in laundry detergents are FWA-1 and FWA-5 (RPA 2006). FWA-1 and

FWA-5 generally have low to moderate aquatic toxicity, a low potential for bioaccumulation and are not readily biodegradable. FWA-1 and FWA-5 may, however, undergo rapid photo degradation. Photo degradation of FWA-1 leads to numerous metabolites that have not been identified. The main photo degradation products of FWA-5 are readily biodegradable. (HERA 2003 & 2004). However, concern still remains regarding the ecotoxicological properties of the degradation products of FWA-5 (RPA 2006). FWA-1 and FWA-5 are, to a large extent, adsorbed to sludge in waste water treatment plants (HERA 2003 & 2004).

Optical brighteners work by depositing on fabrics during laundering to enhance the brightness of light coloured fabrics and do not have any impact on the cleaning performance of the products (the ability to remove soil and stains). As the substances remain in the textiles after washing, the substances are in close contact with the skin. There is no evidence of sensitising properties of the substances. Optical brighteners are used in low concentrations in the products (< 0.2%) and according to the HERA risk assessment reports the estimated risk for health and environment is low. Although the substances may not be considered necessary for the main function of the products – the removal of soil and stains - the use of FWAs seem to have a large influence on the consumer's perception of clean clothes.

5.1.6. Excluded or limited substances and mixtures (4)

Proposed requirement:

a) Specified excluded ingredients

The following ingredients must not be included in the product, neither as part of the formulation nor as part of any preparation included in the formulation:

- Phosphates
- EDTA (ethylenediamine tetraacetate)
- Nitromusk and polycyclic musk

b) Hazardous substances and mixtures

According to the Article 6(6) of Regulation No 66/2010 on EU Ecolabel, the product or any part of it thereof shall not contain substances or mixtures meeting the criteria for classification with the hazard classes or categories in accordance with Regulation (EC) No1272/2008 specified below nor shall it contain substances referred to in Article 57 of Regulation (EC) No 1907/2006.

This criterion applies to all ingredients present in concentrations > 0.010 % (preservatives, coloring agents and fragrances included).

GHS Hazard Statement¹	EU Risk Phrase²
H300 Fatal if swallowed	R28
H301 Toxic if swallowed	R25
H304 May be fatal if swallowed and enters airways	R65
H310 Fatal in contact with skin	R27
H311 Toxic in contact with skin	R24
H330 Fatal if inhaled	R23/26
H331 Toxic if inhaled	R23
H340 May cause genetic defects	R46
H341 Suspected of causing genetic defects	R68
H350 May cause cancer	R45
H350i May cause cancer by inhalation	R49
H351 Suspected of causing cancer	R40

H360F May damage fertility	R60
H360D May damage the unborn child	R61
H360FD May damage fertility. May damage the unborn child	R60/61/60-61
H360Fd May damage fertility. Suspected of damaging the unborn child	R60/63
H360Df May damage the unborn child. Suspected of damaging fertility	R61/62
H361f Suspected of damaging fertility	R62
H361d Suspected of damaging the unborn child	R63
H361fd May damage fertility. May damage the unborn child	R62-63
H362 May cause harm to breast fed children	R64
H370 Causes damage to organs	R39/23/24/25/26/27/28
H371 May cause damage to organs	R68/20/21/22
H372 Causes damage to organs	R48/25/24/23
H373 May cause damage to organs	R48/20/21/22
H400 Very toxic to aquatic life	R50. R50/53
H410 Very toxic to aquatic life with long-lasting effects	R50/53
H411 Toxic to aquatic life with long-lasting effects	R51/53
H412 Harmful to aquatic life with long-lasting effects	R52/53
H413 May cause long-lasting effects to aquatic life	R53
EUH059 Hazardous to the ozone layer	R59
EUH029 Contact with water liberates toxic gas	R29
EUH031 Contact with acids liberates toxic gas	R31
EUH032 Contact with acids liberates very toxic gas	R32
EUH070 Toxic by eye contact	R39-41
Sensitizing substances	
H334 May cause allergy or asthma symptoms or breathing difficulties if inhaled	R42
H317 May cause allergic skin reaction	R43

¹ Regulation (EC) No 1272/2008 on classification, labelling and packaging of substances and mixtures, amending and repealing Directives 67/548/EEC and 1999/45/EC, and amending Regulation (EC) No 1907/2006

² Directive 67/548/EEC with adjustment to REACH according to Directive 2006/121/EC and Directive 1999/45/EC as amended

Derogations: the following substances or mixtures are specifically exempted from this requirement:

Surfactants In concentrations < 25% in the product	H400 Very toxic to aquatic life	R 50
Biocides used for preservation purposes*	H410 Very toxic to aquatic life with long-lasting effects	R50/53
	H411 Toxic to aquatic life with long-lasting effects	R51/53
Fragrances	H412 Harmful to aquatic life with long-lasting effects	R52/53
Biocides used for preservation purposes*		
Enzymes**	H334 May cause allergy or asthma symptoms or breathing difficulties if inhaled	R42
Bleach catalysts **		
Enzymes**	H317 May cause allergic skin reaction	R43
Bleach catalysts **		
NTA as an impurity in MGDA and	H351 Suspected of causing cancer	R40

GLDA***		
Optical brighteners (only for heavy duty laundry detergent)	H413 May cause long lasting effects to aquatic life	R53

* Referred to in Criterion 4e. This exemption is applicable provided that biocides' bioaccumulation potentials are characterized by log Pow (log octanol/water partition coefficient) <3.0 or an experimentally determined bio-concentration factor (BCF) ≤100.

**Including stabilizers and other auxiliary substances in the preparations

*** In concentrations lower than 1.0% in the raw material as long as the total concentration in the final product is lower than 0.10%

c) Substances listed in accordance with article 59(1) of Regulation (EC) No 1907/2006

No derogation from the exclusion in Article 6(6) of the Regulation (EC) No 66/2010 shall be given concerning substances identified as substances of very high concern and included in the list foreseen in Article 59 of Regulation (EC) No 1907/2006, present in mixtures, in an article or in any homogenous part of a complex article in concentrations higher than 0.010%.

d) Specified limited ingredients - fragrances

Any ingredients added to the product as a fragrance shall be manufactured and handled following the code of practice of the International Fragrance Association (IFRA). The code can be found on IFRA website: <http://www.ifraorg.org>.

The recommendations of the IFRA Standards concerning prohibition, restricted use and specified purity criteria for materials shall be followed by the manufacturer.

Fragrance substances subject to the declaration requirement provided for in Regulation 648/2004/EEC of the European Parliament and of the Council on detergents (Annex VII) and which are not already excluded by criterion 4b and (other) fragrance substances classified H317/R43 (May cause allergic skin reaction) and/or H334/R42 (May cause allergy or asthma symptoms or breathing difficulties if inhaled) shall not be present in quantities ≥ 0.010% (≥100 ppm) per substance.

e) Biocides

The product may only include biocides in order to preserve the product, and in the appropriate dosage for this purpose alone. This does not refer to surfactants, which may also have biocidal properties.

Motivation:

By defining criteria which imply that substances characterised by certain intrinsic properties shall not be used in ecolabelled products, the ecolabel may respond to doubts in relation to the safe use of specific chemicals, and thereby address environmental or consumer concern (e.g. substances that are classified as Carcinogenic, Mutagenic, toxic to reproduction (CMR), environmentally hazardous and sensitizing substances).

Substances on the candidate list and substances anticipated to enter the candidate list for authorization under REACH (substances of very high concern) are also excluded from ecolabelled products ECHA (the European Chemicals Agency) defines substances of very high concern as substances being classified as CMR and substances fulfilling the PBT criteria or the vPvB criteria. (Furthermore, case by case studies of other problematic substances, such as endocrine disrupters, may enter the list). Substances fulfilling the PBT and vPvB criteria will thus be excluded from ecolabelled products.

a) Specified excluded ingredients

The groups of substances that are excluded from the products have been expanded to include phosphates.

Phosphates are currently not limited by Regulation 648/2004/EC (February 2011) but a proposal for amendment of the regulation regarding the use of phosphates and phosphorous compounds in household laundry detergents is currently in public consultation. The proposal for regulation of the content of phosphates and phosphorous compounds in household laundry detergents suggests that products containing more than 0.5% phosphorous by weight shall not be placed on the market after 1 January 2013. The current proposal confirms that eutrophication caused by the use of phosphate is still a subject of high relevance.

In the revised Ecolabel criteria phosphates are excluded from ecolabelled products based on the following arguments:

- Phosphates are already banned in laundry detergents in some European countries and limited by legislation or voluntary actions in other countries (e.g. Norway, Sweden, Switzerland, Czech Republic, France, Germany, Italy, Austria, Netherlands, Belgium and Poland) and are furthermore expected to be restricted through the foreseen amendment to Regulation 648/2004/EC. Thus, allowing phosphate in ecolabelled products will contradict national bans already implemented.
- Many regions in Europe (primarily eastern Europe) have limited or poor waste water treatment with limited capacity for phosphate removal in the waste water. In these areas there is a significant risk of phosphate eutrophication (CSTEE 2003).
- Chemical phosphorous removal in sewage treatment is expected to increase the volume of sludge from approx. 15% to more than 50%, resulting in sludge of lower quality that may not be suitable for agricultural use (CSTEE 2003).
- Many of the large retailers in Western Europe have voluntarily decided to phase out phosphates in laundry detergents due to the public concern of eutrophication.
- High market shares of phosphate free detergents are already a reality in several European countries (CSTEE 2003).

Phosphate emission from agriculture and point sources (including waste water from households and industry) are the major contributors of P to the aquatic environment (EEA 2005). However, phosphates from detergents (laundry, dish wash) play only a minor role in the overall phosphate emissions to the aquatic environment, especially in areas where phosphate is effectively removed in waste water. In a European quantitative risk assessment of the eutrophication of polyphosphates in detergents, it is estimated that on average, less than 5% of the overall P contribution is related to laundry detergents (INIA 2009). Point sources still have a significant contribution to the overall P emissions. The major P contributions to point sources arise from human metabolism (INIA 2009). Generally, the emissions of P via point sources have decreased during the last 30 years. This is mainly due to improved waste water treatment, especially in Northern and Western Europe, following the implementation of the EU Waste Water Treatment Directive (1991/271/EC). (EEA 2005). Eastern European countries seem to be following this development although Directive 1991/271/EC is not fully implemented in many member states (EEA 2005, CEEP 2007).

The most important alternative substances for phosphates in laundry detergents are zeolites, which are typically used in combination with polycarboxylates and

phosphonates, and silicates and citrates. Other phosphate alternatives that are currently used to a minor extent in laundry detergents include iminodisuccinate, MGDA and GLDA. A total ban on phosphates would lead to a much reduced amount of sludge from the waste water treatment plants (WWTPs) using chemical phosphate removal and is not suspected to affect the biological processes in the WWTP.

The replacement of phosphates in laundry detergents with the above mentioned alternatives is not expected to cause adverse effects in the environment, and a positive side effect could be lower operation costs related to reduction in the use of chemicals for phosphate precipitation in the WWTP. Zeolites, which is the main alternative to phosphate, do not pose a risk to health and environment (HERA 2004 and 2005). However, an important aspect of the use of zeolites is the contribution to the volume of waste water sludge as approximately 90% of the zeolite entering the WWTPs is incorporated into the sewage sludge (HERA 2004 & 2005). In the opinion from The Scientific Committee on Toxicity, Ecotoxicity and the Environment (CSTEE) it was concluded, that "the use of zeolites in detergent products should not increase the amount (volume) of sewage sludge produced, or lead to a sewage sludge of unacceptable quality for agricultural use (CSTEE 2003). SCHER evaluated the potential risk related to the co-builders phosphonates and polycarboxylates, which are used in both phosphate and zeolite based detergents (RPA 2006), and have concluded that only limited data are available and that further assessments should be conducted. For both phosphonates and polycarboxylates, the available data indicate that there may be a potential environmental risk under worst case conditions, but further data are needed to validate this. It is furthermore indicated that the potential risks of phosphonates and polycarboxylates are expected to be higher for zeolite-based than for P-based detergents (SCHER 2007). Still, phosphates and polycarboxylates are generally present in very low concentrations compared to zeolite and phosphate. Through the ecolabel criteria, the content of phosphonates and polycarboxylates is limited through the general requirements to aNBO and anNBO.

The benefits of moving from phosphate based to zeolite based detergents have been assessed for each of the EU-25 countries. The greatest benefits are estimated in countries with high phosphate detergent use, low provision of tertiary sewage treatment and severe problems with eutrophication. Based on this assessment, there are only few or some benefits to gain in Northern and Central Europe, whereas the most benefits from moving to phosphate free detergents are assumed to be gained in the Baltic, eastern and southern European countries (Czech Republic, Slovakia, Poland, Spain, Portugal, Latvia and Lithuania) (RPA 2006).

EDTA can re-mobilise metals from sediments and soils leading to contamination of surface and ground waters. The aerobic and anaerobic biodegradability of EDTA are furthermore limited. Risk assessment of EDTA has concluded a need for limitation of the risk in a range of applications, although not for domestic detergents as the use of EDTA in these products is limited (EU RAR 2004). Exclusion of EDTA in the ecolabel criteria is thus a preventive measure. This also ensures that it can be communicated to the consumers that ecolabelled products are EDTA free.

Nitromusk and polycyclic musk generally have unwanted health and environmental properties. Some are already excluded through the exclusion of CMR substances. Communication with suppliers of fragrance (personal communication, 2009) has confirmed that many companies all over Europe still use polycyclic musk in consumer products. The use of nitromusk is apparently very limited, but manufacturers outside Europe still produce for example Musk Ambrette, which is prohibited by IFRA. Exclusion of nitro- and polycyclic musk is thus still considered relevant as a preventive measure.

Note that **APEO's and derivatives** were excluded in the 2003 criteria as their degradation products are not readily biodegradable and as some degradation products are suspected of endocrine disrupting effects. This applies e.g. to Nonylphenol and Nonylphenoethoxylates (Danish EPA 2002, DHI 2007). APEO and derivatives have, however, been phased out of a range of industrial applications by voluntary actions in different industrial sectors. APEO's have since 2004 been excluded from laundry detergents through the Detergents Regulation (648/2004/EEC).

b) Hazardous substances and mixtures

Exclusion of CMR substances, toxic substances and environmentally hazardous substances are a general requirement for ecolabelled products according to Regulation (EC) No 66/2010 of the European Parliament and of the Council of 25 November 2009 on the EU Ecolabel. In addition the requirement also addresses substances classified as sensitizers. Allergy is an increasing problem. Some ingredients used in laundry detergents and auxiliary products are designed to stay in/leave traces in the textile (e.g. fragrances). Other substances may be left in the textile due to incrustation of poorly soluble substances or poor/insufficient rinsing in the washing process. Thus, a limitation of the content of sensitizing substances is foreseen to minimise the risk of allergic reactions. By exclusion of substances with certain hazardous properties, the most critical substances regarding human health and environment are excluded from the products. According to the EU Ecolabel Regulation, derogation from this requirement is only possible if it is not technically possible to substitute such substances or if the overall environmental benefit from using the abovementioned substances can be demonstrated. Certain derogations have thus been introduced for laundry detergents, for example regarding the use of surfactants classified as environmentally hazardous. In ecolabelled laundry detergents, the majority of the surfactants typically used are classified R50 (H400): Very toxic to aquatic life. (This e.g. applies to non-ionic surfactants categorised as DID no 25, 28, 29 and 34). In the revised criteria, surfactants classified R50 (or H400) are not prohibited as this would require a shift towards other types of surfactants such as non-anaerobically biodegradable anionic surfactants. Other derogations apply for enzymes, biocides, bleach catalysts, fragrances and optical brighteners as these substances (except fragrances) cannot be substituted while still maintaining satisfactory performance of the products. Enzymes and bleach catalysts (including stabilisers and other additives in the formulations) are e.g. derogated as these substances are important for the function of the products and may also reduce the content of other active ingredients (primarily surfactants) in the product. Both enzymes and certain bleach catalysts can lead to savings of the overall environmental impact by reducing the volume of the total chemicals, the CDV and/or by facilitating wash at lower temperatures.

Although fragrances do not contribute to the performance of laundry detergents, fragrances are to a certain extent derogated from the requirement as it is recognised that a large proportion of the consumers require fragranced products - also when purchasing ecolabelled products. The possibility of marketing fragranced product variants is an important sales parameter, and the prevalence of ecolabelled products is heavily compromised if fragrances are not allowed.

c) Substances listed in accordance with article 59(1) of Regulation (EC) No 1907/2006

Through this requirement "Substances of very high concern" will be restricted from use in ecolabelled products. Such substances are CMR substances (addressed in requirement 4b) and substances fulfilling the PBT and vPvB criteria as defined under REACH. Furthermore, other substances of very high concern identified on a case-by-case basis

from scientific evidence as causing probable serious effects to human health or the environment might enter the candidate list (e.g. endocrine disrupting chemicals).

d) Specified limited ingredients - fragrances

The requirement stating that fragrance must be manufactured and/or handled following the code of practice of the International Fragrance Association (IFRA) ensures compliance with IFRA standards.

Many fragrance formulations contain a range of sensitizing substances. By limiting the content of allergenic substances to a minimum, the risk of allergic reactions when using ecolabelled products for laundry washing is minimised. The limit implies that fragrances present in ecolabelled products will not require declaration on the label according to the Detergents regulation, as the limit for declaration is set at 0.010 % (100 ppm).

e) Biocides

This requirement ensures that biocides used for other purposes than preservation are not used in ecolabelled laundry detergents. Antimicrobial or disinfecting ingredients added for other purposes than preservation are generally unwanted in laundry detergent and other household products as disinfection is not required for household washing and cleaning. In case of infectious diseases in the household, the washing temperature should be raised to $\geq 60^{\circ}\text{C}$, which is also a mandatory washing advice in the revised criteria. Due to their mode of action, substances with disinfecting or antimicrobial properties generally have a high aquatic toxicity and are often poorly biodegradable due to inhibitory effects on bacteria. Use of antimicrobials and/or disinfecting agents should also generally be reduced in relation to the possible development of resistant bacteria. Claims of antibacterial effects are seen on detergent products currently on the European market (e.g. stain removers and cleaning products). The use of e.g. nanosilver as bactericides in products marketed outside Europe has been reported and the EU Ecolabel should be prepared for the possible appearance of such products on the European market in the future (The Project on Emerging Nanotechnologies; Nanogist Co. 2009).

5.1.7. Packaging requirements (5)

Proposed requirement:

- **Weight/utility ratio (WUR)**

The weight/utility ratio (WUR) of the product must not exceed the following values:

Product type	WUR
Powders	1.2 g/kg wash
Others (e.g. liquids, gels, tablets, capsules)	1.5 g/kg wash

WUR is calculated only for primary packaging (including caps, stoppers and hand pumps/spraying devices) using the formula below.

$$WUR = \sum [(W_i + U_i)/(D_i * r_i)]$$

Where:

W_i = the weight (g) of the packaging component (i) including the label if applicable.

U_i = the weight (g) of non-recycled (virgin) material in the packaging component (i). If the proportion of recycled material in the packaging component is 0% then $U_i = W_i$.

D_i = the number of functional units contained in the packaging component (i). The functional unit = dosage in g/kg wash

r_i = recycling figure, i.e. the number of times the packaging component (i) is used for the same purpose through a return or refill system ($r=1$, if the packaging is not re-used for the same purpose. If the packaging is reused r is set to 1 unless the applicant can document a higher number.

Exceptions:

Plastic/paper/cardboard packaging containing more than 80% recycled material is exempted from this requirement.

Packaging is regarded as recycled if the raw material used in the packaging has been collected from packaging manufacturers, the distributive stage or the consumer stage. If the raw material is industrial waste from the material manufacturer's own production process, then the material will not be regarded as recycled.

- **Plastic packaging**

Only phthalates that at the time of application have been risk assessed and have not been classified according to requirement 4b (and combinations hereof) may be used in the plastic packaging.

- **Labelling of plastic packaging**

To allow for identification of different parts of the packaging for recycling, plastic parts in the primary packaging must be marked in accordance with DIN 6120, Part 2 or the equivalent. Caps and pumps are exempted from this requirement.

Motivation:

a) Weight/utility ratio (WUR)

In a life-cycle perspective, the packaging has a relatively low impact on the environment (Appendix 2). However, it is still relevant to reduce the consumption of packaging material to a minimum in accordance with the aim of the packaging and packaging waste directive (Directive 94/62/EC). From a communication point of view, it is also an important signal to the consumers that packaging is reduced to a minimum for ecolabelled products.

The former requirement establishing a limit of the weight of the primary packaging per wash is no longer considered applicable as the criterion in practice did not include liquid products (or: plastic packaging) and to some extent limited the possibility for ecolabelling of tablets and powders in cardboard boxes. The general trend of increased market shares of liquid laundry detergents and possibly also tablets has created a need for adjustment of the packaging requirement enabling packaging for e.g. liquids, tables and sachets to comply with the criteria. Products other than powders generally have a higher proportion of packaging relative to the volume of product, and more resources are thus used for packaging of such products. On the other hand, dosing via liquids, tablets and other forms of unit dosing is anticipated to reduce the risk of overdosing of the products. It is also recognised that different types of products may be needed for different applications and that the consumers in some countries prefer liquids or tablets relative to powders.

The requirement limiting the amount of packaging per wash has been modified and the concept weight/utility ratio (WUR) has been adopted from the Nordic Ecolabel Criteria for laundry detergents, version 6.0 with minor modifications. More than 50 different ecolabelled product formulations already on the market in Scandinavia (powders, liquids and tablets) comply with the proposed levels. A re-calculation of some of the products in the Danish EU Ecolabel licences show that the formulations (tablets and powders) currently holding the EU Ecolabel also comply with the proposed WUR ratio.

With respect to the recycling figures (r_i) for re-used packaging components, a higher number than 1 can be used if the applicant can demonstrate that the packaging component is actually recycled. This can be demonstrated e.g. by indicating the sales (or expected sales – figures should be provided by the retailer) of primary packaging versus refill packaging, respectively. Alternatively, provided that both primary and refill packaging is equally available for the consumer *at all times*, the applicant may estimate the number of times the primary packaging can reasonably be re-used by refill. (The extent of re-use of a cardboard box is e.g. expected to be lower than a plastic or metal container).

b) Plastic packaging

This requirement is new and will prohibit the use of problematic phthalates as plasticisers in plastic packaging. Some of the phthalates most frequently used in plastics are classified as being toxic to reproduction (DEHP, DBP, BBP). Several other phthalates are suspected of causing endocrine disrupting effects (DHI 2007). Due to these concerns, the phthalates DEHP, DBP, BBP, DINP, DIDP and DNOP have e.g. been prohibited/limited for use in toys and childcare articles (Directive 2005/84/EC). Other ecolabel criteria, e.g. the EU Ecolabel criteria for footwear (2009/563/EEC), also prohibit the use of phthalates of concern. The possible risk associated with the use of phthalates

in plastic packaging for laundry detergents is unknown, but the possible use of potentially endocrine disrupters in ecolabelled laundry detergents and their packaging is generally unwanted.

5.1.8. Washing performance (fitness for use) (6)

Proposed requirement:

The product shall comply with the performance requirements as specified for the relevant product type according to the EU Ecolabel laundry detergents performance test's latest version that can be found here:

http://ec.europa.eu/environment/ecolabel/ecolabelled_products/categories/laundry_detergents_en.htm

Motivation:

Documentation of performance is crucial for the credibility of the Ecolabel. Fulfilling the requirement for performance ensures that the product is fit for use and fulfils the consumer's expectations of a satisfactory functioning detergent. The test protocol has been revised as a separate activity assigned by the EU Commission and has been conducted by Leitat Technological Center parallel to the revision of the EU Ecolabel criteria. The test protocol is a separate document serving to supplement the Ecolabel criteria for laundry detergents.

5.1.9. Points (7)

Proposed requirement:

a) Heavy-duty laundry detergents

A minimum of 3 points must be achieved from the matrix below. (The maximum achievable points are 8 points for coldwater products, 7 points for low-temperature products and 6 points for other products).

Climate profile	Coldwater product (washing performance documented at ≤ 20 °C)	2 P
	Low-temperature product (washing performance documented at > 20 °C to ≤ 30 °C)	1 P
Maximum dosage	Max dosage ≤ 14 g/kg wash (powder, tablet) or ≤ 14 ml/kg wash (liquid, gel)	2 P
	Max dosage ≤ 16 g/kg wash (powder, tablet) or ≤ 16 ml/kg wash (liquid, gel)	1 P
CDV	CDVchronic $< 25,000$ l/kg wash	2 P
	CDVchronic between 25,000 to 30,000 l/kg wash	1 P
aNBO	aNBO $\leq 75\%$ of limit value	1 P
anNBO	anNBO $\leq 75\%$ of limit value	1 P
<i>Minimum points to be achieved for Flower labelled products</i>		3 P

b) Low-duty laundry detergents

A minimum of 3 points must be achieved from the matrix below. (The maximum achievable points are 8 points for coldwater products, 7 points for low-temperature products and 6 points for other products).

Climate profile	Coldwater product (washing performance documented at ≤ 20 °C)	2 P
	Low-temperature product (washing performance documented at > 20 °C to ≤ 30 °C)	1 P
Maximum dosage	Max dosage ≤ 14 g/kg wash (powder, tablet) or ≤ 14 ml/kg wash (liquid, gel)	2 P
	Max dosage ≤ 16 g/kg wash (powder, tablet) or ≤ 16 ml/kg wash (liquid, gel)	1 P
CDV	CDV _{chronic} $< 15,000$ l/kg wash	2 P
	CDV _{chronic} between 15,000 to 18,000 l/kg wash	1 P
aNBO	aNBO $\leq 75\%$ of limit value	1 P
anNBO	anNBO $\leq 75\%$ of limit value	1 P
<i>Minimum points to be achieved for Flower labelled products</i>		3 P

Motivation:

As described in Appendix 2, lowering of the washing temperature will greatly influence the overall environmental impact of laundry detergents. The purpose of the scoring system has two functions: 1) to promote coldwater and low-temperature products which reduce the energy consumption during the wash stage and 2) promote (other) products with very low emissions of hazardous substances to the environment. With this scoring system, products fulfilling the performance test at 30 °C will have to perform even better on parameters like TC, CDV, aNBO and anNBO than stated by the mandatory requirements compared to products with documented performance at lower washing temperatures (< 30 °C). The scoring system is a simple “pass/fail” system reflecting the main environmental impacts of the products.

Based on an analysis of the existing coldwater/low-temperature products on the market holding either the Nordic Ecolabel or the EU Ecolabel (heavy-duty laundry detergents), the chemical parameters of such products is relatively similar to other ecolabelled laundry detergents used at washing temperatures of 40 °C and above. The CDV_{chronic} values for the available coldwater formulations are, however, higher than for other, comparable products due to the choice of builder. The builder in question (inorganic compound) has a relatively high contribution to the CDV_{chronic} due to a lack of chronic toxicity values on the DID list. Acute data are thus used to estimate chronic values and in spite of a low acute toxicity, acute data have a relatively high contribution to chronic CDV values. On the other hand, the analysis also showed that it is possible for existing EU ecolabelled products used at washing temperatures at 40-60 °C to achieve at least 3 points as required (available formulations from Denmark, UK and France). Thus, the requirement is expected to promote the development of products that facilitate reduced CO₂ emissions in the washing phase and/or products with very low emissions of hazardous substances to the aquatic environment.

A prerequisite for washing at low temperatures or in cold water is that the washing machines have programmes facilitating washing at temperatures lower than 30 °C. An enquiry to different manufacturers of washing machines (Danish head offices for Miele, Gorejne, Bosch/Siemens and Asko Vølund) confirm that many of the newer models have

an option for using “cold water” (i.e. the temperature of the inlet water). However, some of the manufacturers also emphasise that especially in regions with hard water, the deposition of calcium combined with soap and other detergent ingredients provide a substrate for development of bio-film in the machine. This problem increases with decreasing washing temperatures and may lead to a reduced lifetime of the machine and possibly problems with smell. It is, however, not expected that all washes in a household are conducted at temperatures $<30\text{ }^{\circ}\text{C}$, and following the machine manufacturer’s instructions and running a high temperature maintenance wash ($\geq 60\text{ }^{\circ}\text{C}$) now and then with a suitable (bleach containing) detergent should prevent possible problems with smell or biofilm. Washing in cold water has been a reality for many years in other regions, e.g. Spain and countries outside Europe (Japan, Asia), indicating that washing machines as well as detergents have been adapted to or developed for this use.

At present, the market for low temperature products are mainly related to heavy duty detergents.

5.1.10. Consumer information (8)

Proposed requirement:

a) Dosage instructions

The recommended dosages shall be specified for ‘normally’ and ‘heavily’ soiled textiles and various water hardness ranges relevant for the countries concerned and referred as appropriate to the weight of textile. (Not applicable for stain removers).

The difference between the dosage recommendations for the lowest water hardness range (soft) for normally soiled textiles and the highest water hardness range (hard) for heavily soiled textiles may not differ by more than a factor of 2. (Not applicable for stain removers).

The reference dosage used for the washing performance test and for assessment of compliance with the ecological criteria on ingredients shall be the same as the recommended dosage on the package for ‘normally soiled’ textiles and a water hardness corresponding to $2.5\text{ mmol CaCO}_3/\text{l}$.

If only water hardness lower than $2.5\text{ mmol CaCO}_3/\text{l}$ are included in the recommendations, the maximum dosage recommended for ‘normally soiled’ shall be lower than the reference dosage used in the washing performance test (water hardness $2.5\text{ mmol CaCO}_3/\text{l}$).

b) Information on the packaging

The following washing advices (or equivalent) shall appear on the packaging of EU ecolabelled products within the product group except for pre-treatment stain removers. The washing advices may be present either as text or symbols:

- “Wash at the lowest possible temperature
- Always wash with full load
- Dose according to soil and water hardness, follow the dosing instructions
- If you are allergic to house dust, always wash bedding at 60° . Increase wash temperature to 60°C in case of infectious diseases

Using this ecolabelled product and following the dosage instructions will contribute to the reduction of water pollution, waste production and energy consumption.”

c) Claims on the packaging

In general, claims on the packaging shall be documented either through performance testing or other relevant documentation (e.g. claims of efficiency at low-temperatures, claims of removal of certain stain types, claims of benefits for certain types or colours of textile or other claims of specific properties/benefits of the product).

- E.g. if a product claims efficiency at 20 °C, the efficiency test must be performed at ≤ 20 °C (and correspondingly for other temperature claims below 30 °C).
- E.g. if a product claims to be efficient on certain stain types, this must be documented with efficiency test

d) Information on the packaging – additional requirements for stain removers

The removal of stains for which no performance test has been conducted, must not be claimed on the product.

Motivation:

The information required on the packaging of ecolabelled products addresses dosing instructions and optimised use of the products in order to facilitate correct dosing and the lowest possible environmental impact of the washing process. Overdosing of laundry detergents is a common phenomenon (Brückner 2007, Elforsk 2005). It is questionable if more accurate dosing information/information text on the packaging will alter the habits of the consumer, as a large proportion of the consumer's dose "by the feel" (Brückner 2007, Elforsk 2005). According to the AISE survey of European washing habits, only 65% of the consumers dose according to the recommendations provided by the manufacturers (AISE 2008). Campaigns like AISEs voluntary industry initiative (the wash-right campaign, www.washright.com) has introduced clear and visible labelling in the form of easily recognisable pictogram's on the packaging (voluntary commitment for manufacturers). Such pictograms are considered very informative. However, the possible introduction of similar pictograms in the ecolabel criteria has been evaluated, but it is concluded that this may cause confusion. An introduction of unique ecolabel pictograms will increase the "burden" of information for manufacturers already committed to using the wash-right symbols. The space is often very limited on the packs due to the many declaration and consumer information requirements already laid down by the Detergents regulation, as well as the demand for placing the information in many different languages by the manufacturers. The manufacturers may choose whether the washing advices are placed as text or symbols, giving the possibility of using the wash-right symbols and adding the remaining information required by the Ecolabel.

The requirement ensures that the recommended dosage on the package complies with the dosage used to document the performance of the product. Furthermore, the requirement ensures that claims of the efficiency and specific benefits of the products are documented. Even though lowering of the wash temperature is generally recommended in order to reduce the energy consumption, the washing advices takes into account special conditions that may apply for consumers allergic to house dust and in case of infections diseases in the household.

5.1.11. Information appearing on the Ecolabel (9)

Proposed requirement:

Optional label with text box shall contain the following text:

- Reduced impact on aquatic ecosystems
- Limited hazardous substances
- Performance tested

The guidelines for the use of the optional label with text box can be found in the "Guidelines for use of the Ecolabel logo" on the website:

http://ec.europa.eu/environment/ecolabel/promo/logos_en.htm

Motivation:

According to Regulation (EC) No 66/2010, three key environmental characteristics of the ecolabelled product shall be stated in each criteria document and may be displayed in the optional label with text box.

5.2. Former requirements not included in the revised criteria

5.2.1. Insoluble, inorganic ingredients

Former requirement:

The requirement limiting the content of insoluble, inorganic substances to 30 g/wash is excluded in the revised criteria.

Motivation:

A requirement limiting the content of insoluble, inorganic ingredients is not considered a key parameter in reducing the environmental impact of laundry detergents. Insoluble inorganics are mainly present in form of zeolites. Zeolites do not pose a risk to health and environment (HERA 2004 and 2005). However, an important aspect of the use of zeolites is the contribution to the volume of waste water sludge as approximately 90% of the zeolite entering the WWTPs is incorporated into the sewage sludge (HERA 2004 & 2005). In an opinion from The Scientific Committee on Toxicity, Ecotoxicity and the Environment it was concluded, that "the use of Zeolites in detergent products should not increase the amount (volume) of sewage sludge produced, or lead to a sewage sludge of unacceptable quality for agricultural use (CSTEE 2003).

5.2.2. Phosphates

Former requirement:

The requirement limiting the content of phosphates to 25 g/wash is replaced with a total exclusion of phosphates. Reference is made to requirement no 4a, addressing excluded substances and mixtures.

Motivation:

Reference is made to the motivation presented under requirement No 4: Excluded or limited substances and mixtures.

5.2.3. Surfactants

The revised criteria have no unique requirements for surfactants. Reference is made to requirement no 3, addressing the biodegradability of the total content of organics in the products.

5.2.4. Purity of enzymes

Former requirement:

The requirement regarding the absence of production microorganisms is excluded in the revised criteria.

Motivation:

The former requirement for enzymes was introduced due to concern about genetically modified organisms. Most detergent enzymes are produced by genetically modified micro-organisms (GMM) today. In this way, enzymes with high purity for the targeted washing conditions (e.g. cold wash) can be developed (personal communication with Novozymes, 2009).

Use of GMM is regulated through EU's directive on contained use of GMM (Directive 90/219/EEC). Absence of production strains in enzyme products is one of the requirements in this directive. In addition, Novozymes explains that regardless GMM or non-GMM, production micro-organisms are removed during the recovery process. The requirement of absence of production micro-organisms is thus unnecessary.

5.3. Other issues of importance discussed during the revision

5.3.1. Renewable ingredients

During the latest years a lot of attention has been put to the use of fossil fuel based ingredients versus vegetable based ingredients. This discussion is relevant considering the future limitations on fossil fuels and the concern of global warming. Global warming is to a high extent related to the burning of fossil fuels.

In laundry detergents it is mostly surfactants and various polymers that are derived from the petro-chemical industry. Many of the bulk ingredients in the detergents are inorganic (e.g. builders like zeolite, silicates, carbonates) and are not replaceable by renewable resources. Some renewable raw materials are already used in laundry detergents such as soaps (typically derived from vegetable oils). Other ingredients may partly consist of renewable materials such as Alkyl Polyglycosides (APG) and biopolymers.

Although the environmental benefits of moving away from petro-chemical based ingredients seem obvious, replacement with renewable resources are associated with some concerns - both ecologically, economically and socially. Major topics of concern are loss of natural habitats (e.g. rainforest, other areas of high biological value) and increased food costs combined with reduced food supplies (WWF 2009, RSPO 2009). Roundtable for Sustainable Palm Oil (RSPO) is one of the initiatives that aim at promoting the growth and use of sustainable vegetable oils. A possible promotion of the use of renewable raw materials in ecolabelled detergents would imply that the production of renewable raw materials (especially vegetable oil production) is sustainable. Some important considerations in relation to a possible integration of requirements promoting renewable substances are:

- It is presently uncertain if there is an overall benefit of a (partial) replacement of renewable raw materials with non renewable raw material with respect to climate

impact. Relevant data for global warming potential on ingredients used in laundry detergents (renewable as well as non renewable) have not been identified during the criteria revision process. Based on the available LCA's it is mostly the use of laundry detergents that contributes to global warming through considerable energy consumption. The climate impact from extraction and processing of raw materials is secondary to the use phase.

- If sustainability requirements are to be imposed on the use of renewable raw materials, compliance is in practice expected to be difficult for many manufacturers due to challenges of procurement of the relevant documentation. If proper documentation for renewable cannot be obtained, this might lead to increase in use of non-renewable raw materials compared to the situation today. It is not desirable to promote increased use on non-renewable raw materials.
- The availability of renewable raw materials for detergents may be limited and expensive and may put a strain especially on smaller manufacturers.
- There is currently not much experience with promoting renewable raw materials within EU ecolabelling of chemical products. In the EU Ecolabel criteria for Lubricants there is a requirement regarding the amount of renewable oil but only little experience has been gained through this product group.

An example of "green" or (partly) renewable ingredients for detergents is Methyl ester sulfonates (MES). MES have been on the market for some years but has so far not been price competitive to e.g. LAS, which on a global scale is one of the most widely used surfactants in laundry detergents. However, with increasing petro-chemical prices and improvement of the MES production process, MES may become a realistic alternative to petro-chemical based surfactants such as LAS. MES have been highlighted for their high biodegradability, low aquatic toxicity and good environmental profile. MES are obtained from plant and tallow resources and are being promoted as "green surfactants" with application both within the detergent and personal care industry. Although the benefits of MES as a possible replacement for substances like LAS have been highlighted and although regulatory and environmental bodies advocate the use of green chemistry, concerns about feedstock availability have also been expressed in relation to the use of MES (Satsuki 1994, Research and Markets 2009).

At this stage it is thus chosen not to impose requirements regarding the use of renewable substances, as assessment of the environmental and socioeconomically impact of such a requirement is highly complex and out of scope of this criteria revision.

5.3.2. Nanomaterials

Some stakeholders, especially the consumer organisations, have expressed concern regarding the possible use of nanomaterials/nanoparticles in laundry detergents. The concerns are related to the possible use of nanosilver as a bactericide are addressed under requirement no. 4e as biocides cannot be used for other purposes than preservation of the product itself. Other concerns are related to the current absence of safety assessment methods and the potential large ecological footprint of the manufacture of nanomaterials. Nanosized materials are currently not sufficiently characterized and methods for risk and safety assessment (incl. analytical methods and test methods for ecotoxicological and toxicological properties) are not sufficiently developed and harmonized. The EU Scientific Committee on Emerging and Newly Identified Health Risks (SCENIHR) concluded that: "*Current risk assessment methodologies require some modification in order to deal with the hazards associated with nanotechnology*" (SCENIHR 2006). As discussed at the 3rd. AHWGM, exclusion of certain substances or substance groups need to have relevance for the product group. A question was raised, mainly towards the manufacturers, whether nanoparticles/nanomaterials are currently used in laundry detergents in Europe.

According to the participants this is not an issue at present. Furthermore, the use of bactericidal substances is addressed through requirement no. 4e prohibiting the use of antimicrobial and disinfecting substances for other purposes than preservation.

5.4. Recommendations for future criteria

A range of subjects have been discussed during the present criteria revision and some topics have either been out of scope of the current revision or have been considered premature in the context of the current market for laundry detergents. The working group has thus pointed out some key issues, which are suggested addressed within the next revision of the criteria:

- Increased focus on energy use (carbon footprint) and further promotion of cold-water products
- Increased level of compaction/decreased dosage
- Possibility of introduction of requirements for use of renewable, sustainable raw materials
- Evaluation and tightening of requirements for the newly introduced product category: pre-treatment stain removers
- Revision of the DID list

ABBREVIATIONS AND DEFINITIONS

AISE	The International Association for Soaps, Detergents and Maintenance products
aNBO	Anaerobically not biodegradable substances
anNBO	Anaerobically not biodegradable substances
BCF	Bioconcentration Factor
Coldwater product	A coldwater product is in the context of the ecolabel criteria defined as products that have a documented washing performance at $\leq 20\text{ }^{\circ}\text{C}$
CDV	Critical Dilution Volume
°dH	German degree of hardness. (14 °dH is considered medium water hardness)
DID-list	Detergents Ingredients Database list
EDTA	Ethylenediamine tetraacetate
Functional unit	The quantity of detergent (in grams) used per kg textile during washing/treatment. (calculated as the dosage per standard wash/4.5 kg)
GHS	Globally Harmonised System of Classification and Labelling of Chemicals
GLDA	Glutamic acid diacetic acid
GMM	Genetically modified micro-organisms
Heavy-duty detergents	Detergents used for ordinary washing of white and colored textiles (at any temperature)
IFRA	International Fragrance Organisation
LogKow	Log Octanol-Water partition coefficient
Low-duty detergents	Detergents promoting special fabric care: e.g. low temperature wash, use for delicate fabrics such as wool and silk, use for delicate colors
Low-temperature product	A low-temperature product is in the context of the ecolabel criteria defined as products that have a documented washing performance at $> 20\text{ }^{\circ}\text{C}$ to $< 30\text{ }^{\circ}\text{C}$
LSP2	Laundry Sustainability Project No 2 (AISE Voluntary industry initiative for sustainable cleaning)
MGDA	Methylglycin diacetic acid
NTA	Nitrilotriacetic acid
PPM	Parts per million. Measuring unit (100 ppm = 0.010%)
TC	Total Chemicals
WUR	Weight Utility Ratio
WWTP	Waste water treatment plant

6. REFERENCES

ACNielsen 2007: Miljømærkning Svanen og EU Blomsten. Rapport til Dansk Standard. Februar 2007 [*Ecolabelling The Swan and the EU Flower. Report to Danish Standards. February 2007*]

AISE 2008: AISE Annual Review 2008. Towards Sustainable Cleaning: A.I.S.E. highlights from 2008. http://www.aise.eu/downloads/AISE_AR2008FINAL.pdf

Brückner 2007: Anna Bruckner, Anke Kruschwitz and Rainer Stamminger, Universität Bonn: Consumer washing behaviour: results of a survey involving 100 households. 54 Sepawa Kongress mit European Detergents Concurrence, 10-12. October 2007.

CEEP 2007: Phosphates: a good environmental solution for detergents. August 2007, CEEP (Centre Europeen d'Etudes des Polyphosphates).

COM 2009a: Commission report (COM(2009)0230) concerning anaerobic biodegradation (May 2009).
<http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=COM:2009:0230:FIN:en:PDF>

COM 2009b: Commission report (COM(2009)0208) on the biodegradability of the main non-surfactant organic detergent ingredients (May 2009).
<http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=COM:2009:0208:FIN:en:PDF>

CSTEE 2003: Opinion of the Scientific Committee on Toxicity, Ecotoxicity and the Environment on "The environmental impact (reduction in eutrophication) that would result from banning sodium tripolyphosphate (STPP) in household detergents". Adopted 12-13. November 2003.

Danish EPA 2002: Miljøprojekt nr 704, 2002: Nonylphenol og nonylphenoethoxylater i spildevand og slam [*Environmental project No. 704, 2002: Nonylphenol and nonylphenoethoxylates in waste water and sludge*]. Miljøstyrelsen, Miljø- og Energiministeriet 2002.

Dansk Kemi 2005: Vaskemidler anno 2005 [*Laundry detergents anno 2005*]. Dansk Kemi, 86, Nr 8, 2005

DHI 2003: Revision of Ecolabel criteria for laundry detergents. Final Report. (Annex 6: Statement from Regulatory Committee meeting on 4 December 2002). DHI Water & Environment, dk-Teknik Energy & Environment, May 2003.

DHI 2007: Study on enhancing the Endocrine Disrupter priority list with a focus on low production volume chemicals. Report to DG Environment, May 2007.
http://ec.europa.eu/environment/endocrine/documents/final_report_2007.pdf

ECB 2006: Classification proposal. Trisodium nitrilotriacetate CAS-No.: 5064-31-3. European Chemicals Bureau ECBI/05/06 Rev. 1
(http://ecb.jrc.it/classlab/0506r1_DE_NTA.doc)

Ecolabelling Denmark 2008: Revision of Ecolabel Criteria for Laundry Detergents & Dishwashing Detergents, Preliminary report. June 2008.

EEA 2005: Source appointment of nitrogen and phosphorus inputs to the aquatic environment. EEA report no 7/2005. European Environmental Agency.

Elforsk 2005: Hvilken indflydelse har vaskeadfærden på den mængde energi en familie bruger på tøjvask. PSO-projekt nr. 337-009. Slutrapport. [*What influence does the washing habits have on the amount of energy a family uses on laundry washing. PSO-project No. 337-009. Final report*]. December 2005. (http://www.elforsk.dk/doks/337-009/slutrapport_337-009.pdf)

EU RAR 2004: European Union Risk Assessment Report. Tetrasodium Ethylenediaminetetraacetate (NA₄EDTA) CAS No: 64-02-8, EINECS No: 200-573-9. Volume 51.

HERA 2003 & 2004: Human and environmental risk assessment of Fluorescent Brightener FWA-1 (draft) and Fluorescent Brightener FWA-5 (draft). www.heraproject.com

HERA 2004 & 2005: Human and environmental risk assessment of Zeolite A (final) and Zeolite P & -X (draft). www.heraproject.com

IARC 1999: IARC Monographs on the evaluation of carcinogenic risks to humans. Volume 73. WHO International Agency for Research on Cancer. Lyon, France 1999.

INIA 2009: Development of an European quantitative eutrophication risk assessment of polyphosphates in detergents. Green Planet Research Report GPR-CEEP-09-1- Final, April 2009. http://ec.europa.eu/enterprise/sectors/chemicals/files/docs/ceep_study_final_report_042009_en.pdf

JohnsonDiversey 2008: Answer to questionnaire send out by Ecolabelling Denmark

Nanogist Co. 2009: Nanogist Co., Ltd. Korean Company marketing e.g. laundry detergents with antimicrobial properties. http://www.alibaba.com/product/nanogist-100647666-101251773/Nano_Silver_Laundry_Detergent.html

Nielsen and Skagerlind 2007: Per H. Nielsen and Peter Skagerlind: Sustainable Innovation. Cost-neutral replacement of surfactants with enzymes – a shortcut to environmental improvement for laundry washing. Household and Personal Care Today. No. 4/2007.

Nordic Ecolabelling 2008: Data from Ecolabelling Norway and personal communication with national trade organisations: Teknokemiske föreningen Finland 2008 and KEMI 2006

Research and Markets 2009: Frost and Sullivan: Global Methyl Ester Sulphonate Market. (Only abstract available). <http://www.researchandmarkets.com/reports/835631>

RPA 2006: Non-surfactant Organic Ingredients and Zeolite-based Detergents. Final Report prepared for the European Commission. Risk & Policy Analysts Limited (RPA) June 2006.

RSPO (2009): <http://www.rspo.org/>

Satsuki 1994: Teruhisa Satsuki: Methyl Ester Sulfonates: A Surfactant based on Natural Fats. In Proceedings of the 3rd World Conference on Detergents: Global Perspectives. AOCS Press 1994.

SCHENIHR 2006: Opinion on The appropriateness of existing methodologies to assess the potential risks associated with engineered and adventitious products of nanotechnologies.

SCHER 2005: Scientific Committee on health and environmental risks. Opinion on "Environmental Risk Assessment of non Biodegradable Detergent Surfactants under Anaerobic Condition" Adopted by the SCHER during the 8th plenary meeting of 25 November 2005.

SCHER 2007: Scientific Committee on Health and Environmental Risks (SCHER). Non surfactant Organic Ingredients and Zeolite-based Detergents Adopted on 29 May 2007.

The Project on Emerging Nanotechnologies: Consumer products. An inventory of nanotechnology-based consumer products currently on the market.
<http://www.nanotechproject.org/inventories/consumer/>

Umweltsbundesamt 2008: <http://www.umweltbundesamt.de/uba-info-presse-e/2008/pe08-033.htm>

UEAPME 2008: Answer to questionnaire send out be Ecolabelling Denmark

WWF (2009):

http://www.panda.org/about_our_earth/about_forests/deforestation/
http://www.panda.org/what_we_do/footprint/forestry/

APPENDIX 1: KEY ISSUES FOR THE REVISION - SUMMARY

Key issues as presented in the preliminary report:

(Revision of Ecolabel Criteria for Laundry Detergents & Dishwashing Detergents. Preliminary report. June 2008. Ecolabelling Denmark, DHI Water, Environment, Health)

- Clarification on scope of the criteria
- Incorporation of the current DID list and DID list parameters in the criteria
- Reducing the environmental impact through strengthening of values for CDV, total chemicals, phosphates, promotion of compact/super compact products
- Lowering the climate impact through promotion of low-temperature products (requirements in favour of these)
- Requirements to vPvB substances
- Possibility for promotion of easy-to dose products
- Restrictions in content of organics that are not readily/anaerobically biodegradable and stricter limitations for use of phosphates
- Restriction on use of preservatives
- Clarification of performance requirements, the need for revision/optimisation of the test should be evaluated
- Possible expansion of product group with fabric softeners and stain removers in order to gain environmental benefits from all products used in the washing process (if environmental benefits can be identified)
- Enhancement of consumer information regarding dosing and washing means

Key issues as suggested during the previous revision (2002):



EUROPEAN COMMISSION
DIRECTORATE-GENERAL
ENVIRONMENT
Directorate D - Implementation and enforcement
ENV.D.3 - Industry and implementation
Head of Unit



Brussels, 4 December
ENV/D.3

Regulatory Committee
established under Regulation (EC) No 1980/2000
of the European Parliament and of the Council of 17 July 2000
on a revised Community Eco-Label award scheme

STATEMENT

On the occasion of the next revision of the Commission Decision establishing the ecological criteria for the award of the Community eco-label to laundry detergents, particular attention will be paid to the following issues:

- Further restricting the use of phosphates
- The size of the load for the reference dosage, and the performance test in general
- CDV tox, also to be revised with reference to the new DID list
- Anaerobic biodegradability of surfactants
- Optical brighteners
- Total chemicals
- Perfumes
- Disinfectants
- Safety messages, including keep out the reach of children and avoid getting in eyes
- Reusable and recycled packaging
- Impact on energy use
- The use of points-based versus pass-fail criteria

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APPENDIX 2: MAIN ENVIRONMENTAL IMPACTS OF LAUNDRY DETERGENTS (IN BRIEF)

The main environmental impacts related to the use of laundry detergents are related to the energy used for heating of the washing water in the use phase, the extraction and processing of raw materials and the emission of chemicals to the environment after use. Other environmental impacts relate to the production and transportation of raw materials and the final products, and disposal of solid waste. Primary contributors to solid wastes are ashes from energy generation in the use phase, sludge from waste water treatment, and waste from the ingredient supply stage (AISE 2001). In addition, laundry detergents (and auxiliary washing products) may give rise to health related problems such as allergy and skin irritation.

Life-cycle analyses (LCA's) for laundry detergents clearly show that the use phase and the product formulation are the largest contributors to most of the environmental impacts deriving from laundering. This has been concluded in LCA's where a range of environmental indicators have been considered, namely: primary energy consumption, total solid waste, water consumption, potential impacts on aquatic eco-toxicity, eutrophication, acidification, human toxicity, photochemical oxidant formation, depletion of the ozone layer and climate change (AISE 2001, Procter & Gamble, Van Hoof et al 2003).

This indicates that the environmental impact of laundry detergents can be influenced by lowering the washing temperature (use phase), optimising the chemical composition of the laundry detergents and increasing the level of compaction. Large energy savings can be obtained by using super compact detergents in preference of regular powders. The environmental burden may be decreased by up to 50% with the use of super compact products compared to regular powders. With super compact products, efficient chemistry means less detergent per wash and good performance at lower temperatures. Lowered washing temperatures and lower consumption of detergents (incl. packaging) will cause decreased CO₂ emissions and reductions in solid waste. With respect to the contributions to the aquatic toxicity, the major contributions from detergent ingredients arise from surfactants and fragrances. This underlines the relevance of having requirements addressing these substances in the ecolabel criteria.

The environmental impacts of laundry detergents are illustrated by the below LCA figure showing the relative environmental contributions from the different phases of the lifecycle of a generic laundry detergent, divided into the categories of energy consumption, water emissions and solid waste.

Life Cycle Analysis of a Generic European Fabric Washing Powder (normalised on a per wash basis)

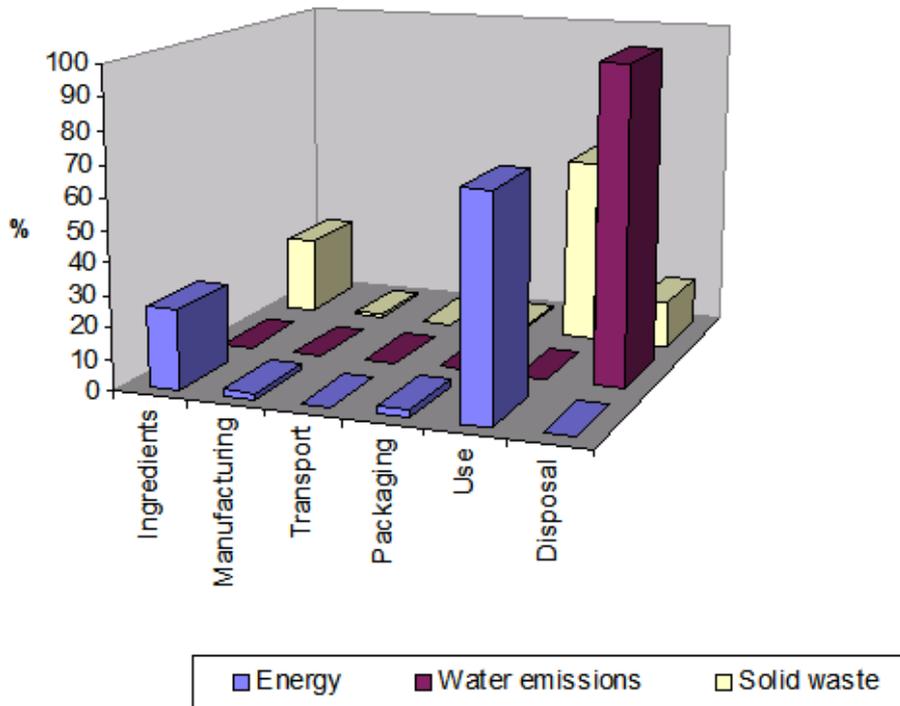


Fig 1: Life-Cycle Analysis of a Generic European Fabric Washing Powder. (AISE 2008)

The figure clearly shows that the energy consumption in a cradle to grave perspective primarily is connected to the use phase, followed by the processing of raw-materials. Water emissions are dominant in the disposal phase while solid waste is produced mainly in the use phase (ashes from energy generation).

In a comparative life-cycle assessment of laundry detergent formulations in the UK, the relative contribution to primary energy was calculated for different kinds of formulations, including powders, liquids and tablets. The result of the LCA showed, that the use phase (washing process) is the key contributor (>70% of the total contribution) for most of the environmental indicators analysed. Furthermore, the study concluded that compact formulations (powder and liquids) are environmentally preferable, mainly because of the lower use of chemicals per wash (Van Hoof et al 2003).

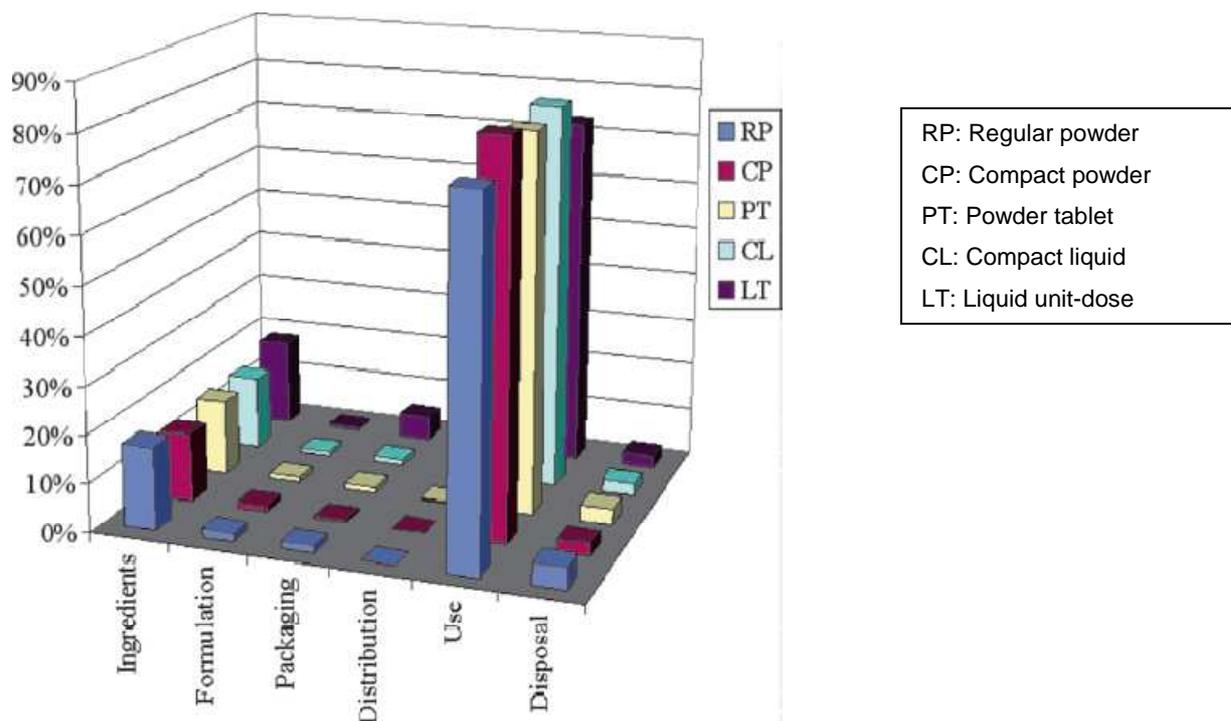


Fig 2: Contribution from the various life-cycle stages to primary energy for year 2001 UK laundry formulations (Van Hoof et al 2003)

It should be kept in mind that energy consumption during use and the environmental impact of the ingredients used are incomparable parameters. Thus – a product that performs well at low temperatures may still have a large impact on the aquatic environment (depending on the level of sewage treatment etc.). Keeping focus on the ecotoxicological properties and biodegradability of the ingredients should thus still have a high focus in the ecolabel criteria.

References:

AISE 2001: The Life-cycle Assessment of European Clothes Laundering. Report 2: LCA of Compact Fabric Washing Powder & main wash process. AISE LCA taskforce.

Procter & Gamble: Cutting Environmental Effect by half: Compact detergents can do it! Part I: The LCA Approach. www.scienceinthebox.com

Procter & Gamble: An evaluation of the environmental profile of laundry detergents for washing at low wash temperatures. http://www.scienceinthebox.com/en_UK/pdf/Ariel%20Cold%20Wash%20Low%20Temperature%20Energy%20Savings%20Sustainability.pdf

Van Hoof, G; Schowanek, D and Feijtel, T.C.J 2003: Comparative Life-Cycle Assessment of Laundry Detergent formulations in the UK. Part 1: Environmental fingerprint of five detergent formulations in 2001. Tensidde Surf. Det. 40, pp 266-275, 2003.

APPENDIX 3: TYPICAL INGREDIENTS IN LAUNDRY DETERGENTS

Composition of laundry detergents

Laundry detergents are composed of a range of ingredients that give the final product its different characteristics. The most common ingredients are listed alphabetically below (not all of them are necessarily present in a given product).

Anti-redeposition agents

Anti-redeposition agents are added to prevent the dirt that is removed from the clothing from reattaching itself. Accordingly they also prevent the clothing from taking on a greyish color. Commonly occurring anti-redeposition agents in laundry detergents are CMC (carboxymethyl cellulose), CEC (carboxyethyl cellulose), starch-based compounds or other polymers.

Bleaching agents

Bleaching agents are added to remove or decolorize (whiten or lighten) a type of stain that is not removed by the surfactants, i.e. colored stains such as red wine or tea. Bleaching agents work by cutting the stain molecule into smaller pieces that are more easily dissolved and removed. Alternatively, bleaching agents may work by removing the color of the stain so it becomes invisible. These two processes may work simultaneously on a given stain. Bleaching agents used in laundry detergents include borate, perborate, percarbonates, hydrogen peroxide and sodium hypochlorite.

Buffering agents

Buffering agents work by upgrading or protecting the cleaning efficiency of the surfactant. As washing proceeds, the alkalinity or pH drops. Under acidic (low pH) conditions, cleaning is reduced. Buffering agents stabilize the pH, and keep this drop from being too severe and reducing the cleaning.

Builders/sequestering agents

Builders/sequestering agents are primarily added to bind calcium in the water and in the soils on the clothing. The binding of calcium allows the surfactants better access to clean the clothes, as the soil molecules are often bound to the fabric by calcium ion bridging. The binding of calcium also prevents the ions to react with other detergent ingredients and precipitate from the solution. Builders are thus a very important ingredient in laundry detergents in areas in which hard water is used for washing. The builders used in laundry detergents include e.g. phosphate, phosphonate, zeolite, silicates, carbonate and citrate. Often more builders are used in one product, creating a builder system. There is wide variation in the builders used in the European countries. One reason for this is the difference in the number of households connected to treatment plants and whether the treatment plants are capable of removing builders from the water. Another reason is the difference in water hardness in different regions.

Colorants

Coloring agents are added to laundry detergents for aesthetic reasons and/or to aid the marketing of the products. Coloring agents have no effect on the ability of the product to clean clothes.

Corrosion-inhibiting substances

Corrosion-inhibiting substances protect the washing machine against corrosion. Silicates are the most commonly used, and they also function as stabilisers for perborates (see bleaching agents).

Dye-transfer inhibitors (DTIs)

A DTI is a substance that prevents the transfer of dyes from one textile to another during the wash. DTI's are either polymers or copolymers; the most commonly used DTI is PVP (Polyvinylpyrrolidone).

Enzymes

Enzymes are proteins that are used in laundry detergents to break down particularly difficult stains. Enzymes also help to improve wash results at low temperatures. Enzymes function by breaking down difficult stains into smaller parts which can then be more readily removed. The enzymes do not lose the functionality after use on a given stain. Enzymes used in laundry detergents and stain removers include protease, lipase and amylase. Each enzyme has its own defined target, i.e. fat stains, protein stains etc. Enzymes can replace large quantities of chemicals with the same function.

Fabrics whitening agents (optical brighteners)

Fabrics whitening agents or optical brighteners are fluorescent whitening agents that reflect the ultra-violet rays of the sun as white, visible light. This gives the clothing an impression of whiteness and accordingly cleanness. Optical brighteners are frequently already present in clothing, and the quantity left by the washing process helps to give an impression of cleanness. Optical brighteners/fabric whiteners do not bleach or remove color from the textile.

Fillers

Fillers are added to laundry detergents to give the product structure. In powder products sodium sulphate is often used as filler - in liquid products the filler is water.

Fragrances (perfume)

Fragrances are added to give the product a particular smell or to conceal an unpleasant smell in the raw materials used in the products. Fragrance has no effect on the ability of the product to clean the clothes. Fragrance is a mixture of many different aromatics. Commonly little information is available on the environmental effects of fragrance, but generally fragrances are regarded as environmentally harmful. Allergies to fragrances are common.

Hydrotropes

Hydrotropes help increase the solubility of other ingredients in liquid products.

Preservatives

Preservatives are frequently added to liquid products to prevent the growth of bacteria in the product and thereby extend its durability. Surfactants sometimes have a preservative effect.

Soap

Soap is used for cleaning the fabric by reducing surface tension and loosening, dispersing, and suspending the soil. Soap also softens fabrics naturally. Soap may also be used as a suds inhibitor.

Solvents

Organic solvents are primarily used in liquid products to dissolve the ingredients. Typical solvents are alcohols. Alcohols also add an anti-freeze property so that the detergent may be shipped and stored in cold climates.

Suds inhibitors

Suds inhibitors are added to reduce the quantity of suds (foam) in the washing machine. Suds inhibitors in laundry detergents include silicone or surfactants with this particular property.

Surfactants

Surfactants are added for a number of reasons, the main purposes being their washing and surface active properties. They remove soils from the clothing and keep it suspended in the washing solution. Some surfactants perform other functions such as foam inhibition. Examples of surfactants used in laundry detergents include alkylether sulphates, alkyl sulphates, alcohol ethoxylates and alkylphenol ethoxylates.