Revision of the European Ecolabel and Green Public Procurement (GPP) Criteria for Textile Products

TECHNICAL REPORT AND CRITERIA PROPOSALS

(Draft) Working Document

for

2nd AHWG MEETING FOR THE REVISION OF THE EU ECOLABEL AND GPP CRITERIA FOR TEXTILE PRODUCTS

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Revision of the EU European Ecolabel and Green Public Procurement Criteria for Textile Products

Technical report and criteria proposals

(Draft) Working Document

for the 2nd AHWG Meeting

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1. INTRODUCTION

This document is intended to provide the background information for the revision of the Ecolabel criteria for Textiles and the development of Green Public Procurement (GPP) criteria for this product group. The study has been carried out by the Joint Research Centre's Institute for Prospective Technological Studies (JRC-IPTS) with technical support from the Danish Standards Foundation (DS) and COWI. The work is being developed for the European Commission's Directorate General for the Environment.

The main purpose of this document is to evaluate the current criteria and discuss if the criteria are still relevant or should be revised, restructured or removed. This document is complemented by and informed by the preliminary report, which provides the legislative, market and technical analysis to support the criteria proposals.

For each criterion a table indicating any major changes proposed and a direct comparison of the current and proposed criteria is provided. After each table a discussion of the rationale for the proposed change (or not) to the criterion is made. Proposals for new criteria have also been made together with the rationale behind each proposal.

The intention is that this technical report will be updated during the criteria development process based on new information, stakeholder inputs or input from the working group meetings. The final technical report will bring together the scientific arguments for the proposed new criteria document.

1.1 How the Preliminary Report informs the criteria proposals

The basis of this technical report are the conclusions and recommendations in the preliminary report. The preliminary report sets the framework for the revision and consists of three main chapters which reflect the procedure and methodology for the revision of EU Ecolabel criteria:

- Chapter one provides a **background** for the revision process by:
  - Defining the scope of the criteria revision
  - Summarising the legal framework relevant for the production of textiles,
  - Addressing Commission Statements arising from the 2009 revision

- Summarising initial stakeholder input to the revision from a questionnaire.

- Chapter two provides updated **market analysis** which brings together:
  - Statistics describing the market for textile products in the EU
  - A summary of eco-innovations by front runners in the industry
  - The market status of the EU Ecolabel textile licenses
  - A summary of other labels and initiatives
- Chapter three provides an up-to-date **technical analysis** which comprises:
  - A review of the findings from two textile product LCA studies
  - .Technical analysis of key environmental issues and industry best practice
  - Discussion of how these issues could be addressed by the criteria revision

This technical report takes the findings from the preliminary report and then discusses all current criteria and how the environmental issues identified can be addressed through criteria revisions. For each criterion consultation questions are listed. Input from stakeholder on these issues is of great importance in formulating the final proposal for a new and updated criteria document.

1.2 The current scope of the EU Ecolabel criteria document for Textile Products

The current scope of the EU Ecolabel criteria document for textile products is defined in article 1 of the Commission Decision of 9 July 2009 'establishing the ecological criteria for the award of the Community Ecolabel for textile products' [Decision 567/2009]. Three categories are defined:

- Textile clothing and accessories: clothing and accessories (such as handkerchiefs, scarves, bags, shopping bags, rucksacks, belts etc.) consisting of at least 90 % by weight of textile fibres;
- Interior textiles: textile products for interior use consisting of at least 90 % by weight of textile fibres. Mats and rugs are included. Wall to wall floor coverings and wall coverings are excluded;
- Fibres, yarn and fabric (including durable non-woven) intended for use in textile clothing and accessories or interior textiles.

Feedback on the current scope of the label was invited at the beginning of the revision process in the form of a questionnaire sent to registered stakeholders. The results of the questionnaire and specific comments relating to the scope and definition are presented in section 2 of this report.

The criteria document itself currently consists of a short framework which sets out the objectives of the criteria and provides notes on assessment and verification requirements. The aim of the criteria are described as being:

> *'[the promotion of] the reduction of water pollution related to the key processes throughout the textile manufacturing chain, including fibre production, spinning, weaving, knitting, bleaching, dyeing and finishing.'*

The criteria document consists of forty criteria which are intended to meet this specific aim, together with the aims of the EU Ecolabel Regulation. The forty ecological criteria are divided into three main categories:

1. Textile fibre criteria (9 criteria)
2. Processes and chemicals criteria (24 criteria)
3. Fitness for use criteria (7 criteria)

The detailed criteria under each category are listed in table 1.1. Application of the first set of criteria is determined by the form of textile fibre. Application of the second set of criteria vary depending on the fibre, the processing stages that have been used to produce the finished garment or fabric and the type and application of the garment or fabric. Application of the third set of criteria is generic to all products apart from specific stated exclusions.

Table 1.1: Current textile product Ecolabel criteria according to Decision 2009/567/EC

Textile fibre criteria	1. Acrylic
	2. Cotton and other natural cellulosic seed fibres (including kapok)
	3. Elastane
	4. Flax and other bast fibres (including hemp, jute and ramie)
	5. Greasy wool and other keratin fibres (including wool from sheep, camel, alpaca and goat)

	6. Man-made cellulose fibres (including viscose, lyocell, acetate, cupro and triacetate) 7. Polyamide 8. Polyester 9. Polypropylene
Processes and chemicals criteria	10. Auxiliaries 11. Biocidal and biostatic products 12. Stripping or depigmentation 13. Weighting 14. All chemicals and chemical preparations 15. Detergents, fabric softeners and complexing agents 16. Bleaching agents 17. Impurities in dyes: Colour matter with fibre affinity (soluble or insoluble) 18. Impurities in pigments: Colour matter with fibre affinity (soluble or insoluble) 19. Chrome mordant dyeing 20. Metal complex dyes 21. Azo dyes 22. Dyes that are carcinogenic, mutagenic or toxic to reproduction 23. Potentially sensitizing dyes 24. Halogenated carriers for polyester 25. Printing 26. Formaldehyde 27. Wastewater discharges from wet processing 28. Flame retardants 29. Anti felting finishes

	30. Fabrics finishes 31. Fillings 32. Coatings, laminates and membranes 33. Energy and water use
Fitness for use criteria	34. Dimensional changes during washing and drying 35. Colour fastness to washing 36. Colour fastness to perspiration (acid, alkaline) 37. Colour fastness to wet rubbing 38. Colour fastness to dry rubbing 39. Colour fastness to light 40. Information appearing on the ecolabel

1.3 The key environmental impacts associated with the product group

Based on the LCA review presented in the preliminary report the overall findings indicate that the fibre production phase, followed by the use phase, are associated with the most significant environmental impacts during the life cycle of textile products. The specific environmental 'hot spots' identified as being of significance were as follows:

- **Cotton production:** The ecotoxicity associated with the production and use of fertilisers and pesticides is the main contributor to both energy consumption and ecotoxicity. The resource impact of water use for irrigation was also highlighted as being significant. A shift to organic cotton should significantly reduce the toxicity profile of products made of cotton, although this would not address water use.
- **Synthetic fibre production** (acrylic, nylon, polyamide, polypropylene): The climate change and ecotoxicity impact of energy and raw material use to manufacture fibres. Nylon and acrylic are the most energy intensive to produce and are technically the most difficult to recycle. The LCA case studies reviewed highlighted how the energy required to produce garments is, to some extent, influenced by fibre blends.

- **Man-made cellulose fibres (viscose):** The climate change and ecotoxicity impact of energy use to manufacture fibres. The LCA case studies reviewed highlighted viscose, which was used as the reference fibre, as being the most energy intensive fibre to produce.
- **Raw material and feedstocks required to manufacture cellulose fibre, soaping agents and softeners.** Timber and bamboo are the predominant sources of raw material for cellulose fibre manufacturing. Palm oil was identified as especially significant as a feedstock for the manufacturing of soaping agents and softeners. Viscose has significantly higher impacts associated with soaping agent and softener use;
- **Process energy and ecotoxicity associated with the fabric formation, finishing and printing and dyeing stages of production.** However, there was conflicting evidence in this area, with one LCA study reaching the conclusion that the effect on ecotoxicity from the production phase for traditional cotton was less significant overall. The scouring stage was highlighted in relation to wool. Dye carriers were highlighted in relation to polyester.
- **Fuel use and climate change impacts associated with shipping and air freight** to distribute products. Although air freight only accounts for a small share of distribution its impacts are proportionally much higher.
- **Energy and ecotoxicity associated with the use phase** of textile products. This primarily relates to washing energy and detergents, and can be influenced by fibre choice and blends.

The findings also highlighted the potential benefits of more sustainable systems of resource use associated with the disposal phase. The allocation of benefits from re-use, recycling and energy recovery was an area specifically highlighted.

A number of environmental issues currently addressed by the EU Ecolabel criteria were not specifically highlighted by the LCA findings as being significant overall. These included flame retardants, dyes and plasticizers. To some extent this may have been due to the exclusion and substitution of the most hazardous substances from the LCA analysis. Nanotechnology was also identified as a new area of focus for which limited data and evidence currently exists for the potential environmental impacts. However, evidence suggests that a precautionary approach may be justified for some specific functional applications.

1.4 The proposed framework for the revision

Based on the discussion in the Preliminary Report a framework has been proposed for the criteria revision. This framework proposes five themes that are intended to inform our approach to the revision:

1. Focussed technical updates: *based on BREF and technical evidence review*
2. Improved whole life scope: *based on a fibre and product LCA review*
3. Reflect product best practice: *based on eco-innovation by manufacturers, retailers and brands*
4. Explore options for label and initiative harmonisation: *based on a review of state, NGO and private label scheme criteria*
5. Improve focus on opportunities in target market segments: *based on textile label, public procurement consumer and industry priorities*

It is currently suggested to keep the overall structure and approach of the existing criteria document and not to split the criteria by market segment.

The suggestion is to improve in the documentation the weight of the proposed criteria by ensuring that the issues highlighted as environmental 'hot spots' have the strictest criteria based on industry best practice. In seeking to do this a number of criteria revisions and new criteria proposals are proposed. For other relevant issues not listed as 'hot spots' relevant criteria would be set but based more on an industry average. It is also to be considered whether all the criteria should be retained.

It is also recommended to discuss harmonisation with other labels or schemes in order to reposition the EU ecolabel within the market and to lower the administrative burden for both applicants and Competent Bodies. Keeping in mind that harmonisation will have both pros and cons which are to be discussed.

The readability of the document as well options to streamline and focus the assessment and verification element are also recommended to be in focus – again in order to streamline and lighten the application process. The new criteria dealing with hazardous substances may also provide a new way of thinking about the structure of the criterion – for example, in order to highlight criteria that relate to processes and criteria that relate to finished product.

The main focus and the most selective criteria shall be the textile fibre criteria. Here an in-depth revision is necessary, especially for the criteria for cotton, man-made cellulose fibres and man-made synthetic fibres.

With regards to the process and chemical criteria the focus shall be on updating the criteria in relation to REACH, the Ecolabel Regulation and BAT and to analyse the possibility to harmonise with other labels or schemes. The latter being a significant consideration in relation to managing the administrative burden for Competent Bodies.

Several new areas for developing criteria have been proposed. They are all relevant either from an environmental point of view or because of market expectations. It has to be discussed whether it is possible to develop criteria in these areas and if it is feasible taken into account the improvement potential and the ability of both applicants and Competent bodies to verify compliance.

2. PRODUCT GROUP DEFINITION

Major proposed changes	• Improved focus on specific consumer facing textile products highlighted by the market analysis. • Specific reference to the most significant clothing products as identified by IMPRO Textiles. • Reduction in the % weight threshold in order to reflect the composition of more complex garments.

Present criterion, Decision 2009/567

The product group "textile products" shall comprise:

- **Textile clothing and accessories**: Clothing and accessories (such as handkerchiefs, scarves, bags, shopping bags, rucksacks, belts etc.) consisting of at least 90% by weight of textile fibres;
- **Interior textiles**: Textile products for interior use consisting of at least 90% by weight of textile fibres. Mats and rugs are included. Wall to wall floor coverings and wall coverings are excluded;
- **Fibres, yarn and fabric**: intended for use in textile clothing and accessories or interior textiles.

This product group will not include textiles treated with biocidal products, except where those biocidal products are included in Annex IA to Directive 98/8/EC of the European Parliament and of the Council (1), where this substance confers to the textiles additional properties directly aiming at protecting human health (e.g. biocidal products added to textile nets and clothing to repel mosquitoes and fleas, mites or allergens) and where the active substance is authorised for the use in question according to Annex V to Directive 98/8/EC.

For 'textile clothing and accessories' and for 'interior textiles': Down, feathers, membranes and coatings need not be taken into account in the calculation of the percentage of textile fibres.

Suggested criterion

The product group “textile products” shall comprise:

- **Textile clothing and fabric accessories**: Clothing (defined as tops, underwear, nightwear, hosiery, bottoms, jackets, dresses, suits, sports and swimwear and gloves) and fabric accessories (defined as ties, handkerchiefs, shawls, scarves and bags) ~~bags, shopping bags, rucksacks, belts etc.~~ consisting of at least 90% by weight of textile fibres;
- **Interior textiles**: Textile products for interior use (defined as curtains, bed linen, table linen, towels, blankets, throws, mats and rugs) consisting of at least 90% by weight of textile fibres. ~~Mats and rugs are included~~
- **Fibres, yarn and fabric**: Intended for use in textile clothing and fabric accessories and interior textiles, to include upholstery fabric prior to the application of backings and treatments associated with the final product.

For ‘textile clothing and fabric accessories’ and for ‘interior textiles’: Down, feathers or synthetic materials not covered by this document need not be taken into account in the calculation of the percentage of textile fibre. Membranes and coatings need not be taken into account in the calculation of the percentage of textile fibres. Fillings, linings and padding made of fibres covered by this document shall be taken into account in the calculation of the percentage of textile fibres and shall also fulfil the relevant fibre criteria.

Filling materials that are not made from textile fibres should still comply with restrictions listed in Criterion 11 that relate to auxiliaries, surfactants, biocides and formaldehyde.

The following products are not covered by these criteria:

- Medical devices
- Single use products
- Wall and floor coverings (Please see the EU Commission Decision 2009/967/EC for textile floor coverings)
- Fabrics that form part of structures intended for use outdoors (such as banners and tents)
- Garments, fabrics and fibres that contain electrical devices or which form an

integral part of electrical circuitry

- Garments, fabrics and fibres that contain devices or impregnated substances designed to sense or react to changes in ambient conditions

AHWG1 technical discussion

Initial feedback from the stakeholder questionnaire was that in general the scope remains relevant and adequate but that some issues should be clarified:

1. Points from the Competent Body forum should be addressed, eg which product categories are included (single use products, hessian cloth – intermediate product, textiles for outdoor use)
2. Define filling materials more clearly and also take the 90% calculation into account – what is not included in the calculation?
3. Define end products and intermediate products (which are not included in the scope)
4. Define whether B2B products are included, including those produced by spinners, dyers and textiles finishers
5. Define “smart textiles” and textiles containing electronics and how/whether they shall be included.

Single use products such as those used for surgical applications are not currently included. This has been discussed among the Competent Bodies and in order to provide clarification to applicants these have been noted as being excluded. These products have very specific quality requirements that may necessitate exclusions from certain criteria.

Likewise for textiles for use in outdoor structures. These are not covered by the criteria and cannot easily be included. The reasoning is that the fitness for use criteria might not be relevant for these kinds of products. They may also require additional fabric materials to be introduced into the criteria.

Regarding fillings it was noted that the means of calculating the percentage should be made clearer and that fillings made of fibres mentioned in the criteria document shall also fulfill the relevant fibre criteria. Both of these points have now been added.

Smart textiles and electronic textiles are two new areas highlighted by stakeholders for consideration. No specific definition is currently provided in the criteria document for these two product types. However, the textile fibre criteria that would allow for

either product to be included if they constituted less that 15% of the fibre content and if the electronic components constituted less than 10% of the total weight of the product.

Smart textiles have been defined as *functional textiles with engineered properties*. If required a possible definition could be:

> *Textiles that can sense and react to changes in the environment, such as changes from mechanical , thermal, chemical, magnetic and other sources.*

The product may therefore contain substances such as phase change materials or treatments designed to fulfill these functions. These substances may therefore require further consideration in terms of their composition and their impact on the ability to recycle the textile at the end of its life.

Textiles containing electronics – so-called e-textiles - can take a number of different forms. They can include the integration of whole devices such as mobile phones, the interweaving of circuitry and cabling into fabric components or the use of yarns and fabrics with specific electrical properties e.g. solar photovoltaic, transistors.

The inclusion of sub suppliers like spinners, dyers and fibre manufacturers has been discussed among Competent Bodies. The advantage would be that if these steps in the product chain have their own license it would be much easier for the end producer or a retailer to choose the right sub suppliers. Today a sub supplier to a license holder is confidential like other parts of the application. For some sub suppliers it could be attractive to have their own license (B2B). But on the other hand some license holders may wish to keep their sub suppliers confidential as they may be regarded as a trade secret.

Stakeholder feedback

It was requested by stakeholders that the 90% threshold be lowered to 75-80% in order to reflect the composition of garments such as suits, which incorporate linings and paddings to increase weight and definition.

The ecolabel should apply to different parts of the supply chain and these require clearer definition. The ecolabel should assist producers in sourcing/identifying ecolabelled fibres and fabrics. In seeking to do this it should aim for consistency with other labels/standards e.g. GOTS, GRS, Oeko-tex 1000.

The scope should focus on the end-use for products. Furniture fabrics should be kept within the scope. Specialist technical fibres should be addressed – although

criteria in this area may require more detailed analysis and may be more relevant to GPP (e.g. firefighting, military). E-textile electronic elements are best addressed by the WEEE rules as they are a separate supply chain. Professional cleaning products should be addressed but clarification is needed and specific criteria may be required – particularly for micro-fibre products. The fitness for use criteria would also then require revising.

Consideration should be given to accessories such as buttons and closings that may contain elements such as nickel that can be allergens.

Follow-up research and proposed response

In order to better focus the criteria on end-products the definitions for clothing and interior textiles have been revised to reflect the most significant products on the EU market. In response to requests furniture fabrics (upholstery) have been specifically referred to.

A number of comments were received questioning the practicalities of extending the scope to cleaning products. For example, the Nordic Swan criteria for fabric cleaning products contains four additional fitness for use criteria specifically required for this product group [1]. In response to these concerns, and in order to retain the focus on the most important products on the EU market, it is therefore proposed to exclude cleaning products.

With regard to the request for B2B products to be able to be hold the Ecolabel the current definition, which specifically covers *fibres, yarn and fabric*, is considered to address this issue as far as products are concerned. It may be possible to add wording that would enable other sub-suppliers of processes and treatments such as dyeing and finishing that comply with relevant parts of the criteria but these would not then relate to a specific product. This topic is therefore proposed for further discussion at the 2nd AHWG in order to establish the practicalities of how processes might be licensed and information about them would be shared between Member States.

In order to check and verify the possible composition of a complex textile product a typical mens suit was taken used as an example. A technical paper examining the

[1] Nordic Ecolabelling, *Fabric cleaning products containing microfibers*, Version 2.0, October 2010

different constituent elements of example suits was reviewed [2]. The typical materials used to manufacturer interlinings and padding were then also checked using web-based listings of fabric products [3].

Our finding was that in many cases these elements of the suit are manufactured from a combination of cotton, viscose and polyester in woven and non-woven forms. This suggests that the 90% threshold would not exclude a typical suit and that in fact it would ensure that a high proportion of the materials are addressed by the Ecolabel criteria. However, in order to provide some additional accommodation for variations in product composition it is proposed to reduce the composition to 85%, which would align with Directive 2008/121/EC on textile names [4]. Specific reference has also been made to these components, which may also form part of interior products such as curtains, in the product scope and definition.

The preliminary report briefly reviewed the emerging market for smart and e-textiles and literature making an early assessment of environmental issues that may arise from their increased use [5]. They are both currently considered to be niche products. Significant potential problems were highlighted in relation to the end of life phase, with the miniaturised and integrated metal components posing problems for recycling. On this basis it is therefore proposed to exclude them from the scope of the product group.

Following further consideration it is proposed not to add specific criteria for accessories. The EDIPTEX LCA study considered accessories within the scope of the analysis and came to the conclusion that they are not a significant area of focus for improvement. Introducing additional environmental criteria would not therefore bring minimal benefit to the product group. Stakeholders main concern appeared to relare to phthalates that may be contained in plastics and potential skin allergens such as nickel and chrome. It is therefore proposed that accessories are addressed

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[2] Gam.H.J, Gau.H, Bennett.J, Helmkamp.C. and C.Farr, Application of design for disassembly to a men's jacket, International Journal of Clothing Science and Technology, Vol 23, p 83-94, 2011

[3] Alibaba, Accessed 2012, *Product search results for 'suit shoulder pad'*, http://www.alibaba.com/showroom/suit-shoulder-pad.html

[4] European Parliament and the Council of the European Union, *Directive 2008/121/EC of the European Parliament and of the Council of 14 January 2009 on textile names (recast)*, Official Journal L 019 , 23/01/2009 P. 0029 - 0048

[5] Köhler.A.R, Hilty.L.M. and C.Bakker, *Prospective impacts of electronic textiles on recycling and disposal*, Journal of Industrial Ecology, Vol 15 (4), p496-511

within the scope of the proposed new Criteria 11 Restricted Substance List, with a focus on plastic and metal components.

The text excluding biocides is considered to be too technically specific for the product definition. It is therefore proposed to incorporate the biocide exclusion into the new Criteria 11 Restricted Substance List.

3. Assessment And Verification Requirements

Major proposed changes	• Requirement for certification systems to be in conformance with ISO/IEC Guide 65

Present criterion, Decision 2009/567

The specific assessment and verification requirements are indicated within each criterion.

Where the applicant is required to provide declarations, documentation, analyses, test reports or other evidence to show compliance with the criteria, it is understood that these may originate from the applicant and/or his supplier(s) and/or their supplier(s), etc., as appropriate.

Where appropriate, test methods other than those indicated for each criterion may be used if their equivalence is accepted by the Competent Body assessing the application.

The functional unit, to which inputs and outputs should be related, is 1 kg of textile product at normal conditions (65 % RH ± 4 % and 20 °C ± 2 °C; these norm conditions are specified in ISO 139 Textiles — standard atmospheres for conditioning and testing).

Where appropriate, Competent Bodies may require supporting documentation and may carry out independent verifications.

The Competent Bodies are recommended to take into account the implementation of recognised environmental management schemes, such as EMAS or ISO 14001, when assessing applications and monitoring compliance with the criteria (*note*: it is not required to implement such management schemes).

Suggested additional wording

Where the applicant uses a certification system to provide third party verifications the chosen system and any associated accreditation of verifiers should be in conformance with the criteria contained within ISO/EIC Guide 65.

Follow-up research and proposed approach

As was highlighted by the Preliminary Report the textile industry is increasingly using certificates as a means of verifying the chain of custody for raw materials. To ensure that certification systems provide consistent third party verification it is proposed that certification systems are required to be in conformity with international standards.

This step would ensure that certifications can provide verification that is in conformity with the EU Ecolabel's requirement for independent third party verification as stated by the EU Ecolabel Regulation:

> *'Competent bodies shall ensure that the verification process is carried out in a consistent, neutral and reliable manner by a party independent from the operator being verified, based on international, European or national standards and procedures concerning bodies operating product-certification schemes.'*

Compliance with ISO/IEC Guide 65 'General requirements for bodies operating certification systems' would provide a level of assurance that certification is made by a third party that has been trained to assess the criteria in a consistent way and that there is sufficient due diligence and quality assurance by accreditation bodies (who Competent Bodies would rely on to issue certificates).

4. CURRENT CRITERIA AND PROPOSED CHANGES

In this section each of the criteria in the current criteria document (Decision 567/2009) are evaluated and, where considered necessary, proposals for revisions or new criterion are made.

To give a better view of any proposed changes a tabular form has been used. This format is used to highlight the major changes proposed followed by the current criterion with the new proposal next to it in order to be able to make a direct comparison. An example of the format we have used is presented below.

Subject to discussion with stakeholders, it is currently the intention to follow the same broad structure as in Decision 567/2009 with the proposed addition of one new criteria area:

- Textile Fibre Criteria
- Process and Chemical Criteria
- Fitness For Use Criteria
- Product Use and End of Life Criteria

Under these headings changes in the ordering and arrangement of the criteria in order to improve clarity and to reflect the nature of the proposed criteria revisions are proposed. These are described later in the report.

EXAMPLE STRUCTURE OF EACH CRITERIA PROPOSAL

Major proposed changes *A brief summary of the major proposed changes to the criterion are presented here*

Present criterion, Decision 2009/567
The text of the current criterion as published in the product group Decision is provided here as a point of reference.
Suggested criterion
Any proposed changes to the text of the current criterion are provided here marked in red and/or ~~struck out~~ in order to illustrate how it could work.

AHWG1 technical discussion

Here the technical analysis and arguments put forward at the 1st AHWG to support proposals for criteria revisions are presented and discussed.

Follow-up research and proposed approach

Here the findings of follow-up research carried out subsequent to the first draft of the technical report and the 1st AHWG and in response to stakeholder feedback is summarised and discussed.

A summary of feedback received from stakeholders is briefly presented alongside the findings. This brings together feedback from the 1st AHWG and subsequent written submissions.

Consultation questions

- *Here we list the key questions for stakeholders that have arisen from our analysis of each criteria*

4.1 TEXTILE FIBRE CRITERIA

Major proposed revisions	• Clearer presentation of fibre types • Clarified wording for the 85% weight thresholds

Present text, Decision 2009/567

Fibre-specific criteria are set in this section for acrylic, cotton and other natural cellulosic seed fibres, elastane, flax and other bast fibres, greasy wool and other keratin fibres, man-made cellulose fibres, polyamide, polyester and polypropylene.

Other fibres for which no fibre specific criteria are set are also allowed, with the exception of mineral fibres, glass fibres, metal fibres, carbon fibres and other inorganic fibres.

The criteria set in this section for a given fibre-type need not be met if that fibre contributes to less than 5 % of the total weight of the textile fibres in the product. Similarly they need not be met if the fibres are of recycled origin. In this context, recycled fibres are defined as fibres originating only from cuttings from textile and clothing manufacturers or from post-consumer waste (textile or otherwise). Nevertheless, at least 85 % by weight of all fibres in the product must be either in compliance with the corresponding fibre-specific criteria, if any, or of recycled origin.

Assessment and verification: The applicant shall supply detailed information as to the composition of the textile product.

Proposed revision

Fibre-specific criteria are set in this section for the following fibre types:

- Natural fibres: Cotton and other natural cellulosic seed fibres, flax and other bast fibres, greasy wool and other keratin fibres;
- Synthetic fibres: Acrylic, elastane, polyamide, polyester and polypropylene;
- Man-made cellulose fibres: Cupro, lyocell, modal and viscose..

~~Other fibres for which no fibre specific criteria are set are also allowed, with the exception of mineral fibres, glass fibres, metal fibres, carbon fibres and other inorganic fibres.~~

The criteria set in this section for a given fibre-type need not be met if a fibre contributes to less than 5% of the total weight of the textile fibres in the product.

However, at least 85% by weight of the whole product must be in compliance with the criteria.

These criteria do not have to be met if the product contains fibres that are of recycled origin constituting at least 70% by weight of all fibres in the product. In this context, recycled fibres are defined as fibres originating only from cuttings from textile and clothing manufacturers or from post-consumer waste (textile or otherwise). ~~Nevertheless, at least 85 % by weight of all fibres in the product must be either in compliance with the corresponding fibre-specific criteria, if any, or of recycled origin.~~

Assessment and verification: The applicant shall supply detailed information as to the composition of the textile product.

Stakeholder feedback

The main feedback received was that the text allowing *'other fibres for which no fibre specific criteria are set'* to be awarded the label should be deleted and for consideration of the inclusion of specialist technical fibres related to public procurement.

A major industry stakeholder considered the 85% threshold for recycled content to be too high as an incentive, suggesting that 50% was more achievable – particularly for blends – and that it would work to incentivise the industry.

Specialist technical fibres should be addressed – although criteria in this area may require more detailed analysis and may be more relevant to GPP (e.g. firefighting, military).

Follow-up research and proposed response

The current criteria are currently listed in alphabetical order. In order to make them clearer and more distinguishable it is proposed to group them into three more commonly understood categories – natural, synthetic and regenerated. It is also proposed that regenerated cellulose fibres are reduced in scope to better reflect the most common fibres used in clothing and interior textiles – namely viscose, modal, cupro and lyocell (see Fibre Criteria 6). Acetate is not understood to be generally used as the basis for clothing or interior textiles.

The text highlighted by stakeholders relating to fibre with no criteria is proposed for deletion. This is because at the moment this allows fibres for which no scientific evidence may exist of their environmental impacts to acquire the Ecolabel.

Meta-aramids are proposed to be investigated for GPP but are not proposed at this stage to be added as an EU Ecolabel fibre. Meta-aramids are high strength, heat resistant synthetic fibres which are an aromatic form of polyamide. Their name is derived from the meta amide linkages between fibres which give them their strength. They are a specialist technical fibre commonly used in the manufacturing of personal protective equipment for emergency services and the military. Global production in 2009 amounted to just 64,000 tonnes, dominated largely by Dupont (USA) and Teijin (Japan) 6. They are therefore of particular relevance to GPP criteria but appear to be less significant for the EU Ecolabel.

[6] Oerlikon, *The fibre year 2009/10 – A world survey on textiles and non-wovens industry*, May 2010

CURRENT CRITERION 1: ACRYLIC

Major proposed changes	• No proposed change to the criteria
Present criterion, Decision 2009/567	
a) The residual acrylonitrile content in raw fibres leaving the fibre production plant shall be less than 1.5 mg/kg. *Assessment and verification:* The applicant shall provide a test report, using the following test method: extraction with boiling water and quantification by capillary gas-liquid chromatography. (b) The emissions to air of acrylonitrile (during polymerisation and up to the solution ready for spinning), expressed as an annual average, shall be less than 1 g/kg of fibre produced. *Assessment and verification:* The applicant shall provide detailed documentation and/or test reports showing compliance with this criterion, together with a declaration of compliance.	
Suggested criterion	
a) The residual acrylonitrile content in raw fibres leaving the fibre production plant shall be less than 1.5 mg/kg. *Assessment and verification:* The applicant shall provide a test report, using the following test method: extraction with boiling water and quantification by capillary gas-liquid chromatography. b) The emissions to air of acrylonitrile (during polymerisation and up to the solution ready for spinning), expressed as an annual average, shall be less than 1 g/kg of fibre produced. *Assessment and verification:* The applicant shall provide detailed documentation and/or test reports showing compliance with this criterion, together with a declaration of compliance.	

AHWG1 technical discussion

It is suggested based on the LCA findings to include a criterion for process energy consumption or the content of reused material. The LCA findings also highlighted the significance of water-based emissions contributing to aquatic toxicity and resource consumption associated with raw material use. These points were identified as being important areas of potential environmental improvement in the preliminary report.

Process energy benchmarks published by Plastics Europe were presented and discussed in section 3.3.2 of the preliminary report [7]. Further evidence is therefore required as to the environmental benefits of acrylic recycling to produce textile fibres and as to its technical viability and market acceptability as an option.

Feedback from stakeholders

Limited feedback was received in relation to this fibre criteria. Those that provided feedback highlighted the potential difficulty of applying energy benchmarks and the need to understand the market availability of fibre with a recycled content. The high level of regulation of EU man-made fibre manufacturing means that plant perform to a comparable and high level of efficiency.

One stakeholder emphasised that currently no acrylic fibres are ecolabelled and that the industry and Competent Bodies have experienced difficulty sourcing ecolabelled fibres. The ability of industry to meet the criteria therefore requires reviewing.

Follow-up research and proposed response

Process energy benchmarking

With regard to energy benchmarking the IPPC BREF documents were investigated as a main point of reference. Fibre production is not addressed by the BREF for polymers [8]. The most recent BREF for large volume organic chemicals addresses the production of Acrylonitrile – the copolymer used to polymerise acrylic fibres [9]. The BREF notes that the production process is highly exothermic and that most sites

[7] Plastics Europe, Eco-profiles of the European Plastics Industry – Acrylonitrile, March 2005

[8] European Commission, Reference document on Best Available Techniques in the production of polymers, IPPC Bureau, August 2007

[9] European Commission, Reference document on Best Available Techniques in the large volume organic chemical industry, IPPC Bureau, February 2003

are net steam exporters. The balance of energy recovery is, however, site specific because of the different possible configurations of plant.

The development of CO_2 (rather than primary energy) benchmarks for a number of synthetic fibre polymer feedstocks, including acrylonitrile, were proposed for inclusion within the EU Emission Trading Scheme 2013-2020 [10]. These were not developed further as they were not considered significant relative to other bulk chemical production processes.

Our conclusion is therefore that there is currently no suitable independent reference point for an energy or CO_2 benchmark criteria for acrylic fibre production.

Reference to polymer BAT for acrilonitrile production

As an alternative, BAT processes for acrylonitrile production could be used to inform the criteria. Production of acrilonitrile accounts for 48% of the process energy consumed in producing the fibres [11]. The most significant environmental improvements identified as BAT relate to:

- Optimisation of the catalyst used;
- The conversion of waste outputs from the process into saleable by-products;
- and the biotreatment of wastewater.

This finding is supported by a peer reviewed LCA study of an acrylonitrile plant redesign [12]. These BAT measures would address the energy and wastewater related impacts of acrylic fibres, including the minimisation of upstream impacts associated with propylene production.

These options are considered to be overly complex to trace and verify for acrylic fibres, particularly in the light of stakeholder concerns about being able to obtain ecolabelled acrylic fibres.

Minimum recycled content

[10] Ecorys, Fraunhofer ISI & Øko-Institut, Methodology for the free allocation of emission allowances in the EU ETS post 2012 – Select report for the chemical industry, November 2009

[11] Danish Environmental Protection Agency (1997) *Environmental assessment of textiles*, Environmental project number 239,

[12] Morales-Mora.M.A., Rosa-Dominguez.E., Suppen-Reynaga.N. & S.A, Martinez-Delgadillo, Environmental and eco-costs life cycle assessment of an acrylonitrile process by capacity enlargement in Mexico, Process safety and environmental protection, 90 (2012) 27–37

Whilst acrylic with a recycled content is available on the global market there is limited information as to its availability and technical qualities. As an environmental improvement option acrylic with a recycled content does not yet appear to have attracted significant attention from industry or to be readily available enough to warrant a minimum % recycled content criteria.

CURRENT CRITERION 2: COTTON AND OTHER NATURAL CELLULOSIC SEED FIBRES (INCLUDING KAPOK)

Major proposed changes	• Minor updates to the pesticide safeguard list • Introduction of minimum requirements for organic or Integrated Pest Management (IPM) cotton content • An increase in the minimum requirement for organic cotton to 10% with a higher 50% requirement for some specific products. • The IPM cotton minimum requirements to mirror the organic requirements.
Present criterion, Decision 2009/567	
Cotton and other natural cellulosic seed fibres (hereinafter referred to as cotton) shall not contain more than 0.05 ppm (sensibility of the test method permitting) of each of the following substances: aldrin, captafol, chlordane, DDT, dieldrin, endrin, heptachlor, hexachlorobenzene, hexachlorocyclohexane (total isomers), 2,4,5-T, chlordimeform, chlorobenzilate, dinoseb and its salts, monocrotophos, pentachlorophenol, toxaphene, methamidophos, methylparathion, parathion, phosphamidon. The test should be made on raw cotton, before it comes through any wet treatment, for each lot of cotton or two times a year if more than two lots of cotton per year are received. This requirement does not apply where more than 50% of the cotton content is organically grown cotton or transitional cotton, that is to say certified by an independent organisation to have been produced in conformity with the production and inspection requirements laid down in Council Regulation (EEC) No 2092/91 of 24 June 1991 on organic production of agricultural products and indications referring thereto on agricultural products and foodstuffs (1). This requirement does not apply if documentary evidence can be presented that establishes the identity of the farmers producing at least 75% of the cotton used in the final product, together with a declaration from these farmers that the substances listed above have not been applied to the fields or cotton plants producing the cotton in question, or to the cotton itself. Where at least 95% of the cotton in one product is organic, that is to say certified by	

an independent organisation to have been produced in conformity with the production and inspection requirements laid down in Regulation (EEC) No 2092/91 the applicant may place the mention ‘organic cotton’ next to the eco-label. Between 70% and 95% it may be labelled “made with xy% organic cotton”).

The applicant shall either provide proof of organic certification or documentation relating to the non-use by the farmers or a test report, using the following test methods: as appropriate, US EPA 8081 A (organo-chlorine pesticides, with ultrasonic or Soxhlet extraction and apolar solvents (iso-octane or hexane)), 8151 A (chlorinated herbicides, using methanol), 8141 A (organophosphorus compounds), or 8270 C (semi-volatile organic compounds).

A minimum of 3% of organic cotton that is to say certified by an independent organisation to have been produced in conformity with the production and inspection requirements laid down in Regulation (EEC) N°2092/91 have to be used on an annual basis. The applicant shall provide :

- Information about the certification body,
- A declaration stating the proportion of certified cotton used in the total production of textiles on a yearly basis

The competent body may request the submission of further documentation to enable it to assess whether the requirements of the standard and certification system have been fulfilled.

Suggested criterion

2.1 Products should contain the following minimum content of organic or Integrated Pest Management (IPM) produced cotton:

- 50% minimum organic or IPM cotton content requirement for selected products: baby clothing, shirts, blouses, t-shirts, jeans, bed linen and towels
- 10% minimum organic or IPM cotton content requirement for all other

products

The organic cotton should be grown according to the requirements laid down in Regulation (EC) No 834/2007 [13] or the US National Organic Programme (NOP). IPM cotton should be grown according to the general principles of IPM laid down in the Directive 2009/128/EC[14].

Assessment and verification: Organic and IPM content should be certified by an independent organisation to have been produced in conformity with the production and inspection requirements laid down in Regulation 834/2007/EC or the US National Organic Programme (NOP). The applicant shall provide:

- Information about the control body or certification body,
- Transaction records which provide evidence of the proportion of certified cotton used on an annual basis.

2.2 Cotton and other natural cellulosic seed fibres (hereinafter referred to as cotton) shall not contain more than 0.5 ppm in total of (sensibility of the test method permitting) of the following substances:

Aldrin, captafol, chlordane, DDT, dieldrin, endrin, heptachlor, hexachlorobenzene, hexachlorocyclohexane (total isomers), 2,4,5-T, chlordimeform, chlorobenzilate, dinoseb and its salts, monocrotophos, pentachlorophenol, toxaphene, methamidophos, methylparathion, parathion, phosphamidon, aldocarb, endosulfan.

This requirement does not apply where more than 50% of the cotton content is organically grown cotton or transitional organic cotton, and more than 75% of the cotton is Integrated Pest Management (IPM) cotton.

This requirement does not apply if documentary evidence can be presented that establishes the identity of the farmers producing at least 75% of the cotton used in the final product, together with a declaration from these farmers that the substances listed above have not been applied to the fields or cotton plants producing the cotton

[13] European Parliament and the Council of the European Union, Council Regulation (EC) No 834/2007of 28 June 2007 on organic production and labelling of organic products and repealing Regulation (EEC) No 2092/91, Office Journal of the European Union, 20th July 2007

[14] European Parliament and the Council of the European Union, *Directive 2009/128/EC of 21 October 2009 establishing a framework for Community action to achieve the sustainable use of pesticides*, 24th November 2009

in question, or to the cotton itself.

~~Where at least 95% of the cotton in one product is organic, that is to say certified by an independent organisation to have been produced in conformity with the production and inspection requirements laid down in Regulation (EEC) No 2092/91 the applicant may place the mention 'organic cotton' next to the eco-label. Between 70% and 95% it may be labelled "made with xy% organic cotton").~~

Assessment and verification: The applicant shall either provide proof of organic or IPM certification, or documentation relating to the non-use by the farmers or a test report, using the following test methods: as appropriate, US EPA 8081 A (organo-chlorine pesticides, with ultrasonic or Soxhlet extraction and apolar solvents (iso-octane or hexane)), 8151 A (chlorinated herbicides, using methanol), 8141 A (organophosphorus compounds), or 8270 C (semi-volatile organic compounds).

Tests should be made on raw cotton, before it comes through any wet treatment, for each lot of cotton or two randomly selected samples a year if more than two lots of cotton per year are received.

AHWG1 technical discussion

The current criterion focuses on the growing of cotton using methods that minimise or eliminate pesticide use. A number of revisions are proposed based on industry best practice and evidence which suggests that the potential for environmental improvement could be significantly greater:

- Organic cotton: It is proposed to increase the minimum proportion of certified organic fibre content;
- IPM cotton: It is also proposed to recognise Integrated Pesticide Management (IPM) techniques through the introduction of a minimum proportion of certified IPM fibre content. IPM certification routes should also address water use for irrigation;
- Updating of the pesticide list: It is proposed to add a number of substances to the pesticide list. Given the proposed introduction of a minimum % certified IPM content it is proposed that testing against the pesticide list is a requirement alongside compliance with the general principles of IPM production.

- Recycled cotton: The specification of recycled cotton is proposed as an alternative compliance route that would reduce the need for cultivation and reduce the landfilling of textiles.

Below we discuss the technical issues relating to each of these areas of the criterion proposal.

Organic cotton

The environmental benefits of organic cotton relate especially to the avoidance of pesticide use and the avoidance of artificial fertilisers. The use of artificial fertilisers contributes with approximately 106 kg N/ hectare, 63 kg P/hectare (P as P_2O_5) and 64 kg K/ha (K as K_2O)[15]. Artificial fertilisers and pesticides are energy intensive to produce and also contribute to nitrous oxide emissions from soil which mean that conventionally grown cotton also contributes more to the greenhouse effect than organic cotton.

The use of organic cotton results thus in a reduction in the emission of greenhouse gases but the major environmental benefit is the avoidance of the use of pesticides which is good for both the environment and the health of farmers that do not have to handle the pesticides which, according to studies by the FAO, in some cotton growing regions is carried out without sufficient protection.

The amount of organic cotton production worldwide is still very small. According to the Textile Exchange the global production was less than 1% in 2009 [16]. The biggest producers of organic cotton are India and Turkey and the amount of organic cotton is still increasing. This is largely due to an increasing demand from companies like C&A, H&M, Nike, Adidas and Zara [17].

There are a number of labeling schemes for organic cotton. The most successful labeling schemes for organic cotton appear to be the Textile Exchanges' OE Blended and OE 100% content standards [18] and the International Working Group on Global

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[15] Laursen, S. E., Hansen, J., Knudsen, H. H., Wenzel, H., Larsen, H. F., & Kristensen, F. M. (2007). *EDIPTEX: Environmental assessment of textiles*. Danish Environmental Protection Agency, working report 24

[16] Textile Exchange, *Organic cotton farm and fibre report* 2009/10

[17] Textile Exchange, Organic Cotton press release September 6th 2011

[18] Textile Exchange, *OE Standards*, http://textileexchange.org/content/oe-standards/

Organic Textile Standards' GOTS standard [19]. OE blended requires a minimum 5% organic cotton content. GOTS requires a minimum content of 70% organic cotton. The OE standards focus on providing traceability along the supply chain based on transaction certificates. GOTS has a broader focus, with the inclusion of standards that apply to wet processes in the supply chain.

During the revision in 2006-7 organic cotton was discussed which resulted in the current criterion where 3% organic cotton is required. This was a compromise that was decided because most participants wanted a criterion that required organic cotton but most participants agreed that 100% organic cotton was too difficult and would exclude too many products.

Some stakeholders wanted each product made of cotton to contain 3% organic cotton. Others argued that this would be very complicated for the license holders and would make it much more complicated. It was hence decided to require a minimum of 3% organic cotton as an annual average. This criterion has later turned out to be rather challenging to administrate for both license holders and competent bodies.

Since the last revision the OE standards and GOTS have become much more common and global cotton production has increased substantially which has resulted in a boost in the quantity of textiles with certified organic cotton. However, whilst GOTS has a minimum organic content requirement of 70% the required percentage for the Ecolabel should be determined based on current EU product best practice and taking into account any market constraints to the availability of organic cotton in the EU.

Reducing pesticide use

Cotton is a crop that, as highlighted by the preliminary report's technical analysis, normally requires large quantities of pesticides. It uses approximately 2.5% of the world's cultivated land yet uses 16% of the world's insecticides, more than any other single major crop [20] A study in USA has concluded that the application of pesticides

[19] International Working Group on Global Organic Textile Standards, *Standard general description*, http://www.global-standard.org/the-standard.html

[20] EJF. (2007). *The deadly chemicals in cotton. Environmental Justice Foundation in collaboration with Pesticide Action Network UK*: London, UK. ISBN No. 1-904523-10-2

to cotton crops is 3 to 5 times greater per hectare than the application of pesticides to corn in the humid areas of USA [21] .

The current list of excluded pesticides has remained unchanged since the criteria version from 2002. The list was adopted from the Prior Informed Consent (PIC) Procedure which is derived from the Rotterdam Convention on the Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade [22]. This procedure has been accepted by more than 120 member nations of the the FAO (Food and Agricultural Organisation of the UN) and UNEP (United Nations Environment Programme).

Endrin is the only pesticide included within the Ecolabel criterion that is not mentioned in the PIC procedure. Endrin is an organochloride that is not understood to have been used in cotton production in many years. It has been banned in USA since 1986.

Identifying possible additional pesticides using the PIC procedure

The PIC procedure was adopted at the Rotterdam Convention in 1998. The PIC procedure is voluntary - it has been unanimously accepted by member countries to the FAO and UNEP and is supported by the leading chemical industry associations and a variety of non-governmental organisations.

The PIC procedure helps participating countries learn more about the characteristics of potentially hazardous chemicals that may be shipped to them. It initiates a decision-making process on the future import of these chemicals by the importing countries themselves, facilitating the dissemination of this decision to other countries, and encourages exporting countries to take measures to ensure that unwanted exports do not occur.

Pesticides, industrial and consumer chemicals that have been banned or severely restricted for health or environmental reasons by the participating governments can be included in the procedure. In addition acutely toxic pesticide formulations, which may present a hazard under the conditions of use in developing countries, may also be included.

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[21] U.S. Geological Survey,http://toxics.usgs.gov/regional/cotton.html

[22] The Prior Informed Consent (PIC) Procedure. http://www.pic.int/Procedures/PICProcedure/tabid/1364/language/en-US/Default.aspx]

In December 2011 the Annex III of the Rotterdam Convention consisted of 43 chemicals of which 32 are pesticides. The listing from Annex III is presented in table below. The remaining 11 chemicals that are not pesticides are industrial chemicals that are not relevant to this report.

Table 3.1.1 Pesticides from Annex III of the PIC procedure [PIC]

Aldrin	Methyl-parathion
Captafol	Parathion
Chlordane	Phosphamidon
DDT	Alachlor
Dieldrin	Aldicarb
Heptachlor	Binapacryl
Hexachlorobenzene	Dinitro-ortho-cresol (DNOC) and its salts
HCH (mixed isomers)	EDB (1,2-dibromoethane)
2,4,5-T and its salts and esters	Endosulfan
Chlordimeform	Ethylene dichloride
Chlorobenzilate	Ethylene oxide
Dinoseb and its salts and esters	Fluoroacetamide
Monocrotophos	Lindane (gamma-HCH)
Pentachlorophenol and its salts and esters	Mercury compounds
Toxaphene (Camphechlor)	Tributyl tin compounds
Methamidophos	combination of benomyl, carbofuran and thiram

The existing criterion for cotton includes 19 of the 32 pesticides listed on the current PIC-list. Hexachlorocyclohexane (total isomers) in the criterion covers both HCH (mixed isomers) and Lindane (gamma-HCH) on the PIC list. The remaining 13 pesticides from the PIC-list that are not covered by the current criteria document are:

> *Alachlor, Aldicarb, Binapacryl, Dinitro-ortho-cresol (DNOC) and its salts, EDB (1,2-dibromoethane), Endosulfan, Ethylene dichloride, Ethylene oxide, Fluoroacetamide, Mercury compounds, Tributyl tin compounds, combination of benomyl, carbofuran and thiram.*

Of these, four are used mainly for warehouse fumigation. These are 1,2-dibromoethane (EDB), ethylene e dichloride, ethylene oxide and fluoroacetamid. For warehouse fumigation, the use of these substances is often a part of a deferring procedure and seems difficult to substitute. Furthermore the use of the fumigations is not directly linked to the production or handling of eco labelled textiles. For this reason we propose that these four substances should be removed from the criterion.

Mercury compounds are normally used for seed treatment. However, some mercury compounds have also been used for aerial spraying against aphids and cotton mites, (The Merck Index) [23] .The references to the use for aerial spraying are however very old, and there is no indication of current use for this purpose. The cost of performing the relevant tests for mercury and its compounds is quite high since a separate test is needed. For these reasons mercury and its compounds are not proposed for this criterion.

Tributyltin compounds have been used in anti-fouling ship paints but have been banned in most countries and have been substituted. It can also been used for conservation purposes but this function is already regulated by the criterion 11 concerning biocides. For these reasons tributyl compounds are not proposed for this criterion.

The remaining pesticides from the PIC procedure: Alachlor, Aldicarb, Binapacryl, Dinitro-ortho-cresol (DNOC) and its salts, Endosulfan, and combination of benomyl, carbofuran and thiram could all be candidates for extension of the criterion based on their relevance to cotton growing.

Managing water consumption for irrigation

The water consumption of cotton production has been raised as an issue because heavy irrigation is sometimes needed. According to the FAO cotton requires 700 to 1300 mm to meet its requirements and the highest water demand is during the flowering period when the leaf area is at its maximum. Approximately 53% of global cotton production is irrigated with the higher yield coverting this figure to 73% of production.

Water is added to the crops by both natural sources (rainfall) and artificially (irrigation). The proportion between the two types of sources depends on the time of year and on where the cotton grows. In Egypt the crop water requirement is 1009

[23] Hayes (1982)

mm and almost all is added by irrigation systems whereas in USA the requirement is 516 mm of which 311 mm is from rainfall and irrigation only contributes with 205 mm [24].

Setting requirements for the amount or method of irrigation could possibly reduce the water used but this would require co-operation with the farmers. For conventional cotton it is normally very difficult to trace the cotton back to the individual farmers since the traceability is lost through cotton merchants, ginners and spinners.

Examples of schemes that try to reduce the amount of water used to irrigation are the Better Cotton Initiative and Cotton Made in Africa who both work closely with the farmers in order to help them use less pesticide and water. Helvetas Swiss Intercooperation have also published a guideline called *Irrigation and soil conservation Innovations* that describes how irrigation systems can be improved [25].

Recycled cotton

Recycled cotton is normally defined as cotton made from textile remnants in production. These are segregated by colour and shredded into fibre, spun into new yarns and woven into new fabrics. New recovery processes are also being developed that enable a higher quality of recycled fibre to be produced.

The chain of custody for recycled content can now be certified by a number of emerging schemes. The Global Recycling Standard is the most significant globally and was developed by Control Union Certifications. Since 2011 the standard is owned by Textile Exchange (formally Organic Exchange).

Fairtrade Cotton

Fairtrade is a scheme that primarily ensures that farmers receive a higher price for their cotton but the scheme also includes requirements which apply to production banning the most harmful pesticide and substances [26]. It is claimed that better trading conditions can in turn also facilitate more sustainable management practices. The extent to which Fairtrade may be a certification option that delivers environmental improvements is to be further investigated.

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[24] *The water footprint of cotton consumption*. Value of Water Research Report Series No. 18. 2005

[25] Helvetas Swiss Intercooperation (2004) *Irrigation and soil conservation Innovations*

[26] Fair Trade International, *Standards listing*, http://www.fairtrade.net/our_standards.html

Stakeholder feedback

The pesticide list was still felt to have value as a safeguard for environmental protection. The list should be reviewed for its relevance to substances used/restricted not just in Europe but internationally. Specific additional pesticides should be added including aldacarb and endosulfan – although some RSL's have wider coverage, more closely reflecting Oeko-tex 100. It was also suggested that a sum total should be introduced of 1.0 mg/kg.

Organic cotton's small share of the cotton market was cited as a barrier to raising the minimum % requirement. There is also not enough information for manufacturers as to how/where to obtain certified cotton.

Opinions varied on increasing the minimum organic % content. On one hand the Nordic Swan is proposing to reduce from 100% to 10% because it is too difficult to achieve and is not having the desired market impact. A lower figure was supported by some industry stakeholders. Availability and price was seen as a key barrier.

On the other hand it was felt strongly by some stakeholders that a high % is required to drive the market, distinguish from competitors and make the product meaningful to consumers - '*we would not consider the ecolabel if the minimum is lower then 50%*' - although some concerns were raised about the potential impact on current licenses. Availability and price in this case were not seen as a significant barrier.

Verification of content claims raised concerns. Cotton is not often traced back to the farmer and there is too much reliance on self-declaration. EU Regulation 834/2007 and the use of transaction certificates as evidence should be the main verification route for this criterion. Mixed opinions were raised about recognising GOTS.

Whilst there was interest in IPM certification routes such as Better Cotton Initiative and Cotton Made in Africa concerns were raised that these schemes are not yet mature enough to be recognised by the Ecolabel. Concerns related to both the criteria and the verification systems.

Regarding water use, in general this was felt to be too complex to frame criteria. Not all cotton growing areas are reliant on high levels of irrigation (50% was quoted) and organic growing may result in better soil moisture retention.

Follow-up and proposed response

Updating of the pesticide list

The pesticide list is considered a safeguard to ensure that banned or hazardous substances are not used. Evidence suggests, however, that the testing of raw cotton may not always act as an effective safeguard. Annual testing results for raw cotton commissioned by the Bremen Cotton Exchange illustrates this [27]. Cotton is tested from the major producing countries. The results between 1994 and 2011 show very limited detection of pesticide residues (<0.01 mg/kg threshold) with the exception of the more recent detection of cypermethrin, profenophos, DEF, dieldrin, esfenvalerat and fenvalerat – which, with the exception of dieldrin, are not currently addressed by the Ecolabel criteria. These results are in spite of evidence of the continued use of hazardous pesticides in developing countries, with WHO Class 1a, 1b and II understood to be the most frequently used.

It is notable that emerging certification systems such as the Better Cotton Initiative and Cotton Made in Africa ban the use of pesticides that are on the Stockholm Convention PIC list as well as WHO Class 1 (1a Extremely hazardous and 1b Highly hazardous) pesticide classification lists.

The Bremen Exchange results, together with feedback from licenseholders of the Danish Competent Body, suggest that a stronger criteria focus is required on production systems such as IPM and organic, which are intended to educate farmers and control pesticide use at source. However, the route for farmers to make declarations of non-use is still considered to be valid given estimates that 15% of world cotton production is grown without pesticides because farmers cannot afford agrochemicals.

Raising the minimum organic content requirement

Stakeholders emphasised that in 2010/11 organic cotton only accounted for approximately 1.1% of the world market (241,276 tonnes). However, whilst organic cotton is undoubtedly still a niche product this figure does not reflect the distinct global distribution of demand for organic cotton.

Estimates suggest that the top ten EU and US retailers account for 70% of organic cotton demand [28], reflecting the largest two global markets for organic cotton.

[27] Bremen Baumwollbörse (2011) *Analysis of chemical residues – pesticides as per Oeko-Tex Standard 100*

[28] Yarns and Fibers Exchange, *The biggest markets are Europe and the United States*, 6th February 2012, http://www.yarnsandfibers.com/preferredsupplier/reports_fullstory.php?id=600#

Assuming an even split of demand for organic cotton between the EU and the USA, and based on an apparent EU consumption of cotton products of 3,686 k tonnes (derived from the IMPRO Textiles study), this would effectively mean that organic cotton holds an EU market share of approximately 6.5%, the majority of which is likely to be accounted for by large brands and retailers. Further data is awaited from the USA NOP and the Textile Exchange in order to verify this estimate.

An analysis of the strategies summarised in Table 3.1.2 adopted by leading manufacturers highlights a dual approach. On one hand organic cotton is blended at lower percentages in order to meet ambitious targets across all mainstream product lines. On the other hand high profile product lines with tailored branding contains higher percentages of organic cotton, usually between 50% and 100%, in order to appeal to 'light green' consumers and create a distinct product. A new trend evidenced by adidas and other market leaders such as Marks & Spencers and Zara is a shift from a focus on organic cotton towards targets for IPM cotton, in part driven by price and availability.

Concern was also raised by stakeholders about potential false claims. A review of some of the brands and retailers identified as driving the market suggests that organic cotton production is largely certified by control bodies recognised by the EU or the USA or by the independent body IFOAM. These include national control bodies such as APEDA in India, independent certification bodies such as Ecocert and certification schemes such as the Textile Exchange's OE Blended and 100% content claim standards. However, the status of certifiers as EU organic control bodies is more complex because cotton is not formally covered by Europe's organic production Regulation 834/2007.

The most substantial evidence of false claims appears to relate to the contamination of organic cotton from India with GM cotton[29]. Major certifiers such as Ecocert and Control Union were fined as a result, but investigations did not reveal that fraudulent claims had been made.

Stakeholders raised concerns about the price and availability of organic cotton. The Nordic Swan's recent public hearing will shortly provide relevant insight into industries viewpoints on these two issues – particularly given their proposal to move from 100% organic cotton requirement to a 10% requirement.

[29] Ecouterre, H&M, other major brands guilty of 'organic cotton fraud'?, 25th January 2010, http://www.ecouterre.com/hm-other-brands-guilty-of-organic-cotton-fraud/

In addition, Ecolabelling Denmark has contacted several license holders regarding these two issues The balance of feedback was that organic cotton was relatively easy to obtain, however, the price premium can vary. The price for organic cotton is normally 5-10 % more expensive but the difference can vary depending on availability.

Table 3.1.2 Analysis of organic cotton products sold by brands retailing in the EU that contribute to 70% of global organic cotton demand.

Retailer	Organic cotton purchased		Product strategy	Certification
	Total demand	% retail lines		
H&M	15,000 tonnes (2010)	-	3-50% blend – across selected lines (including EU Ecolabel) 100% content – organic labeled products	Textile Exchange OE blended and 100% (Control Union and IMO), EU Ecolabel
C&A	-	12% (32 million units)	100% content items	Textile Exchange OE blended and 100%
Nike	-	>14% (2009)	5% blend (86% of all apparel) targeting 10% by 2015 100% content – organic labeled products	Textile Exchange OE blended and 100%
Zara	-	1.9 million units	100% content – organic labeled products	
adidas	In the process of switching to BCI cotton	-	Moving away from organic to IPM cotton (40% targeted by 2014)	Better Cotton Initiative (BCI)
Hess Natur	1 million units per season	-	100% content – organic labeled products	GOTS

Co-op Switerland	1,300 tonnes (2011)	-	100% content – organic labeled products	Bio Inspecta Bio Suisse Flo Cert Intertek

Organic cotton proposal:

In order to respond to the very divided stakeholder opinions on the minimum organic content requirement, and in order to reflect recent developments in the market and broaden the appeal of the Ecolabel to larger retailers, it is proposed to introduce two minimum requirements:

- Products with greatest market share: The first requirement would be for a minimum of 50%. This would reflect the product content of larger retailers and would signal to them that the Ecolabel recognises consumer demand for high organic content. A higher % content would be required for clothing and interior textile 'basics' and high profile garments that constitute by far the greatest share of the EU market as identified by IMPRO Textiles.
- All other cotton products: The second requirement would raise the current minimum from 3% to 10%. This figure is likely to be easily achieveable for most manufacturers and retailers, as well as aligning with proposals put forward for amending the Nordic Swan criteria and the suggestions of a number of stakeholders. This would reflect lower blends being used across their product ranges.by larger retailers in addition to their high content products.

All content claims would need to be certified by an independent organisation as having been produced in conformity with the production and inspection requirements in Council Regulation (EC) No 834/2007.

Integrated Pest Management (IPM)

IPM is a system of cultivation that is intended to minimise the application of pesticides by the careful observation and management of crops. IPM cotton is claimed to reduce pesticide use by between 30% and 90%, and to constitute 20% of global cotton production. The system has been promoted by the UN FAO in developing countries that grow cotton. The FAO defines IPM as:

> *A site-specific strategy for managing insect, weed, disease and other pests in the most cost effective, environmentally sound and socially acceptable way*

Definition of IPM has also been developed by the European Commission [30] and is a key part of the European Union's agricultural policy. IPM was defined by Directive 91/414/EEC as:

> *The rational application of a combination of biological, biotechnical, chemical, cultural or plant-breeding measures, whereby the use of plant protection products is limited to the strict minimum necessary to maintain the pest population at levels below those causing economically unacceptable damage or loss".*

Directive 91/414/EEC encouraged Member States to take the principles of IPM into account. In 2006, the EU authorities published a "Thematic Strategy on the Sustainable Use of Pesticides" and this was followed up by Directive 2009/128/EC *Establishing a community framework to achieve the sustainable use of pesticides* [31]. The Directive introduced a definition of the principles of IPM and required Member States to take all necessary measures to introduce low-pesticide input pest management.

The principles of IPM and the learning from educational programmes worldwide promoted by the FAO now form the basis for a number of certification schemes. These schemes aim to bring low-pesticide input cotton to the textile market and allow for traceability from the farm. Schemes include the Better Cotton Initiative and Cotton Made in Africa. The Better Cotton Initiative was established in 2006 and aims to promote measurable improvements in the environmental and social impacts of

[30] European Commission, Development of guidance for establishing IPM principles, BIPRO, 24th April 2009

[31] European Parliament and the Council of the European Union, *Directive 2009/128/EC of 21 October 2009 establishing a framework for Community action to achieve the sustainable use of pesticides*, 24th November 2009

cotton cultivation worldwide. It is supported by a number of large clothing brands including Gap, H&M, C&A, Levi, Nike, adidas and Marks & Spencers.

The reliability and probity of the emerging IPM certification schemes is further discussed in this document in order to ensure that this improvement option can be verified and that traceability can be ensured that is comparable with the organic cotton verification requirements.

Comparison of conventional, IPM and organic methods

In terms of share of global production it has been estimated that conventional cotton accounts for 80%, IPM around 19% and organic 1%. In order to identify the potential for environmental improvement it is important to understand how the three main methods of cotton production compare. Here we refer to programme evaluations and literature reviews of available evidence by Wageningen University [32], the FAO [33] and the Better Cotton Initiative [34].

Wageningen University highlight pesticide and water use as the two most significant impacts arising from cotton production They conclude that while organic cotton production has clear benefits in terms of reducing harmful pesticide use the differences between conventional, IPM and organic methods may not be as clear on the ground because significant impacts can still arise from land clearance, natural pesticide use and, depending on the location, unsustainable water use.

Variations in yield also need to be taken into account, with clear variations between high input and low input agricultural systems. IPM production is claimed according to FAO programmes to achieve the highest yields of the three systems [35]. In developing countries it should also be noted that the cost of agrochemicals can also mean that farmers use little or no pesticides.

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[32] Kooistra K,J , Pyburn, R and A,J. Termorshuizen, *The sustainability of cotton – consequences for man and the environment*, Wageningen University, Report 223, April 2006

[33] Van den Berg, H, *A synthesis of 25 impact evaluations*, Wageningen University for Global IPM facility, January 2004

[34] Better Cotton Initiative, A report on better management practices in cotton production in Brazil, India, Pakistan, Benin, Burkina Faso, Cameroon, Mali, Senegal & Togo, April 2009.

[35] Kooistra K,J , Mancini F and A,J. Termorshuizen, *Environmental impact assessment of cotton cultivation in India,* p-53-68 in *Mancini,F (2006)* Impact of IPM Farmer Field Schools on the environment, health and livelihoods of cotton growers in Southern India, Wageningan University, The Netherlands

Table 3.1.3: Comparison of conventional, IPM and organic cotton farming systems

Characteristics	Farming technique		
	Organic	**IPM**	**Conventional**
Synthetic/organic fertiliser use	organic	Synthetic/organic	Synthetic/organic
Synthetic/natural pesticide use	natural	Synthetic/natural	Synthetic/natural
Irrigation water use	yes	yes	yes
Average yields	low	high	variable
Monoculture/mixed cropping	mono/mixed	mono/mixed	mono/mixed
Continuous cultivation	no	yes/no	yes/no
Land clearance permitted	yes	yes	yes
Burning of organic material	no	yes	yes
Mechanised labour	yes	yes	yes
Share of world production (%)	1.1	20.0	<79

Source: Kooistra K,J (2006)

Introducing an IPM content requirement

Evidence from the worldwide application of IPM principles suggests that as a method it can reduce pesticide use by between 30% and 90%. The extent to which reductions are made and sustained can, however, vary considerably and cannot be guaranteed. It is claimed that the benefits of improved health and safety and substantial increases in yield (up to +47% based on FAO programme reviews) create incentives in their own right.

The training of farmers to apply IPM and organic techniques is a critical factor in their success. The FAO has promoted Farmer Field Schools in Asia and Africa. In the USA and Australia both Government and industry-led programmes are understood to have achieved over 70% coverage.

The EU has now made a commitment to IPM principles in agriculture. Directive 2009/128/EC Establishing a community framework to achieve the sustainable use of pesticides requires Member States to take 'all necessary measures' to introduce low-pesticide input pest management .

IPM principles as defined by Directive 2009/128/EC

1. The prevention and/or suppression of harmful organisms should be achieved or supported among other options especially by:
   - crop rotation,
   - use of adequate cultivation techniques (e.g. stale seedbed technique, sowing dates and densities, under-sowing, conservation tillage, pruning and direct sowing),
   - use, where appropriate, of resistant/tolerant cultivars and standard/certified seed and planting material,
   - use of balanced fertilisation, liming and irrigation/drainage practices,
   - preventing the spreading of harmful organisms by hygiene measures (e.g. by regular cleansing of machinery and equipment),
   - protection and enhancement of important beneficial organisms, e.g. by adequate plant protection measures or the utilisation of ecological infrastructures inside and outside production sites.
2. Harmful organisms must be monitored by adequate methods and tools, where available. Such adequate tools should include observations in the field as well as scientifically sound warning, forecasting and early diagnosis systems, where feasible, as well as the use of advice from professionally qualified advisors.
3. Based on the results of the monitoring the professional user has to decide whether and when to apply plant protection measures. Robust and scientifically sound threshold values are essential components for decision making. For harmful organisms threshold levels defined for the region, specific areas, crops and particular climatic conditions must be taken into account before treatments,

where feasible.

4. Sustainable biological, physical and other non-chemical methods must be preferred to chemical methods if they provide satisfactory pest control.
5. The pesticides applied shall be as specific as possible for the target and shall have the least side effects on human health, non-target organisms and the environment.
6. The professional user should keep the use of pesticides and other forms of intervention to levels that are necessary, e.g. by reduced doses, reduced application frequency or partial applications, considering that the level of risk in vegetation is acceptable and they do not increase the risk for development of resistance in populations of harmful organisms.
7. Where the risk of resistance against a plant protection measure is known and where the level of harmful organisms requires repeated application of pesticides to the crops, available anti-resistance strategies should be applied to maintain the effectiveness of the products. This may include the use of multiple pesticides with different modes of action.
8. Based on the records on the use of pesticides and on the monitoring of harmful organisms the professional user should check the success of the applied plant protection measures.

Whilst evidence suggests that the benefits of IPM can be substantial until recently it was almost impossible to source certified IPM cotton. So whilst evidence suggests that there are significant quantities of IPM cotton on the global market, no certified, traceable systems have existed to verify this. One of the main problems is the ability to verify that IPM practices are being applied. This task is more difficult than for organic cotton because there are multiple definitions of IPM.

Directive 2009/128/EC now provides a definition of IPM which could form the basis for Ecolabel verification. Furthermore, a number of certification schemes now exist which are based on IPM principles, with the Better Cotton Initiative [36], Cotton Made in Africa [37] , Fair Trade [38] and BMP (Australia) [39] being well known examples. A

[36] Better Cotton Initiative, P*roduction principles and criteria v2.0*, December 2009

[37] Aid by Trade Foundation, Cotton Made in Africa - Criteria matrix Version 2.0, January 2011

comparison of these schemes with the EU IPM principles is presented in table 3.1.4 below. The EU has also recently launched the SPRING initiative to develop a scheme for Pakistan in conjunction with WWF-Pakistan.

Although no one scheme addresses all of the IPM principles in their criteria it is to be noted that the schemes also include many criteria that could be considered of importance to the Ecolabel. For example, Cotton Made in Africa excludes irrigated cotton and supports the training of farmers, Better Cotton Initiative includes criteria promoting better irrigation and pesticide application practices. Schemes also place a strong emphasis on improvement plans and BCI requires farmers to participate in farmer best practice groups.

[38] Fairtrade International, *Fair trade standard for small producer organisations*, Version 1.1, May 2011

[39] CRC (2005) Integrated pesticide management guidelines for cotton production systems in Australia, Australia.

Table 3.1.4 Comparison of IPM-based cotton certification programmes with Directive 2009/128/EC IPM Principles

EU IPM principles	Conformity of scheme criteria and systems			
	Better Cotton Initiative	Cotton Made in Africa	Fair Trade	BMP (Australia)
1. Prevention and suppression of harmful organisms	Criteria 1.1 and 3	Criteria 3a/b	*Training required*	IPM and Biosecurity levels 1-2
2. Monitoring of harmful organisms	Criteria 1.1	*Plan required*	Criteria 3.2.3	IPM and Biosecurity levels 1-2
3. Use of decision thresholds	*No specific details*	Criteria 4e	*No specific details*	IPM module (levels 1-2)
4. Preferential use of sustainable control methods	Criteria 1.1	*No specific details*	*Training required*	*No specific details*
5. Use of specific, low impact pesticides	Criteria 1.1	Criteria 4a	*No specific details*	*No specific details*
6. Minimisation of dosage	*No specific details*	*No specific details*	*No specific details*	IPM module (levels 1-2)
7. Anti-resistance strategies	Criteria 1.1	Criteria 4a	*No specific details*	IPM module (levels 1-2)
8. Monitoring of results	Criteria 1.1	*No specific details*	*No specific details*	Not covered at level 1-2

Sources: BCI (2009), CMiA (2011) Fair Trade International (2012) and BMP (2012)

Availability of IPM cotton

The availability of certified cotton via these schemes is increasingly rapidly in response to demand from large retailers and clothing manufacturers, with some evidence of a shift in focus from organic to IPM cotton. The combined tonnage for BCI and CMiA is estimated at 125,240 for 2010/11 with a projection of 460,000 for 2011/12. Australian BMP cotton is estimated to represent around 60% of the countries total production (1.2 m tonnes in 2010/11) [40].

However, stakeholders raised specific concerns that the verification and assessment systems of current IPM schemes may not yet be developed enough for the Ecolabel to use them for verification. Concerns related to the specifics of the criteria, certification of IPM techniques and traceability.

The organic production Regulation 834/2007 [41], which requires the use of Member State control bodies and transaction certificates, has been referred to by some stakeholders as the benchmark for how IPM certification should operate. We have therefore used this as the basis for criteria development.

Taking this approach IPM certification would need to be in line with Titles V and VI of Regulation 834/2007, and in particular Article 33 of Title VI, and Regulation 1235/2008 [42]. In summary they require a control system in which:

- A certificate of inspection is required for the product up to the first consignee by *'competent authorities, control authorities or control bodies'* with at least one verification annually;
- Traceability is ensured *'at all stages of production, preparation and distribution'*.
- Control bodies that are certification bodies are accredited to EN 45011 or ISO Guide 65.

[40] *Implications and Opportunities for Australian Cotton*, ABARE Outlook 2005 Conference, Background papers, 1-2 March 2005, Australia

[41] European Parliament and the Council of the European Union, Council Regulation (EC) No 834/2007of 28 June 2007 on organic production and labelling of organic products and repealing Regulation (EEC) No 2092/91, Office Journal of the European Union, 20th July 2007

[42] European Parliament and the Council of the European Union, *Commission Regulation (EC) No 1235/2008 of 8 December 2008 laying down detailed rules for implementation of Council Regulation (EC) No 834/2007 as regards the arrangements for imports of organic products from third countries*, Office Journal of the European Union, 12th December 2008

Countries listed by the Commission as having adequate organic control systems could potentially also be used to verify IPM production.

Table 3.1.5 makes a comparison between IPM certification schemes and Regulation 834/2007. The main strength of the schemes is their control of the operator. Product certification is a weakness for two of the schemes but it is possible that this could be overcome through the use of existing organic control systems, if available in relevant countries. Only one scheme is certified to ISO Guide 65 suggesting that this may not be a realistic expectation.

Table 3.1.5 Comparison of IPM-based cotton certification programmes with EU organic import control systems

EU control system requirements	Conformity of scheme criteria and systems			
	Better Cotton Initiative	Cotton Made in Africa	Fair Trade	BMP (Australia)
Operator control measures	Yes, due diligence of farmer and farmer group self-assessments	Yes, licensing of producer organisations based on verification of self-assessments	Yes, certification of producer organisation and random checking of farmers	Yes, 3rd party auditing and certification of farms
Product certificate of inspection	Yes, chain of custody for bales	No, cotton is purchased via a 'Demand Alliance'	Yes, physical and documentary traceability are required.	No specific process
EN 45011/ISO Guide 65	No, large farms are 3rd party verified every 3 years	No, cotton Co. and small holding are 3rd party verified every 2 yrs	Yes, FLO CERT is ISO 65 accredited. Annual on-site inspections are carried out.	No, farms are certified for 5 years

Sources: BCI (2009), CMiA (2011) Fair Trade International (2012) and BMP (2012)

IPM Proposal:

Given the global importance of IPM as an improvement measure, its theoretical availability – much more so than organic cotton – and its growing significance as an affordable alternative to organic cotton for retailers and manufacturers it is therefore proposed that minimum IPM requirements are introduced as an alternative to organic cotton in this revision.

A content standard of 10% blended and 50% for selected basics is proposed, mirroring the proposed approach to organic cotton but reflecting the fact that although IPM is potentially cheaper and available in greater quantities, the certified IPM cotton market is not as mature.

However, in response to stakeholder concerns the verification requirements would be aligned with those of Regulation 834/2007. This would signal that IPM is recognised by the Ecolabel but could serve to incentivise these schemes to further improve their systems. Our brief review of existing IPM-type schemes suggests that this may be workable.

CURRENT CRITERION 3: ELASTANE

Major proposed changes	• The aromatic diisocyanate criterion is changed to focus on occupational exposure

Present criterion, Decision 2009/567

3.1. Organotin compounds shall not be used.

Assessment and verification: The applicant shall provide a declaration of non-use.

3.2. The emissions to air of aromatic diisocyanates during polymerisation and fibre production, measured at the process steps where they occur, including fugitive emissions as well expressed as an annual average, shall be less than 5 mg/kg of fibre produced.

Assessment and verification: The applicant shall provide detailed documentation and/or test reports showing compliance with this criterion, together with a declaration of compliance.

Proposed criteria revision

3.1. Organotin compounds shall not be used.

Assessment and verification: The applicant shall provide a declaration of non-use.

3.2. The emissions to air of aromatic diisocyanates during polymerisation and spinning shall not exceed 0.005 ml/m³ in the workplace measured in those process stages in which they occur, expressed as an 8-hour average value (shift mean value).

Assessment and verification: The applicant shall provide detailed documentation and/or test reports showing compliance with this criterion, together with a declaration of compliance.

Feedback from stakeholders

Limited feedback was provided on this criterion. It was highlighted at the 1st AHWG that aromatic diisocyanates are reactive chemicals and that occupational exposure levels would be more appropriate for this criterion. The Blue Angel label specifies a workplace exposure limit based on MAK values [43].

Follow-up research and proposed approach

Aromatic diisocyanates form the basis for the manufacturing of elastane, commonly termed spandex. The most commonly used aromatic diisocyanate are understood to be toluene diisocyanate (TDI) and diphenylmethane-4,4'-diisocyanate (MDI). TDI is classified with is classified with H317, H330, H334, H351, H373 and H412. MDI is classified with H317, H334, H351 and H373. These combinations of hazard statements suggest that occupational health exposure pathways should be given more emphasis.

Proposal:

Harmonisation is proposed with the approach taken by the Blue Angel, which focusses on occupational exposure rather than emissions to the environment.

[43] The Blue Angel, Textiles – basic criteria for award of the environmental label, February 2011

CURRENT CRITERION 4: FLAX AND OTHER BAST FIBRES (INCLUDING HEMP, JUTE AND RAMIE)

Major proposed changes	• A criterion which minimises energy inputs required for retting
Present criterion, Decision 2009/567	
Flax and other bast fibres shall not be obtained by water retting, unless the waste water from the water retting is treated so as to reduce the COD or TOC by at least 75 % for hemp fibres and by at least 95 % for flax and the other bast fibres. *Assessment and verification:* If water retting is used, the applicant shall provide a test report, using the following test method: ISO 6060 (COD).	
Suggested criterion	
Flax and other bast fibres should be retted in ambient conditions without thermal energy inputs. *Assessment and verification:* The applicant should provide documentation and records of land use and harvesting. Flax and other bast fibres ~~shall not be~~ obtained by water retting~~, unless the waste water from the water retting is~~ should be treated so as to reduce the COD or TOC of wastewater from retting ponds by at least 75 % for hemp fibres and by at least 95% for flax and the other bast fibres. *Assessment and verification:* If water retting is used, the applicant shall provide a test report, using the following test method: ISO 6060 (COD).	

AHWG1 technical discussion

It is not proposed to change the current criterion. Energy used during the pre-treatment of flax to obtain fibres was highlighted as significant area of potential improvement in the preliminary report. This is therefore proposed as the focus for a potential new criterion.

Feedback from stakeholders

Limited feedback was received from stakeholders on this criterion. Those that responded were not in favour of introducing a new criterion. Whilst it was accepted that inefficient mechanical processes may be used for fibre extraction, a reduction in energy use should not be traded for greater chemical use. New technologies such as ultrasound have the potential to reduce chemical requirements significantly. The price of energy should be sufficient to place pressure on fibre manufacturers.

Comments were also made by one stakeholder about the potential quantity of herbicides used on some flax crops.

Follow-up research and proposed approach

Retting is the first stage in the extraction of bast fibres. It is understood that in most of Europe, which accounts for 34% of global flax production, water or dew retting are used [44]. Dew retting consists of the spreading of the fibres in the fields. Expert literature also highlights enzymatic, chemical and mechanical retting as industrial options [45] . Chemical retting requires the use of sodium hydroxide, sodium benzoate and hydrogen peroxide bleach.

Research into alternative methods highlights water and chemical use and waste arisings associated with chemical retting [46]. Enzymatic retting is understood to have the potential to have lower environmental impacts, with 'bio-retting' catalysing breakdown of the substances that glue the fibre together [47], but requires energy to be used to heat the water. Ultrasound is currently only used at one site in the EU, so cannot be considered to yet be commercially available [48].

[44] Saneco, *Flax production in the world 1993-2010*, http://www.saneco.com/spip.php?article2

[45] Tahir P.D, Ahmed, P.B, Saiful Azry S.O.A, and Z.Ahmed, *Retting process of some bast fibres and its effect on fibre quality,* Bioresources Journal, 6(4), 5260-5281

[46] Harwood R, Nusembaum V and J Harwood (2008) Cottonisation of flax, International conference on flax and other bast plants.

[47] Jan.M, Viktor.A, Marie.B, Prokop.S, Holger.F and J Stefan, (2008) Enzymatic bioprocessing – a new tool of extensive natural fibre source utilization, *Cottonisation of flax, International conference on flax and other bast plants*.

[48] Ecco, *Setralit – Fibres from regenerating raw material*, Accessed 2012, www.ecco-fibre.net

An LCA study carried out by the University of Plymouth which examined energy use associated with the production of flax examined in more detail the 'pre-treatment' stage highlighted by IMPRO Textiles[49]. The study suggests that the most significant 'hot spots' for the Global Warming Potential midpoint are agro-chemical use, retting and scutching with, in contrast to other sources, bio-retting associated with the most significant impact.

Proposal:

It is proposed that a criterion is formulated that seeks to minimise energy inputs and the COD impacts of flax production by requiring low impact agriculture and retting processes.

[49] Dissnanyake N.P.J Life cycle assessment of flax fibres for the re-inforcement of polymer matrix composites, Doctoral Thesis, University of Plymouth, May 2011

CURRENT CRITERION 5: GREASY WOOL AND OTHER KERATIN FIBRES (INCLUDING WOOL FROM SHEEP, CAMEL, ALPACA, GOAT)

Major proposed changes	• Ectoparasiticide testing to be required on randomly selected composite farm lots of wool a minimum of twice per year • Compliance can now be documented by using organic wool • Scourers achieving high levels of grease recovery (>70%) may discharge effluent with a COD of <180 g/kg greasy wool • Scourers with lower levels of grease recovery (<70%) must discharge effluent with a COD of <24 g/kg greasy wool • Value must be recovered from grease, suint, waste fibre and sludge
Present criterion, Decision 2009/567	
The following sum totals shall be achieved for wool ectoparasticide concentrations on raw wool prior to scouring: 5.1 The sum total content of the following substances shall not exceed 0.5 ppm : γ-hexachlorocyclohexane (lindane), α-hexachlorocyclohexane, β-hexachlorocyclohexane, δ-hexachlorocyclohexane, aldrin, dieldrin, endrin, p,p'-DDT, p,p'-DDD. 5.2 The sum total content of the following substances shall not exceed 2 ppm: diazinon, propetamphos, chlorfenvinphos, dichlorfenthion, chlorpyriphos, fenchlorphos. 5.3 The sum total content of the following substances shall not exceed 0.5 ppm: cypermethrin, deltamethrin, fenvalerate, cyhalothrin, flumethrin. 5.4 The sum total content of the following substances shall not exceed 2 ppm: diflubenzuron, triflumuron, dicyclanil. The test should be made on raw wool, before it comes through any wet treatment,	

two times a year if more than two lots of wool per year are received.

These requirements (as detailed in points 5.1, 5.2, 5.3 and 5.4 and taken separately) do not apply if documentary evidence can be presented that establishes the identity of the farmers producing at least 75 % of the wool or keratin fibres in question, together with a declaration from these farmers that the substances listed above have not been applied to the fields or animals concerned.

Assessment and verification for points 5.1, 5.2, 5.3 and 5.4: The applicant shall either provide the documentation indicated above or provide a test report, using the following test method: IWTO Draft Test Method 59.

5.5. For scouring effluent discharged to sewer, the COD discharged to sewer shall not exceed 60 g/kg greasy wool, and the effluent shall be treated off-site so as to achieve at least a further 75 % reduction of COD content, expressed as an annual average.

For scouring effluent treated on-site and discharged to surface waters, the COD discharged to surface waters shall not exceed 45 g/kg greasy wool. The pH of the effluent discharged to surface waters shall be between 6 and 9 (unless the pH of the receiving waters is outside this range), and the temperature shall be below 40 °C (unless the temperature of the receiving water is above this value). The wool scouring plant shall describe, in detail, their treatment of the scouring effluent and continuously monitor the COD-levels.

Assessment and verification: The applicant shall provide relevant data and test reports related to this criterion, using the following test method: ISO 6060.

Suggested criterion

5.1 The following sum totals shall be achieved for wool ectoparasticide concentrations on raw wool prior to scouring:

- The sum total content of the following substances shall not exceed 0.5 ppm :

  γ-hexachlorocyclohexane (lindane), α-hexachlorocyclohexane, β-hexachlorocyclohexane, δ-hexachlorocyclohexane, aldrin, dieldrin, endrin, p,p'-DDT, p,p'-DDD.

- The sum total content of the following substances shall not exceed 2 ppm:

  diazinon, propetamphos, chlorfenvinphos, dichlorfenthion, chlorpyriphos, fenchlorphos.

- The sum total content of the following substances shall not exceed 0.5 ppm: cypermethrin, deltamethrin, fenvalerate, cyhalothrin, flumethrin.
- The sum total content of the following substances shall not exceed 2 ppm: diflubenzuron, triflumuron, dicyclanil.

These requirements (as detailed in points 5.1, 5.2, 5.3 and 5.4 and taken separately) do not apply if:

- Wool is organically produced wool (including transitional wool), that is to say certified by an independent organisation to have been produced in conformity with the production and inspection requirements laid down in Council Regulation (EC) No 834/2007.
- Documentary evidence can be presented that establishes the identity of the farmers producing at least 75 % of the wool or keratin fibres in question, together with a declaration from these farmers that the substances listed above have not been applied to the fields or animals concerned.

Assessment and verification for points 5.1, 5.2, 5.3 and 5.4: The applicant shall either provide the documentation indicated above or provide a test report, using the following test method: IWTO Draft Test Method 59.

The test should be made on sales lots of raw wool, before it comes through any wet treatment. A minimum of one composite sample of multiple farmer lots should be tested per 50 tonne of sales lots where only one lot is purchased, or two randomly selected samples per year for larger orders. A composite sample should consist of wool fibres from at least 10 randomly selected farmer lots within the sales lot.

5.2. For scouring effluent discharges the COD limits applicable will depend on the efficiency of grease recovery.

For wool scouring operations that achieve a minimum total recovery of grease from raw wool of 70% the COD discharged to sewer shall not exceed 180 g/kg greasy wool. The effluent shall then be treated off-site to a minimum of secondary treatment standard as defined by Annex I of Council Directive 91/271/EEC.

For wool scouring operations that achieve a total recovery of grease from raw wool of less than 70% the COD discharged to sewer shall not exceed 24 g/kg greasy wool. No further treatment is then required.

In all cases the pH of the effluent discharged to surface waters shall be between 6

and 9 (unless the pH of the receiving waters is outside this range), and the temperature shall be below 40 °C (unless the temperature of the receiving water is above this value).

Assessment and verification: The applicant should provide reports and annual data from on-site monitoring of wool lots and grease recovery equipment .The wool scouring plant shall describe, in detail, their treatment of the scouring effluent, how value is recovered from by-products and monitoring systems for COD-levels. The applicant shall provide relevant data and test reports related to this criterion, using the following test method: ISO 6060.

5.3 Value should be obtained from wool grease, suint and sludge collected from recovery circuits and wastewater treatment plant. Sludge should not be landfilled or incinerated.

Assessment and verification: The applicant should provide reports and waste transfer notes confirming the recovery routes for waste streams.

AHWG1 technical discussion

The current criteria for pesticides (5.1 to 5.4) were discussed thoroughly during the latest revision in 2006-7. The criteria were commented on by several competent bodies and other stakeholders and were revised accordingly to the incoming suggestions and to the recommendations from BREF Textiles [50]. The latter document was published in 2003 and has not been revised since then.

Commercially produced wool uses large amounts of pesticides often described as *ectoparasiticides* that help farmers manage external parasites on ruminants. Ectoparasiticides have important implications for the discharge of raw wool scouring effluent and disposal of the sludge generated by the treatment of the effluent. Different types of ectoparasiticides are used:

- Organochlorides
- Organophosphorous
- Pyrethroids
- Insect growth regulators

[50] BREF Textile 2003. *Reference document on Best Available Techniques for the Textile industry*. European Commission, JRC, Seville.

Ectoparasiticides are often applied to the sheep through sheep dipping where the animals walk through pools with liquid solutions of insecticide and fungicide.

Testing frequency

The EU Ecolabel already has strict requirements for the amounts of ectoparasiticides in the raw wool. Before the 2009 version of the criteria it was not specified how often the wool should be tested for the specified pesticides which meant that license holders in some cases only submitted a test report when they applied for a license but not continually through the lifetime of the license. The criterion was hence changed in 2009 in such way that tests should be conducted on "*each lot of wool or two times a year if more than two lots of wool per year are received*".

This criterion has been commented on by a stakeholder with significant experience in the wool industry who has pointed out practical difficulties in upholding the Ecolabel criteria*:*

> *A wool scour receives several hundred processing lots of wool per year. An interpretation of the foregoing statement is that the scour requires only 2 processing consignments of wool to meet the EU eco-label requirements per year. In this case the scour will source these lots in early January and the scour will process normal wool from the auction system thereinafter. This will not meet the environmental protection goals of the eco-label. Unfortunately, this is the interpretation that is possible under the heading of Manufacturer's Declaration (2-5) in the Danish User manual.*

A clarification and/or improvement of the criterion is therefore considered necessary in order to ensure it is delivering a high level of confidence in the performance of the wool that is sourced.

Scouring effluent treatment

The criterion for scouring effluent was discussed intensely at the last EUEB meetings in Brussels in 2009 just before the criteria were decided. As a result of this the resulting values for COD (Chemical Oxygen Demand) in the waste water are quite different depending on if the effluent is treated on-site or off-site:

- For effluent treated on-site the criterion is: the COD discharged to surface waters shall not exceed 45 g/kg greasy wool
- For effluent treated off-site the criterion is: the COD discharged to sewer shall not exceed 60 g/kg greasy wool, and the effluent shall be treated off-site so as to achieve at least a further 75% reduction of COD content

This mean that the final COD in effluent treated off-site must not exceed 15 g/kg. This fact means that the final COD level in effluent treated on-site can be three times larger than COD in effluent treated off-site which may seem unfair. To take an example, in areas of New Zealand very few scouring plants have their own waste water treatment plants and the effluent is therefore treated off-site and it is understood that only very efficient waste water treatment plants with secondary treatment can achieve greater than a 75% COD reduction.

A single COD value of 20 g/kg treated wool no matter where and how the effluent is treated has been suggested by stakeholders. This value would harmonise with the requirements of criterion 27 so for practical reasons there could just be a reference to this criterion. Regional differences in how wastewater is treated, together with current industry best practice, must however be investigated before a final value can be proposed.

Organic wool

Production of organic wool is increasing as it is increases in popularity. The total global production of wool is approximately 1.3 million tons per year but it is hard to find estimates for the production of organic wool. The figure is most likely to still be very small and it may be too early to have a criterion that requires a minimum content of organic wool. The criterion could, on the other hand, be expanded to encourage certified organic wool production.

Energy use by wool scouring operations

Energy use associated with wool scouring was identified as a significant area for environmental improvement by the technical analysis. The IMPRO Textile LCA study provided the reference point. The midpoint indicator for climate change, together with several midpoint indicators that are also influenced by fossil fuel energy use, highlighted wool scouring as the most energy intensive process in the wool supply chain from cradle to factory gate, and potentially comparable with synthetic fibres.

Feedback from stakeholders

The proposal to introduce a minimum requirement for organic wool was not supported. Stakeholders cited the limited development of the supply chain, albeit

without data to back this up, and minimal customer demand. There are also varying international definitions and allowable practices, with the definition used in some Countries' deemed unlikely to meet the Ecolabels pesticide restrictions.

Limited feedback was received with regards to an alternative solution to the identified weakness with testing frequencies. It is important to distinguish between sales lots and processing lots. Taking Australia as an example it is claimed based on sample modeling that 30% of sales lots would meet the Ecolabel criteria. A proposal was therefore made to move towards the model used in Australia where pre-identification of suitable wool can be achieved because systems now apply residue tests to farm consignments of wool (sales lots).

The wastewater criteria generated the most comments. It is understood that in New Zealand it is not possible to meet the criteria because at least two scouring processes discharge with limited heavy flow treatment via primary municipal treatment which then discharges to sea. BAT techniques are applied to maximise both top and carbonised grease recovery, achieving much higher recovery levels than those presented in the textile BREF (>76%), reducing COD levels significantly to between 28 and 190 g/kg and minimising the use of detergents.

Conversely it was also highlighted that at least one major Australian scour which has invested in modern BAT downflow treatment cannot meet the current off-site target as defined because the treated effluent fluctuates between 60 and 80 g/kg and this is then reduced by 90% by a municipal plant, resulting in a very low COD. Technical evidence was also provided demonstrating that on-site investment by scours in combined flocculation and aerobic treatment plant in New Zealand and China can enable the proposed 20 g/kg on-site target to be met.

No feedback was received with regards to process energy benchmarking.

Follow-up and proposed response

Ectoparasiticide testing

During our follow-up research it has been noted that the New Zealand Ecolabel criteria for wool scouring test for two additional insect growth regulators - dicyclanil and cyromazine [51]. Dicyclanil also forms part of test procedures in Australia. More information from stakeholders is required in order to determine assess the risks associated with these substances. However, it is not proposed to update the ectoparasticide list at this stage.

The evidence received suggests that the current testing process do not provide sufficient re-assurance that the Ecolabel criteria are being met. It is our view that sales lots of wool should be specified for testing rather than scouring lots, which can be made up of many different sales lots. This would provide greater re-assurance and traceability that farmers have managed the wool under appropriate conditions. The auction systems in Australia and UK have been considered in order to test this proposal [52].

With regard to sample frequency, IFOAM provide sampling recommendations for residue testing of bulk goods. They suggest between 4 and 8 samples per 10-50 tonnes of lot [53]. However, it is understood from a testing authority in Australia that composite samples from 10 sales lots can now be obtained, making higher assurance more cost effective [54].

Proposal:

A minimum of one randomly selected composite sample per 50 tonne of sales lot or, for large orders, twice per year is therefore proposed for discussion. Composite samples should be made up of at least 10 randomly selected farm lots.

Scouring effluent treatment

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[51] New Zealand Ecolabelling Trust, *License criteria for wool scouring services - Responses on submissions*, October 2011

[52] British Wool Marketing Board, *Auction buyers*, Accessed 2012, http://www.britishwool.org.uk/woolbuyers.asp?pageid=46

[53] IFOAM, *Guideline for pesticide residue contamination for international trade in organic*, March 2012

[54] AWTA Ltd, *AWTA raw wool testing fees 2012-13 – Pesticide residue analysis reports*, Australia *see also* Australian Wool Testing Authority Ltd, *Pesticide residue analysis*, Accessed 2012, http://www.awta.com.au/en/Home/Our_Services/Pesticide-Residue-Analysis/

The current position with regard to scouring operations in Australia and New Zealand was investigated further with input from stakeholders and the New Zealand Ecolabelling Trust. The regulatory position in both countries was also briefly investigated.

In both countries scouring processes are under heavy competitive pressure from China. Only four plant appear to remain in Australia and the industry in New Zealand has consolidated down to four plant. Some operators have sought to differentiate themselves by pre-cleaning wool to improve optical brightness and reduce detergent use or, in the case of at least one EU Ecolabel supplier, by investing in advanced effluent treatment technology. Those with subsidiaries in China also appear to be investing in high standards of energy, water use and wastewater management in order to meet Chinese environmental standards for new plant [55].

The National Water Quality Management Strategy adopted by both Australia and New Zealand sets the framework for protecting and enhancing the quality of water resources. Supporting guidance for the Australian wool industry states the objective to *minimise and as far as possible use the effluent they produce* and to *minimise the effect of effluent addition to land* [56].

The *New Zealand Waste Strategy* contains a target to upgrade or close substandard wastewater treatment facilities by 2020 [57]. Significant expenditure is understood to be being made to upgrade wastewater treatment plants and trade waste permits have been updated to introduce new requirements for on-site waste treatment.

As of 2010 four out of five of the remaining wool scouring operations in New Zealand discharged to municipal wastewater treatment works [58]. Only one of these has treatment to a tertiary level. The other three have primary treatment. Two of these are introducing requirements for further pre-treatment by industry. The site discharging to river has on-site anaerobic treatment. During 2011/12 one operation

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[55] Michell, *Leading by example – Michell Suzhour raises the bar on environmental management*, Press release, 17th July 2007, http://www.michellwool.com

[56] Agriculture and Resource Management Council of Australia and New Zealand, *Effluent management guidelines for aqueous wool scouring in Australia*, June 1999

[57] Ministry for the Environment, *Waste management in New Zealand - a decade of progress*, New Zealand, http://www.mfe.govt.nz/publications/waste/waste-management-nz-oct05/html/page3d.html

[58] New Zealand Ecolabelling Trust, *License criteria for wool scouring services - Responses on submissions*, October 2011

has installed on-site treatment which will enable it to comply with the requirements of the Ecolabel.

Grease recovery combined with the pre-cleaning of wool before scouring appears to represent the BAT for COD minimisation at source as evidenced by consultation with the operator of two major sites in New Zealand where >70% grease recovery is being achieved. This has the benefit of improving the product, increasing the amount of valuable by-products recovered from the wool and minimising the need for advanced wastewater treatment.

Evidence collected suggests that at least two of the four sites in New Zealand (Kaputone and Awatoto) and two of the four sites in Australia (Michell and E.P.Robinson), including the largest site representing approximately 37% of their scouring capacity, have the potential to comply based on high standards of on and off-site wastewater treatment.

It also noted that Cavalier Holdings in New Zealand have achieved GOTS certification (requiring 45 g/kg COD to be achieved) for at least one site. However, it is recognised from stakeholder feedback that adjustments may be required to the off-site COD target in order to reflect higher on-site effluent COD discharges to very efficient municipal plant with secondary or tertiary treatment. This is particularly the case where pre-treatment of wool and high levels of grease recovery have been implemented, which in turn minimises detergent use and COD levels.

Proposal:

The limit values in the criteria should be updated to better reflect the performance of BAT pre-cleaning, grease recovery systems, advanced on-site wastewater treatment (modeled on EU scouring plant) and secondary off-site municipal treatment when applied to effluents from coarse and fine wool. It is proposed that the criteria are designed to incentivise waste removal at source – using pre-treatment and grease recovery - over advanced 'end of pipe' wastewater treatment.

In accordance with the Textile BREF [59], manufacturers performance data and additional information on BAT submitted by stakeholders the proposals are therefore as follows:

[59] European Commission, *Reference document on Best Available Techniques for the textile industry*, IPPC Bureau, July 2003

- COD target combined with high levels of grease recovery: It is proposed that a 70% level of grease recovery shall be rewarded by allowing a higher on-site COD level. The effluent discharged must then be treated by a municipal wastewater treatment plant with a minimum of secondary treatment (see below).

  It is therefore proposed to raise the off-site COD value to 180 g/kg greasy wool based on a net water consumption of 6 l/kg greasy wool. These figures reflect either a high level of grease recovery (>70%).

  This would represent the BAT as installed by scours in New Zealand that are served by modern wastewater treatment. Grease recovery is commonly installed in order to generate additional revenue. This change would enable a number of scours that did not meet the on-site element of the criteria to comply.

- COD target combined with lower levels of grease recovery: It is proposed that where grease recovery is less than 70% then lower on-site COD value of 24 g/kg greasy wool would apply based on a net water consumption of 6 l/kg greasy wool.

  This would reflect the performance of a combination of an installed grease recovery loop, a flocculation plant and aerated sludge treatment. These measures represent the BAT for standalone on-site treatment and have been installed by scours in Australia, New Zealand and China. The most commonly installed solution appears to be a combination of Sirolan CF-A [60] (flocculation) and B [61] (aeration) processes. The criteria would therefore reflect the investment made by modern scouring plant.

- Add value to residues: The addition of the BAT measures described above in turn create solid waste disposal issues. It also considered important to incentivise grease recovery. The BREF highlights the value of appropriately treated sludge and suint as a fertiliser. Australian Wool Innovation illustrate the potential of currently available technologies to achieve multiple by-

[60] Andar Fibretec, *Sirolan CF – recovering residual solids*, Accessed 2012, http://www.andar.co.nz/woolscours/andar_fibretec

[61] Andar Fibretec, *Sirolan CFb – reducing organic pollutant levels*, Accessed 2012, http://www.andar.co.nz/woolscours/andar_fibretec

product recovery from wool scouring (see Figure 3.1.1). Evidence from industry suggests that grease already has a market value based on its refinement into lanolin. It is therefore proposed that scouring operations are required to demonstrate that grease, suint and sludge are used as a resource rather than being disposed to landfill.

In addition it is proposed to reference the minimum EU standards for secondary municipal wastewater treatment in the criteria wording, reflecting the approach taken by the Blue Angel [62]. The standards provide some flexibility, giving a choice between a COD target value of 125 mg/l (equivalent to 0.75 g/kg greasy wool at a 6 l/kg flow rate) or a 75% COD reduction.

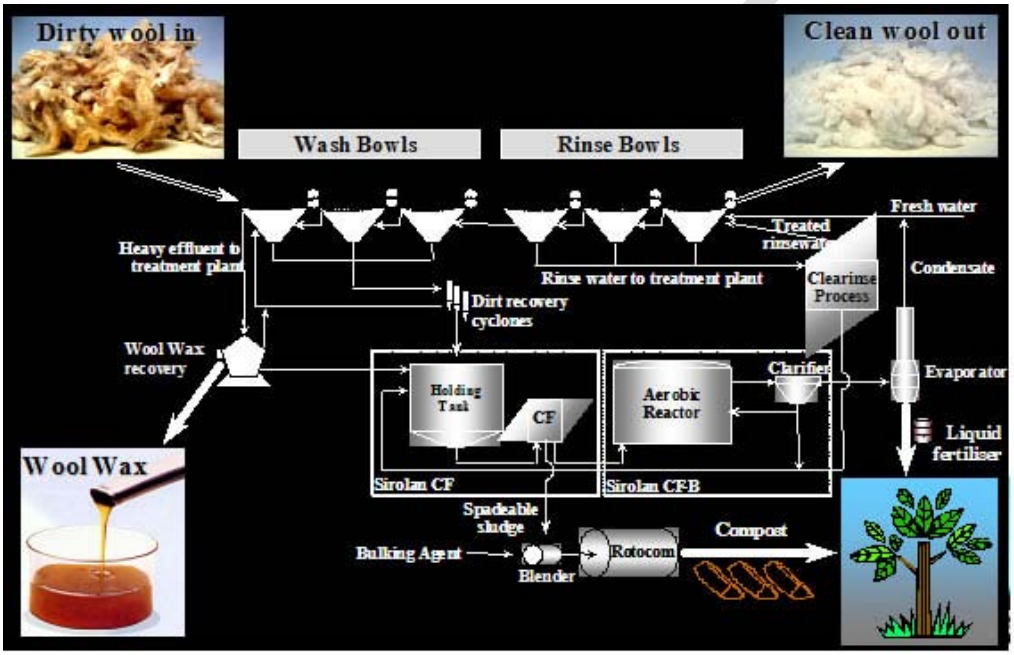

Figure 3.1.1: Diagram of comprehensive wool effluent treatment and by-product recovery system. Source: Australian Wool Innovation Ltd (2012)

Process energy criteria

The BREF Textiles provides evidence from a sample of scouring operations which could be used as the basis for setting an energy benchmark. The performance of scouring operations varies widely according to the data. The New Zealand

[62] Council of the European Communities, *Council Directive of 21st May 1991 concering wastewater treatment*, 91/271/EEC, Office Journal of the European Communities.

Ecolabelling Trust have for a number of years had an energy criteria of 4 GJ/tonne greasy wool in their wool scouring criteria. Certification and testing organisation ENco have also used a similar target to certify scouring operations.

Both these criteria sets were based on the BREF [63] and evidence shows this can be achieved by a number of New Zealand scouring plant which have been awarded their label. It is understood that a combination of the innovative scour bowl designs developed by New Zealand engineering firm ANDAR, heat recovery and grease recovery loops facilitate a high level of energy efficiency and that this technology is now used in other countries.

During the last revision of the criteria it was recognised that the 4 GJ/tonne criteria is challenging and might only be achieveable by New Zealand scourers and selected international scourers using similar technology [64]. It is therefore proposed based on the BREF Textile data to set the criteria at 8 GJ/tonne based on a linear correlation with an assumed water consumption of 6 l/kg wool (see Figure 3.1.2 below). This would encompass all processes from the scour bowl to final dryer as well as effluent treatment.

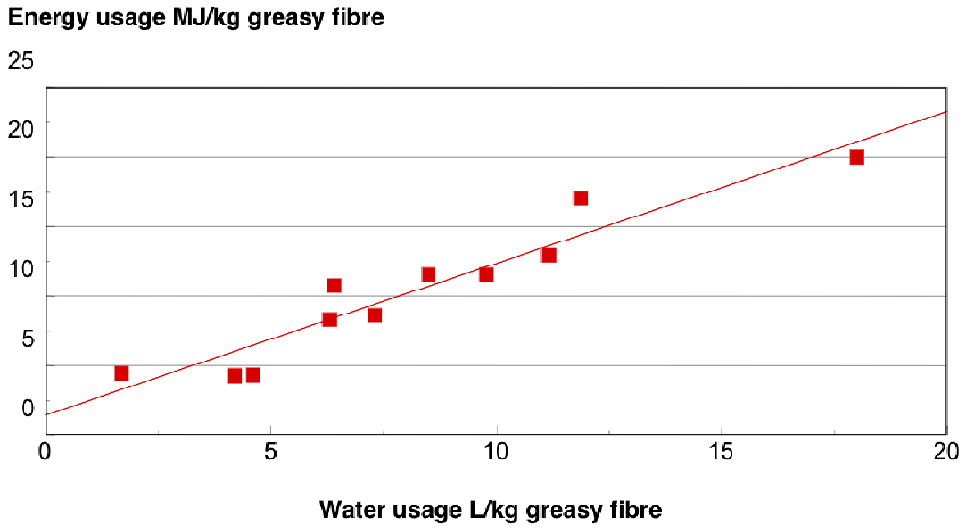

Figure 3.1.2: Correlation between energy and water used by wool scouring operations. Source: BREF textiles (2003)

[63] European Commission, *Reference document on Best Available Techniques for the textile industry*, IPPC Bureau, July 2003

[64] New Zealand Ecolabelling Trust, *License criteria for wool scouring services - Responses on submissions*, October 2011

Proposal:

An energy benchmark criteria of 8 GJ/tonne greasy wool is proposed. This would encompass all processes from the scour bowl to final dryer as well as effluent treatment.

This new sub-criterion would have the benefit of minimizing wool scouring energy use in-line with the IMPRO textile LCA results which suggested that energy use can be as high as for synthetic fibres such as polyamide and acrylic.

However, the views of stakeholders with regard to energy benchmarks for any fibre type must also be respected. It is therefore proposed for discussion at the second AHWG.

CURRENT CRITERION 6 : MAN-MADE CELLULOSE FIBRES (INCLUDING VISCOSE, MODAL AND LYOCELL, CUPRO, ~~ACETATE, TRIACETATE~~)

Major proposed changes	• A reduction in the AOX level associated with the fibre production to reflect Elemental Chlorine Free (ECF) production processes • On-site energy recovery from process by-products is to be maximised • Certification of a minimum of 25% of cellulose pulp feedstock as being from sources certified to follow the principles of Sustainable Forestry Management. • Due diligence to ensure that the balance of cellulose pulp feedstock is from legal forestry sources. • Cotton linter feedstock must comply with the cotton criteria
Present criterion, Decision 2009/567	
(a) The level of AOX in the fibres shall not exceed 250 ppm. *Assessment and verification:* The applicant shall provide a test report, using the following test method: ISO 11480.97 (controlled combustion and microcoulometry). (b) For viscose fibres, the sulphur content of the emissions of sulphur compounds to air from the processing during fibre production, expressed as an annual average, shall not exceed 120 g/kg filament fibre produced and 30 g/kg staple fibre produced. Where both types of fibre are produced on a given site, the overall emissions must not exceed the corresponding weighted average. *Assessment and verification:* The applicant shall provide detailed documentation and/or test reports showing compliance with this criterion, together with a declaration of compliance. (c) For viscose fibres, the emission to water of zinc from the production site, expressed as an annual average, shall not exceed 0.3 g/kg. *Assessment and verification:* The applicant shall provide detailed documentation and/or test reports showing compliance with this criterion, together with a declaration of compliance.	

(d) For cupro fibres, the copper content of the effluent water leaving the site, expressed as an annual average, shall not exceed 0.1 ppm.

Assessment and verification: The applicant shall provide detailed documentation and/or test reports showing compliance with this criterion, together with a declaration of compliance.

Proposed revised criterion

a) The level of AOX in the fibres shall not exceed 150 ppm.

Assessment and verification: *The applicant shall provide a test report, using the following test method: ISO 11480.97 (controlled combustion and microcoulometry).*

b) Energy recovery from by-products of the production process should be maximised in order to contribute to on-site power, heat and steam requirements.

Assessment and verification: *The applicant shall provide documentation and evidence of the energy balance for dissolving pulp and integrated production sites.*

c) For viscose fibres, the sulphur content of the emissions of sulphur compounds to air from the processing during fibre production, expressed as an annual average, shall not exceed 60 g/kg filament fibre produced and 30 g/kg staple fibre produced. Where both types of fibre are produced on a given site, the overall emissions must not exceed the corresponding weighted average.

Assessment and verification: *The applicant shall provide detailed documentation and/or test reports showing compliance with this criterion, together with a declaration of compliance.*

(d) For viscose fibres, the emission to water of zinc from the production site, expressed as an annual average, shall not exceed 0.16 g/kg filament fibre produced and 0.30 g/kg staple fibre produced.

Assessment and verification: *The applicant shall provide detailed documentation and/or test reports showing compliance with this criterion, together with a declaration of compliance.*

(e) For cupro fibres, the copper content of the effluent water leaving the site, expressed as an annual average, shall not exceed 0.1 ppm.

Assessment and verification: The applicant shall provide detailed documentation and/or test reports showing compliance with this criterion, together with a declaration

of compliance.

f) A minimum of 25% pulp fibres shall be from pulp that has been grown according to the principles of Sustainable Forestry Management as defined by the UN FAO. This figure will increase 5% for each year after the Decision date of the criteria. The remaining % of pulp fibres shall be from pulp that is from legal forestry.

Assessment and verification: *The applicant shall provide valid chain of custody certificates demonstrating that pulp fibre has been independently certified to have been grown according to Sustainable Forestry Management principles and is from legal sources. FSC and PEFC shall be accepted as independent certification schemes. Due diligence processes should be followed according to Regulation (EC)19/2010 to minimise the risk that timber has been illegal harvested. Valid FLEGT or CITES licenses or third party certification will be accepted as evidence of legal sourcing.*

g) Dissolving pulp produced from cotton linters shall meet with the requirements of the cotton criterion.

AHWG1 technical discussion

Viscose fibres are made from regenerated cellulose pulps. This cellulose may be derived from a range of different sources, including timber, bamboo and, increasingly in China cotton pulp. Over the last decade production of viscose fibres stabilised at approximately 2.6 million tonnes world-wide (Europe : 600 thousand tons) but has recently risen sharply again to 5.5 million tonnes because of the increase in the price of cotton [65].

The pulp required to manufacture viscose fibres is a specialised grade called dissolving pulp. Dissolving pulp is a commodity product which manufacturers buy from different sources on the world market. Benchmarking of the performance of global pulp mills suggests that pulp production technology varies considerably in the amount of energy used and the quantity and nature of the emissions to air and water.

A number of different processes exist to manufacture the fibres, with the viscose and modal processes being the most widely used. The lyocell production process has

[65] Asia Paper Markets, *Commodities to watch – dissolving pulp*, Market briefing paper, February 2001

been developed over the last two decades and whilst it has cleaner process chemistry it is understood that the process uses more energy.

Pulp feedstock sourcing, pulp liquors and process solvents have cited as being associated with deforestation and water pollution in developing countries [66].

AOX levels in fiber

In the last revision it was discussed if point (a) could be removed. According to the "Environmental Assessment of Textiles" elaborated in 1997 by the Danish Environment Protection Agency, there are no reasons to have emissions of AOX during the production of viscose. Only chlorinated bleaching can generate this type of emission. The proposal was to delete the reference to AOX in this criterion. But the representative body of the European man-made fibre industry, stated that the sentence “the level of AOX in the fibres shall not exceed 250 ppm” should be kept, because the AOX not only depends on bleaching during the production of the fibres (and in the follow up during fabric finishing), but also from the process conditions of the cellulosic raw material. It is possible that a distinguishment could be made between the production of pulp and the production of viscose fibres in order to more accurately determine an appropriate AOX level.

Sulphur emissions to air

The toxicity of carbon disulphide emissions from viscose fibre production stage was highlighted by the LCA findings in the preliminary report. Data from the polymer BREF provide the following data for emissions of Sulphur to air:

- Fiber production: 12,5 – 30 kg/t
- Filament production (with integrated washing): 170 – 210 kg/t
- Filament production (batch washing): 40-60 kg/t

This indicates that the limit for filament production could be split into 2 separate limits. Today batch washing can very easily perform better than these limits whereas integrated washing will have great difficult passing. However, the significantly better performance data for batch processes suggests that the criterion should retain their focus on the performance of batch washing processes.

Emissions to water of zinc

[66] NRDC, *Not all bamboo is created equal*, August 2011 http://www.nrdc.org/international/cleanbydesign/files/CBD_FiberFacts_Bamboo.pdf *see also* Patagonia, *On bamboo and rayon*, April 2009

Zinc can be eliminated by leading the wastewater through staged neutralization, whereby the pH is raised from 4 to 10 by lime milk. According to the BREF this technique is “generally applicable”. The BAT would be to achieve 1,5 mg/l Zn. The BAT for sensitive waterbodies would be to achieve 0,3 mg/l Zn.

This means that the present limit value is equal to BAT for sensitive waterbodies. It is therefore recommended to keep the value but to change the unit from g/kg to g/l as stated in BREF.

Copper content of effluent water

This criterion has not been changed in the last 2 versions. No reference is made in the BREF and since the criteria has not been challenged or commented on it is suggested to keep the criteria as it is

Process energy consumption

The preliminary report discussed the energy intensity of viscose production, with a benchmark of consumed primary energy data suggested as being 196 MJ/kg of fibre [67] . This figure is significantly higher than the data for synthetic fibres. However, closer examination of the polymer BREF highlights the difference between staple and filament fibres.

The process energy use for staple fibre use is 26.1 – 33.2 MJ/kg of fibre and filament fibre between 70 – 125 MJ/kg depending on whether it is a batch or continuous process. The preceding pulp production stage also requires consideration, with the draft pulp, paper and board BREF suggesting a range of 7.5 – 16.5 MJ/kg for dissolving pulp production.

Further investigation of energy benchmarks for man-made cellulose fibres is therefore required in order to determine to identify if there are variations in process energy use between different forms of cellulose fibre production and whether a criterion is justified to achieve environmental improvements.

Pulp feedstock sourcing

With the growth of viscose production in countries such as China concerns have risen about the possible extent of deforestation in order to supply cellulose pulp

[67] Laursen, S. E., Hansen, J., Knudsen, H. H., Wenzel, H., Larsen, H. F., & Kristensen, F. M. (2007). *EDIPTEX: Environmental assessment of textiles*. Danish Environmental Protection Agency, working report 24

feedstock. Whilst the use of raw material from forestry was highlighted by the preliminary report the issue of deforestation will not have been identified by the IMPRO LCA findings as it is regionally specific.

In other sectors such as construction the responsible sourcing of timber has been successfully regulated by certification schemes such as FSC and PEFC which set requirements for the sustainable management of forestry and require third party verification of the chain of custody for timber products.

It is therefore proposed that a requirement for evidence of responsible sourcing is introduced for viscose fibres. Comparisons suggest that the FSC and PEFC certification schemes provide a high level of assurance in their verification of the chain of custody [68]. It is to be investigated whether certification can be obtained for bamboo plantations.

Feedback from stakeholders

Stakeholders highlighted a number of technical points that inform the follow-up research for this criterion:

- The AOX limit cannot be reduced much further because chlorinated bleaches must be used to meet market requirements. It should be clarified if the focus is to be on AOX in wastewater or the fibre.
- The ISO test specified for use to verify AOX content requires checking as it may not be the appropriate test;
- Energy benchmarks are difficult to apply and the processes used to produce regenerated cellulose fibres are not as energy intensive as stated;
- The LCA study carried out by Shen and Patel (2010) 'Life cycle assessment of man-made cellulose fibres' should be reviewed as evidence;
- The introduction of certification for sustainable dissolving pulp was supported, however, it is difficult to obtain and therefore a target of 25% was proposed as a starting point for the criterion.

Follow-up research and proposed approach

[68] UK sourcing

Dissolving pulp – a specialist pulp grade

Dissolving pulp is required to manufacture regenerated cellulose fibres. It is a specialist pulp grade because it requires longer fibres, a level of higher quality control and more feedstock to produce than paper pulp [69]. It is understood to be largely produced using eucalyptus, a tree grown in warmer climates, as well as beech and bamboo pulp in Western Europe and China respectively.

There are less than a dozen sites producing market dissolving pulp globally, with 4.5 million tonnes/annum base on wood pulp and 1.0 million tonnes/annum base on cotton pulp [70]. The most significant production sites are located in Brasil (Bahia-pulp) and South Africa (Sappi). The majority of the remaining capacity is located in North America and Europe, although India and China are looking to expand capacity rapidly. Commentators highlight that some of the global market dissolving pulp capacity is ageing and may therefore have environmental performance problems – for example, in China and North America.

A number of integrated pulp and fibre production sites exist, mainly in Europe – for example, SNIACE in Spain and Lenzing in Austria, but these account for only a small proportion of capacity. These plants produce pulp to very high environmental standards (see the next section).

LCA-derived options for reducing the impacts of fibre production

A peer reviewed LCA study completed by Utrecht University and commissioned by Lenzing (2010) compared the different processes for the production of viscose, modal and lyocell fibres [71]. The study identifies the most significant environmental improvement potential as:

1) Using cleaner sources of power/steam, which in part can be influenced by locational factors such as the electricity grid emission factor and the availability of local district heating;

[69] European Commission, *Best Available Techniques reference document for production of pulp, paper and board*, IPPC Bureau, Draft May 2012.

[70] Patrick, K, *Dissolving pulp gold rush in high gear*, Paper 360, September 2011, p-8

[71] Shen, L and M.K.Patel, *Life cycle assessment of man-made cellulose fibres*, Utrecht University, Lenzinger Berighte 88 (2010) 1-59

2) Moving to integrated pulp and fibre production (a biorefinery approach) with by-products such as black liquor and other by-products being used to fuel the processes and offset on-site emissions;

3) Reduction of caustic soda use in pulp production because of the environmental impacts associated with its production;

4) Minimisation of carbon disulphide solvent emissions to air and water from the viscose and modal fibre production stage;

5) Moving to lyocell production because of the different chemistry which is based on a safer, biodegradable solvent which is 99% recycled within the process, although this benefit is partly offset by greater process energy use.

Option 1 would be complex to measure and benchmark. The polymer BREF contains energy consumption figures for staple and filament fibre production. It does not, however, provide data for integrated pulp and fibre production. Market pulp production would require reference to the pulp, paper and board BREF. Variations in electricity grid emissions and the availability of district heating would further add to complexity. It is considered that a hybrid response to Option 1 and 2 may, however, be possible by reference to the pulp, paper and board BREF (see below).

Option 2 is understood to be very site specific and is not currently representative of the industry, with market dissolving pulp sourced from separate sites generally being used. However, the new draft pulp, paper and board BREF suggests that energy recovery from black liquor waste (termed 'spent sulphite liquor'), a pollutant which has raised concerns in relation to the environmental impact of viscose production in China, would represent the BAT for pulp production [72]. Plants recovering energy organic compounds can reach 90% energy self-sufficiency. This technique also has the benefit of reducing COD loads.

Consultation with the current Ecolabel licenseholder suggests that the polymer BREF value of 0.5 t/t staple fibre product could be used for Option 3.

Option 4 is already addressed by the criterion.

In relation to Option 5 the polymer BREF claims that Lyocell fibres have different properties to Viscose and Modal fibres and therefore the process should not be seen

[72] European Commission, *Best Available Techniques reference document for production of pulp, paper and board*, IPPC Bureau, Draft May 2012.

as a substitute [73]. However, consultation with the leading producer of lyocell has confirmed that modal and lyocell are of similar and higher quality than viscose. Although it was also highlighted that lyocell only currently accounts for 3% of world cellulose market [74].

The potential to substitute cotton was also highlighted. Lyocell and modal fibres are commonly substituted for cotton in women's apparel where greater uniformity of the product and lower tenacity (moisture retention) are required. Viscose, modal and lyocell are also blended with polyester to produce a superior fabric product to cotton which has high tenacity and strength.

Proposal

Based on the options presented by the LCA study it is proposed that a new criterion is introduced requiring that energy is recovered from by-products in order to meet on-site power and heat requirements. This is understood to be achieveable by the current licenseholder and represents European BAT.

Bleaching and AOX emissions

In order to better understand the position with regard to possible AOX emissions the draft BREF for paper and pulp products was consulted. This is currently at an advanced stage of drafting by the European Commission's IPPC bureau. As of May 2012 the draft BREF claims that apart from some very specialist applications no EU dissolving pulp is produced using chlorine bleaching and that Elemental Chlorine Free (ECF) processes are increasingly being replaced by Total Chlorine Free (TCF) processes in order to reduce/eliminate AOX emissions and dioxin formation [75].

In order to further investigate whether ECF or TCF specifications are feasible for fibre manufacturing a current licenseholder was consulted. They confirmed that at the pulp stage ECF bleaching predominates and that TCF dissolving pulp is difficult to obtain on the market.

[73] European Commission, Reference document on Best Available Techniques in the production of polymers, IPPC Bureau, August 2007

[74] Lenzing Group (2012) *Fact sheet*,

[75] European Commission, *Best Available Techniques reference document for production of pulp, paper and board*, IPPC Bureau, Draft May 2012.

Whilst the Polymer BREF (2007) specifies TCF pulp for the integrated pulp and fibre production plant used as a case study, suggesting a range of 7-50 mg AOX/kg product [76], integrated plant supplied with TCF dissolving pulp are not understood to be typical for the industry globally, which relies on market ECF pulp production.

This position was further confirmed by consultation of publicly available information from leading producers of dissolving pulp. Based on manufacturers production volumes TCF dissolving pulp appears to account for around 13% of global production . It also only appears to be produced for specialist applications, for example medical devices.

At the fibre production stage it is understood that sodium hypochlorite (NaClO) is still required by the industry to meet customer requirements for uniform whiteness of the fibres. Hydrogen peroxide bleaching is used, but only for medical applications where chlorine cannot be present.

Proposal:

A limit value of 150 mg/kg in the fibres was considered to be representative, based on operational experience, of a fibre produced from market ECF pulp and bleached using sodum hypochlorite. This can also be verified by reference to the pulp, paper and board BREF.

Sustainable timber certification and chain of custody

Further investigation of the basis for both European sustainable forestry policy [77] and certification schemes for sustainable forestry [78] confirmed their basis in the UNEP and FAO principles of Sustainable Forestry Management (SFM) [79]. These principles should therefore provide the reference point for selection of appropriate certification

[76] European Commission, Reference document on Best Available Techniques in the production of polymers, IPPC Bureau, August 2007

[77] European Commission, *EU forests and forest related products*, http://ec.europa.eu/environment/forests/home_en.htm

[78] Rametsteiner, E and M, Simula, *Forest certification—an instrument to promote sustainable forest management?* Journal of Environmental Management 67 (2003) 87–98

[79] Castaneda, F. *Criteria and indicators for sustainable forestry management*. UN FAO, http://www.fao.org/docrep/x8080e/x8080e06.htm#TopOfPage

schemes. Their conformance with ISO/IEC guide 65 is also a consideration in relation to the quality of verification systems [80].

In terms of market share the two most significant certification schemes are those operated by the Forestry Stewardship Council (FSC) [81] and the Programme for the Endorsement of Forestry Certification (PEFC) [82]. The PEFC scheme now incorporates the Sustainable Forestry Initiative (SFI), the Malaysian Timber Certification Council (MTCC) and American Tree Farm System (ATFS) [83].

In 2009 these schemes accounted for 9% of global forestry and 26% of industrial timber supplies [84]. Bamboo is currently certified under these schemes. PEFC is the most significant scheme, accounting for over two thirds of certified timber. The majority (over 90%) of certified timber is from Europe and North America.

Belgium [85], Germany [86], the UK [87] and the Netherlands [88] are notable for their detailed monitoring and evaluation of forestry certification schemes in support of Green Public Procurement (GPP) [89]. Their current consensus is that FSC and PEFC provide sufficient levels of assurance, with the exception of PEFC Malaysia which is excluded by the Netherlands because of weaknesses in a number of Sustainable

[80] ISO/IEC Guide 65: *General requirements for bodies operating certification systems*

[81] Programme for the Endorsement of Forestry Certification, http://www.pefc.org/

[82] Forestry Stewardship Council, http://www.fsc.org/

[83] UNECE, FAO and UNFF (2009) *Vital forest graphics*

[84] UNECE and FAO (2010) *Forest products annual market review 2009-2010*

[85] UK Central Point of Expertise on Timber, *Government procurement of timber in Belgium*, http://www.cpet.org.uk/uk-government-timber-procurement-policy/international-context/international-policies-1/belgium

[86] Germany Government Procurement Policy, *Wood and paper based products*, http://www.sustainableforestprods.org/tools/german_government_procurement_policy

[87] UK Central Point of Expertise on Timber (2008) *Review of forestry certification schemes results*,

[88] Timber Procurement Assessment Committee, Netherlands, http://www.tpac.smk.nl/

[89] UK Central Point of Expertise on Timber (2008)*A comparative study of the national criteria for 'legal and 'sustainable' timber and assessment of certification schemes in Denmark, UK, Netherlands and Belgium* http://www.cpet.org.uk/uk-government-timber-procurement-policy/international-context/international-policies-1/comparative-study-of-danish-uk-dutch-and-belgium-national-criteria

Forestry Management, including customary rights, limited public availability of forestry plans and identification of areas of high ecological value [90].

The availability of certified dissolving pulp

No reliable market data is currently available for the quantity of certified dissolving pulp that is available, however, a review of publicly available information from the major producers suggests that at least 14.5% of capacity may be certified to either FSC or PEFC. Consultation with the only current EU licenseholder confirmed that certified market dissolving pulp can be obtained but that the maximum they could practically achieve would be 50% certified fibre content. Wider consultation by CIRFS with EU producers suggested 25%.

Proposal:

Given the potential for growth in certified dissolving pulp availability during the new license period an initial target of 25% is therefore proposed, which could be increased by an increment of 5% each year.

Given that some fibres from China may be produced from cotton lint pulp it is also proposed that regenerated fibre produced from cotton should conform with the cotton criterion.

The market impact of certification

Whilst the proportion of forestry covered by these certification schemes market is still relatively low they are considered by the FAO and independent research to have played an important role in influencing forestry practices and in raising awareness of the threat to global forests [91]. However, it has been highlighted by the UNEP, the FAO and by European Commission policy that in countries where there is poor governance and limited enforcement of forestry protection these schemes cannot be

[90] [90] Timber Procurement Assessment Committee, Netherlands http://www.tpac.smk.nl/webadmin/files/Uitspraak%20College%20van%20Beroep%20inzake%20MTCC.pdf

[91] UNECE and FAO (2010) *Forest products annual market review 2009-2010* see also Rametsteiner, E and M, Simula, *Forest certification—an instrument to promote sustainable forest management?* Journal of Environmental Management 67 (2003) 87–98

expected to work [92]. This point is picked up in relation to illegal forestry later in this section.

In the previous section the dissolving pulp was highlighted as a specialist pulp product. Given that the feedstock commonly used to produce market dissolving pulp is eucalyptus or bamboo, a proportion of feedstock may be sourced from countries where the availability of certified timber is lower and where there may be greater concerns about illegal forestry [93]. This can be illustrated by the categorisation in Figure 3.1.3. There is therefore a clear justification for seeking sustainable certification of dissolving pulp and restriction of illegal sources.

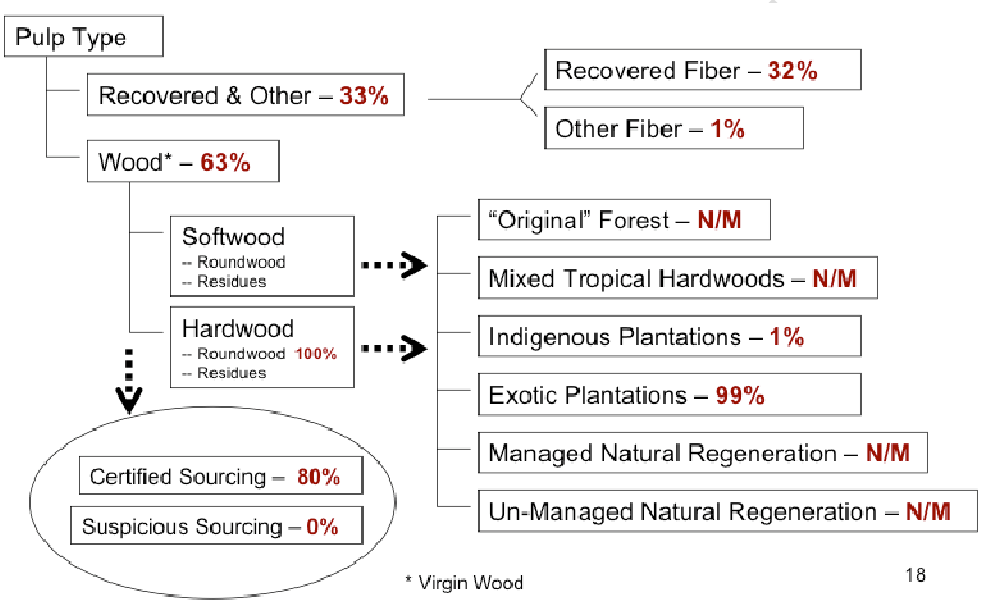

Figure 3.1.3 Categorisation of fibre sourcing for Brasil

Source: Goetzl, A (2008)

Certification that timber is from legal sources

[92] UNECE, FAO and UNFF (2009) *Vital forest graphics*

[93] Goetzl, A (2006) *Wood for paper: fibre sourcing in the global pulp and paper industry*, Presentation made to 'Forestry trends Potomac Forum' 14th February 2008

A reduction in illegally harvested timber is a policy objective for Europe. There are three main routes currently available to demonstrate legal sourcing:

- UN CITES permits have historically been the main form of documentary evidence that timber is from legal sources.
- Both FSC and PEFC certify that timber is legally sourced, labelling it as being from 'controlled sources'.
- Europe is in the process of introducing the FLEGT (Forest Law Enforcement Governance and Trade) licensing scheme. FLEGT is based on bilateral agreements between the EU and timber producing countries [94].

As we noted in the previous section, forestry certification and legality are strongly influenced by governance and the effectiveness of local enforcement. The FLEGT scheme attempts to tackle this issue by addressing both governance and certification.

The new EU Timber Regulation (EC) 95/2010 will introduce new requirements for the sourcing of timber products from 2013 [95]. For new products introduced onto the EU market the regulation will prohibit illegally harvested timber and introduce requirements for 'due diligence', which it defines as comprising:

> *(a) measures and procedures providing access to the [origin of] the operator's supply of timber or timber products placed on the market;*
>
> *(b) risk assessment procedures enabling the operator to analyse and evaluate the risk of illegally harvested timber or timber products derived from such timber being placed on the market.*
>
> *(c) except where the risk identified in course of the risk assessment procedures referred to in point (b) is negligible, risk mitigation procedures which consist of a set of measures and procedures that are adequate and proportionate to minimise effectively that risk and which may include requiring additional information or documents and/or requiring third party verification.*

In terms of proof of legality the regulation states that:

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[94] European Commission, *Illegal logging and FLEGT action plan*, http://ec.europa.eu/environment/forests/illegal_logging.htm

[95] Regulation (EU) No 995/2010 of the European Parliament and of the Council of 20 October 2010 laying down the obligations of operators who place timber and timber products on the market

'Timber and timber products covered by valid FLEGT or CITES licenses are considered to comply with the requirements of the Regulation.'

The regulation will also recognise existing third party certification systems for legal timber (which could, for example, include FSC or PEFC) as long as they can meet the due diligence criteria setout in Article 6 of the Regulation.

Whilst the Regulation does not therefore introduce a legal requirement for all timber, it will require existing products to demonstrate full traceability of their supply, which it defines as being able to identify:

(a) the operators or the traders who have supplied the timber and timber products; and

(b) where applicable, the traders to whom they have supplied timber and timber products.

Given the likely sources of pulp feedstock, and the focus of Europe's new timber policy, the legality of sourcing is considered to be an important consideration and an Ecolabelled product should demonstrate the highest level of assurance required by Regulation (EC) 95/2010.

Proposal:

It is therefore proposed that all pulp must be demonstrated through due diligence processes, supported where necessary by CITES, FLEGT or independent third party certification of legal sourcing. Furthermore, consultation with the current Ecolabel licenseholder has confirmed that this is a feasible criterion.

CURRENT CRITERION 7: POLYAMIDE

Major proposed changes	• Emission limit of N_2O is lowered for PA66 fibre • Minimum 3% recycled content
Present criterion, Decision 2009/567	
The emissions to air of N_2O during monomer production, expressed as an annual average, shall not exceed 10 g/kg polyamide 6 fibre produced and 50 g/kg polyamide 6.6 produced. *Assessment and verification:* The applicant shall provide detailed documentation and/or test reports showing compliance with this criterion, together with a declaration of compliance.	
Suggested criterion	
The emissions to air of N_2O during monomer production, expressed as an annual average, shall not exceed: - 10 g/kg polyamide 6 fibre produced - 16,5 g/kg polyamide 6.6 produced. *Assessment and verification:* The applicant shall provide detailed documentation and/or test reports showing compliance with this criterion, together with a declaration of compliance. Fibres shall be manufactured using a minimum content of 3% nylon that has been recycled from pre and/or post-consumer waste. *Assessment and verification:* Content shall be traceable back to the reprocessing stage. This shall be verified by independent third party certification of the chain of custody or by documentation provided by suppliers and processors.	

AHWG1 technical discussion

Emissions to air of N_2O

Nitrous oxide is a significant greenhouse gas and is emitted during the polyamide (nylon) production process. According to [Boustead, 2000] the "process" air emissions of N_2O in the production of Nylon 6 polymer are calculated to be 8.6 g / kg polymer ("when all production sequences are traced back to the extraction of raw materials from the earth") [96].

CIRFS reports that 3 different factories in Europe emit 50, 50 and 196 g/kg and suggests a limit of 50 g/kg. This limit was discussed at the AHWG meeting on December 3, 2001, and the meeting was predominantly in favour of this limit.

The Blue Angel differentiates between the limit for N_2O between polyamide 6 and polyamide 6.6. The associated limits are:

- Polyamide 6: 10 g/kg
- Polyamide 6.6 16,5 g/kg.

The question is therefore whether the criterion for polyamide 6.6 should be harmonised with the stricter requirements of the Blue Angel.

Process energy consumption

The Preliminary Report highlighted the significance of energy consumption associated with nylon production. Process energy consumption associated with the fibre production stage has been benchmarked by the BREF for polymers. Process energy data for all production stages has been compiled by Plastics Europe as part of their Ecoprofiles collection.

For nylon 6 the BREF suggests benchmarks of 6.500 – 7.000 MJ/tonne for continuous processes and 9.500 – 10.000 MJ/tonne for batch processes. This is estimated to represent 7.6% - 10.6% of the life cycle process, excluding feedstock energy. It can therefore be seen that an energy benchmark for the fibre production stage would have minimal improvement potential compared to improvement to upstream processes.

[96] Asqual, *Revision of the textile Eco-label – final report 2007*,

Table 3.1.6 Process energy benchmarks for the polyamide 6 and 6.6 fibre production stages

	PA 6 (MJ/tonne production)				PA 66 (MJ/tonne production)			
	Continuous process		Batch process		Continuous process		Batch process	
Total process energy	6,500	7,000	9,500	10,000	5,700	7,500	5,050	7,250

Table 3.1.7 Process energy consumption for polymer production

Material	Total average energy consumed to produce 1 kg material	Reference/comments
Polyamide 6 (nylon 6)	66.12 MJ	PlasticsEurope 2005a,
Polyamide 6.6 (nylon 6.6)	64.51 MJ	PlasticsEurope 2005a,

Minimum recycled content

The preliminary report highlighted evidence for the manufacturing and use in textile products of nylon 6 with pre and post consumer waste nylon content. This improvement option would have the benefit of avoiding energy intensive feedstock production, as highlighted by the Plastics Europe Eco-Profiles data. It is understood that nylon 6.6 is, at the moment, technically more difficult to recycle because of its chemical structure.

Feedback from stakeholders

Stakeholders highlighted a number of technical points that inform the follow-up research for this criterion:

- The criteria should better reflect values given in the polymer BREF
- An energy benchmark was not supported because it would be too complex to normalise and verify.
- More evidence was requested as to whether the criteria could be harmonised with the Blue Angel.
- Nylon with a recycled content is not generally available and there is only one example of such a project in Europe.

Follow-up research and proposed way forward

Process energy benchmarking

With regard to energy benchmarking the IPPC polymer BREF document was investigated as a main point of reference. Whilst the document does provide benchmarks, for nylon the preceding stages of caprolactam (an amine), adipic acid and cyclohexanone are understood to be more significant, accounting for 7.6% - 10.6% of the primary energy inputs required, excluding feedstock energy.

CO_2 (rather than primary energy) benchmarks for a number of synthetic fibre polymer feedstocks, including caprolactam, were proposed for inclusion within the EU Emission Trading Scheme 2013-2020. These were not developed further as they were not considered as significant relative to other bulk chemical production processes, including adipic acid (a polyamide monomer).

Our conclusion is therefore that an energy or CO_2 benchmark criteria for nylon fibre would be too complex to introduce and would not achieve a significant enough impact. A recycled content is considered to be a more effective option as it would reduce raw material and process energy use upstream of lactam polymerisation into polyamide.

Setting a minimum recycled content

Recycling of nylon 6 was pioneered by the carpet industry as part of a closed loop recycling services. Nylon can be recycled by mechanical or chemical recycling of

nylon waste. A comparative LCA study of virgin nylon and recycled nylon for carpet manufacturing carried out for Shaw Carpets (2010) and reviewed by LBP-GaBi University of Stuttgart highlights the significant environmental improvement potential of recycled nylon [97]. No similar comparative studies could be found to determine the environmental improvement potential of recycled nylon textile fibres.

In order to understand the possible availability and quality specifications of nylon 6 and nylon 6,6 fibre with a recycled content an attempt was made to identify EU and global manufacturers. The following products have been used in clothing products available on the EU market:

- Hyosung (Taiwan): The MIPAN Regen nylon 6 product is a 100% recycled content product and is third party certified by the Global Recycled Standard (GRS) [98]. Pre and post consumer waste is used as feedstock. Data on production capacity has been requested.
- Unifi (USA): The REPREVE fibre product is manufactured with 100% recycled content and is solution dyed [99]. Pre and post consumer waste is used as feedstock. Data on production capacity has been requested. The recycled content of the fibre is third party certified. In 2011 the company launched a nylon textile take-back option for industry production waste [100].

Consultation with a stakeholder who has experience specifying recycled nylon confirmed its limited availability and higher price. Quality is also still a concern, particularly in relation to dyeability and mechanical strength. However, it was emphasised that without the creation of demand by retailers and manufacturers, as was the case with polyester a decade ago, production capacity and waste collection will not expand and develop.

Proposal:

On the basis of the evidence gathered it is proposed that minimum pre and/or post consumer recycled content of 3% is introduced. This would:

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[97] Binder, M, Albrecht, S, Marincovic, C, Flanigan, L and D,McGavis (2010) *Life Cycle Assessment of Caprolactam production from Nylon 6 carpet recycling*, http://www.lbp-gabi.de/refbase/files/49_Binder_etal2010.pdf

[98] Hyosung, *MIPAN Regen product*, http://www.mipan.com/eng/products/regen.html

[99] Unifi, *REPREVE product line*, http://unifi.com/pdf/utsc_repreve_eng.pdf

[100] Unifi, *Unifi Launches the REPREVE® Textile Takeback Program- Polartec to team up with Unifi in a first of its kind recycling program*, http://unifi.com/un_news_pr.aspx?id=43

- Reflect the introduction of recycled content into the GPP criteria for textiles;
- Reflect the growing interest of clothing manufacturers and retailers in specifying recycled content, whilst reflecting its limited availability;
- Support emerging supply and demand for nylon 6 for recycled fibre, allowing for the use of a blend of pre and post consumer waste in order to ensure quality;

It is also proposed that content claims should be supported by verification of traceability, either using third party certification schemes such as GRS, third party independent verification or documentary evidence from suppliers or processors.

CURRENT CRITERION 8: POLYESTER

Major proposed changes	• Introduction of a minimum recycled content of 20% for filament fibres and 50% for staple fibres • Revision of the VOC limit values to reflect the polycondensation and fibre production stages
Present criterion, Decision 2009/567	
(a) The amount of antimony in the polyester fibres shall not exceed 260 ppm. Where no antimony is used, the applicant may state 'antimony free' (or equivalent text) next to the eco-label. *Assessment and verification:* The applicant shall either provide a declaration of non-use or a test report using the following test method: direct determination by Atomic Absorption Spectrometry. The test shall be carried out on the raw fibre prior to any wet processing. (b) The emissions of VOCs during polymerisation and fibre production of polyester, measured at the process steps where they occur, including fugitive emissions as well, expressed as an annual average, shall not exceed 1.2 g/kg of produced polyester resin. (VOCs are any organic compound having at 293.15 K a vapour pressure of 0.01 kPa or more, or having a corresponding volatility under the particular conditions of use). *Assessment and verification:* The applicant shall provide detailed documentation and/or test reports showing compliance with this criterion, together with a declaration of compliance.	
Proposed revised criterion	
(a) The amount of antimony in the polyester fibres shall not exceed 260 ppm. Where no antimony is used, the applicant may state 'antimony free' (or equivalent text) next to the eco-label. *Assessment and verification:* The applicant shall either provide a declaration of non-use or a test report using the following test method: direct determination by Atomic Absorption Spectrometry. The test shall be carried out on the raw fibre prior to any wet processing. (b) The emissions of VOCs during the polymerisation ~~and fibre production~~ of	

polyester from terephthalic acid (TPA), and during the production of filament fibres, measured at the process steps where they occur, including fugitive emissions as well, expressed as an annual average, shall not exceed 1.2 g/kg for PET chips and 10.3 g/kg for filament fibre

Assessment and verification: The applicant shall provide detailed documentation and/or test reports showing compliance with this criterion, together with a declaration of compliance. VOCs are defined as any organic compound having at 293.15 K a vapour pressure of 0.01 kPa or more, or having a corresponding volatility under the particular conditions of use.

(c) Fibres shall be manufactured using a minimum content of PET that has been mechanically or chemically recycled from post-consumer waste. Staple fibres should have a minimum content of 50% and filament fibres 20%.

Assessment and verification: Content shall be traceable back to the reprocessing stage. The applicant shall provided independent third party certification of the chain of custody or documentation provided by suppliers and reprocessors that enables the feedstock to be traced.

AHWG1 technical discussion

Residual antimony content

There are many different types of polyester, but the type most often produced for use in textiles is polyethylene terephthalate, abbreviated PET. Used in a fabric, it is most often referred to as “polyester”.

PET production requires the use of catalysts such as antimony oxides or antimony acetate to regulate polymerisation. Antimony is therefore present as a residue in polyester. The antimony content in commercial polyester fibres is cited to be in the range of 200 to 300 ppm. The current state of the art in relation to catalysts requires further investigation if the limit value is to be varied.

Process VOC emissions

BREF lists the BAT value for PET polymerisation as up to 1.2 g/kg saleable product. VOC emissions associated with the spinning of filament fibres appear to be the most significant, with 10.3 g/kg stated at the BAT value. The extent to which either of these limit valued could be reduced is to be investigated further.

Process energy consumption

The Preliminary Report highlighted the significance of energy consumption associated with polyester production. The polymer BREF states the maximum level of process energy use for poly condensation of PET and PET processing as being 10.3 GJ/tonne for staple fibres and 32 GJ/tonne for filament fibres. This does not however take account of energy used to produce dimethyl terephthalate, its precursor p-xylene and ethylene glycol.

Plastics Europe have also produced benchmark figures for feedstock production which take into account feedstock production, suggesting 45 GJ/tonne of resin. This data suggests that for staple fibre, feedstock production is more significant than the PET polycondensation and spinning stages.

Minimum recycled content

Polyester is the synthetic fibre with the greatest market share and is the most widely recycled polymer. The preliminary report highlighted evidence for the significant environmental benefits of mechanical and chemical polyester recycling for the majority of the midpoint indicators used in the reference LCA study. Recycling would also avoid the process energy use associated with feedstock production. Further consultation is required in order to explore the feasibility of a minimum recycled content figure based on market best practice.

Feedback from stakeholders

Stakeholders highlighted a number of technical points that inform the follow-up research for this criterion:

- The criteria should reflect values given in the polymer BREF
- An energy benchmark was not supported because it would be too complex to normalise and verify.
- The VOC emissions limit value could be lowered to 0.2 g/kg based on the Blue Angel.
- The potential to reduce the antimony limit value should be investigated as evidence cited suggests that up to 175 ppm can leach out of the fibre during processing stages such as dyeing.
- Whilst manufacturing polyester using recycled PET can reduce the environmental impact of polyester, recycling systems in the EU are based on the recycling of PET drinks bottles and their availability is constrained

because of demand on the global market from China.

- It may not be feasible or economic to manufacture filament fibres and microfibres from recycled feedstock. The functionality and grade of polyester should be considered when considering recycled content.
- Polyester fibres are not recovered in sufficient quanities to link the criteria to closed loop recycling.
- Any new criteria should be easily verifiable in order to avoid an additional cost burden.
- The recycling of synthetic fibres may lead to the cycling of hazardous substances.

Follow-up research and proposed approach

Reviewing the limit value for Antimony

Expert commentators suggest that Antimony catalysts are still used in 97% of global polyester manufacturing [101]. EU manufacturers consulted by CIRFS highlighted the importance of antimony for polyester products which require a high level of colour fastness in order to avoid yellowing e.g. curtains.

The optimum range used by industry is quoted as 280-350 ppm [102]. It is understood that this figure may be raised further in order to optimise the polymerisation process but that this would require additional energy use. A US carpet manufacturer claims that it may be present in levels as high as 650-700 ppm [103]. There is also scope to optimise this figure downwards through process optimisation but no technical evidence could be found that provided values.

Antimony raised concerns amongst some stakeholders because of its potentially hazardous properties. Antimony trioxide is classified with R51 (H351 Suspected of causing cancer). Antimony triacetate is not formally classified but notifications

[101] Thiele, U.K. *Polyester catalysts – a critical analysis of current technologies and available alternatives,*, Presentation made to the European PET conference 2006, http://www.polyester-technology.com/

[102] See footnote 106

[103] Victor Innovatex (2003) *Sustainable textile development at Victor Innovatex*, http://www.victor-innovatex.com/doc/sustainability.pdf

suggest that it would be classified with R51/53 (H411 Aquatic chronic toxicity 2). Evidence suggests that exposure from finished garments is negligible because the catalysts are bound into the fibre (see proposed new Criterion 10 discussion). Other exposure pathways include leaching from fibres during high temperature dyeing and air or solid waste emissions if fibres are incinerated. A US carpet manufacturer claims that up to 175 ppm may leach, however, no evidence could be found to substantiate this figure [104].

Proposal:

It is therefore proposed that antimony catalysts are still permitted by the criteria and that the limit value is retained at 260ppm.

Reviewing the VOC limit values

The main reference point for this criterion is considered to be the polymer BREF (2007) [105]. This indicates a range of 0.07 and 0.8 g/kg for the polycondensation of dimethyl terephthalic acid (DMT) and an upper limit of 1.2 g/kg for terephthalic acid (TPA). A lower limit is not provided for TPA. It is understood that DMT is used to produce PET chips and that TPA may be used to directly produce higher viscosity yarns. It is therefore possible that the criterion could distinguish between the two processes.

Proposal:

It is therefore proposed that the polymer BREF VOC limit values used in the criterion focus on the processes with the highest VOC emissions, setting limit values for polycondensation and the production of filament fibre.

Process energy benchmarking

With regard to energy benchmarking the IPPC polymer BREF document was investigated as a main point of reference. Whilst the document does provide

[104] See footnote 108

[105] European Commission, Reference document on Best Available Techniques in the production of polymers, IPPC Bureau, August 2007

benchmarks, for polyester the preceding stages of para-xylene, terephthalic acid and ethylene glycol are more significant, accounting for 89% of the primary energy required, excluding feedstock energy.

CO_2 (rather than primary energy) benchmarks for a number of synthetic fibre polymer feedstocks, including terephthalic acid, were proposed for inclusion within the EU Emission Trading Scheme 2013-2020. These were not developed further as they were not considered as significant relative to other bulk chemical production processes, including para-xylene.

Our conclusion is therefore that an energy or CO_2 benchmark criteria for polyester fibre would be too complex to introduce and would not achieve a significant enough impact. A recycled content is considered to be a more effective option as it would reduce raw material and process energy use upstream of terephthalate poly-condensation.

Setting a minimum recycled content

Recycled PET (R-PET) can be used to manufacture polyester fibres using a mechanical route, in which spinning chips are remelted and extruded into fibres at around 250^{o}C, or a chemical route, in which the PET feedstock is depolymerised before being polymerised again and extruded into fibres. The comparative LCA study of virgin PET and R-PET carried out by Shen et al (2010) highlights the environmental improvement potential of both options for eight out of nine of the midpoint indicators used [106]. However, the study also notes that mechanical recycling has lower impacts than chemical recycling.

In order to consider the technical potential for introducing a recycled content is important to distinguish between staple and filament fibre. Polyester staple fibre is used to manufacture non-woven fabrics such as fleece. CIRFS suggest that 70% of EU staple polyester production, which was 600,000 tonnes in 2009 [107], is currently manufactured using 100% recycled PET feedstock. EU manufacturers include Wellman, Advansa, Miroglio, Greenfiber and Radici [108].

[106] Shen L, Warrell E and Patel M.K. *Open loop recycling, an LCA case study of PET bottle to fibre recycling*, Resources, Conservation and Recycling Journal, 55 (p-34-52)

[107] Oerlikon, *The fibre year 2009/10 – A world survey on textiles and non-wovens industry*, May 2010

[108] CIRFS full members, http://www.cirfs.org/MEMBERSHIP/CIRFSMembers/FullMembers.aspx

The technical specifications of staple fibre are close to the specifications required for PET bottles, so with adequete sorting, cleaning and drying of the R-PET feedstock it is understood that manufacturers' quality specifications can be met. certain applications are, however, excluded such as medical devices, because of hygiene restrictions on recycled content.

Polyester filament fibre is used to manufacturer woven fabrics. It is a higher quality product than staple fibre requiring higher technical specifications than staple fibre and careful control of manufacturing processes in order to ensure qualities such as colour, tenacity, tensile strength and dyeability are within manufacturers quality specifications. The heterogenous nature of the R-PET feedstock means that consistency cannot always be assured [109].

Consultation with a significant EU clothing retailer that has experience using filament fibre with a high recycled content has highlighted tensile strength and dyeability as potential problems. As a result they have initially chosen to specify filament fibres that have been chemically recycled. This is because chemically recycling of fibres is able to provide a consistentcy in quality that is identical to virgin fibres.

Manufacturers of polyester with a recycled content

In order to understand the possible availability and quality specifications of filament fibre with a recycled content an attempt was made to identify EU and global manufacturers of polyester filament fibre:

- Mechanically recycled content: Two EU manufacturers are understood to manufacture filament fibre products – Filature Miroglio and Radici, both in Italy. Both claim that the fibres are suitable for a wide variety of clothing applications, including technicalwear and sportswear.
    - Filature Miroglio: The filament is manufactured with 100% recycled content and is solution dyed [110].. Production capacity is quoted as 3,000 tonnes/annum. The post consumer origin of their 'Newlife' product is second party certified by the Italia Plastics Institute's Plastic Seconda Vita scheme

[109] Thiele, U.K. *Conversion of PET bottle flakes to added value products – quality and processing criteria*, Presentation made in Charlotte, USA, May 2003, http://www.polyester-technology.com/

[110] Filature Miraglio, *Newlife product*, Accessed 2012, http://www.filaturemiroglio.com/eng/newlife.php

- Radici Group: The filament is manufactured with 70% recycled content and is solution dyed [111]. Data on the production capacity has been requested. The post consumer origin of their r-Starlight (POY and drawn yarn) and r-Radyarn product is third party certified.

The US manufacturer Unifi is also understood to be used by major outdoor manufacturer Polartec who supplies fabric to brands such as Patagonia and the North Face. Their filament fibre content is manufactured with a 20% recycled content and is third party certified [112]. Production capacity is quoted as approximately 14,000 tonnes/annum [113].

The Global Recycle Standard is a content standard that certifies fibres with a recycled content Their list of certified companies as of June 2012 includes 18 manufacturers of polyester filament and fabric containing filament with a recycled content [114].. Locations include China, India and Taiwan. The recycled content ranges between 10 and 100%. An example is Libolon in Taiwan which has a production capacity of 15,000 tonnes/annum [115]. Data obtained from GRS for the spread of recycled contents for GRS certified product is presented in Table 3.1.7.

- Chemically recycled content: There are understood to be only two manufacturers globally – Teijin in Japan which has pioneered the technology and Hyosung in Korea. The capacity of Teijin's plant is 10,000 tonnes. Commentators suggest that investment in new capacity has been constrained because of the economies of scale required to operate plant (>20-50,000 tonnes/annum).

[111] Radici Group, *r-Starlight – Post-consumer recycled polyester*, Accessed 2012, http://www.radicigroup.com/starlightfibres/En/Products/Products_05.aspx

[112] Unifi, *REPREVE product line*, http://unifi.com/pdf/utsc_repreve_eng.pdf

[113] Textile News, *Unifi Opens REPREVE® Recycling Center*, May 2011 http://www.textileworld.com/Articles/2011/May/Unifi_Opens_Repreve_Recycling_Center.html

[114] Textile Exchange, *Companies certified to the Global Recycled Standard*, Current as of June 2012.

[115] Libolon, Polyester chips – using recycled polyester to create new polyester yarn, Accessed 2012 http://www.libolon.com/polyester.php

- Teijin's Eco Circle products contain 100% recycled content product manufactured from PET bottles and recovered polyester fibres [116].
- Hyosung's MIPAN Regen product is a 100% recycled content product and is third party certified by the Global Recycled Standard (GRS) [117].

[116] Teijin Fibres Ltd, *Eco Circle*, http://www.teijinfiber.com/english/products/specifics/eco-circle.html

[117] Textile News, *Hyosung's Mipan Regen yarns net GRS certification*, May 2009

http://www.textileworld.com/Articles/2009/May/FW/Hyosung_Awarded_GRS_Certificate_For_Mipanx_regenx_Nylon_And_Polyester_Yarns.html

Table 3.1.7 Indicative recycled content 01/12 – 04/12 for GRS certified fibres

Recycled content	Proportion of GRS certified fibres
100%	74.1%
75 – 99%	2.1%
50 – 74%	6.7%
26 – 49%	12.6%
5 – 24%	4.5%

Source: Control Union (2012)

R-PET availability

The availability of recycled PET (R-PET) feedstock has been cited as a possible barrier to further use in fibre. In considering the issue of R-PET availability it is important to consider the position both in the EU and globally. This is because textile products sold in the EU may be manufactured in the EU or internationally.

In 2010 19,139 kilotonnes of PET bottles were produced, a break down of which by continent is presented in Table 3.1.8. Approximately xx% of recovered PET bottles globally are used to manufacture polyester fibres. This figure reflects the value of fibres on the market and hygiene regulations which restrict the use of recycled content in food grade PET.

Table 3.1.8 Global PET bottle production capacity

PET Resin Capacity [kt/a]	2004	2005	2006	2007	2008	2009	*2010*
North America	3,685	3,745	3,923	4,595	4,595	4,595	*5,000*
South America	513	500	500	725	950	950	*1,200*
Europe	2,411	2,894	3,515	3,766	4,005	4,005	*4,205*
Africa, Middle East	308	338	499	604	843	843	*843*
Asia (ex China)	4,107	4,411	4,636	4,636	4,636	4,636	*4,636*
China	1,469	2,49	3,217	3,255	3,255	3,255	*3,255*
Total	12,493	14,378	16,29	17,581	18,284	18,284	*19,139*

Source: Thiele (2007)

The collection rate for PET bottles in the EU 27 was 51% (1.59 m tonnes) in 2011, an all time high, but with potential for further increase given that the highest recovery rates were over 70% in one third of EU countries [118]. The growth rate is 2% per annum. Processing capacity is also understood to be greater than the recovered tonnage, as illustrated by Table 3.19, creating an incentive for added value processing in the EU.

Approximately xx% of recovered PET bottles globally and 39% in Europe are used to manufacture polyester fibres. To put this into context EU27 apparent consumption of polyester in 2007 was approximately 1.9 m tons.

[118] Petcore, *Petcore and EuPR publish PET collection figures for 2011 - European collection rate increases to 51% of all PET bottles,* 13th July 2012, http://www.petcore.org/content/petcore-and-eupr-publish-pet-collection-figures-2011-european-collection-rate-increases-51-a

Table 3.1.9 Global PET recycling capacity (2010 projected)

R-PET Capacity all in [kt/a]	1999	2002	2003	2004	2006	*2010*
North America	470	480	500	550	600	*800*
Europe	211	350	430	680	944	*>1200*
ME, Asia, South America, Others	218	370	470	680	1 700	*3 000*
World R-PETBottle Flakes	*899*	*1200*	*1400*	*1 900*	*3 100*	*5,000*
World PET-resin	*7 100*	*9 900*	*11 800*	*12 500*	*16 300*	*19 200*
Recycling potential	***6 201***	***8 700***	***10 400***	***10 600***	***13 200***	***14 200***

Source: Thiele (2007)

Informed estimates suggest that 25% of the 19,139 kilotonnes of PET bottle resin manufactured globally was recycled in 2010 [119]. To put this into content approximately 32 million tonnes of polyester fibres were manufactured in 2009, of which 69% was manufactured in China. Filament fibre is currently the fastest growth area.

A significant factor creating global demand for R-PET has been China's rising demand [120]. Market data highlights China as the world's largest producer of polyester, in part explaining their demand for R-PET. Export levels have remained strong but fell away slightly with the recession, with 16% of recovered PET exported in 2009 [121]. China's significant role as a manufacturer of EU clothing means that some exported R-PET may therefore return to the EU as polyester product.

Proposal:

[119] Thiele,U.K, (2007) Polyester recycling industry

[120] Thiele, U,K, *Paradigm shift in polyester recycling, Presentation to 3rd Chinese International polyester fibre market and technical forum*, September 2007, http://www.polyester-technology.com/

[121] See footnote 123

On the basis of the evidence gathered it is proposed that minimum post consumer recycled contents of 50% for staple fibre and 20% for filament fibre are introduced. This would:

- Reflect the introduction of recycled content into the GPP criteria for textiles;
- Reflect the existing high recycled content of EU staple fibre, whilst encouraging an improvement in the performance and transparency of imported fibre specifications;
- Reflect the growing interest of clothing manufacturers and retailers in specifying a high recycled content, particularly in the outdoor clothing market where staple fibre appears to predominate;
- Support emerging demand for filament fibre, whilst reflecting the lower end of content claims being made for product currently available on the market;

Exemptions could be introduced for specific products for which there is evidence that quality specifications cannot currently be met, even by the most advanced fibre product.

It is also proposed that content claims should be supported by verification of traceability, either using third party certification schemes such as GRS, third party independent verification or documentary evidence from suppliers or processors.

CURRENT CRITERION 9: POLYPROPYLENE

Major proposed changes	• No changes are proposed
Present criterion, Decision 2009/567	
Lead based pigments shall not be used. *Assessment and verification:* The applicant shall provide a declaration of non-use.	
Suggested criterion	
Lead based pigments shall not be used. *Assessment and verification:* The applicant shall provide a declaration of non-use.	

AHWG1 technical discussion

Process energy consumption

It is suggest to include a criterion for process energy consumption or the content of reused material. These points were identified as being important areas of potential environmental improvement in the preliminary report. Process energy benchmarks published by Plastics Europe were presented and discussed in section 3.3.2 of the preliminary report. However, these benchmarks only address feedstock production.

Table 3.1.8 Process energy used to manufacture for polymer production

Polypropylene (resin)	14.74 MJ	PlasticsEurope 2005c, data are also available for 1999

Minimum recycled content

Further evidence is required as to the environmental benefits of polypropylene recycling to produce textile fibres and as to its technical viability and market acceptability as an option.

Feedback from stakeholders

No specific written feedback was received on this criterion. Stakeholders were not in favour of energy benchmarks for synthetic fibres because difficulties in their application.

Proposal:

No change is currently proposed to the criterion.

4.2 CHEMICALS AND PROCESS CRITERIA

PROPOSED NEW CRITERION 10: HAZARDOUS SUBSTANCES AND MIXTURES

Major proposed changes	• A new criteria which restricts the use of substances that appear on the REACH Candidate List and/or which carry specific risk and hazard phrases. • The criteria links to proposed new criteria 11-13 that draw upon content from the existing process criteria.
Present criterion, Decision 2009/567	
Not specifically covered	
Suggested criterion	
In accordance with Article 6(6) of Regulation (EC) No 66/2010 on the EU Ecolabel, the product or any component shall not contain substances that: • Are referred to in Article 57 of Regulation (EC) No 1907/2006 and of the Council of 18th December 2006 concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH) • Have been identified according to the procedure described in Article 59(1) which establishes the Candidate List for Substances of Very High Concern • Meet the criteria for classification as toxic, hazardous to the environment, carcinogenic, mutagenic or toxic for reproduction (CMR) in accordance with Regulation (EC) No 1272/2008 or Directive 67/548/EC and as interpreted according to the hazard statements and risk phrases listed under this criterion The hazard classes and risk phrases listed below generally apply to substances. However, where information on substances cannot be obtained, the classification rules for mixtures shall be applied. The use of substances or mixtures which change their properties upon processing (e.g., become no longer bioavailable, undergo chemical modification) so that the identified hazard no longer applies are exempted from the above requirements. No derogation shall be given concerning substances that meet the criteria of Article 57 of Regulation (EC) No 1907/2006 and that are identified according to the procedure described in Article 59(1) of that Regulation, and are present in mixtures,	

in an article or in any homogeneous part of a complex article in concentrations higher than 0,1 % (weight by weight).

This criterion also applies to known degradation products such as formaldehyde from formaldehyde releasers.

List of hazard statements and risk phrases:

Hazard Statement [1]	Risk Phrase [2]
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 Suspected of damaging fertility. Suspected of damaging 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
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
Sensitising substances	

H334: May cause allergy or asthma symptoms or breathing difficulties if inhaled	R42
H317: May cause allergic skin reaction	R43

Notes

1. According to 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. According to Directive 67/548/EEC and the REACH Directive 2006/121/EC and Directive 1999/45/EC as amended

Assessment and verification: Compliance with this criterion is to be achieved by reference to Criterion 11: Restricted Substance List and 12: Substitution of hazardous substances used in dyeing, printing and finishing.

AHWG1 technical discussion

The requirement for a criterion relating to hazardous substances is set out in the EU Ecolabel Regulation Articles 6(6) and 6(7). The criterion relates to the final ecolabelled product, which could be a fibre, a textile fabric or a final textile/garment. The most significant implications of this new criterion are likely to be the production processes addressed by the 'processes and chemicals criteria'.

As can be seen from table 3.2.1 the main current focus of the current criteria are on processes – either in the form of substance restrictions, emissions limit values or biodegradability requirements. In contrast, articles 6(6) and 6(7) of the Ecolabel Regulation shift the focus onto the end product.

For other product groups it has been discussed as to how such a criterion can be implemented and especially how applicants can document and verify compliance with such a criterion. For textiles it raises specific questions, such as:

- Which substances currently used by industry would be restricted?
- At what stage in the lifecycle of the product is it best to apply the criteria, given that toxic substances may be washed out of the final product?
- What proportion of these substances may subsequently remain in the final product, either as residues or as functional components?

- What is the capacity of industry to respond to restriction of all the listed classifications?
- Are all the classifications relevant given the exposure paths associated with the textile supply chain and subsequent use and disposal by the consumer?

The granting of derogations will therefore need to be carefully evaluated in light of the real need for a specific substance and the environmental and technical performance of the product (or associated process) without its presence.

This is also an area in which the cost and complexity of the verification process will need to be carefully considered. Harmonisation with existing labels could assist in this regard. Oeko-tex 100, for example, is based on the testing of finished products and has an extensive global network of affiliated testing laboratories and competent bodies.

Table 3.2.1 Grouping of the current Ecolabel criteria according to their focus

Criteria that currently apply to processes	
Criteria that restrict substances	12. Stripping or depigmentation
	13. Weighting
	14. All chemicals and chemical preparations
	16. Bleaching agents
	17. Impurities in dyes: Colour matter with fibre affinity (soluble or insoluble)
	18. Impurities in pigments: Colour matter with fibre affinity (soluble or insoluble)
	19. Chrome mordant dyeing
	20. Azo dyes
	22. Dyes that are carcinogenic, mutagenic or toxic to reproduction
	23. Potentially sensitising dyes
	24. Halogenated carriers for polyester
	25. Printing
	29. Anti felting finishes
	30. Fabrics finishes
	31. Fillings
Criteria that set limit values for wastewater or aerial emissions	10. Auxiliaries
	15. Detergents, fabric softeners and complexing agents
	20. Metal complex dyes
	27. Wastewater discharges from wet processing
	31. Fillings
	32. Coatings, laminates and membranes

	33. Energy and water use (no specific limit values)

Criteria that currently apply to end products	
Criteria that restrict substances	11. Biocidal and biostatic products
	28. Flame retardants
	31. Fillings
	32. Coatings, laminates and membranes
Criteria that set concentration limits	26. Formaldehyde
	31. Fillings

Substances restricted or requiring authorisation under REACH

REACH has consolidated EU processes for the classification, authorisation and restriction of substances formerly regulated by other separate pieces of international and EU legislation. These include substances controlled by the Biocide Directive 98/8 EC, the Azo dye Directive 2002/61/EC and Regulation 850/2004 on Persistent Organic Pollutants.

A number of substances with functions that are relevant to the textile industry are currently authorised or restricted by Annexes XIV and XVII of REACH:

- Carriers: Trichlorobenzene must not be used in concentrations of more than 0.1%.
- Biocides: Textiles must not contain pentachlorophenol (PCP). The import, export, sale or use of products containing 5 ppm, or above of PCP or its salts or esters is prohibited.
- Dyes: Azo dyes are the name of the group of synthetic chemicals based on nitrogen that are commonly used in the textile industry. Azo dyes that may cleave to produce the carcinogenic arylamines listed in Annex 8 of REACH Directive are banned from use.
- Plasticisers: DEHP (Di-(2-ethylhexyl)-phthalate), BBP (Butylbenzylphthalate) and DBP (Dibutylphthalate)

- Flame retardants: The threshold limit for the use of penta- and octabromodiphenol ethers (penta and octa-BDE) is 0,1% (w/w). Impregnants tris (2, 3-dibrompropyl) phosphate, tris (1-aziridinyl) phosphineoxide (TEPA) and polybrominated biphenyls (PBB) must not be used in textiles which are intended to come into contact with the skin, e.g. articles of clothing or linen.
- Surfactants: Nonylphenol and nonylphenol ethoxylates must not be be used as a substance or in mixtures at concentrations of more than 0.1%.
- Water repellents: PFOS (perflourooctane sulfonate and its derivatives) are prohibited in textiles if the amount of PFOS comprises >1µg/m^2 of the coated materials.

Substances that currently appear on the ECHA Candidate list

Substances that appear on the SVHC (Substances of Very High Concern) Candidate List should also be excluded from Ecolabelled products [122]. The list is dynamic and is updated with new substances as candidate substances are identified and dossiers of evidence are brought forward by Member States. The Candidate list will therefore have changed since the last revision of the textile product Ecolabel criteria.

Substances of functional relevance to textiles that currently feature on the candidate list (as of August 2012) are as follows:

- Auxilliaries
    - 4-(1,1,3,3-tetramethylbutyl)phenol
    - 1-Methyl-2-pyrrolidone
- Dyes and mordants
    - Anthracene (dye precursor)
    - See also table 1.3 in the Preliminary Report
- Flame retardants
    - HBCD – Hexabromocyclododecane

[122] ECHA, *Candidate list of Substances of Very High Concern for Authorisation*, http://echa.europa.eu/web/guest/addressing-chemicals-of-concern/authorisation/substances-of-very-high-concern-identification/candidate-list-of-substances-of-very-high-concern-for-authorisation

- TCEP – Tris (2,chloroethyl)phosphate
- Alkanes, C10-13, chloro (Short Chain Chlorinated Paraffins)

- Plasticizers (phthalates)
  - Bis(2-methoxyethyl) phthalate
  - DIBP (Diisobutylphthalat)
  - TCEP (Tris(2-chlorethyl)phosphate)
- Solvents (fibre production)
  - N,N-Dimethylacetamide (DMAC)

The use of substances or mixtures which change their properties upon processing (e.g., become no longer bioavailable, undergo chemical modification) so that the identified hazard no longer applies are exempted from the Article 6(7) requirement to restrict substances that appear on the Candidate List.

Substances that are classified with risk or hazard phrases

Given the broad range of chemical substances and formulations used by the textile industry the implication of this restriction could be significant. The pre-cautionary approach taken by labels such as Oeko-tex could assist in this respect by contributing to an understanding of the typical concentrations of substances that may be found in finished products, and in seeking to harmonise testing and verification in order to reduce the burden on Competent Bodies.

Sensitising substances have been proposed for addition to the list in other product groups and given that many textile products may be worn close to the skin and that particles could potentially also be inhaled the following risk phrases are also proposed for inclusion: R42/H334 and R43/H317.

Feedback from stakeholders

The new criterion raised general concerns from stakeholders about its practicality. It was felt that the criterion should be framed in a way that it does not restrict the use of important chemicals that are fundamental to certain processes. The notion of avoiding the use of hazardous substances at source was supported. The criterion and its environmental improvement objectives should be balanced against the overall complexity of the textile criteria set and the relative importance of other criteria.

The following specific feedback was also received:

- A clear distinguishment should be made between substances and preparations. GOTS was given as an example. Preparations are banned if they are classified with R51/53, R55, R56. However, substances are not banned if they are classified with R50, R50/53, R58, R59 as long as this does not trigger classification of the preparation itself.
- Manufacturers were on balance in agreement with the addition of allergen risk phrases to the list as this is perceived to be a consumer-facing issue.
- Monomers or additives could be exempted from the requirements relating to classification as long as they are reacted with and are covalently bonded to polymers e.g. water repellent coatings, and if their concentration is below the cut-off value for mixtures.
- Safety Data Sheets must meet the requirements of Annex II, Article 3 of Directive (EC) No 1907/2006 which sets out the requirements for describing the *chemical identify of the ingredients of a substance or mixture, including impurities and stabilising additives*.
- Reference should be made to industry best practice, including the development of Restricted Substance Lists (RSL's) by manufacturers and brands and by organisations such as AFIRM, industry road maps to eliminate certain substances, process management systems such as Bluesign
- Testing of the final product is proposed as a requirement for verification, for consumer safety and because often there is limited self-verification (e.g. SDS's) by the supply chain. The industry stakeholders who manufacture clothing in volume carry out routine testing against Restricted Substance Lists. Examples were provided of how this is carried out. Given the cost of testing, samples of clothing are selected on a risk basis e.g. by age group (childrens skin contact products being the most sensitive), colour, finishing treatment.
- Air emissions from textile finishing processes are proposed as a new criterion which could complement possible derogations. A formulae approach to calculating and setting thresholds based on substance emissions factors is BAT according to the textile BREF and forms part of the Blue Angel criteria and Bluesign.
- Some of the current criteria could be addressed by the horizontal approach within the hazardous substance criteria e.g. flame retardants, biocides

A number of substances and R Phrases were also highlighted for either restriction or derogation. These have been compiled in a tabular form in Annex 1.

Follow-up research and proposed response

Identifying substances that may be present on the final product

In order to inform criteria development a number of areas were investigated in order to better understand the nature of substances, or functional groups of substances, that may remain on the final product, as well as current industry initiatives. The investigation focused on the following areas:

- Literature bringing together the results of sample testing of final textile products (see Annex 2);
- A screening of some of the most commonly used substances against the H Statements and R Phrases listed in the proposed criterion (spreadsheet to be circulated in advance of the AHWG2);
- Industry practices of using Restricted Substance Lists and screening tools (e.g. TEGEWA classification method);
- A review of the feedback from stakeholders and their proposals for derogations and new substance restrictions (see Annex 1).

The results of the literature review suggest that fixed and residual substances from the bleaching (optical brighteners), dyeing, printing and finishing stages are of most significance. Substances from earlier processing stages such as sizes and coning oils are generally washed out during the pre-treatment desizing and bleaching stages and during subsequent washing and rinsing carried out during latter stages.

Substances can be readily grouped by their function, with their presence on the final product varying according to the substrate and the specification of the final product. Indicative concentrations for substances found on final textile products are presented by function group in table 3.2.2.

It is also notable that REACH impact evaluations carried out for the European Commission highlighted the importance of critical functional groups which, because

of their small production volumes, are particularly sensitive to restrictions [123]. These comprised reactive dyes, dye carriers, general formulation solvents, softeners and easy care finishes (see Annex 2 for further details).

Table 3.2.2 **Indicative concentrations of functional and residual substances on final textile products**

Functional group	Concentration on finished product (% w/w)	Technical notes
Dyes *Aryl amines*	0.05 – 3.0% >30 ppm	The concentration will depend on the strength and depth of colour. Aryl amines will only be present as degradation products of certain azo dyes. Printed patterns, if applied, comprise dyes and pigments.
Carriers	0.1 – 1.0%	May also include other printing and dyeing auxilliaries
Surfactants	5.5 – 26.4 mg/kg	Residual concentrations may remain from dyeing, washing and finishing
Optical brighteners	Up to 0.5%	Added during pre-treatment process stages.
Softeners	*Check source*	Added during washing and rinsing before or after dyeing.
Easy care	Up to 8%	Mainly cross linking agents. May also include levelling and fixing agents.
Fluorocarbons	0.3 – 8.0%	Coatings that provide dirt or water repellency

[123] Envirotex and Cast Consulting, *Analysis of the potential impacts of REACH on the European textile supply chain*, Report to DG Enterprise & Industry, 16th December 2005

Flame retardants	1 – 10%	Reactive coatings bonded to fibres. The % will depend on the weight of the fabric.
Biocides	5 ppm	Concentrations vary by application and can reach 100 ppm

Findings from follow-up research and literature review

The main observations and findings from our our follow-up research are as follows:

- The concentrations and range of substances commonly found in final textile products generally pose minimal health risks to consumers. There are however some combinations of garments and substances that may pose higher risks e.g. tight, skin contact garments coloured with allergenic disperse dyes. Poorly regulated production can also result in greater risks of exposure.
- The hazards and risks phrases identified by the criterion are more relevant to occupational exposure during their handling in factories and to wastewater and aerial emissions to the environment. For example, many dyes carry H317 (Category 1 skin allergen) which reflects hazards associated with handling in their dust form. However, not all the hazards and risks are applicable to this product group e.g. R29, 31, 32.
- The large number of substances and the high number of possible combinations in recipes used by the industry means that it is difficult to identify, within the limitations of the Ecolabel revision process, the potential for substitution. However, some hazards and risks require derogation because they would restrict commonly used substances e.g. R42 and R43 which would restrict most dyes.
- Many of the substance restrictions contained within the existing Ecolabel criteria are mirrored by industry and NGO Restricted Substance Lists, however, there are areas where restrictions within the Ecolabel could be clarified to make them more user friendly e.g. by listing dyes instead of Aryl amines.
- RSL's are generally subject to due diligence which requires the sample testing of final products. Sample testing is carried out on a risk basis e.g. by

colour related to banned azo dyes, childrens clothing ranges where there is greater risk from exposure, plastic elements that may contain phthalates.

- There is evidence that EU Industry has successfully used screening tools to reduce the number of hazardous substances used in textile formulations and recipes e.g. TEGEWA, ETAD. These were, however, processes that took time to implement.

In terms of risk and exposure GOTS separates substances into those that have potential health impacts and those that have potential impacts on the environment. It is also notable that some existing labels provide exemptions and derogations based on the fastness of substances on the final product. For example, the Blue Angel specifically refers to monomers and additives:

> *Exempted from regulation b) are monomers or additives that turn into polymers during the manufacture of plastics for coatings or are chemically (covalently) bound to the plastic if their residual concentrations are below the consideration limits for mixtures.*

Proposal:

Given the potential complexity of applying this criterion to textile products it is important that the approach proposed is practical to implement and reflects industry best practices. The environmental improvement potential must also be balanced against the relative importance of the other EU Ecolabel criteria and the capacity of industry to respond. The following approach is therefore proposed:

- Restricted Substances List: Existing substance restrictions with the Ecolabel criteria together with Candidate List SVHC's would be compiled into an RSL which would facilitate greater ease of communication to suppliers (see Criterion 11: Restricted Substance List).
- Substitution of hazardous substances: Each supplier that carries out a dyeing, printing or finishing process would be required to, as far as possible, substitute substances used in their process chemistry that are classified with the listed hazard statements (see Criterion 12: Substitution of hazardous substances used in dyeing, printing and finishing).

  The hazard statements would be differentiated by splitting them into Category A (the most significant hazards according to CLP Guidance) and Category B (lower level hazards according to CLP guidance). Category A hazards would

be banned and a timescale would be given to find substitutes for Category A substances, with the exception of specific derogations. The Categorisaton can be found in Annex 4.

- Durability of surface finishes: Surface finishes that impart a functional benefit to the textile product, including easy-care, softeners, water repellency, flame retardancy, but which may degrade and leach into the environment or expose consumers should achieve a high level of durability (see Criteria 40 Durable surface finishes).
- Due diligence: Because a manufacturer may use multiple suppliers, and the nature and concentration of substances on final products may be therefore difficult to control, products may need to be tested to ensure compliance with the criterion. However, it is recognised that testing may be a burden for smaller licenseholders.

  The extent of any requirement for testing is to be discussed further with stakeholders, with the following options available to minimise the burden:

  - Testing could be required on a risk basis only e.g. specific colours or finishes, childrens clothing, plastic accessories
  - Testing could be carried out randomly or on a risk basis across all licenseholders
  - Testing could be exempted if suppliers carry out their own testing of intermediate products
  - Oeko-Tex 100 labelling and/or reference to white lists of products could be accepted as contributing towards compliance

Proposed New Criterion 11: Restricted Substance List

Major proposed changes	• A new criteria which would support implementation of Criteria 10 and 12 • A Restricted Substance List (RSL) would provide a master list of substances that either cannot be used or are subject to concentration limits. • The RSL would need to be communicated to suppliers at the dyeing, printing and finishing stages
Present criterion, Decision 2009/567	
Not specifically covered	
Proposed criterion	
Final products should not contain substances listed in the the Restricted Substance List (RSL) or at or above the specified concentration limits in RSL which can be found in Annex 3. The RSL should be communicated to suppliers and agents at the dyeing, printing, finishing and the cut/make/trim stages. *Assessment and verification:* The applicant shall demonstrate compliance through selective testing of the final product. Samples of product should be selected on a risk basis by reference to the RSL. The applicant shall provide documentation and test reports showing compliance with the RSL.	

Feedback from stakeholders

Stakeholders at the first AHWG highlighted the need to refer to current industry practice in the use of Restricted Substance Lists (RSL's) which are communicated to suppliers. Examples such as AFIRM were highlighted for further investigation. The discussions also suggested that many of the current criteria could be brought together under the new hazardous substances criteria – a so-called 'horizontal approach'. The success of Oeko-Tex 100 and due diligence by large clothing manufacturers means that final product testing is readily available.

Follow-up research and proposed response

A number of RSL's were reviewed, including those produced and used by Oeko-Tex 100, NICE (Nordic Initiative, Clean and Ethical), AFFA (the American Footwear and Apparel Association), AFIRM (the Apparel and Footwear International RSL Management Group), C&A and Marks & Spencers and feedback was obtained from selected manufacturers and the Oeko-Tex Institute as to how they are developed used in practice.

The existing Ecolabel criteria were then screened in order to identify all existing substance restrictions. These were then compiled into a draft EU Ecolabel Restricted Substance List (RSL). The RSL can be found in Annex 3 of this report. In some cases modifications and improvements were made. These are highlighted in red. These are intended to align the RSL with other RSL's and labels, and to make the RSL clearer and easier to communicate to suppliers. The relevant existing EU Ecolabel criteria used to draft the RSL and any modifications or changes are recorded in table 3.2.3 below.

Table 3.2.3 Schedule of current criteria used to create the RSL

Criteria	Restrictions	Modifications
11. Biocidal and biostatic products		
14. All chemicals and chemical preparations		
15. Detergents, fabric, softeners and complexing agents		
Dye criteria 17 - 23		
24. Halogenated carriers for polyester		
25. Printing		
26. Formaldehyde		
27. Flame retardants		
28. Anti-felting finishes		

Proposed New Criterion 12: Subsitution Of Hazardous Substances Used In Dyeing, Printing And Finishing

Major proposed changes	• A new criteria which supports implementation of Criterion 10 and 11 • It would require the substitution of substances used in dyeing, printing and finishing recipes in accordance with the hazard statement listing in Criterion 10. • The aim of the criterion is to encourage manufacturers to identify potentially hazardous substances and to avoid and/or minimise their use at source.
Proposed criterion	
Substances and preparations applied to fibres, fabrics or yarns during dyeing, printing or top finishing processes meeting the criteria for classification with the hazard statements or risk phrases specified below in accordance with Regulation (EC) No 1272/2008 or Directive 67/548/EC or that referred to in Article 57 of Regulation (EC) No 1907/2006 are subject to the restrictions explained below. For the purpose of this criteria only, the hazard statements listed in the table below have been split into Category A and Category B. The following restrictions apply: • Substances or preparations which meet criteria for classification with the hazard statements listed under Category A cannot be used during dyeing, printing or top finishing processes and cannot be present in the product at any concentration. • Substances or preparations which meet criteria for classification with the hazard statements listed under Category B cannot be used during dyeing, printing or top finishing processes if they may be present on the product at or above the generic concentrations provided in the CLP guidance, or the specific concentrations listed in Annex 1 of the Regulation (EC) No 790/2009,. • Substances or preparations which meet criteria for classification with the hazard statements listed under Category B that may be present on the product below the generic concentrations provided in the CLP guidance, or the specific concentrations listed in Annex 1 of the Regulation (EC) No	

790/2009 may be used in dyeing, printing or top finishing processes until 2 years of commencement of this version of the criteria, date after which they have to be substituted.

Categorisation of hazard statements restricted by the criterion

Category A	Category B
H350i May cause cancer by inhalation (R49)	
	EUH070 Toxic by eye contact (R39/41)
H300 Fatal if swallowed (R28)	H301 Toxic if swallowed (R25)
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)
H304 May be fatal if swallowed and enters airways (R65)	
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)
	H334: May cause allergy or asthma symptoms or breathing difficulties if inhaled (R42)
	H317: May cause allergic skin reaction (R43)
H340 May cause genetic defects (R46)	H341 Suspected of causing genetic defects (R68)
H350 May cause cancer (R45)	H351 Suspected of causing cancer (R49)

H360F May damage fertility (R60)	H361f Suspected of damaging fertility (R62)
H360D May damage the unborn child (R61)	H361d Suspected of damaging the unborn child (R63)
H360FD May damage fertility. May damage the unborn child (R60/61/60-61)	H361fd Suspected of damaging fertility. Suspected of damaging the unborn child (R62/63)
H360Fd May damage fertility. Suspected of damaging the unborn child (R60/63)	H362 May cause harm to breast fed children (R64)
H360Df May damage the unborn child. Suspected of damaging fertility (R61/62)	
H400 Very toxic to aquatic life (R50)	H411 Toxic to aquatic life with long-lasting effects (R51/53)
H410 Very toxic to aquatic life with long-lasting effects (R50/53)	H412 Harmful to aquatic life with long-lasting effects (R52/53)
H413 May cause long-lasting effects to aquatic life (R53) [1]	H413 May cause long-lasting effects to aquatic life (R53)
EUH059 Hazardous to the ozone layer (R59)	
	EUH031 Contact with acids liberates toxic gas (R31)
	EUH032 Contact with acids liberates very toxic gas (R32)
	EUH070 Toxic by eye contact (R39-41)

Notes:

1. Where a substance that is classified with H413 is both non-biodegradable and

bioacumulative.

Derogations

The following substances are specifically exempted from the requirements above in accordance with the conditions described below if they are present on the product at or below the generic concentrations provided in the CLP guidance, or the specific concentrations listed in Annex 1 of the Regulation (EC) No 790/2009. Hazards EUH023, EUH 031 and EUH 032 are derogated for all substances.

Functional substances

Functional substances are derogated from the sunset timescale for Category B substances given above.

Function group	Derogated classifications	Derogation conditions
Dyes	Category B, H412, H413, H300-331, H317 and H334	• EU BAT measures shall be used to minimise worker exposure to dyes in powder form; • Wastewater shall be treated according to the additional requirements in Criteria 27
Optical brighteners	Category B, H412 or H413	• No specific additional requirements
Softeners	Category B	• Must not be classified with H334 or H317
Cross linking agents	Category B	• Must not be classified with H334 or H317
Flame retardants	Category B	• Should be required by fire legislation and/or ISO, EN or Member State standards for specific end-uses.

Water and stain repellents	Category B	• Should not be classified with H410 – 413
Membranes and laminates	Category B	• Plasticizers and solvents should not be classified with H410 - 413

Other residual substances		
All functional groups	Category B, EUH023, EUH 031, EUH 032	• EU BAT measures are used to minimise the exposure of workers during the handling of substances; • That wastewater effluent from manufacturing sites is treated according to the additional requirements described in Criteria 27;

Assessment and verification: The applicant shall demonstrate compliance with this criterion by providing a declaration of the classification and/or non-classifications of each substance that forms part of a dyeing, printing or finishing preparations according to the hazard categories referred to above and, as far as this can be determined, as a minimum, based on information meeting the requirements listed in Annex VII of REACH Regulation (EC) 1907/2006.

This declaration shall be supported by a technical report which identifies the substances and preparations used for dyeing, printing and finishing and the predicted concentrations on the final product. Substances and preparations should be characterised in accordance with the level of detail specified in section 10, 11 and 12 of Annex II of Regulation (EC) 1907/2006 (Requirements for the Compilation of Safety Data Sheets). The technical report should also identify substances that are proposed for derogation by the applicant, accompanied by justifications for how the derogation requirements are met.

The final product or intermediate products should be randomly tested in order to validate predicted concentrations of substances on the final product. Final product testing may be exempted if testing data can be provided for each process stage.

Follow-up research and proposed approach

Screening of R Phrases and H Statements

The application of the R Phrase and H Statement listing to textile products poses a significant challenge. In order to test the practicality of the criterion as it is written over 200 commonly used substances identified by textile chemists [124] as potentially being present on a final product were entered into the CLP database. The significant number of substances means that it is beyond the scope of this product revision to identify the scope for substitutes

The substances screened reflect those identified by the hazardous substance background research to Criterion 10 – optical brighteners, dyeing and printing auxiliaries, finishing auxiliaries, softeners, easy care treatments and flame retardants. Derogations proposed by stakeholders were also taken into consideration (see Annex 1). The following observations can be made from the screening:

- Dyes: A range of CMR, carcinogenic or allergenic dyes already form part of the proposed RSL. Two areas of possible derogation have been identified by stakeholders:
    - H334,317 : Dyes carry these classifications because of their characteristics in dust form. Given the minimal risk that in most cases properly dyed garments pose to consumers (as identified by the testing studies reviewed), the most relevant exposure pathway may therefore be their handling by workers.
    - H412,413: The Blue Angel has derogated dyes from these classifications because it would exclude most common dyes. Dye fastness and efficient rinsing off of fabrics to avoid the wash out of

[124] Lacasse, K and W, Bauman (2004) *Textile chemicals*, Springer-Verlag *and* Swedish National Chemicals Inspectorate, Chemicals in textiles – report of a Government Commission, Report No.5/97

dyes during use of textile products, coupled with the degradation of residual dyes by wastewater treatment works at the manufacturing stage therefore appear to be the most practical ways of minimising exposure risks.

- Carriers and levelling agents: These substances are used to assist with the dyeing of polyester fabric. They can be classified with a significant number of H Statements, including H Statements H300-362. Consumer risk can be minimised by careful dosing and the efficient rinsing off of fabrics. Carriers can be avoided by dyeing polyester at higher temperature and pressures, but this increases other environmental impacts through greater energy use.
- Finishes: Some easycare, softeners, water repellents and flame retardants are classified with acutely toxic, CMR and aquatic environment hazards that may lead to exposure of workers from VOC emissions in the factory, the environment from the rinsing off of fabrics and consumers as a result of leaching from a fabric during use. Many of these hazard statements are identified in the current EU Ecolabel criteria. Exposure can therefore be minimised at source in the factory through adequate health and safety measures, process control to ensure fixation, and through the selection of finishes with a high level of fastness.
- Coatings, laminates and membranes: Some of these additional elements of a fabric or product may, depending on their content, contain phthalates and perfluorocarbons. Relevant acute toxicity, CMR and aquatic environment hazard statements are identified in the current criteria. Specific restricted substances are now contained within the proposed RSL.
- EUH 029, 031, 032: Industry stakeholders stated that use of substances carrying these classifications would not permit the operation of textile processes. The hazardous substance screening we carried out against the CLP database did not identify any substances with these classifications;

Critical to interpretation of Hazard classifications are the generic concentration levels that trigger classification, as well as specific concentration limits and M factors that may be listed in Annex 1 of the CLP Regulation (EC) No 790/2009. These are important in that they allow for the level of potential exposure to be determined.

Approaches to the screening of textile chemicals

A number of precedents exist for the screening of textile chemicals and preparations in order to reduce exposure of the workforce, the environment and consumers. These include:

- TEGEWA classification scheme: This scheme has been successfully used in Germany to screen textile auxiliaries into three categories according to their hazard to wastewater [125]. Between 1997 and 2000 it led to a 33% reduction in the use of auxiliaries in the highest category III of hazard (see Table 3.2.4).
- Air Emissions Factor method: The German Government working with the textile industry developed a method for calculating harmful emissions from thermal finishing processes [126]. Manufacturers can therefore attempt to minimise emissions at source by selecting new recipes.
- Global Organic Textile Standard (GOTS): The current criteria v3 distinguishes between hazards to health and the environment [127]. Furthermore it distinguishes between input substances and preparations. Classified substances may be derogated as long they do not trigger classification of a preparation.

Variations on these approaches to screening form part of the Bluesign system [128] and Oeko-Tex 1000 criteria [129]. Bluesign in particular places a strong emphasis on 'input stream management' to reduce risks.

[125] See p-260 of European Commission, *Reference document on Best Available Techniques for the textile industry*, IPPC Bureau, July 2003

[126] See p 262 of European Commission, *Reference document on Best Available Techniques for the textile industry*, IPPC Bureau, July 2003

[127] International Working Group on Global Organic Textile Standards, *Global Organic Textile Standard (GOTS)*, Version 3.0, March 2011, http://www.global-standard.org/the-standard.html

[128] Bluesign Technologies, *Bluesign criteria for textile manufacturers*, Version 1.3, March 2010

[129] Oeko-tex International, *Oeko-tex Standard 1000*, Edition 01/2012

Table 3.2.4 Textile auxiliaries sold in Germany from 1997 to 2000: number, quantity and percentage of textile auxiliaries in classes I, II, III

Class	Number				Quantity (t/yr)				Quantity (%)			
	1997	1998	1999	2000	1997	1998	1999	2000	1997	1998	1999	2000
I	2821	3020	3242	3164	98446	105983	102578	104406	63	67	75	77
II	1499	1485	1358	1258	29972	29422	23321	22103	19	18	17	16
III	460	417	358	297	27574	23830	10231	9206	18	15	8	7
Total	4780	4922	4958	4719	155992	159235	136130	135715	100	100	100	100

Source: European Commission (2003)

Proposal:

It is proposed that hazardous substances used in dyeing, printing and finishing processes which may be present on the final product and which meet the criteria for classification with specified hazard statements or risk phrases should, as far as possible, be substituted by manufacturers according to sunset timescales which would afford applicants time to change processes and recipes.

Because of the number of possible combinations of substances in preparations and recipes, and the imprecise nature of textile manufacturing, no specific concentration thresholds are proposed. Instead concentration limits should be taken from the generic concentrations in CLP guidance or the specific concentrations listed in Annex 1 of the Regulation (EC) No 790/2009

In order to make the criterion easier to understand for industry, substances have been considered in two broad groups:

1. Functional substances that are required to be present on the final product in order to achieve colour, luster or finish,
2. Residual substances that may be present at varying concentrations depending on the process chemistry and how well the product has been washed and rinsed.

In order to ensure that the criterion is practical and hazard based the Criterion 10 hazard listing has been split into into categories A and B. This approach reflects the techniques used by TEGEWA and GOTS, in which the most significant health and environmental hazards are prioritised. The category prioritisation has been developed using the CLP guidance with itself categorises hazards based on concentration thresholds.

It is proposed that Category A hazards shall not used. Category B hazards can be used as long as certain derogation conditions are met but must be substituted within 2 years of the new criterion commencing.

In the case of functional substances the derogation conditions recognise that these substances must be present on the final product in order to meet customer needs, but that in doing so the risk to consumers and the environment must be minimised. It is considered that a number of existing EU Ecolabel criteria already work to minimise this risk – for example, the dye fastness criterion – and the proposed new criterion addressing the durability of finishes is intended to further complement this approach.

In the case of residual substances the derogation conditions have been related to workforce exposure and environmental hazards at manufacturing sites, as this is where the hazards are likely to be expressed if concentrations are minimised on the final product.

Table 3.2.5 Schedule of current criteria incorporated into the new criterion

Criteria	Restrictions	Modifications
10. Auxilliaries and finishing agents for fibres and yarns		
15. Detergents, fabric softeners and complexing agents		
22. Dyes that are carcinogenic, mutagenic or toxic to reproduction		
28. Flame retardants		
30. Fabric finishes		
32. Coatings, laminates and membranes		

PROPOSED NEW CRITERION 13: DYEING, PRINTING AND FINISHING PROCESS EFFICIENCY

Major proposed changes	• This criteria would update and replace existing Criteria 33

Proposed criterion

The applicant shall demonstrate that all suppliers of dyeing, printing and top finishing processes have completed a self-audit questionnaire identifying process improvements they have implemented. Suppliers must score more than xx points. The questionnaire to be used is provided as an annex to the textile criteria.

Assessment and verification: The applicant shall provide a list of suppliers of dyeing, printing and top finishing services. Fully completed self-audit questionnaires should be provided for each supplier. Suppliers shall be requested to update their self-audit responses each year of the license period.

Equivalent self-audit formats, as well as certifications which address process efficiency - such as Oeko-Tex 1000 and Bluesign - will be accepted as proof of compliance. Site visits may be requested by Competent Bodies at any time in order to verify compliance.

Feedback from stakeholders

At the first AHWG stakeholders indicated that the textile BREF should be a reference point for the revision. Some concern was raised about the age of the document, which dates from 2003, but the general feeling was that it was still felt to be valid. The need to consider systems such as Bluesign was also highlighted.

Follow-up research and proposed approach

Cross-referencing IMPRO Textiles to the textile BREF

The IMPRO Textile study highlights the significance of the dyeing, printing and finishing process stages to the LCA midpoint indicators. The study was not,

however, conclusive on process improvement options, recognising the difficulty in accurately assessing the improvement potential of single or multiple combinations of actions that could reduce modelled environmental impacts. Moreover, the study recognised that EU practices were used as the basis for the modelling whereas in practice the efficiency of global practices, which the study identifies as the source for around 60% of EU textiles, may vary considerably.

Many of the improvement options identified by the study were not modelled in detail because of gaps in data availability and/or views on their time horizon for adoption. To inform the EU Ecolabel revision the decision was therefore taken to re-review the long list of IMPRO improvement options against the textile BREF and, where necessary, the current state of the art according to industry guidance and expert literature. The latter were drawn upon in order to check the current status of BAT techniques that the BREF, which dates from 2003, may have identified as emerging e.g. digital printing.

Characterising the main parameters for improvement

The textile BREF, expert literature and industry guidance were used to characterise the most important parameters which influence the process efficiency of dyeing, printing and finishing. Over 20 BAT techniques selected from the textile BREF were reviewed in detail in order to identify and categorise the most relevant techniques. A summary of the BAT techniques can be found in Annex 5.

We have defined process efficiency is defined in terms of energy, water and chemical use, but it can also be defined in terms of product quality control, as this in turn can influence these parameters. Finishing processes comprise the application of functional coatings or treatments to the fabric, including softeners, easy care, anti-felting, water repellents and flame retardants.

The following key improvement measures and parameters were identified:

- o Dyeing
    - Benchmarking studies suggest that substantial savings in energy, water and chemical use can be obtained by moving to more efficient process technology, with savings in the range of 60% for energy

consumption, 70% for water consumption and 20-70% for chemical consumption [130];

- Some processes are inherently less efficient because of their design and/or non-continuous nature which can, for example, mean that the dye baths cannot be prepared in-line (instead of manually) and water and chemicals are more difficult to recycle;
- Dyeing without colour instrumentation and automated dosing of dyes and auxilliaries is imprecise, which can lead to higher environmental impacts because dye baths may need to be kept at temperature longer [131]. Fabrics may also be rejected by clients because they are not 'right first time'. Reject rates can be reduced from more than 7-8% to less than 2-3%;
- Colour fastness is strongly influenced by the dyes selected, how the process is controlled and how well the fabric is subsequently rinsed off [132] . Without careful control dye may remain unfixed on the fabric, which can subsequently be rinsed out in domestic washing machines or leach onto skin;
- Washing and rinsing is common to all dyeing processes and consumes significantly greater quantities of energy and water than dyeing itself. Water savings of between 50-75% can be achieved using efficient processes [133].

o Printing

- Industry standard printing processes such as screen printing are inherently limited as to how efficiently they use printing pastes, with 50% being wasted during the process, before then contributing to significant effluent COD levels [134]. Sample runs are particularly

[130] Schramm. W and J, Jantschgi, *Comparative assessment of textile dyeing technologies from a preventative environmental protection point of view*, Journal of the Society of Dyers and Colourists, Vol 115, p 113-135, April 1999

[131] Marks & Spencers, Environmental and chemical policy for textile processing – Modules 3 and 4: Minimum standards and best practices, Version 1, May 2011

[132] Lacasse, K and W, Bauman (2004) *Textile chemicals*, Springer-Verlag

[133] European Commission, *Reference document on Best Available Techniques for the textile industry*, IPPC Bureau, July 2003

[134] See footnote 14

wasteful as they require the complete setup of a machine for a production run;

- Printing paste residues and waste can be reduced by 40-60% by investment in simple recovery systems and routines [135];
- Digital inkjet printing is the BAT, as it is significantly more efficient, for example using 80% less energy and avoiding nearly all print residues [136]. However, although its use is growing fast, with 300% growth reported between 2005 and 2000, it is still considered an emerging technology. It accounted for just 1% of the market in 2007 but with projections of 10% within a few years [137]. From a technical point of view it cannot replace all standard printing requirements e.g. discharge/etch printing.
- Fixing, washing and drying are process stages common to all print finishing with the exception of transfer and pigment printing. These processes consume significant quantities of energy and water, and more so than printing itself.

o Top finishing

- Energy use associated with drying and curing in so-called stenter frames is generic to most finishing processes, with an improvement potential of 15-30% [138].
- A range of options exist that can make stenter frames more efficient, including optimised exhaust air flow, heat recovery, insulation, heating systems and burner technology [139];
- Air emissions of volatile active substances from finishing formulations can be carried over and volatilised into the exhaust air from stenter

[135] See footnote 14

[136] European Commission, Tieprint - Technology transfer of low environmental impact ink jet printing for the production of textile products, LIFE Programme LIFE99 ENV/IT/000122

[137] Just Style, Digital textile printing on growth trajectory, April 2007, http://www.just-style.com/analysis/digital-textile-printing-on-growth-trajectory_id97071.aspx *see also* Textile Digest, *World textile printing industry*, December 2010, http://www.ttistextiledigest.com/inter-articles/inter-textile-insighttrend/item/3085-world-textile-printing-industry.html

[138] See footnote 13

[139] See footnote 14

frames [140]. This is therefore a potential area of improvement, both in terms of finish application efficiency and pollution control.

The areas of potential improvement that were identified can be seen to fall into three broad categories:

1. Production management:
    a. Engagement of the workforce: A combination of environmental awareness training, good practices for maintenance and cleaning, and process input/output monitoring.
    b. Design and colour instrumentation: Systems which enable the accurate reproduction of customers designs and colours;
    c. Automatic dosing and dispensing: Installation of automatic systems which meter the exact amounts of chemicals, auxiliaries and water required.
    d. Process control and optimisation: A combination of monitoring, flow control and timing, well-documented production procedures, optimised production scheduling and efficient machinery.
2. Process specific measures: BAT techniques have been identified which contribute to improvements in the use of energy, water and chemicals. These techniques are specific to each process and can be grouped into those that require specific technology (e.g. jet dyeing, digital printing) and those that require changes in how the process is managed by the workforce (e.g. dye selection, print paste recovery).
3. Generic energy and water efficiency measures: Washing and drying processes are common to dyeing, printing and finishing. Efficiency can be optimised through a combination of metering, process monitoring and efficient machinery. These measures in part rely on the engagement of the workforce.

Based on these measures and parameters it can be seen that there exists significant potential for improvements based on BAT techniques. Moreover, the assumptions used for the IMPRO Textiles LCA were derived from European textile manufacturers who must comply with IPPC requirements to follow BAT techniques. In contrast, retailers and brands using foreign manufacturers cannot be sure that BAT techniques have been used.

Review of process efficiency initiatives

[140] See footnote 13

As we have highlighted process efficiency is a complex subject, with many different combinations of improvement options being possible. In order to explore whether/how process efficiency is practically being addressed by industry a number of initiatives were selected as case studies.

The case studies are examples of the 'state of the art' when considering process improvements at manufacturing sites. The initiatives reviewed comprise:

- Case study 1: Retailer supply chain policy – Since 1998 UK retailer Marks & Spencers have operated strict policies and standards for the performance of wet production processes and the management of quality along its supply chain [141]. They are applied to dyeing, finishing and printing processes – those with which the company has the most direct commercial influence and greatest 'visibility' down the supply chain. The Company has initiated an 'eco-factory' programme in the UK and Sri Lanka. This focuses on basic energy management practices, with reference to work by NRDC (see below).
- Case study 2: Industry-led process certification - Bluesign is an independent certification system for all production processes associated with a final fabric product [142]. It was established in 2000 and over 200 manufacturers are system partners. Partners include Helly Hansen, Patagonia, the North Face, Polartec and Schoeller. It has recently been independently assessed by the Oeko-Institute as providing as high a level of assurance as the EU Ecolabel and the Blue Angel. The system is based on the concept of 'intelligent input stream management' which focuses on the avoidance at source of chemical inputs which pose risks to health and the environment based on their toxicological properties. Bluesign also benchmarks processes against Best Available Techniques (BAT) in order to improve and optimise resource efficiency.
- Case study 3: Consumer-focussed certification - Oeko-Tex 1000 is an independent certification system for textile manufacturing sites [143]. It is intended to work alongside Oeko-tex 100 which is a certification for products. Manufacturing sites can be certified against the Oeko-tex 1000 criteria Part A.

[141] See footnote 12

[142] See footnote 9

[143] See footnote 10

In May 2012 a total of 57 production sites were certified, including spinners (22 %), yarn dyers (7 %), weavers (20 %), knitters (5 %), finishers (32 %) and final products (14 %).

- Case study 4: Industry-led guidance - MADE-BY is a non-profit industry association established in 2004 with the aim to improve environmental and social performance of the fashion industry [144]. Members include Ted Baker, Komodo and G-Star Raw. The association has sought to assist its members in understanding how they can influence wet processors in their supply chain. This is particularly challenging given that their members tend to have less resources and influence than larger retailers and brands;
- Case study 5: NGO guidance - The National Resource Defence Council (NRDC) is a US NGO that has developed guidance for textile mills [145]. Working with major brands such as GAP, their 'Clean by Design' initiative has audited 17 textile dyeing and finishing mills in China in order to identify practical measures that could be taken to reduce water, energy and chemical use.

For each initiative we have identified the production stages they address, the verification systems used and the main technical criteria areas or guidance they provide. The comparative results are presented in the table below and more detailed summarises can be found in Annex 6. *An additional case study of the Sustainable Apparel Coalition's Higg Index is shortly also to be completed [146].*

The findings broadly accord with the three main areas of potential improvement highlighted in the previous section, although it is notable that production management and energy/water efficiency receive the strongest emphasis.

The aim of improving communication along the supply chain is common to all the initiatives. Marks & Spencers, Bluesign and MADE-BY both recognise the need to engage suppliers in a process of continuous improvement, whilst Oeko-Tex 1000 and

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[144] Moor, A (2010) *The environmental impact of wet processing and how to improve sustainability: written for MADE-BY*, Amsterdam Fashion Institute

[145] National Resource Defence Council, *Ten best practices for textile mills to save money and reduce pollution*, Clean by Design initiative, February 2010 *see also* National Resource Defence Council, *Dyehouse selection a major opportunity to reduce environmental impact*, Clean by Design initiative, April 2012

[146] Sustainable Apparel Coalition*, the Higg Index*, http://www.apparelcoalition.org/higgindex/

NRDC only provide specific improvement measures and limit values. Bluesign relies on confidential dialogue with partners, including technical advice on BAT. Marks & Spencer's self-audit questionnaire is a good example of a relatively simple technique which could suit the Ecolabel. It's impact has been to raise awareness along the supply chain of the clients expectations.

Verification of performance is required by Marks & Spencers, Bluesign and Oeko-Tex 1000. Site visits are carried out by Marks & Spencers to verify self-audits every 2-3 years to verify performance, although product quality is clearly also an indicator. Site visits and contact with partners form an intrinsic part of Bluesign. Site visits form part of the audit process for Oeko-Tex 1000.

Table 3.2.6 Comparison of process efficiency initiatives

BREF Best Available Techniques (BAT)		EU Ecolabel	Marks &	Bluesign	Oeko-Tex 1000	MADE-BY	NDRC
Generic BAT	Generic BAT: Environmental management						
	Generic BAT: Dosing and dispensing of chemicals						
	Generic BAT: Selection and use of chemicals						
	Generic BAT: Selection of fibre raw material						
	Generic BAT: Water & energy management						
	Generic BAT: Waste management						
Dyeing	Equipment optimisation (low liquor ratio and dye machine controllers)					+	+
	Optimised water consumption						+
	Water re-use/recycling						+

	Avoidance of batch softening						
	Automatic preparation and dispensing of chemicals						+
	High-fixation dyestuffs	+					
Printing	Ink-jet digital printing for flat fabric (p-371)						
	Recycling of residual printing pastes						
Wastewater	60% water recycling		+				+
	100% water recycling						+
	Low food-to-micro organisms ratio (F/M) treatment	+	+	+	+	+	
	Selection of dyes and auxiliaries according to wastewater relevance	+	+		+		
Washing and rinsing	Enzymatic after soaping in reactive dyeing						
	Water & energy conservation in batch processes						
	Water & energy conservation in continuous processes						

Drying	Minimisation of stenter frame energy consumption				+		
	Emissions factor concept						

Key:

 Addressed fully by the initiative

+ Addressed only partly by the initiative

Proposal:

Based on the need highlighted by IMPRO Textiles to more fully address process energy, water and chemical use associated with the dyeing, printing and top finishing stages, and the findings of a review of the textile BREF and current industry practices, it is proposed that a criterion is introduced that encourages process efficiency.

This would address life cycle issues identified by LCA and reflect industry best practice and an increasing focus by large brands and retailers on supplier auditing. The criterion must however be designed to assist smaller brands, retailers and manufacturers to improve their supply chain.

The combinations of possible improvement options are too complex to define process-specific limit values. However, there does appear to be scope to encourage a greater focus on the implementation of recognised BAT measures. These measures are understood to already be commonplace in the EU textile industry but this may not be the case where production has been outsourced to developing countries.

The criterion would require that each dye house, printer or top finisher completes a short self-audit checklist covering the following BAT themes:

1. Production management systems;
2. Process specific measures;
3. Energy and water efficiency measures.

An outline of the proposed format for the checklist is presented in table 3.2.7. Three possible options for meeting the criterion are suggested:

- Option 1: Applicants would be required to obtain completed checklists from their suppliers;
- Option 2: A simple scoring system could be introduced, with applicants being required to show that their suppliers meet a minimum score;
- Option 3: Applicants would be required to show that they have used the checklist to inform their selection of suppliers.

The possibility of a site inspection may be desirable as part of the verification requirements, but it must be recognised that not all Competent Bodies will have sufficient resourcing.

Table 3.2.7 Outline format for BAT self-audit

BAT theme	Proposed self-audit criteria
1. Production management	a. Engagement of the workforce: i. Environmental awareness training, ii. Good practices for maintenance and cleaning, b. Automatic dosing and dispensing i. Installation of automatic systems which meter chemicals, auxiliaries and water. c. Process control and optimisation i. Process monitoring, flow control and timing, ii. Well-documented production procedures.
2. Process-specific measures	Dyeing a. Design and colour instrumentation i. Systems enabling accurate reproduction of customer designs and colours; b. Right first time dyeing results i. Reject rates of less than <2-3% c. Specification of high-fixation dyestuffs d. Use of low liquor ratio dyeing machines e. Water re-use/recycling in batch processes Printing a. Print paste waste recovery systems and routines i. Recovery from preparation and production b. Use of digital printing for: i. Sample runs ii. Small to medium sized production runs Top finishing a. Control of VOC emissions from drying processes i. Optimised application of finishes ii. Installation of pollution control equipment
3. Water and energy efficiency	a. Energy and water management i. Sub-metering, ii. Process energy monitoring, iii. Insulation of pipework, valves and flanges iv. Heat recovery e.g. rinse water, steam condensate b. Washing and rinsing i. Smart rinsing technologies,

	c. Drying and curing (including stenter frames) i. Insulated enclosures ii. Efficiency burner systems

CURRENT CRITERION 10: ~~AUXILIARIES AND FINISHING AGENTS FOR FIBRES AND YARNS~~ FIBRE AND YARN SPINNING

Major proposed changes	• Renaming to clearly identify the process stage • Re-ordering of the wording in order to make it clearer and more concise.
Present criterion, Decision 2009/567	
Size: At least 95% (by dry weight) of the component substances of any sizeing preparation applied to yarns shall be sufficiently biodegradable, or else shall be recycled. The sum of each component is taken into account. *Assessment and verification:* In this context, a substance is considered as 'sufficiently biodegradable: if when tested with one of the methods OECD 301 A, OECD 301 E, ISO 7827, OECD 302 A, ISO 9887,OECD 302 B, or ISO 9888 it shows a percentage degradation of at least 70 % within 28 days, or if when tested with one of the methods OECD 301 B, ISO 9439, OECD 301 C, OECD 302 C, OECD 301 D, ISO 10707, OECD 301 F, ISO 9408, ISO 10708 or ISO 14593 it shows a percentage degradation of at least 60% within 28 days, or if when tested with one of the methods OECD 303 or ISO 11733 it shows a percentage degradation of at least 80% within 28 days, or, for substances for which these test methods are inapplicable, if evidence of an equivalent level of biodegradation is presented. The applicant shall provide appropriate documentation, safety data sheets, test reports and/or declarations, indicating the test methods and results as above, and showing compliance with this criterion for all sizeing preparations used. (b) Spinning solution additives, spinning additives and preparation agents for primary spinning (including carding oils, spin finishes and lubricants): At least 90% (by dry weight) of the component substances shall be sufficiently biodegradable or eliminable in waste water treatment plants.	

This requirement does not apply to preparation agents for secondary spinning (spinning lubricants, conditioning agents), coning oils, warping and twisting oils, waxes, knitting oils, silicone oils and inorganic substances. The sum of each component is taken into account**.**

Assessment and verification: ': In this context, a substance is considered as 'sufficiently biodegradable or eliminable in waste water treatment plants':

if when tested with one of the methods OECD 301 A, OECD 301 E, ISO 7827, OECD 302 A, ISO 9887,OECD 302 B, or ISO 9888 it shows a percentage degradation of at least 70 % within 28 days,

or if when tested with one of the methods OECD 301 B, ISO 9439, OECD 301 C, OECD 302 C, OECD 301 D, ISO 10707, OECD 301 F, ISO 9408, ISO 10708 or ISO 14593 it shows a percentage degradation of at least 60% within 28 days,

or if when tested with one of the methods OECD 303 or ISO 11733 it shows a percentage degradation of at least 80% within 28 days,

or, for substances for which these test methods are inapplicable, if evidence of an equivalent level of biodegradation or elimination is presented**.**

The applicant shall provide appropriate documentation, safety data sheets, test reports and/or declarations, indicating the test methods and results as above, and showing compliance with this criterion for all such additives or preparation agents used.

(c) The content of polycyclic aromatic hydrocarbons (PAH) in the mineral oil proportion of a product shall be less than 3% by weight.

Assessment and verification: The applicant shall provide appropriate documentation, safety date sheets, product information sheets or declarations, indicating either the content of polycyclic aromatic hydrocarbons or the non-use of products containing mineral oils.

Proposed criterion revision
At least 95% (by dry weight) of the component substances of any sizeing preparation applied to yarns shall be readily biodegradable, or else shall be recycled. At least 90% (by dry weight) of spinning solution additives, spinning additives and preparation agents for primary spinning (including carding oils, spin finishes and lubricants) shall be sufficiently biodegradable or eliminable in waste water treatment plants. This requirement does not apply to preparation agents for secondary spinning (spinning lubricants, conditioning agents), coning oils, warping and twisting oils, waxes, knitting oils, silicone oils and inorganic substances. In all cases the sum of each component shall be taken into account. *Assessment and verification:* In this context, a substance is considered as 'readily biodegradable': if when tested with one of the methods OECD 301 A, OECD 301 E, ISO 7827, OECD 302 A, ISO 9887,OECD 302 B, or ISO 9888 it shows a percentage degradation of at least 70 % within 28 days, or if when tested with one of the methods OECD 301 B, ISO 9439, OECD 301 C, OECD 302 C, OECD 301 D, ISO 10707, OECD 301 F, ISO 9408, ISO 10708 or ISO 14593 it shows a percentage degradation of at least 60% within 28 days, or if when tested with one of the methods OECD 303 or ISO 11733 it shows a percentage degradation of at least 80% within 28 days, or, for substances for which these test methods are inapplicable, if evidence of an equivalent level of biodegradation or elimination is presented. The applicant shall provide appropriate documentation, safety data sheets, test reports and/or declarations, indicating the test methods and results as above, and showing compliance with this criterion for all sizeing preparations used. ~~*Assessment and verification:* ': In this context, a substance is considered as 'sufficiently biodegradable or eliminable in waste water treatment plants':~~ ~~if when tested with one of the methods OECD 301 A, OECD 301 E, ISO 7827, OECD 302 A, ISO 9887,OECD 302 B, or ISO 9888 it shows a percentage degradation of at least 70 % within 28 days,~~ ~~or if when tested with one of the methods OECD 301 B, ISO 9439, OECD 301 C,~~

~~OECD 302 C, OECD 301 D, ISO 10707, OECD 301 F, ISO 9408, ISO 10708 or ISO 14593 it shows a percentage degradation of at least 60% within 28 days,~~

~~or if when tested with one of the methods OECD 303 or ISO 11733 it shows a percentage degradation of at least 80% within 28 days,~~

~~or, for substances for which these test methods are inapplicable, if evidence of an equivalent level of biodegradation or elimination is presented.~~

~~The applicant shall provide appropriate documentation, safety data sheets, test reports and/or declarations, indicating the test methods and results as above, and showing compliance with this criterion for all such additives or preparation agents used.~~

The content of polycyclic aromatic hydrocarbons (PAH) in the mineral oil proportion of a product shall be less than 3% by weight.

Assessment and verification: The applicant shall provide appropriate documentation, safety date sheets, product information sheets or declarations, indicating either the content of polycyclic aromatic hydrocarbons or the non-use of products containing mineral oils.

AHWG1 technical discussion

The most common fibre used in ecolabelled products is cotton. Before spinning a wax is normally applied to the fibre in order to protect it against mechanical stress. This is normally a paraffin wax that is biodegradable. The products used in the mechanical processes can be divided in five main categories:

1. Sizes
2. Spinning solution additives, spinning additives and spinning bath additives
3. Preparation agents for primary spinning
4. Preparation agents for secondary spinning,
5. Coning oils, warping and twisting oils, knitting oils and silicone oils.

Category 1 - Sizes

According to the textile BREF sizes are typically based on one of the following chemical groups:

- starch

- starch derivatives
- cellulose derivatives (carboxymethylcellulose, CMC)
- galactomannan derivatives
- polyvinyl alcohol (PVA)
- polymethacrylates
- polyesters.

The type and amount of size applied to the yarn depends on the fibre in question. The amount varies from 0 to 200 g/kg of yarn, giving a potential high contribution to the environmental load of the wastewater. The biodegradability of the sizes differ, starch being completely biodegradable, starch derivatives being more difficult to biodegrade, while PVA and polyesters are hardly biodegradable, but show a grade of bioelimination.

Category 2 – Spinning solution additives, spinning additives and spinning bath additives

Within this group the so-called modifiers are most relevant. They are applied for their special viscose qualities in loads of about 5 mg/kg fibres. They mainly consist of polyethylene glycol ethers with molecular weights of about 1500. During pre-treatment, more than 90% of these substances are washed off.

Category 3 – Preparation agents for primary spinning

Preparation agents are applied during the manufacture of chemical fibres, directly after the spinning process. They enable subsequent processes such as drawing, twisting, warping, texturising and further (secondary) spinning.

The preparation agents can be further divided into five main classes:

1. lubricants (slippery agents)
2. emulsifiers
3. wetting agents
4. antistatic agents
5. additives (e.g. biocides and antioxidants).

Typical applied lubricants used in the process stages from fibre to yarn manufacturing are as follows:

- highly refined mineral oils, so-called white oils (mixture of hydrocarbons with C12 – C50 chain length, having a range of boiling points between 220ºC and 450ºC); their use is strongly declining
- fatty acid triglycerides (refined natural oils)
- ester oils (e.g. butyl stearate, tridecyl stearate)
- EO/PO-adducts (Ethylene Oxide/Propylene Oxide (group of copolymers)
- silicones.

Mineral oils are hardly biodegradable, but easily removed by absorption. Due to their low cost, they are still widely used as lubricants.

Ester oils are used as lubricants as an alternative to mineral oils. They are increasingly being used as substitutes for mineral oils in primary spinning while, in secondary spinning, mineral oils still have the highest market share. Ester oils are usually esters of fatty acids (lauryl, stearyl acid) with fatty alcohols or polyhydroxylic alcohols. Compared to mineral oils, ester oils are more thermally stable, biodegradable and easy to emulsify.

EO/PO copolymers are used as lubricants for texturised chemical fibres because they do not interfere with the process in the same way as mineral oils do. The high molecular EO/PO-adducts (sum of EO and PO units more than 15 moles) are non- or hardly biodegradable.

Silicones are used as lubricants for elastomeric fibre (elastane). They show the highest level of COD of all lubricants and they are hardly biodegradable. An additional disadvantage is that they are difficult to emulsify and to remove from the fibre. APEO (alkyl phenol ethoxylates) have previously been used to remove them but a quite high percentage (approximately 40 %) could remain on the fibre after washing, giving rise to air emissions in the subsequent high-temperature treatments.

Emulsifiers can be anionic and non-ionic surfactants. Wetting agents are usually short-chain alkyl phosphates. Mono- and diesters of phosphorous pentoxides are in use as anti-electrostatic agents as well as amphoteric surfactants. “Additives” cover a wide range of substances, with biocides being of most interest. They are handled separately in the criterion on biocides.

Category 4 – Preparation agents for secondary spinning

For these agents there is no clear definition. IPPC suggests a division into “conditioning agents” as a term for preparation agents for secondary spinning of

synthetic fibres, the composition being similar to that of the preparation agents used for primary spinning of staple fibres and with a load of 1-5 g/kg fibres.

Category 5 – Coning, warping, twisting and knitting oils

Oils for coning, twisting and warping consist of 70-95% white oils and 5-30% non-ionic surfactants, especially fatty alcohols and fatty acid ethoxylates. The load of coning oils varies for polyester from 5-30 g/kg, for common polyamide the load is about 5 g/kg. It is reported that imported fabric can have loads of coning oils above 50 g/kg.

Feedback from stakeholders

No feedback was received in relation to this criteria.

Proposal:

No revisions are proposed for this criterion. Some stakeholders have proposed that processes could apply for the ecolabel, reflecting the success of GOTS. It is therefore proposed that the criterion is renamed so that the process stage can be clearly identified. The biodegradability definition should be aligned with that used in the CLP guidance as this forms the basis for Criterion 12.

~~CURRENT CRITERION 11: BIOCIDAL OR BIOSTATIC PRODUCTS~~

Major proposed changes	• The substances identified would form part of the Criterion 11: Restricted Substance List • Nanosilver will be covered by the existing restriction of all biocides applies to the final product.
Present criterion, Decision 2009/567	
a) Chlorophenols (their salts and esters), PCB and organotin compounds shall not be used during transportation or storage of products and semi-manufactured products. *Assessment and verification:* The applicant shall provide a declaration of non-use of these substances or compounds on the yarn, fabric and final product. Should this declaration be subject to verification the following test method and threshold shall be used: extraction as appropriate, derivatisation with acetic anhydride, determination by capillary gas-liquid chromatography with electron capture detection, limit value 0.05 ppm. *Assessment and verification:* The applicant shall provide a declaration of non-use.	
Proposed revised criterion	
Criterion to be incorporated into Restricted Substance List – Criterion 11	

AHWG1 technical discussion

Chlorophenol, PCB and organotin compounds

This part of the criteria has not been changed since 2002. Typical biocides used for conservation during transport are: methylbromide, phosphin, Prussic acid gas derived from formaldehyde, benzen, toluen, styren etc

Information from several licenseholders indicates that the use of biocides can be avoided if the transport time is less than 3 weeks. This short supply time is possible for textiles that are imported from the Far East.

Nanosilver biocidal and biostatic treatments

Silver is one of the most widely used nanoparticles in consumer products [Wijnhoven et al., 2009]. Its use in textiles and personal care products may lead to human and environmental exposures.

Nanosilver in textiles is used in all kinds of clothes from socks and shirts to caps, gloves and underwear. In all cases it is the antimicrobial activity of nano-silver that is the reason for incorporating it into textiles. Sports wear etc. labelled as "antibacterial", "free of odour" etc. have been registered to contain nanosilver or triclosan [Poulsen et al 2011]. These substances stop or reduce bacterial activity and thereby "reduce" the need for washing.

There is some limited evidence of the whole life benefits of nano-silver coatings. An LCA study carried out by scientists from the UK, Germany and Switzerland has highlighted a beneficial reduction in energy and detergent use during the use phase of garments. However, the study did note that the environmental burdens from the mining of silver may outweigh these benefits if consumer behaviour does not lead to reduced clothes washing. The study was not able address emerging evidence of the downstream environmental impacts of the release of anti-bacterial agents.

The environmental releases of nanosilver from textiles has been investigated in some theoretical studies and a few laboratory based ones. In the study by Luoma (2008) it was estimated that mass release from silver containing socks in the USA would be in the range of 6-930 kg or 180-2790 kg assuming that 10% and 30%, respectively, of the population would use these kinds of socks.

The release of nanosilver from socks upon contact with water showed that for some socks almost all silver leached to water whereas for others no leaching was detected [Benn & Westerhoff, 2008].[Benn et al. 2010] measured the content of silver in textiles (in a shirt, a medical mask, a towel and a cloth), personal care products (toothpaste, shampoo), a detergent, a toy (teddy bear), and two humidifiers. They found silver concentrations from 1.4 to 270,000 ìg/g product–1. Upon washing in tap water they estimated the potential release of silver into aqueous environmental matrices in quantities up to 45 ìg/g per product.

Quantification of the extent of nanosilver application in clothing and home furnishings was not possible at this stage in the study. A manufacturer of nanosilver yarn presents the fields of application as active, casual, sports and outdoor wear, under wear and home furnishing and bedding [Everest 2010]. A request for information has been made to dominant international suppliers of sports equipment. While some

companies Nike [Nike 2010; Intersport 2010] have informed us that nanosilver is not used in sports equipment, other companies (e.g. Adidas) had not at the time of writing responded. It is also noted that the use of antibacterial agents is currently prohibited by Oeko-tex certification.

Nanosilver toxicological profile

From Mikkelsen et al (2011) [147].

It has been shown that silver nanoparticles can be absorbed via all routes of exposure (oral dermal and inhalation). However, it is unclear in which form (as particles, free ions, silver ions or complexes) nanosilver is absorbed and distributed to target organs. At least for uptake via the oral route it is likely that at least some of the uptake occurs as ions. It appears that smaller particles exhibit higher toxicity as compared to larger particles; and if silver is absorbed as particles then the surface area is relevant.

Should silver uptake occur solely as ions, the already rich database for silver could be applied to assess systemic silver nanoparticle toxicity. For that exercise, it would need to be considered whether and how the dramatically increased surface area and possibly increased solubility of silver nanoparticles would need to be taken into account.

A number of studies, mainly in vitro, have shown that the main mechanism of silver nanoparticle toxicity seems to be mediated by an increase in ROS production, stimulating inflammation and genotoxic events and apoptosis or necrosis. The concentration of the administered nanoparticles is able to influence the toxicity, specifically, and at low levels of oxidative stress a protective response is initiated which progresses to a damaging response with increasing particle concentration, and therefore oxidant levels. It is thus relevant to consider the toxicity threshold of silver nanoparticles.

Silver is known to be an ecotoxic metal and tests with silver nanoparticles (AgNP) do also reveal very low effect concentrations. Thus, for algae EC50-values as low as 4 µg/l have been found and also for crustaceans values far below 1 mg/l has been

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[147] Mikkelsen, S.H.; Hansen, E.; Christensen, T.B.; Baun, A.; Hansen, S.F.; Binderup, M.-L.; 2011. *Survey on basic knowledge about exposure and potential environmental and health risks for selected nanomaterials*. Environmental Project No. 1370, The Danish Environmental Protection Agency, Copenhagen.

reported. This ranks AgNP as very toxic towards aquatic organisms. It is also important to note that at concentrations below 1 mg/l inhibition of nitrifying bacteria can occur and thus the function of wastewater treatment plants may be affected by the presence of AgNP. Possibly significant environmental effects arising from interactions with symbiotic bacteria present in organisms and in soil have also been documented.

The environmental concentration resulting from the use of AgNP in consumer products are at present uncertain, even though a number of different estimates have been proposed. It is evident that even though silver nanoparticles are incorporated in textiles, they can be released upon washing. Concentrations in the low ng/l range have been observed and even at such low concentrations it may constitute an environmental risk due to the high toxicity of silver.

It is debated today whether silver nanoparticles are in fact more toxic that their bulk counterpart, since effects in many cases can be ascribed to the ionic form of silver (Ag+). Some studies have documented a higher toxic effect from AgNP, but it is the widespread and disperse use of silver in consumer products that poses the greatest risk to the aquatic and terrestrial environment. Even if AgNP are “only” as toxic as larger silver particles, silver is still a very ecotoxic metal.

Feedback from stakeholders

The restriction of the three existing substances was supported by stakeholders and forms part of a number of stakeholders’ Restricted Substance Lists. It was suggested that reference should be made to the existing Biocide Directive. Nano silver was on balance strongly favoured for restriction on a precautionary basis.

Proposal:

It is proposed that only biocides that are authorised under Biocide Directive 98/8/EC and Biocide Regulation (EC) No 528/2012 are permitted for transport and storage purposes.

Biocides applied to the final product in order to impart functional properties are already restricted by the ecolabel and are not permitted in ecolabelled products. This restriction would therefore include the use of nanosilver.

An further additional substance which is currently restricted by an industry RSL is proposed for addition to the new EU Ecolabel RSL - DMFu (dimethyl fumarate) [148]. This substance is commonly used as a fungicide in silica gel sachets to stop mould growth during transport. It causes severe irritation upon human skin contact, with notifications classifying it with H317, and on this basis is considered a risk to consumers.

[148] Marks & Spencers, Environmental and chemical policy for textile processing – Module 1: Restricted Substance List, Version 1.0, May 2011

~~CURRENT CRITERION 12: STRIPPING OR DEPIGMENTATION~~

Major proposed changes	• Deletion of the criterion
Present criterion, Decision 2009/567	
Heavy metal salts (except of iron) or formaldehyde shall not be used for stripping or depigmentation. Assessment and verification: The applicant shall provide a declaration of non-use.	
Proposed revised criterion	
Deletion of the criterion	

AHWG1 technical discussion

The relevance of this criterion was questioned in the last revision (2009). To the knowledge of the authors no metal salt or formaldehyde is or has been used in stripping or depigmentation, at least in Europe. No justification is given in the revision in 2002.

Since with reference to the LCA findings in the preliminary report this criterion clearly does not have a significant environmental impact the criteria could be either be deleted or kept. Removing it will not lower the work for the applicant or Competent Body very much but it can help improve the readability of the document by making it simpler and shorter.

Feedback from stakeholders

No feedback was received on this criterion

~~CURRENT CRITERION 13: WEIGHTING~~

Major proposed changes	• Deletion of the criterion
Present criterion, Decision 2009/567	
Compounds of cerium shall not be used in the weighting of yarn or fabrics. *Assessment and verification:* The applicant shall provide a declaration of non-use.	
Proposed revised criterion	
Deletion of the criterion	

Discussion

The relevance of this criterion was also discussed in the last revision (2009). To the knowledge of the authors cerium is not used in weighting of yarn or fabric in Europe, but may be used in some developing countries. Lacasse and Bauman (2004) suggest that weighting mainly relates to silk, which is not covered by the ecolabel.

Feedback from stakeholders

No feedback was received on this criterion

CURRENT CRITERION 14: ~~ALL CHEMICALS AND CHEMICAL PREPARATIONS~~

Major proposed changes	• Criterion to be incorporated into the Criterion 11 Restricted Substance List • The restriction of NTA (nitrilotriacetic acid) is proposed • Linear alkylbenzene sulfonates (LAS) is to be removed from the list • A triviality limit of 5 ppm is proposed for APEOs if testing is required.
Present criterion, Decision 2009/567	
Alkylphenolethoxylates (APEOs), linear alkylbenzene sulfonates (LAS), bis(hydrogenated tallow alkyl) dimethyl ammonium chloride (DTDMAC), distearyl dimethyl ammonium chloride (DSDMAC), di(hardened tallow) dimethyl ammonium chloride (DHTDMAC), ethylene diamine tetra acetate (EDTA), and diethylene triamine penta acetate (DTPA) shall not be used and shall not be part of any preparations or formulations used. *Assessment and verification:* The applicant shall provide a declaration of non-use.	
Proposed revised criterion	
The existing substance restrictions are to be incorporated into Restricted Substance List – Criterion 11.	

AHWG1 technical discussion

Cationic detergents and surfactants

The cationic detergents distearyl-dimethyl ammonium chloride (DSDMAC), di(tallow)dimethyl ammonium chloride (DTDMAC) and di(hardened tallow) dimethyl ammonium chloride (DHTDMAC) are substances with toxic and persistent properties. Their discharges to water have been reduced considerably in the past. The

remaining concern is their use in fabric softeners through which they can reach surface waters via direct discharges, sewer systems or sewage treatment plants.

These three surfactants have been phased out in many countries according to the PARCOM Recommendation 93/4 on the Phasing Out of Cationic Detergents DTDMAC, DSDMAC and DHTDMAC in Fabric Softeners. Since they might still be used in other counties their exclusion is still relevant.

Alkylphenol ethoxylates

APEOs (Alkylphenolethoxylates) have been voluntary phased out by TEGEWA (Industrial Association for Textile and Leather Aids, Tanning Materials, and Raw Materials for Detergents) by the end of 2001. This commitment covers all European TEGEWA members but not necessary manufacturers in other parts of the world. A ban on APEO is therefore still relevant.

The European Union has regulated the industrial use of nonylphenol ethoxylates and nonylphenol since 2003. The EU's REACH Directive incorporated these regulations in Annex XVII and limits the amount of nonylphenol ethoxylate and nonylphenol as a substance or component in preparations to 0.1% by mass.

Öko-Tex 100 has recently (October 2011) decided also to include nonyl- and octylphenol and their ethoxylated compounds in their standard. The limiting values are:

- nonylphenol: 100 ppm
- octylphenol: 100 ppm
- total nonylphenol(1-9) ethoxylates: 1000 ppm
- total octylphenol(1-2) ethoxylates: 1000 ppm

The EU Ecolabel has no limiting values because there is a general restriction on these substances in the production which mean that we have a zero tolerance. However it might be useful to have triviality limit if very small amounts are found in the product. The Danish Competent body has previously tested a number of eco labeled textile and did find very small amounts in 7 out of 7 tested textiles. The concentrations of APEO were between 1-4 ppm so a triviality limit of 5 ppm is proposed when testing is required.

Nitrilotriacetic acid (NTA) toxicology

At earlier revisions a ban against NTA was discussed. Evidence suggests that the strong complexing capacity of NTA can result in adverse effects upon heavy metal

removal during sewage treatment and upon mobilisation of metals from sediments in receiving waters. Moreover, NTA is notified with hazard statements H351.

Several investigations have shown that the presence of NTA in water/sediment systems increases the concentration of heavy metals in the water phase. NTA is known to be aerobically biodegradable by acclimated microorganisms. Biodegradability tests with NTA have been inconsistent; 90% degradation has been reported after 9 and 13 days in tests with activated sludge, while degradation attained only 20% in a CO_2 evolution test after 28 days and did not occur in shake flask and BOD tests. Following a period of acclimatisation, almost complete biodegradation has been reported for the activated sludge process when operated under optimum conditions.

The toxicity of NTA towards algae, crustaceans and fish is low with EC/LC_{50} values well above 100 mg/l. The acute toxicity of NTA and its salts in animals is also relatively low. However, The International Agency for Research on Cancer (IARC) has evaluated that there is sufficient evidence for the carcinogenicity of NTA and its sodium salts in experimental animals, and the overall evaluation is that nitriloacetic acid and its salt are possibly carcinogenic to humans. IARC has placed NTA in Group 2B [149].

Feedback from stakeholders

Those stakeholders that provided written feedback in relation to NTA supported its restriction. The triviality limit for APEO's was also supported.

Detailed information was provided by industry stakeholders in relation to linear alkylbenzene sulfonates (LAS). It was requested that LAS be removed from the list on the basis that it is not classified under CLP, has been extensively researched under REACH without being restricted, and that restrictions on its use have been relaxed in EU countries such as Denmark.

[149] See footnote 26

Follow-up research and proposed approach

Evidence submitted by industry

Information provided by industry stakeholders in relation to LAS was reviewed. This highlighted the following points:

- LAS fully complies with the Detergent Regulation.
- Testing results by industry suggest that LAS is readily biodegradable, as evidenced by a self-classification Chemical Safety Report;
- The HERA Project (Human and Environmental Risk Assessment) project is a European voluntary initiative launched in 1999 to provide a common risk assessment framework for the household cleaning products industry [150]. It has assessed LAS as posing no risk to human health and environment.
- LAS is not tested for by Oeko-Tex 100 and Oeko-Tex 1000.

It is noted that LAS is not formally classified. Notifications suggest classification with H302, 315 and 318.

Concerns relating to biodegradation

Concerns relating to LAS have been extensively discussed in the Soaps and Shampoos product group. The toxicity of surfactants is linked to their affect on surface tension and the length of their molecular chains. Their biodegradability is linked to the degree of chain branching, with linear chains being more readily degradable.

The main concerns about LAS in the past have related to evidence of its limited biodegradation under anaerobic conditions. The Nordic Swan and the Swedish Good Environmental Choice labels require that surfactants are degradable under both aerobic and anaerobic conditions. The new EU Ecolabel criteria for Industrial and Institutional laundry detergents for professional use derogates surfactants that are not anaerobically degradable as long as they are not classified with H400.

Stakeholders raised concerns that poor treatment in aerobic wastewater treatment plant could lead to the accumulation of LAS in biosolids which may then be spread on agricultural land and leach into water coarses. Research in Denmark suggests that concentrations of LAS found in biosolids pose minimal risk to the soil or ecology

[150] HERA project, http://www.heraproject.com/

[151]. 98-99% degradation is achieved within one year. Uptake from biosolids was very limited.

Anaerobic degradation is not specifically required by the Detergents Regulation (Regulation 648/2004/EC) and a 2009 study commissioned by the European Commission concluded that anaerobic degradation should not be used as a criteria for determining the acceptability of surfactants [152].

Anaerobic degradation is not currently required by other textile criteria such as 11: Auxilliaries and finishing agents for fibres and yarns and Criterion 15: Detergents, fabric softeners and complexing agents. The latter requires surfactants to be ultimately aerobically biodegradable as defined by Regulation (EC) No 645/2004 on Detergents.

Proposal:

On the basis of evidence the use of LAS shall be permitted by the Ecolabel and the use of Nitrilotriacetic acid (NTA) shall be restricted.

If derogation conditions are required by stakeholders it is proposed that wastewater treatment plant comply with revised requirements for hardly degradable substances or ultimate aerobically biodegradation proposed under Criterion 27.

[151] Jensen J, Løkke H, Holmstrup M, Krogh PH and L Elsgaard, *Effects and risk assessment of linear alkylbenzene sulfonates in agricultural soil - Probabilistic risk assessment of linear alkylbenzene sulfonates in sludge-amended soils*, Journal of Environmental Toxicology and Chemistry, August 2001, 20(8):1690-7

[152] Report from the Commission to the European Parliament and the Council. *Pursuant to Article 16 of Regulation (EC) N° 648/2004 of the European Parliament and of the Council of 31 March 2004 on detergents, concerning anaerobic biodegradation*. Brussels, 2009.

CURRENT CRITERION 15: DETERGENTS, FABRIC SOFTENERS AND COMPLEXING AGENTS

Major proposed changes	• Changes to biodegradability requirements in-line with the EU Ecolabel criteria for Industrial and Institutional laundry detergents for professional use
Present criterion, Decision 2009/567	
At each wet-processing site, at least 95 % by weight of fabric softeners, complexing agents and detergents by weight shall be sufficiently degradable or eliminable in wastewater treatment plants. This is with the exception of surfactants in detergents and fabric softeners at each wet processing site, which shall be ultimately aerobically biodegradable. *Assessment and verification:* 'Sufficiently biodegradable or eliminable' is as defined above in the criterion related to auxiliaries and finishing agents for fibres and yarns. The applicant shall provide appropriate documentation, safety data sheets, test reports and/or declarations, indicating the test methods and results as above, and showing compliance with this criterion for all detergents, fabric softeners and complexing agents used. 'Ultimate aerobic biodegradation' has to be interpreted as laid down in Annex III to Regulation (EC) No 648/2004 of the European Parliament and of the Council (1). The applicant shall provide appropriate documentation, safety data sheets, test reports and/or declarations, indicating the test methods and results as above, and showing compliance with this criterion for all surfactants in detergents and fabric softeners used.	
Proposed revised criterion	
At each wet-processing site, at least 95 % by weight of fabric softeners, complexing agents and detergents by weight shall be sufficiently degradable or eliminable in wastewater treatment plants. This is with the exception of surfactants in detergents and fabric softeners at each wet processing site, which must be biodegradable under aerobic conditions. All non-ionic and cationic surfactants must also be biodegradable under anaerobic	

conditions.

Assessment and verification: 'Sufficiently biodegradable or eliminable' is as defined above in the criterion related to auxiliaries and finishing agents for fibres and yarns. The applicant shall provide appropriate documentation, safety data sheets, test reports and/or declarations, indicating the test methods and results as above, and showing compliance with this criterion for all detergents, fabric softeners and complexing agents used.

~~'Ultimate aerobic biodegradation' has to be interpreted as laid down in Annex III to Regulation (EC) No 648/2004 of the European Parliament and of the Council (1).~~ The applicant shall provide appropriate documentation, safety data sheets, test reports and/or declarations, indicating the test methods and results as above, and showing compliance with this criterion for all surfactants in detergents and fabric softeners used.

AHWG 1 technical discussion

This criterion was changed during the 2009 revision. The change meant that the surfactants in detergents and fabric softeners shall be ultimately aerobically biodegradable. This criterion is harmonization with Regulation (EC) No 648/2004 and does not affect products regulated by this regulation.

For detergents and fabric softeners produced in countries outside Europe the new criterion meant that some products no longer could be used in the production of ecolabelled textiles.

The criterion is harder than the corresponding criterion from GOTS (Global organic textile standard) which only requires that the surfactants are inherently biodegradable.

Feedback from stakeholders

No feedback was received in relation to this criterion.

Proposal:

It is proposed that softeners are considered alongside other finishes as part of Criterion 12.

The biodegradability requirements shall be updated in-line with the EU Ecolabel criteria for Industrial and Institutional laundry detergents for professional use, which distinguishes between aerobic and anaerobic biodegradation.

CURRENT CRITERION 16: ~~BLEACHING AGENTS: CHLORINE AGENTS ARE EXCLUDED FOR~~ BLEACHING YARNS, FABRICS AND END PRODUCTS

Major proposed changes	• No change to the criterion
Present criterion, Decision 2009/567	
This requirement does not apply to the production of man-made cellulose fibres (see criterion 6.1) *Assessment and verification* The applicant shall provide a declaration of non-use of chlorinated bleaching agents	
Proposed revised criterion	
Chlorine agents shall not be used for the bleaching of any yarns, fabrics or end-products with the exception of man-made cellulose fibres (see criterion 6.1) *Assessment and verification* The applicant shall provide a declaration of non-use of chlorinated bleaching agents	

Discussion

The exclusion of chlorine bleaching agents was introduced in the revision in 2009. It did not cover man-made cellulose fibres which were covered by criterion 6.1.

Since chlorine bleaching is still used the criterion is still considered to be relevant. In order to simplify the criterion it is to be discussed whether the clause excluding man-made cellulose fibres could be removed. Industry best practice suggests that man-made cellulose fibres can be bleached using alternative agents.

Feedback from stakeholders

Stakeholders confirmed that the clause excluding man-made fibres should be retained because the industry requires chlorinated bleach in order to meet customer requirements.

Follow-up research and proposed approach

Follow-up discussions with an existing licenseholder are reported under Criterion 6: Man-made cellulose fibres. These confirmed the feedback from stakeholders with regard to the need to exclude man-made cellulose fibres.

Proposal:

The exclusion for cellulose fibres should be maintained.

CURRENT CRITERION 17: ~~, 21, 22 AND 23:~~ DYES

Major proposed changes	• Incorporation of this criterion into Criterion 11: Restricted Substance List • Potentially sensitizing dyes: Two new dyes have been added to harmonise with Ökotex: C.I. Disperse Blue 1 and C.I. Disperse yellow 3 • Azo Dyes: A listing of specific dyes that are restricted has also been compiled. One new aryl amine has been added to the list order to harmonise with Ökotex: 4,4'-Methylene-bis-(2-chloroaniline) (CAS 101-14-4). • Dyes classified with R43, R52/53 and R53 are to be derogated under Criterion 12
Present criterion, Decision 2009/567	
See the full text in the criteria document criteria 17, 21, 22 and 23.	
Proposed revised criterion	
Criterion to be incorporated into Restricted Substance List – Criterion 11	

AHWG1 technical discussion

Historically the criteria for dyes have been divided into several criteria where each one covered a specific aspect. This group of criterion have more or less remained unchanged sinces 2002. In this version it has been the intention to group the different criteria in one single criterion which covers all the relevant criteria.

During the last revision we discussed the possibility of excluding the use of dyes and chemicals that were classified as environmentally hazardous but it was decided not to do it at that time. According to major dye manufactures the trend is for dyes and

chemicals are becoming less and less harmful so it is now proposed to exclude dyes that are classified as environmental hazardous.

The new requirements under the Ecolabel Regulation also require that hazardous substances are restricted and these restrictions will apply to the majority of the dyes addressed by the current criteria. However, industry experience suggests that the restricted dyes should still be listed for clarity as the majority of production is situated outside the EU.

Old criterion 17 Impurities in dyes:

The criterion is unchanged.

Old criterion 21 – Azo dyes

Refering to the Preliminary report most of the azo dyes are not allowed to be used in the EU because of REACH. Since the majority of production is situated outside the EU it is suggested to keep the criteria but to make it clear in the User Manual which azo dyes are covered by REACH.

The list of aryl amines have been removed to an appendix. The list contains aryl amines that have carcinogenic properties according to MAK III category 1 and 2. This is the same requirement that Öko-tex has.

Since the last revision in 2006-7 4,4'-Methylene-bis-(2-chloroaniline) have been added to MAK category 2 and has been added to the list in the appendix. GOTS have also listed aryl amines classified according to MAK III category 3. These are to be cross referenced with the Ecolabel restrictions.

Old criterion 22 - Dyes that are carcinogenic, mutagenic or toxic to reproduction

The criterion is unchanged.

Old criterion 23 - Potentially sensitizing dyes

The list of restricted dyes has been removed to an appendix. C.I. Disperse Blue 1 and C.I. Disperse yellow 3 have been added to the list in order to harmonize with Öko-tex.

MAK III category 3 dyes

GOTS have also listed aryl amines classified according to MAK III category 3. No justification for this is public available. These are not currently listed by the Oeko-tex label. It is to be discussed if this classification should also be added to the EU

Ecolabel criteria. These substances are also to be cross referenced with the Ecolabel restrictions.

Feedback from stakeholders

There was general support for the proposed change in the format of the dye criteria. Opinions were mixed on whether to add MAKIII dyes. Specific dyes proposed for addition were: Disperse Yellow 23 and Disperse Orange 149 because they can cleave to aryl amines, Disperse Orange 149 and Disperse Yellow 23 because they are CMR, and Disperse Blue 1 and Disperse Yellow 3 because they are sensitising. Comments were provided in relation to the risk phrases carried by dyes – these were discussed under Criterion 10 and 11.

Follow-up research and proposed approach

Investigation of dye classifications

The Danish Competent body, which has the greatest number of licenses, has checked the classification of more than 50 dyestuffs on the market today from different suppliers and concluded that the most common risk phrases are R43 (May cause sensitization by skin contact) and R52/53 (Harmful to aquatic organisms, may cause long-term adverse effects in the aquatic environment).

The quality of the material safety data sheets was generally good but some of the data sheets from India and China did not contain much information and the dyestuffs from these suppliers were not classified at all or did not claim to contain any classified substances according to the safety data sheets. Some of the data sheets from an Indian supplier had information that indicated that the dyestuffs should have been classified as R52/53.

Proposed allergen dye additions

Disperse dyes are used to dye polyester and occasionally polyamide. Because these dyes are not covalently bonded their colour fastness under certain conditions can be lower. The German Federal Institute for Risk Assessment (BfR) highlight specific instances of higher risk such as tight fitting garments made from synthetic

fibres [153]. Disperse dyes classified as allergens are therefore more likely to pose a risk to consumers.

Moving from listing aryl amines to listing dyes

A review of industry RSL's highlighted the potential to list specific dyes available on the world market that may cleave to aryl amines. This would have the benefit of being clearer to industry and easier to apply. Listings used by industry are derived from the opinions of the EU Scientific Committee on Health and Environmental Risks (SCHER) on the use of azo dyes in cosmetic and non-food products. The listing is understood to cover all of the Aryl Amines currently banned under REACH, including 4-Amino-3-fluorophenol (CAS 399-95-1) and 6-Amino-2-ethoxynaphthaline (CAS 293733-21-8) which are not currently contained within the Ecolabel list of aryl amines.

Proposal:

It is proposed that the list of potentially sensitizing dyes is updated and that a list of azo dyes that may cleave to aryl amines is provided. The criterion are proposed to be incorporated into the Criterion 11 RSL. Stakeholder input is required to check whether the listing is comprehensive and whether the listing of aryl amines is still required.

[153] German Federal Institute for Risk Assessment (BFR) (2007*) Introduction to the problems surrounding textile garments*, Germany.

~~CURRENT CRITERION 18: IMPURITIES IN PIGMENTS: INSOLUBLE COLOUR MATTER WITHOUT FIBRE AFFINITY~~

Major proposed changes	• Criterion to be incorporated into the Criterion 11 Restricted Substance List
Present criterion, Decision 2009/567	
The levels of ionic impurities in the dyes used shall not exceed the following: Ag 100 ppm; As 50 ppm; Ba 100 ppm; Cd 20 ppm; Co 500 ppm; Cr 100 ppm; Cu 250 ppm; Fe 2 500 ppm; Hg 4 ppm; Mn 1 000 ppm; Ni 200 ppm; Pb 100 ppm; Se 20 ppm; Sb 50 ppm; Sn 250 ppm; Zn 1 500 ppm. Any metal that is included as an integral part of the dye molecule (e.g. metal complex dyes, certain reactive dyes, etc.) shall not be considered when assessing compliance with these values, which only relate to impurities.	
Proposed revised criterion	
Criterion to be incorporated into Restricted Substance List – Criterion 11	

AHWG 1 technical discussion

No change has been suggested for this criterion. It has not been possible to find evidence that the listed impurities are not still present in pigments.

Proposal:

The criterion are to be incorporated into the Criterion 11 RSL

~~CURRENT CRITERION 19: CHROME MORDANT DYING~~

Major proposed changes	• Criterion to be incorporated into the Criterion 11 Restricted Substance List
Present criterion, Decision 2009/567	
Chrome mordant dying is not allowed. *Assessment and verification:* The applicant shall provide a declaration or non-use.	
Proposed revised criterion	
Criterion to be incorporated into Restricted Substance List – Criterion 11	

AHWG 1 technical discussion

Chrome mordant dyes can be used with wool. It is not clear how much they are used any more so this criterion may no longer be relevant.

Proposal:

The criterion are to be incorporated into the Criterion 11 RSL

~~CURRENT CRITERION 20: METAL COMPLEX DYES~~

Major proposed changes	• The criterion is to be incorporated into Criterion 11: Restricted Substance List • Metal complex dyes are only to be allowed when dying wool and polyamide.
Present criterion, Decision 2009/567	
If metal complex dyes based on copper, chromium or nickel are used: 20.1. In case of cellulose dyeing, where metal complex dyes are part of the dye recipe, less than 20 % of each of those metal complex dyes applied (input to the process) shall be discharged to waste water treatment (whether on-site or off-site). In case of all other dyeing processes, where metal complex dyes are part of the dye recipe, less than 7 % of each of those metal complex dyes applied (input to the process) shall be discharged to waste water treatment (whether on-site or off-site). The applicant shall either provide a declaration of non-use or documentation and test reports using the following test methods: ISO 8288 for Cu, Ni; EN 1233 for Cr. 20.2. The emissions to water after treatment shall not exceed: Cu 75 mg/kg (fibre, yarn or fabric); Cr 50 mg/kg; Ni 75 mg/kg. *Assessment and verification:* The applicant shall either provide a declaration of non-use or documentation and test reports using the following test methods: ISO 8288 for Cu, Ni; EN 1233 for Cr.	
Proposed criterion revision	
Criterion to be incorporated into Criterion 11: Restricted Substance List	

AHWG1 technical discussion

Metal complex dyes are proposed only to be allowed when dyeing wool or polyamide. During the last revision metal complex dyes were debated since they contain heavy metal complexes that often are more toxic for the aquatic environment compared to other dyes.

It has been argued that for fibers like wool and polyamide it is difficult to obtain a good colour fastness if metal complex dyes are not permitted.

By contrast, when dyeing cotton it can be difficult to obtain a high colour fastness when dyeing light colours and so only some colours can be difficult to obtain without metal complex dyes (e.g. turquoise).

A restriction on metal complex dyes would make it difficult to dye wool or polyamide but will only have minor influence when dyeing cotton. It is therefore proposed only to permit metal complex dyes when dying wool or polyamide.

Feedback from stakeholders

Limited written feedback was received. Those that commented agreed that wool and polyamide should be permitted to use metal complex dyes.

Proposal:

Metal complex dyes shall be restricted with the exception of wool and polyamide. The criterion are to be incorporated into the Criterion 11 RSL

~~***CURRENT CRITERION 21: AZO DYES***~~

It is proposed that the criterion is incorporated into new criterion 11: Restricted Substance List

~~***CURRENT CRITERION 22: DYES THAT ARE CARCINOGENIC, MUTAGENIC OR TOXIC TO REPRODUCTION***~~

It is proposed that the criterion is incorporated into new criterion 11: Restricted Substance List

~~***CURRENT CRITERION 23: POTENTIALLY SENSITISING DYES***~~

It is proposed that the criterion is incorporated into new criterion 11: Restricted Substance List

~~*CURRENT CRITERION 24: HALOGENATED CARRIERS FOR POLYESTER*~~

Major proposed changes	• Criterion to be incorporated into the Criterion 11 Restricted Substance List
Present criterion, Decision 2009/567	
Halogenated carriers shall not be used. *Assessment and verification:* The applicant shall provide a declaration of non-use.	
Proposed revised criterion	
Criterion to be incorporated into Restricted Substance List – Criterion 11	

AHWG1 technical discussion

At this stage it has not been possible to gain evidence as to whether halogenated carriers for polyester are still being used and if they will be restricted by the new criterion on hazardous substances.

Proposal:

The criterion are to be incorporated into the Criterion 11 RSL.

CURRENT CRITERION 25: PRINTING

Major proposed changes	• Plastisol criterion to be incorporated into the Criterion 11 Restricted Substance List • Criterion relating to printing paste VOC's to be retained
Present criterion, Decision 2009/567	
25.1. Printing pastes used shall not contain more than 5 % volatile organic compounds such as white spirit (VOCs: any organic compound having at 293,15 K a vapour pressure of 0,01 kPa or more, or having a corresponding volatility under the particular conditions of use). *Assessment and verification*: The applicant shall either provide a declaration that no printing has been made or provide appropriate documentation showing compliance together with a declaration of compliance. 25.2. Plastisol-based printing is not allowed. *Assessment and verification*: The applicant shall either provide a declaration that no printing has been made or provide appropriate documentation showing compliance together with a declaration of compliance.	
Proposed revised criterion	
25.1. Printing pastes used shall not contain more than 5 % volatile organic compounds such as white spirit (VOCs: any organic compound having at 293,15 K a vapour pressure of 0,01 kPa or more, or having a corresponding volatility under the particular conditions of use). *Assessment and verification*: The applicant shall either provide a declaration that no printing has been made or provide appropriate documentation showing compliance together with a declaration of compliance. Sub-criterion 25.2 is to be incorporated into Restricted Substance List – Criterion 11	

AHWG1 technical discussion

This criteria was identified in the preliminary report as an area of significant in relation to process energy use. Information on the content of VOC in the printing past is to be investigated further.

The energy use associated with printing processes was highlighted as a potential area of improvement in the preliminary report – although more data is required to substantiate its significance.

Consultation questions

No feedback was received on this criterion.

Proposal:

The current VOC sub-criterion is mirrored by the Blue Angel so it is proposed to retain the current limit value. The plastisol exclusion is to be incorporated into the Criterion 11 RSL. Process efficiency options for printing are discussed under proposed new Criterion 13.

~~*CURRENT CRITERION 26: FORMALDEHYDE*~~

Major proposed changes	• Incorporation into Criterion 11 Restricted Substance List • Harmonisation of skin contact and interior textile limit values with Oeko-Tex 100. • Easycare finishes are also proposed to be addressed by proposed new Criterion 40: Durable finishes
Present criterion, Decision 2009	
The amount of free and partly hydrolysable formaldehyde in the final fabric shall not exceed 20 ppm for babies and young children under 3 years old, 30 ppm for products that come into direct contact with the skin, and 75 ppm for all other products. *Assessment and verification:* The applicant shall either provide a declaration that formaldehyde containing products have not been applied or provide a test report using the following test method: EN ISO 14184-1.	
Proposed revised criterion	
The amount of free and partly hydrolysable formaldehyde in the final fabric shall not exceed 20 ppm for products used for babies and young children under 3 years old, ~~30 ppm~~ 75 ppm for all other clothing products and 300 ppm for interior textile products. *Assessment and verification:* The applicant shall either provide a declaration that formaldehyde containing products have not been applied or provide a test report using the following test method: EN ISO 14184-1.	

AHWG1 technical discussion

Formaldehyde is released by some textiles finishes, such as those conferring crease resistance, while the garment is new. These finishes are most likely to be used on fabrics that otherwise crease easily, such as cotton or wool.

Skin contact with formaldehyde can cause skin rashes and allergic skin reactions. The levels of exposure which may cause these allergic reactions will vary between individuals, and will depend in part on the individuals previous allergy history.

Instances of dermatitis arising from wearing clothing containing high levels of formaldehyde have been documented [154].

Formaldehyde is also a potential problem for the indoor climate, where the sources are mainly understood to be fibre boards used in furniture but also emissions from textiles on furniture or decorations can also contribute.

According to textile BREF (2003) the best available technology is to use formaldehyde-free or formaldehyde-poor cross-linking agent (<0,1 % formaldehyde content in the formulation). Substitute products such as glyoxals can be used [155]. These enable levels of less than 75 ppm to be achieved.

In the label Ökotex there are 4 classes of limit values on formaldehyde depending on the degree of skin exposure and sensitivity [Okotex 100, version 1 2011]:

- Class 1 (baby): 16 ppm (i.e. no formaldehyde)
- Class 2 (contact with skin): 75 ppm
- Class 3 (without contact with skin): 300 ppm
- Class 4 (decoration material): 300 ppm

Two standard methods are available for measuring the release of formaldehyde from textiles: the water extraction method (EN ISO 14184-1) and the vapor absorption method (EN ISO 14184-2) for testing air emissions of formaldehyde. The detection limit for both methods is 20 mg/kg.

Oeko-tex certification (baby-level) requires that formaldehyde cannot be detected in final products. Not detected is assumed to correspond to a level of < 16 ppm. The Eco-label requires that the concentration of formaldehyde must not exceed 20 ppm in products for babies and young children under 3 years old, 30 ppm for products in direct contact with the skin and 75 ppm for all other products.

A European survey on the release of formaldehyde showed that 11% of the samples intended to be in direct contact with the skin exceeded 30 mg/kg. For textiles for babies under the age of two 11% of the garments released more than 20 mg/kg [EU Ecolabel, 2007].

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[154] NICNAS (National industrial chemicals notification and assessment scheme, Australia) Existing chemicals information sheet, October 2007

[155] Asqual (2007) *Revision of the textile Eco-label – final report*

There are two possible ways for setting the new criteria:

- The first is a harmonisation with Ökotex 100. This means no strengthening of the criteria and referring to the survey the majority of the products on the market should fulfil these criteria.
- The second is to harmonise with GOTS and to not accept any release of formaldehyde – with a detection limit is 16 mg/kg. This would be a clear strengthening of the criteria and yet it would still be possible for the producers to achieve. From a communication or sales point of view "zero formaldehyde" is a clear improvement compared to the present criteria.

Feedback from stakeholders

The majority of stakeholders who responded on this criterion favoured a harmonisation with Oeko-Tex 100. One industry stakeholder stated that it was sometimes difficult for small suppliers to achieve these levels.

Follow-up research and proposed response

Surveys which have tested products suggest that the limit values specified by Oeko-Tex can readily be met by using alternative easy care finishes. Care must be taken, however, because some common low or no formaldehyde alternatives, such as dihydroxyethylene urea (DMDHEU), are similarly classified with H351 (suspected of causing cancer) and H317 (Allergen skin reactions).

In terms of consumer exposure a study by the Danish EPA which tested final products for levels of formaldehyde suggests that after a single domestic wash cycle the level of formaldehyde on garments is reduced substantially [156]. This finding is supported by a more recent literature survey of final product testing carried out by the Danish EPA [157]. They survey suggests that between 57% to 81% may be washed out. It appears therefore to be the case that final product testing reflects the highest potential exposure but that the risk may quickly diminish.

[156] Danish Environmental Protection Agency (2003) *Survey of chemical compounds in textile fabrics*, Report No.23

[157] Danish Environmental Protection Agency (2011) *Survey of chemical substances in textiles,*, Report No.113

Proposal:

It is proposed that the limits values are adjusted as follows:

- childrens clothing up to the age of 3 years are retained at 20 ppm,
- all other clothing products are harmonised at 75 ppm
- interior textiles are harmonised with Oeko-Tex at 300 ppm

CURRENT CRITERION 27: WASTE WATER ~~FROM~~ DISCHARGES FROM WET-PROCESSING

Major proposed changes	• Replacement of 20 g/kg COD limit value with a 180 COD mg/l limit value *or* 85% reduction requirement, in harmonisation with Oeko-Tex and Bluesign • Harmonisation of the criterion with Criterion 12 on the substitution of hazardous substances
Present criterion, Decision 2009/567	
(a) Waste water from wet-processing sites (except greasy wool scouring sites and flax retting sites) shall, when discharged to surface waters after treatment (whether on-site or off-site), have a COD content of less than 20 g/kg, expressed as an annual average. *Assessment and verification:* The applicant shall provide detailed documentation and test reports, using ISO 6060, showing compliance with this criterion, together with a declaration of compliance. **(b)** If the effluent is treated on site and discharged directly to surface waters, it shall also have a pH between 6 and 9 (unless the pH of the receiving water is outside this range) and a temperature of less than 40°C (unless the temperature of the receiving water is above this value). *Assessment and verification:* The applicant shall provide documentation and test reports showing compliance with this criterion, together with a declaration of compliance.	
Proposed criteria revision	
Waste water from wet-processing sites shall, when discharged to surface waters after treatment (whether on-site or off-site), have a COD content of less than 20 mg/kg, or a reduction of COD by at least 85%, expressed as an annual average. In order to derogate substances that are hardly biodegradable or non-biodegradable, or to achieve ultimate aerobic biodegradation, additional treatment systems shall be introduced. In this case mineralisation and/or colour removal should be at least 90%. *Assessment and verification:* The applicant shall provide detailed documentation and test reports, using ISO 6060, showing compliance with this criterion, together with a	

declaration of compliance.

(b) If the effluent is treated on site and discharged directly to surface waters, it shall also have a pH between 6 and 9 (unless the pH of the receiving water is outside this range) and a temperature of less than 40°C (unless the temperature of the receiving water is above this value).

Assessment and verification: The applicant shall provide documentation and test reports showing compliance with this criterion, together with a declaration of compliance.

AHWG1 technical discussion

In the present criteria the COD of discharges from the scouring of greasy wool is exempted from this criteria. Proposals for these discharges to be addressed by this criterion were discussed under criterion 5.5.

Comments from stakeholders, (see Preliminary report) suggest that the two options listed in criteria 5.5 are inconsistent. It was suggested by stakeholders to delete the criteria 5.5 and include it in this criterion and only to have a limit for the emission after final treatment, whether this is on side, off side or a combination. Also it was also suggested to harmonise the emissions limit to 20 g COD/kg.

The limit for other production sites was suggested to be 20 g COD /kg in the last revision (2009) – based on input from 19 Danish license holders (just under a quarter of the current textile product Ecolabel licenses). It is therefore suggested to harmonise the emissions requirement for the different processes at 20 mg COD/m^3.

Feedback from stakeholders

At the 1st AHWG stakeholders supported proposals to review the relevance of BAT techniques to the criterion. No written feedback was received from stakeholders. Separate feedback in relation to the wool criteria suggested that scouring wastewater treatment should continue to dealt within by Criterion 5 because of process-specific issues.

Follow-up research and proposed approach

Introducing flexibility into the criteria

The textile BREF highlights the varying combinations of production processes and operating conditions that characterise the textile industry. This makes the application of a single COD value potentially difficult to apply as a criteria. Previous consultations with Danish industry does, however, suggest that the current 20 g/kg of finished fabric is workable.

Whilst this limit value is shared by GOTS, both Bluesign and Oeko-Tex 1000 refer to an 85% COD reduction target and Oeko-Tex 1000 also refers to a 180 mg/l COD reduction target. The textile BREF suggests that 85% would represent BAT performance for COD removal. This suggests that some flexibility could be introduced into the criteria, which would also allow for harmonisation with these schemes.

Derogation requirements for hardly and non-biodegradable substances

The proposed new Criterion 12 requires substances and formulations to, as far as possible, be specified to be biodegradable. It also raised the possibility that potentially hazardous and hardly degradable substances (e.g. Nitrilotriacetic acid) or non-degradable substances (e.g. some forms of dye) could be derogated if they are removed by wastewater treatment plant. Ultimate biodegradability is currently also required by the EU Ecolabel for surfactants.

The textile BREF identifies BAT techniques for the degradation of hardly biodegradable and non-biodegradable substances. The techniques include:

- Treatment of textile waste water in activated sludge system with low food-to-micro organisms ratio (p-405) – Suitable for degradation of effluents which contain hardly biodegradable substances.
- Anaerobic removal of residual dyestuff from padding liquors and printing paste residues (p-426) – Suitable in particular for dye colour removal, sometimes in combination with activated carbon.
- Treatment of selected and segregated, non-biodegradable waste water stream by chemical oxidation (p-428) – Suitable for effluents with very high levels of COD and non-biodegradable substances e.g. desizing baths, dye baths.

This suggests that whilst a range of BAT techniques exist, the criterion should be flexible so that manufacturers can choose the most appropriate treatment solution.

Proposal:

Based on the textile BREF and the Bluesign and Oeko-Tex 1000 schemes it is proposed that an alternative target of 85% COD removal is introduced.

Based on BREF findings any Criterion 12 derogations requiring the removal of hardly biodegradable or non-biodegradable substances should be supported by a 90% removal target.

~~CURRENT CRITERION 28: FLAME RETARDANTS~~

Major proposed changes	• Incorporation of restrictions into proposed new criterion 11: Restricted Substance List • Derogation of flame retardants where fire regulations or product-related ISO, EN or Member State standards,. • Flame retardant finishes must be semi-durable or durable thereby reducing consumer exposure (see proposed new Criterion 40).
Present criterion, Decision 2009/567	
No use is allowed of flame retardant substances or of flame retardant preparations containing more than 0.1% be weight of substances that are assigned or may be assigned at the time of application any of the following risk phrases (or combination of thereof): R40 (limited evidence of a carcinogenic effect), R45 (may cause cancer), R46 (may cause heritable genetic damage), R49 (may cause cancer by inhalation), R50 (very toxic to aquatic organisms), R51 (toxic to aquatic organisms), R52 (harmful to aquatic organisms), R53 (may cause long-term adverse effects in the aquatic environment), R60 (may impair fertility), R61 (may cause harm to the unborn child), R62 (possible risk of impaired fertility), R63 (possible risk of harm to the unborn child), R68 (possible risk of irreversible effects), as laid down in Directive 67/548/EEC and its subsequent amendments. Flame retardants which are only physically mixed into the polymer fibre or into a textile coating are excluded (additive flame retardants).	

Assessment and verification: The applicant shall either provide a declaration that additive flame retardants have not been used and indicate which reative flame retardants, if any have been used and provide documentation (such as safety data sheets) and/or declarations indicating that those flame retardants comply with this criterion.
Proposed criteria revision
Incorporation of substances that are restricted into proposed new Criterion 11: Restricted Substance List, all other flame retardants are to be screened according to proposed new Criterion 12 on the substitution of hazardous substances and must meet proposed new Criterion 40 on the durability of finishes.

AHWG1 technical discussion

Feedback from the stakeholder questionnaire argued that flame retardants are necessary in some textile applications and should be regulated like other chemicals because there is no clear definition of a “flame retardant”. Flame retardants have been discussed extensively in other product groups and no solution satisfying all stakeholders has been found yet.

The current criteria have been criticised by producers stating that it is too arbitary in how it deals with flame retardants in textiles. For example, an additive flame retardant with no risk phrases would not currently fulfil the criteria. On the other hand, it is also the case that some products that currently qualify for Ökotex, which excludes a wider range of flame retardants than currently feature in the ECHA candidate list, may also not qualify because their precursors are covered by excluded risk phrases. Very few flame retardants exist that are fully reactive, as the industry interprets the current criteria.

Furthermore, a significant number of flame retardants currently used are understood to be incorporated in an additive form and therefore excluded by the Ecolabel unless the alternative clause in the current Regulation is used which is with reference to Regulation (EC) No 1272/2008. It is understood that without clarification this effectively excludes certain product ranges which require specific flame retardants in order to meet Member State fire regulations.

Fire retardants currently restricted by REACH and forming part of the SVHC Candidate List are as follows:

REACH Annex XIV

- HBCD – Hexabromocyclododecane (sunset date of 21st August 2015)

REACH Annex XVII

- PeBDE – Pentabromodiphenyl oxide (0,1% wt)
- OcBDE – Octabromidiphenyl oxide (0,1% wt)
- TEPA – Tris(aziridinul)phosphinoxide (skin contact)
- TRIS – Tris (2,3 dibromopropyl) phosphate (skin contact)
- PBBs – Polybrominated biphenyls (0,1% wt)

REACH SVHC Candidate List

- TCEP – Tris (2,chloroethyl)phosphate

With the exception of decaBDE this combined list is reflected by the flame retardants currently restricted by the Ökotex 100 label as of January 2011.

Brominated flame retardants were highlighted as an area of focus by the Commission Statements and stakeholder feedback. As we have highlighted a range of brominated retardants are now either restricted by REACH or appear on the SVHC Candidate List Although Decabromodiphenyl ether (Deca-BDE) is not restricted it has now been formally proposed for addition to the SVHC Candidate List.

It is to be discussed during the revision process whether derogations of other specific flame retardants which may be classified as hazardous substances should be made – particularly for the following specific applications in which fire retardancy may be necessary to meet member state fire regulations:

- Personal Protective Equipment (PPE).
- Furnishings and drapery that fulfil the textile product definition,
- Nightwear (poly-cotton blends and health service and care facility nightwear),
- Bed linen (particularly for health services and care facilities)

Derogations can only be made if no technically or economically feasible alternatives can be identified.

It is understood that Deca-BDE in combination with antimony trioxide may be of limited application in relation to the Ecolabel for textile products, with the exception of

upholstery, where a back coating may be applied in order to fire proof furniture fabrics. For the other listed applications organophosphorous and inorganic retardants would tend to be used, a number of which are already restricted and appear on the SVHC Candidate List.

It is also understood that the suitability of different retardants depends on whether the fibre is natural or synthetic, and that this in turn also influences the potential for residues to come into contact with skin – some of which may be by-products of the application process - and also the durability of the garment – which can be damaged and lose tensile strength because of some of the chemicals present in formulations.

How flame retardants are treated by other labels

Öko-tex distinguishes between fibre materials which receive the flame retardant properties into the spinning mass already (copolymer, additives) and a finish with flame retardant products in a later processing step [158]. For both forms of application flame retardants are only allowed for classes 1, 2 and 3 (as discussed under criterion 26) if the substance has been assessed by Öko-tex and it has been concluded that the substances can be used without any restrictions (Ökotex 100, point 4.3.) A white list is also published.

GOTS have no specific requirements for flame retardants although their hazardous substance requirements are relevant for flame retardants. They are also addressed in relation to wastewater. Flame retardants with halogens are allowed as long as they do not contribute with more than 1% AOC (Assimilable Organic Carbon) to the primary effluent. This is a requirement that is difficult to evaluate so it is a requirement where harmonisation is not advisable.

Feedback from stakeholders

Industry stakeholders highlighted the fact that flame retardants are required to meet international and national fire regulations. Reactive flame retardants are not reacted to near 100% as defined by the Ecolabel. There are very few reactive flame retardants that are not classified, and distinguishment between reactive and additive does not say anything about health or environmental risks. Many additive flame retardants have been assessed as being safe to use. Each flame retardant should

[158] Okotex 100, version 1 2011

each be assessed on its own merit depending on its CLP classification.

The permanency of flame retardants should be considered within the criterion. The incorporation of the function should be as permanent as possible.

In contrast a number of stakeholders proposed that flame retardants be completely restricted by the Ecolabel. Derogation could only be provided where they were necessary to meet fire regulations. Inherently flame retardant fibres should be favoured.

Follow-up and proposed approach

The new hazardous substance criterion will restrict the use of a number of flame retardants which are used to treat textiles, including APO and TRIS. The proposed new Criterion 12 would require that, as far as practically possible and within the proposed timescales, hazardous substances should be substituted.

In order to test the impact of Criterion 12 on flame retardants we attempted to screen a number of common flame retardants for their classifications. A significant number were not found in the CLP database, which could mean they are not classified, and most were notified and not formally classified. The following are examples of commonly used flame retardants that can be found in the CLP database:

- tetrakis (hydroxymethyl) phosphonium chloride (THPC): Commonly used for cotton fabrics. It is not formally classified but notifiers self-classify it with H411.
- Dimethylphosphono (N-methylol) propionamide (CAS 20120-33-6) : Commonly used for cotton fabrics. It is not formally classified but notifiers self-classify it with H317.
- Phosponate esthers (CAS 42595-45-9/ 41203-81-0): Used for polyester fabrics.
- *Additional flame retardants to be screened*

It should also be noted that flame retardants may be reacted with other synergists and cross linking agents. In the case of polyester flame retardancy can also be

achieved by modifying the polymer structure during manufacturing [159]. An example co-polymer used by EU manufacturer Trevira was not found to be classified [160] .

It is also understood that in the UK some retailers meet the fire regulations for nightwear by specifying less flammable fibres, for example modacrylic [161]. A major retailer's RSL restricts the use of flame retardants on clothing for small children [162]. It is also notable that the Oeko-Tex 100 white list includes a number of inherently flame retardant fibres and fabrics – including products manufactured by Gore Tex, Trevira and Dupont [163]. Many of these fibres consist of modified polyester, fluoropolymers or aramid fibres.

The durability of flame retardants

The European Flame Retardant Association (EFRA) highlights the importance of flame retardant durability [164]. Clothing may need to resist many washing cycles whereas for interior textiles such as curtains water soak tests may be sufficient. Expert literature on the subject distinguishes between non-durable, semi-durable and durable finishes [165]. Non-durable finishes may need retreating after one laundering whilst semi-durable may endure more than 5-10 washing cycles or dry cleaning, and durable may endure more than 50 washing cycles [166].

Inherently flame retardant fibres are durable, although it is understood that certain washing conditions can damage the flame retardancy of some fibres [167]. Durable

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[159] Lacasse, K and W, Bauman (2004) *Textile chemicals*, Springer-Verlag

[160] Balabanovich, A.I. *Thermal decomposition study of 2-methyl-1,2-oxaphospholan-5-one 2-oxide,* Thermochimica Acta 409 (2004) 33–39

[161] Bolton Consultancy Ltd (2009) *Flammability of nightwear - UK*

[162] See footnote 29

[163] Oeko-Tex Association, *Flame retardant products* https://www.oeko-tex.com/en/manufacturers/certified_products/active_chemical_products/flame_retardant_products/flame_retardant_products.html

[164] EFRA (2012) *Keeping fire in check – An introduction to flame retardants used in upholstered furniture and textile applications*

[165] See footnote 40

[166] USA National Research Council (2000) *Toxicological risks of selected flame retardant chemicals*, Sub-committe on flame-retardant chemicals, Committee on toxicology, National Research Council

[167] Trevira, *How Trevira CS works*, http://www.trevira.de/en/textiles-made-from-trevira/home-textiles/flame-retardant-textiles-trevira-cs/how-trevira-cs-works.html

flame retardants have the potential benefit of extending the functional lifespan of products whilst minimising exposure of consumers and the environment during the use phase.

Proposal:

It is proposed that flame retardant finishes (including their associated formulations, cross-linking agents and synergists) are screened according to the proposed new Criterion 12.

Finishes that are classified in accordance with Regulation (EC) No 1272/2008 can be derogated if it can be demonstrated that:

1. They are required to meet fire regulations;
2. They are required to meet ISO, EN or Member State standards for specific product end-uses;
3. Their flame retardancy is:
    i. Durable for clothing applications;
    ii. Semi-durable for interior textiles (see proposed new Criterion 40);

Further input is requested from stakeholders to inform the durability specifications and to identify any relevant standards.

~~CURRENT CRITERION 29: ANTI FELTING FINISHES~~

Major proposed changes	• Criterion to be incorporated into the Criterion 11 Restricted Substance List and Criterion 12 Screening of substances and preparations
Present criterion, Decision 2009/567	
Halogenated substances or preparations shall only be applied to wool slivers and loose scoured wool. *Assessment and verification:* The applicant shall provide a declaration of non-use (unless used for wool slivers and loose scoured wool).	
Proposed revised criterion	
Criterion to be incorporated into Restricted Substance List – Criterion 11	

AHWG1 technical discussion

Shrink resistant finishes or anti-felt finishing are applied with the purpose of conferring anti-felt characteristics to the wool goods. This is required when the material needs to be repetitively washed in a laundry machine without shrinking.

According to the draft IPPC reference [BREF Textiles] two treatments, which are also complementary, are applied:

- oxidising treatment (subtractive treatment)
- treatment with resins (additive treatment).

These treatments can be applied at any stage of the process and on all different make-ups. They are most commonly applied to combed tops for specific end products (e.g. underwear).

The issues to be addressed by the criteria are two-fold – 1) the COD and AOX of wastewater effluent and 2) the restriction of substances under Articles 6(6) and 6(7) of the Ecolabel Regulation. Ecotoxicity from wastewater effluent was not highlighted as a specific area for improvement in the preliminary report.

Oxidising treatments

This treatment has traditionally been carried out using one of the following chlorine-releasing agents:

- sodium hypochlorite
- sodium salt dichloroisocyanurate
- active chlorine (no longer used).

The oldest process is the one using sodium hypochlorite. However, since the development of active chlorine is difficult to control, wool fibre characteristics can be deeply changed, also giving irregular results. Dichloroisocyanurate is more advantageous here, because it has the ability to release chlorine gradually, thereby reducing the risk of fibre damage.

The chlorine-based agents have recently encountered restrictions because they react with components and impurities (soluble or converted into soluble substances) in the wool, to form adsorbable organic chlorine compounds (AOX).

Alternative oxidising treatments have therefore been developed. In particular, peroxysulphate, permanganate, enzymes and corona discharge come into consideration here. However, the only alternative to chlorine-based agents readily available today is peroxysulphate. The process with peroxysulphate compounds is quite similar to the chlorine treatment. If necessary, the material is treated with a polymer (see treatments with resins below).

Treatments with resins (additive processes)

In additive processes polymers are applied to the surface of the fibre with the aim of covering the scales with a coating. The polymer may be, in some case, sufficiently effective on its own to make pre-treatment unnecessary. Otherwise an oxidative and reductive pre-treatment is necessary.

Combined treatments

However, the combination of subtractive and additive processes has the largest technical effect.

A combined treatment has been widely used for years as anti-felt finishing of wool in different states (loose fibre, combed top, yarn, knitted and woven fabric) due to its low cost and high quality effects. However, the effluent shows high concentrations of COD and AOX. The formation of AOX is attributable not only to the oxidant, but also to the resin, which is based on a cationic polyamide and involves the use of epichlorohydrine.

Alternative resins have been developed, based on polyethers, cationic aminopolysiloxanes, synergic mixtures of polyurethanes and polydimethylsiloxanes, but they all have some limitations concerning their applicability.

New processes have also been developed, but so far the results achieved with the combined treatment process cannot be fully matched by any alternative, which is why it is still the preferred process particularly for treatments such as the anti-felt finishing of combed tops.

According to the PARCOM recommendations from 1992 chlorinated shrink resistant finishes were still accepted for wool sliver, knitted wool garments and socks before piece dyeing. These recommendations were revised in December 1999 after which chlorinated shrink resistant finishes were only recommended for wool tops.

Consultation questions

Feedback received was that this criterion is still required. It is likely that the oxidising agents are classified.

Proposal:

It is proposed that the restriction is incorporated into the proposed new Criterion 11 RSL and that alternative finishes are screened according to proposed new criterion 12.

~~*CURRENT CRITERION 30: FABRIC FINISHES*~~

Major proposed changes	• Criterion to be incorporated into proposed new Criterion 12

Present criterion, Decision 2009/567

The word 'finishes' covers all physical or chemical treatments giving to the textile fabrics specific properties such as softness, waterproof, easy care.

No use is allowed of finishing substances or of finishing preparations containing more than 0,1 % by weight of substances that are assigned or may be assigned at the time of application any of the following risk phrases (or combinations thereof):

— R40 (limited evidence of a carcinogenic effect),

— R45 (may cause cancer),

— R46 (may cause heritable genetic damage),

— R49 (may cause cancer by inhalation),

— R50 (very toxic to aquatic organisms),

— R51 (toxic to aquatic organisms),

— R52 (harmful to aquatic organisms),

— R53 (may cause long-term adverse effects in the aquatic environment),

— R60 (may impair fertility),

— R61 (may cause harm to the unborn child),

— R62 (possible risk of impaired fertility),

— R63 (possible risk of harm to the unborn child),

— R68 (possible risk of irreversible effects),

as laid down in Directive 67/548/EEC.

Alternatively, classification may be considered according to Regulation (EC) No 1272/2008. In this case no substances or preparations may be added to the raw materials that are assigned, or may be assigned at the time of application, with and of the following hazard statements (or combinations thereof): H351, H350, H340, H350i, H400, H410, H411, H412, H413, H360F, H360D, H361f, H361d H360FD, H361fd, H360Fd, H360Df, H341.

Assessment and verification: The applicant shall either provide a declaration that finishes have not been used, or indicate which finishes have been used and provide documentation (such as safety data sheets) and/or declarations indicating that those finishes comply with this criterion.

Proposed revised criterion

Criterion to be addressed by proposed new Criterion 12: Screening of dyeing, printing and finishing preparations and recipes. Certain substances are restricted by proposed new Criterion 11: Restricted Substance List.

AHWG1 technical discussion

No change is proposed for this criterion. The technical criteria are now superceded by the Article (6) and (7) requirements of the Ecolabel Regulation. The wording is to be coordinated with the new proposed criterion 10 on hazardous substances and implementing criteria 11 and 12.

Feedback from stakeholders

Some reservations were expressed about removing this criterion, linked to reservations about the new Criterion 10 on hazardous substances and mixtures.

A proposal was made to introduce a new criterion which would focus on airborne emissions from finishing processes, including VOC's. A methodology for predicting and calculating emissions was outlined, reflecting BAT technique in the textile BREF and as also used by Bluesign.

A proposal was made to address garment finishing methods that are considered to be harmful to workers. An example was given of denim sand blasting.

Persistent perfluorinated substances used as water repellent and heat resistant finishes and coatings should be avoided or reduced. It was suggested that only short chained polymers might be permitted. Substitutes can still breakdown into perfluoro-sulfonic acid (PFOS) or perfluoro-octanoic acid (PFOA) monomers. PFOA is likely to be proposed as a SVHC by at least one .

Proposal:

Given that the criterion is based on the screening of finishes against risk phrases it is proposed that finishing is addressed by the proposed new Criterion 12.

It is also proposed that the durability of finishes is introduced as a new fitness for use criteria as a means of reducing consumer exposure and extending the life of products. The criteria would address: softness, waterproofing, easy care and flame retardancy. See criteria proposal 40

The possibility for introducing a criterion addressing airborne emissions from finishing processes is proposed for discussion at the second AHWG. Alternatively the proposed methodology could be listed within the proposed new process Criterion 13 as BAT.

CURRENT CRITERION 31: FILLINGS

Major proposed changes	• Retention of the criterion • Addition of a reference to fillings in Article 1 and in the introduction to the fibre criteria
Present criterion, Decision 2009/567	
31.1. Filling materials consisting of textile fibres shall comply with the textile fibre criteria (1–9) where appropriate. 31.2. Filling materials shall comply with criterion 11 on 'Biocidal or biostatic products' and the criterion 26 on 'Formaldehyde'. 31.3. Detergents and other chemicals used for the washing of fillings (down, feathers, natural or synthetic fibres) shall comply with criterion 14 on 'Auxiliary chemicals' and criterion 15 on 'Detergents, fabric softeners and complexing agents'. *Assessment and verification:* As indicated in the corresponding criteria	
Proposed revised criterion	
31.1. Filling materials consisting of textile fibres shall comply with the textile fibre criteria (1–9) where appropriate. 31.2. Filling materials shall comply with criterion 11 on 'Biocidal or biostatic products' and the criterion 26 on 'Formaldehyde'. 31.3. Detergents and other chemicals used for the washing of fillings (down, feathers, natural or synthetic fibres) shall comply with criterion 14 on 'Auxiliary chemicals' and criterion 15 on 'Detergents, fabric softeners and complexing agents'. *Assessment and verification:* As indicated in the corresponding criteria	

AHWG1 discussion

No change is currently proposed for this criterion.

Feedback from stakeholders

No feedback was received on this criterion

Proposal:

The wording is to be coordinated with the new proposed criterion 10 on hazardous substances.

CURRENT CRITERION 32: COATINGS, LAMINATES AND MEMBRANES

Major proposed changes	• Retention of the criterion • 32.3 is to reference the classifications listed in Criterion 12
Present criterion, Decision 2009/567	
32. Coatings, laminates and membranes 32.1. Products made of polyurethane shall comply with the criterion set out in point 3.1 regarding organic tin and the criterion set out in point 3.2 regarding the emission to air of aromatic diisocyanates. *Assessment and verification*: As indicated in the corresponding criteria. 32.2. Products made of polyester shall comply with the criterion set out in point 8.1 regarding the amount of antimony and the criterion set out in point 8.2 regarding the emission of VOCs during polymerisation. *Assessment and verification*: As indicated in the corresponding criteria. 32.3. Coatings, laminates and membranes shall not be produced using plasticisers or solvents which are assigned or may be assigned at the time of application any of the following risk phrases (or combinations thereof): — R40 (limited evidence of a carcinogenic effect), — R45 (may cause cancer), — R46 (may cause heritable genetic damage), — R49 (may cause cancer by inhalation), — R50 (very toxic to aquatic organisms), — R51 (toxic to aquatic organisms), — R52 (harmful to aquatic organisms), — R53 (may cause long-term adverse effects in the aquatic environment), — R60 (may impair fertility), — R61 (may cause harm to the unborn child), — R62 (possible risk of impaired fertility), — R63 (possible risk of harm to the unborn child),	

— R68 (possible risk of irreversible effects),

as laid down in Directive 67/548/EEC.

Alternatively, classification may be considered according to Regulation (EC) No 1272/2008 of the European Parliament and of the Council of 16 December 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 (1). In this case no substances or preparations may be added to the raw materials that are assigned, or may be assigned at the time of application, with and of the following hazard statements (or combinations thereof): H351, H350, H340, H350i, H400, H410, H411, H412, H413, H360F, H360D, H361f, H361d H360FD, H361fd, H360Fd, H360Df, H341.

Assessment and verification: The applicant shall provide a declaration of non-use of such plasticizers or solvents.

Proposed revised criterion

32. Coatings, laminates and membranes

32.1. Products made of polyurethane shall comply with the criterion set out in point 3.1 regarding organic tin and the criterion set out in point 3.2 regarding the emission to air of aromatic diisocyanates.

Assessment and verification: As indicated in the corresponding criteria.

32.2. Products made of polyester shall comply with the criterion set out in point 8.1 regarding the amount of antimony and the criterion set out in point 8.2 regarding the emission of VOCs during polymerisation.

Assessment and verification: As indicated in the corresponding criteria.

32.3. Coatings, laminates and membranes shall not be produced using plasticisers or solvents which are assigned any of the classifications listed in Criterion 12. ~~not be produced using plasticisers or solvents, which are assigned or may be assigned at the time of application any of the following risk phrases (or combinations thereof):~~

~~— R40 (limited evidence of a carcinogenic effect),~~

~~— R45 (may cause cancer),~~

~~— R46 (may cause heritable genetic damage),~~

~~— R49 (may cause cancer by inhalation),~~

~~— R50 (very toxic to aquatic organisms),~~

~~— R51 (toxic to aquatic organisms),~~

~~— R52 (harmful to aquatic organisms),~~

~~— R53 (may cause long-term adverse effects in the aquatic environment),~~

~~— R60 (may impair fertility),~~

~~— R61 (may cause harm to the unborn child),~~

~~— R62 (possible risk of impaired fertility),~~

~~— R63 (possible risk of harm to the unborn child),~~

~~— R68 (possible risk of irreversible effects),~~

~~as laid down in Directive 67/548/EEC.~~

~~Alternatively, classification may be considered according to Regulation (EC) No 1272/2008 of the European Parliament and of the Council of 16 December 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 (1). In this case no substances or preparations may be added to the raw materials that are assigned, or may be assigned at the time of application, with and of the following hazard statements (or combinations thereof): H351, H350, H340, H350i, H400, H410, H411, H412, H413, H360F, H360D, H361f, H361d H360FD, H361fd, H360Fd, H360Df, H341.~~

Assessment and verification: The applicant shall provide a declaration of non-use of such plasticizers or solvents.

AHWG1 technical discussion

No change is currently proposed for this criterion.

Feedback from stakeholders

No feedback was received from stakeholders

Proposal:

It is proposed that the wording is coordinated with the proposed new Criterion 12 and with any revision to the criteria for polyester and elastane.

~~***CURRENT CRITERION 33: ENERGY AND WATER USE***~~

Major proposed changes	• Replacement with proposed new Criterion 13: Dyeing, printing and finishing process efficiency

Present criterion, Decision 2009/567

The applicant shall provide data on water and energy use for the manufacturing sites involved in wet processing.

Assessment and verification: The applicant is requested to provide the above mentioned information.

Proposed criterion revision

Replacement and updating with proposed new Criterion 13: Dyeing, printing and finishing process efficiency.

AHWG1 technical discussion

The wording of the criterion makes it impossible to benchmark the data from different productions sites. A number of key environmental impacts relating to energy and water consumption arising from production were highlighted in the Preliminary report. By collecting and reporting the data it gives the producer a very useful tool to manage their energy and water consumption and to then use this data to implement improvements. It is possible that the criteria could be updated as part of the proposed new Corporate Social Responsibility (CSR) criteria.

Feedback from stakeholders

Stakeholders were split between retention of the criterion and incorporation into the proposed Corporate Social Responsibility (CSR) criteria.

The issue of energy and water use has been extensively investigated as part of the background to proposed new Criterion 13, which is intended to address more comprehensively the potential for reductions in energy, water and chemical use by using BAT techniques.

Proposal:

That the criterion is replaced by the proposed new Criterion 13

4.3 FITNESS FOR USE CRITERIA

The following criteria apply either to the dyed yarn, the final fabric(s), or the final product, with tests carried out as appropriate. “Appropriate” in this case means that all products shall be tested according to the criteria 34 – 39 unless the product type is explicitly excluded. If a product does not meet the fitness for use criteria or the test methods are not suited for it, the product is not then eligible for the EU Ecolabel.

CURRENT CRITERION 34: DIMENSIONAL CHANGES DURING WASHING AND DRYING

Major proposed changes	• The limits for dimensional changes are to be harmonised with the Blue Angel

Present criterion, Decision 2009/567

The dimensional changes after washing and drying shall not exceed:

- plus or minus 2% for curtains and for furniture fabric that is washable and removable,
- more than minus 8% or plus 4% for other woven products and durable non-woven, other knitted products or for terry towelling.

This criterion does not apply to:

- fibres or yarn,
- products clearly labelled ‘dry clean only’ or equivalent (insofar as it is normal practice for such products to be so labelled),
- furniture fabrics that are not removable and washable.

Assessment and verification: The applicant shall provide test reports using the following standards EN ISO 6330, ISO 5077 as follows: 3 washes at temperatures as indicated on the product, with tumble drying after each washing cycle unless other drying procedures are indicated on the product,

Proposed revised criterion

The dimensional changes after washing and drying shall not exceed:

Textile products or type of material	Dimensional changes during washing and drying
for curtains and for furniture fabric that is washable and removable	+/- 2 %
knitted fabrics	+/- 4 %
Chunky knit	+/- 6 %
Towels and fine rib fabrics	+/- 7 %
Interlock	+/- 5 %
Woven fabrics: Cotton and cotton mix wool mix synthetic fibres	 +/- 3 % +/- 2 % +/- 2 %

This criterion does not apply to:

– fibres or yarn,

– products clearly labelled “dry clean only” or equivalent (insofar as it is normal practice for such products to be so labelled),

– furniture fabrics that are not removable and washable.

Assessment and verification: The applicant shall provide test reports using the following standards EN ISO 63 30, ISO 5077 as follows: 3 washes at temperatures as indicated on the product, with tumble drying after each washing cycle unless other drying procedures are indicated on the product.

AHWG1 technical discussion

This criteria was not altered in the last revision. It was suggested to lower the tolerance and to remove the possibility to exceed the tolerance if the dimension

change was clearly listed on the product label. None of these suggestions were implemented in the final document.

Feedback received in the first questionnaire from the German Competent Body suggested a change to the limits to the following based on discussion with producers regarding the limits in the Blue Angel label. These changes would reflect the criteria in the Blue Angel (RAL-UZ 154).

Table 3.3.1 Blue Angel tolerances for dimensional change

Textile products or type of material	**Dimensional changes during washing and drying**
for curtains and for furniture fabric that is washable and removable	+/- 2 %
knitted fabrics	+/- 4 %
Chunky knit	+/- 6 %
Towels and fine rib fabrics	+/- 7 %
Interlock	+/- 5 %
Woven fabrics: Cotton and cotton mix wool mix synthetic fibres	 +/- 3 % +/- 2 % +/- 2 %

Feedback from stakeholders

The first AHWG requested clarification as to whether the criteria covers bathing cloths.

Proposal:

Harmonisation with the dimensional changes contained within the Blue Angel is proposed. The criterion applies to all products.

CURRENT CRITERION 35: COLOUR FASTNESS TO WASHING

Major proposed changes	• No change is proposed
Present criterion, Decision 2009/567	
The colour fastness to washing shall be at least level 3-4 for colour change and at least level 3-4 for staining. This criterion does not apply to products clearly labelled “dry clean only” or equivalent (in so far as it is normal practice for such products to be so labelled), to white products or products that are neither dyed nor printed, or to non-washable furniture fabrics. *Assessment and verification:* The applicant shall provide test reports using the following test method: ISO 105 C06 (single wash, at temperature as marked on the product, with perborate powder).	
Proposed revised criterion	
The colour fastness to washing shall be at least level 3-4 for colour change and at least level 3-4 for staining. This criterion does not apply to products clearly labelled “dry clean only” or equivalent (in so far as it is normal practice for such products to be so labelled), to white products or products that are neither dyed nor printed, or to non-washable furniture fabrics. *Assessment and verification:* The applicant shall provide test reports using the following test method: ISO 105 C06 (single wash, at temperature as marked on the product, with perborate powder).	

AHWG1 technical discussion

This criterion was not changed in the last revision. Only the wording of the text was made more clear and in line with the text in the standard ISO-105-C06. Comments from the initial stakeholder questionnaire indicated that the present level is appropriate. The criterion is almost similar to the criterion in the Blue Angel. The only difference is more exacting requirements for indigo dyed denim (see Blue Angel point 3.4.2).

Feedback from stakeholders

Limited feedback was received. No changes were proposed.

Proposal:

It is proposed to leave this criterion unchanged.

CURRENT CRITERION 36: COLOUR FASTNESS TO PERSPIRATION (ACID, ALKALINE)

Major proposed changes	• No changes are proposed
Present criterion, Decision 2009/567	
The colour fastness to perspiration (acid and alkaline) shall be at least level 3-4 (colour change and staining). A level of 3 is nevertheless allowed when fabrics are both dark colored (standard depth > 1/1) and made of regenerated wool or more than 20% silk. This criterion does not apply to white products, to products that are neither dyed nor printed, to furniture fabrics, curtains or similar textiles intended for interior decoration. Assessment and verification: The applicant shall provide test reports using the following test method: ISO 105 E04 (acid and alkaline, comparison with multi-fibre fabric).	
Proposed revised criterion	
The colour fastness to perspiration (acid and alkaline) shall be at least level 3-4 (colour change and staining). A level of 3 is nevertheless allowed when fabrics are both dark colored (standard depth > 1/1) and made of regenerated wool ~~or more than 20% silk~~. This criterion does not apply to white products, to products that are neither dyed nor printed, to furniture fabrics, curtains or similar textiles intended for interior decoration. Assessment and verification: The applicant shall provide test reports using the following test method: ISO 105 E04 (acid and alkaline, comparison with multi-fibre fabric).	

AHWG1 technical discussion

This criterion was not changed in the last revision. Comments from the initial stakeholder questionnaire indicated that the present level is appropriate. The criterion is similar to the criterion in the Blue Angel.

Feedback from stakeholders

Limited feedback was received from stakeholders. No change was proposed.

Proposal:

No major changes to the criterion are proposed. A reference to silk at a 20% content level is to be deleted as it would not be applicable to the EU Ecolabel.

CURRENT CRITERION 37: COLOUR FASTNESS TO WET RUBBING

Major proposed changes	• No change is proposed
Present criterion, Decision 2009/567	
The colour fastness to wet rubbing shall be at least level 2-3. A level of 2 is nevertheless allowed for indigo dyed denim. This criterion does not apply to white products or products that are neither dyed nor printed. Assessment and verification: The applicant shall provide test reports using the following test method: ISO 105 X12.	
Proposed revised criterion	
The colour fastness to wet rubbing shall be at least level 2-3. A level of 2 is nevertheless allowed for indigo dyed denim. This criterion does not apply to white products or products that are neither dyed nor printed. Assessment and verification: The applicant shall provide test reports using the following test method: ISO 105 X12.	

AHWG1 technical discussion

This criterion was not changed in the last revision. Comments from the initial stakeholder questionnaire indicated that the present level is appropriate. The criterion is similar to the first part of criterion in the Blue Angel (point 3.4.4 include both wet and dry rubbing).

Feedback from stakeholders

Limited feedback was received from stakeholders. No change was proposed.

Proposal:

No change is proposed to the criterion.

CURRENT CRITERION 38: COLOUR FASTNESS TO DRY RUBBING

Major proposed changes	• No change is proposed
Present criterion, Decision 2009/567	
The colour fastness to dry rubbing shall be at least level 4. A level of 3-4 is nevertheless allowed for indigo dyed denim. This criterion does not apply to white products or products that are neither dyed nor printed, or to curtains or similar textiles intended for interior decoration. Assessment and verification: The applicant shall provide test reports using the following test method: ISO 105 X12.	
Proposed revised criterion	
The colour fastness to dry rubbing shall be at least level 4. A level of 3-4 is nevertheless allowed for indigo dyed denim. This criterion does not apply to white products or products that are neither dyed nor printed, or to curtains or similar textiles intended for interior decoration. Assessment and verification: The applicant shall provide test reports using the following test method: ISO 105 X12.	

AHWG1 technical discussion

This criterion was not changed in the last revision. Comments from the initial stakeholder questionnaire indicated that the present level is appropriate. The criterion is similar to the last part of criterion in the Blue Angel (point 3.4.4).

Feedback from stakeholders

Limited feedback was received from stakeholders. No change was proposed.

Proposal:

No change is proposed to the criterion.

CURRENT CRITERION 39: COLOUR FASTNESS TO LIGHT

Major proposed changes	• No change is proposed
Present criterion, Decision 2009/567	
For fabrics intended for furniture, curtains or drapes, the colour fastness to light shall be at least level 5. For all other products the colour fastness to light shall be at least level 4. A level of 4 is nevertheless allowed when fabrics intended for furniture, curtains or drapes are both light coloured (standard depth < 1/12) and made of more than 20% wool or other keratin fibres, or more than 20% silk, or more than 20% linen or other bast fibres. This requirement does not apply to mattress ticking, mattress protection or underwear. *Assessment and verification:* The applicant shall provide test reports using the following test method: ISO 105 B02.	
Proposed revised criterion	
For fabrics intended for furniture, curtains or drapes, the colour fastness to light shall be at least level 5. For all other products the colour fastness to light shall be at least level 4. A level of 4 is nevertheless allowed when fabrics intended for furniture, curtains or drapes are both light coloured (standard depth < 1/12) and made of more than 20% wool or other keratin fibres, ~~or more than 20% silk,~~ or more than 20% linen or other bast fibres. This requirement does not apply to mattress ticking, mattress protection or underwear. *Assessment and verification:* The applicant shall provide test reports using the following test method: ISO 105 B02.	

AHWG1 technical discussion

This criterion was not changed in the last revision. Comments from the initial stakeholder questionnaire indicated that the present level is appropriate. The criterion is similar to the criterion in the Blue Angel.

Underwear is not covered by the criterion. The reason for this is that is not exposed as much to the sun as other kind of clothing. Some license holders have stated that the same argument could be used to exempt baby clothing since they do not normally come into contact with direct sun for long periods. It has therefore been suggested that baby clothing in general is exempted from this requirement.

Feedback from stakeholders

Limited feedback was received from stakeholders. No change was proposed.

Proposal:

No major changes to the criterion are proposed. A reference to silk at a 20% content level is to be deleted as it would not be applicable to the EU Ecolabel.

New Criterion: Durability Of Surface Finishes

New criterion proposal	• A new criterion which would require durable functional finishes, to include easy care, softeners, water repellents and flame retardants; • Testing would be based on wash cycles, as set out in relevant ISO and BS standards
Proposed criterion text	
Surface finishes that impart a functional benefit to the textile product should achieve a high level of durability. Finishes addressed by this criterion are easy care, softeners, water repellency and flame retardancy. The following requirements apply: • Flame retardant and water repellent finishes should retain xx% of their functionality after 50 wash cycles at 40°C, or as specified within the relevant standards listed below. • Softeners intended to improve the handle of fabrics and easy care finishes intended to reduce the need for ironing should retain xx% of their functionality after x wash cycles at 40°C. For water repellents and flame retardants consumers should be provided with guidance as how to maintain the functionality of the coatings applied to the product. Textile fibres, fabrics and membranes that lend the final product intrinsic functional properties are exempt from these requirements. *Assessment and verification:* The applicant shall provide reports from tests carried out according to ISO 6330:2001 (+ 2009 A1) and BS 5852. For products with intrinsic properties applicants shall provide test reports demonstrating a high level of comparable performance with alternatives which may be applied as finishes.	

AHWG2 technical discussion

Stakeholders commented during the first AHWG that the durability of finishes such as flame retardants should be a consideration. They also commented that the fitness for use criteria should take a broader approach to the durability of textile products. The current criteria have a significant focus on dye fastness under various conditions. A number of other functional finishes may be applied to the final textile product, with their fastness depending upon their distinct chemistry and how the garment is used.

Concerns about the environmental impact of finishes such as flame retardants and water repellents can largely be seen to relate to two stages in a textile products' lifecycle:

- Use phase: Leaching of the finish into the environment or onto the consumer during use. This could occur as a result of environmental conditions or during laundering. The exposure paths for some surface finishings are addressed by the current Ecolabel criteria. For example, the current flame retardant criteria require covalently bonded finishes. Finishes may also be used about which there is currently uncertainty as to their environmental impact and which may not currently be classified under CLP.
- End of life phase: If a product is landfilled or incinerated. Studies have demonstrated that textiles raise significant concerns in relation to hazardous emissions and that a contributor may be the thermal degradation of finishes and treatments [168].

The proposed Criteria 10-12 on Hazardous substances introduce a horizontal approach to the restriction of substances may be hazardous to consumers. However, information about the hazards associated with many chemical formulations is imperfect and may change over time as new scientific evidence is brought forward.

Evidence suggests that the fastness and durability of functional finishes applied to a product are likely tp influence both the rate of leaching into the environment and the lifespan of a product [169]. On this basis it is proposed to introduce a new Fitness for use criteria that aims to ensure a high level of durability. This would reduce the risk

[168] Abad.E, Adrados,M.A, Caixach,J, Fabrellas,B.and J. Rivera, *Dioxin mass balance in a municipal waste incinerator*, Chemosphere 40 (2000) 1143-1147

[169] See Lacasse, K and W, Bauman (2004) *Textile chemicals*, Springer-Verlag *and* Swedish National Chemicals Inspectorate, Chemicals in textiles – report of a Government Commission, Report No.5/97,

of exposure of consumers and the environment from leaching during use and during the re-application of finishes (if this is feasible). It could also extend the life of products which consumers may choose to dispose of if their functionality has diminished.

Expert literature concerning durability and specialist manufacturers of flame retardant and water repellent finishes suggest that between 50 and 100 wash cycles [170] or resistance to boil temperatures or dry cleaning may be suitable benchmarks for a flame retardant or water repellent durable finish. Relevant testing standards appear to be:

- ISO 6330:2001 (+ 2009 A1) which specifies textile washing and drying procedures
- BS 3426:36 which specifies testing for the stability of coated fabrics to domestic washing.

Further information is required on applicability to softeners and easy care, which may have a shorter lifespan of 5-10 wash cycles [171], as well as possible thresholds for the deterioration of finishes. Deterioration upon folding and creasing could also be a relevant consideration.

For some functions it is also the case that fibres, fabrics or membranes have been developed that minimise or avoid the need for surface finishes [172] e.g. inherently flame retardant fibres (such as WL Gore's Pyrad laminate [173]), densely woven cotton (such as Ventile fabric [174]), modal viscose fibres (such as Lenzing's MicroModal fibres [175]), polyester-cotton blends (such as easycare labelled products) and weatherproof

[170] USA National Research Council (2000) *Toxicological risks of selected flame retardant chemicals*, Sub-committe on flame-retardant chemicals, Committee on toxicology, National Research Council

[171] Momentive, *Magnasoft SRS70 softener*, Product datasheet

[172] DuPont, *Inherent versus treated flame retardant fabrics*, Accessed 2012, http://www2.dupont.com/personal-protection/en-us/dpt/article/flame-resistant-technology.html

[173] Gore Protective Fabrics, *Pyrad flame retardant*, Accessed 2012, http://www.goreprotectivefabrics.com/remote/Satellite/Military-Gore-Pyrad/GORE-PYRAD-Product

[174] Ventile Fabrics, Accessed 2012, http://www.ventile.co.uk/

[175] Lenzing, *MicroModal*, Accessed 2012, http://www.lenzing.com/en/fibers/lenzing-modal/micromodalr.html

membranes (such as Schoeller Dry Skin membranes [176]). These products reduce the need for finishes as well as associated curing processes, which are energy and water intensive. The criteria could therefore be used to promote the selection of alternative functional solutions.

[176] Schoeller, Accessed 2012, http://www.softshell.ch/en/fabric-groups/soft-shell/schoellerR-dryskin.html

5.0 PROPOSALS FOR NEW CRITERIA AREAS

In this section new areas suggested to be included in the criteria document are discussed and presented. These are in addition to the proposed new Criterion 10-13 which address the requirements of Article 6(6) and 6(7) of the Ecolabel Regulation and the new fitness for use Criterion. The new criteria areas proposed for this revision comprise:

- Supplier social responsibility
- Brand and retailer producer responsibility
- Consumer labeling advice

These new proposals have been formulated in response to the findings from the preliminary report. Specific considerations in formulating the criteria were the LCA findings identifying the key areas of environmental impact associated with textile production, current industry best practices and consumer expectations.

5.1 Corporate Social Responsibility

New criterion proposal	• Limited introduction of CSR into the ecolabel criteria, setting out minimum CSR and reporting standards • Provision to suspend licenses if non-compliance with minimum CSR standards is reported to Competent Bodies
Proposed criterion text	
Applicants shall ensure that the fundamental principles and rights at work as specified in the - International Labour Organisation's Core Labour Standards shall be observed by all production sites used to manufacture EU Ecolabelled products. The ILO Core Standards are: 029 Forced Labour 087 Freedom of Association and Protection of the Right to Organise 098 Right to Organise and Collective Bargaining 100 Equal remuneration 105 Abolition of Forced Labour 111 Discrimination (Employment and Occupation) 138 Minimum Age Convention 182 Elimination of the Worst Forms of Child Labour *Assessment and verification:* The applicant shall obtain reports on compliance from their production sites. These should be compiled and provided to Competent Bodies. Third party certification will be accepted as evidence of compliance. A license may be suspended or revoked if substantive evidence is received that ILO Core Labour Standards have been breached.	

AHWG1 technical discussion

Setting CSR criteria are relative new to the EU Ecolabel. But for the production of textiles CSR related issues are of great importance when it comes to customers expectations – which have become increasingly sensitised in recent years to social and environmental issues - and in order to avoid situations where EU Ecolabeled products may be produced by companies who have not addressed these issues. This could lead to bad press and, based on the recent experiences of a number of high profile brands and retailers [177], could reflect badly on the reputation of the EU Ecolabel.

CSR issues form an important part of the promotion of the Ecolabel to manufacturers in countries which supply the EU. In some countries where social and environmental standards may not be as high, organisations such as the United Nations Environment Programme (UNEP) are actively engaged in promoting the market opportunities created by the ecolabel [178]. Leading clothing retailers are also active in auditing their sub-suppliers performance due to the high consumer profile of these issues [179]. CSR criteria would re-enforce and reward this work.

This may be an area in which it will be difficult for the Competent bodies to evaluate documentation or to evaluate findings from audits. One possibility is therefore verification of compliance for productions sites by recognised third party assurance schemes. Schemes identified as being used by industry include:

- Business Social Compliance Initiative (BSCI)
- Global Social Compliance Programme (GSCP)
- Ethical Trading Initiative (ETI)
- Fair Labor Association (FLA)

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[177] The Guardian, *Gap, Next and M&S in new sweatshop scandal*, 8th August 2010, http://www.guardian.co.uk/world/2010/aug/08/gap-next-marks-spencer-sweatshops

[178] UNEP, *Enabling developing countries to seize ecolabel opportunities project*, Accessed 2012, http://www.unep.fr/scp/ecolabelling/

[179] See Marks & Spencer's Ethical Trading Policy http://corporate.marksandspencer.com/howwedobusiness/our_policies/ethical_trading *and* H&M's Code of Conduct http://about.hm.com/content/hm/AboutSection/en/About/Sustainability/Commitments/Responsible-Partners/Code-of-Conduct.html

- Fair Wear Foundation (FWF)
- Social Accountability 8000 (SA8000)
- Worldwide Responsible Apparel Production (WRAP)
- Global Reporting Initiative (GRI)

Codes of Conduct included within these schemes specifically address human rights, labour rights, working agreements and salaries and occupational health and safety issues.

The ecolighting criteria were the first Ecolabel criteria to introduce a CSR criterion in which reference is made to basic CSR standards [180]. Criteria within environmental schemes such as GOTS, Oeko-tex 1000 and Bluesign also address CSR issues and, provided that third party verification has been carried out, could be used as a harmonised compliance route.

An option to use existing third party verification routes would reduce the workload of the Competent Bodies whilst still ensuring there is a focus on these areas and would force the producers to actively evaluate if they are in compliance with the suggested criteria. It is important to note, however, that verification systems and the associated level of assurance they provide varies, with some only able to provide second party verification following self-assessment. This is reflected in the recent grading of a number of schemes by clothing association MADE-BY [181]. In situations where declarations may be questioned Competent Bodies could request the documentation backing the declaration.

Feedback from stakeholders

Opposing views were expressed by stakeholders.

On one hand the proposals were supported because this is a high profile issue for consumers and textiles are imported from 'high risk countries'. Manufacturers supported the proposal because it fitted with their existing CSR policies. SA8000 was mentioned as an example of an existing scheme to which stakeholders are

[180] Commission decision of 6 June 2011 on establishing the ecological criteria for the award of the EU Ecolabel for light sources

[181] MADE-BY, *Benchmark for social standards*, Accessed 2012, http://www.made-by.org/node/22

certified.

In contrast views were expressed that this criterion would be difficult to verify and would complicate certification given that 60% of textiles are imported and much of the remaining 40% is based on so-called 'grey' (unfinished) textile fabrics which are also imported.

In order to make the criterion manageable proposals included an ability to suspend licenses if a scandal occurs or non-compliance is reported, and third party proof of compliance based on the growing number of compliance schemes and reporting standards.

Follow-up research and proposed approach

Experience shared in the first meeting of the Ecolabel's Horizontal Task Force on Social Criteria has been used as the basis for further criteria development. The aim of the Task Force is to address if and how social criteria should be taken into account by the Ecolabel. The first meeting was held on the 5th March in Brussels. Experience was shared by Germany (representing the Blue Angel), Denmark (representing the Nordic Swan) and the Netherlands (Ministry of Infrastructure and the Environment presenting a GPP perspective):

- The Blue Angel has taken a view based on stakeholder opinion to focus on the International Labour Organisation's core conventions [182] which have been adopted as 'basic principles'. These conventions are contained within the ILO's Declaration on fundamental principles and rights and work [183]. Four tiers of verification were considered which ranged from self-verification to membership of multi-stakeholder initiatives. A key issue for them is the potential for this issue to result in scandals, therefore they have introduced

[182] International Labour Organisation, *Conventions and recommendations*, Accessed 2012, http://www.ilo.org/global/standards/introduction-to-international-labour-standards/conventions-and-recommendations/lang--en/index.htm

[183] International Labour Organisation*, ILO Declaration on Fundamental Principles and Rights at Work and its Follow-up,* http://www.ilo.org/declaration/thedeclaration/textdeclaration/lang--en/index.htm

the ability to terminate contracts (licenses) based on non-compliance and there are 'focal points' where stakeholders can submit complaints. Their experience is that process based verification is better than a pass/fail approach.

- The Nordic Swan has focused on minimum number of issues for compliance. Features of their approach are a requirement for open/public CSR reports and plans to audit against, a requirement for SA8000 compliance [184], and a license revocation option. Their experience is that is very difficult to comply fully with SA8000.
- The Netherlands have developed an approach to 'social public procurement' which is applied to larger contracts [185]. Their approach is based on, as a minimum, an annual requirement for supply chain risk assessment, self-declarations of 'reasonable endeavours' and/or certified performance against standards or codes established by supply chain initiatives. A list of supply chain initiatives that meet their qualifying criteria is published. Infringements reported by third parties or communities – so called countervailing powers – must be acted upon. Their research suggests that working hours and workplace safety pose the greatest risks.

A number of relevant principles and codes of conduct were also highlighted – including the UN 'Protect, respect, remedy' framework which promotes a due diligence approach, the UN Global Compact which is aimed at companies, OECD guidelines for multi-nationals, ISO26000 for multi-stakeholder reporting and industry initiatives such as BSCI and the CSR 2010 group.

It was also noted that the European Commission distinguishes between SME's and large companies in how they address this issue. DG Internal Market is preparing a new requirement for non-financial reporting by EU companies [186]. This will include

[184] Social Accountability International, SA8000 Standard, http://www.sa-intl.org/

[185] European Commission, First step for social criteria in procurement, December 2009, http://ec.europa.eu/enterprise/policies/sustainable-business/corporate-social-responsibility/reporting-disclosure/swedish-presidency/files/nat_laws_and_policy_init/nl_social_criteria_in_public_procurement_-_summary_en.pdf

[186] European Commission, *Non-financial reporting*, The Internal Market Directorate General, Accessed 2012, http://ec.europa.eu/internal_market/accounting/non-financial_reporting_en.htm

social and environmental performance. Requirements will be graded by company size.

Key points of relevance to product criteria development were:

- There is no precedent for achieving or successfully evidencing 100% compliance;
- It is better to focus on incremental improvement against minimum standards than absolute requirements;
- Avoid requirements that create potential for scandals and build-in routes to take action if they occur (a safety net);
- Requirements for due diligence can be applied to larger companies, whilst requirements applied to SME's should be less onerous;
- Third party initiatives and certifications can play a role in reducing the burden for CP's/procurers but they are costly and may not always be meaningful.

Proposal:

It is proposed that minimum criteria based on adherence to the eight ILO Core Conventions are introduced. Reference will be made to the specific conventions, building on the approach taken by the Ecolighting criteria and reflecting the approach taken by the Blue Angel. Applicants will be required to report on compliance and progress.

Competent Bodies would have the power to suspend licenses if significant breaches of ILO Conventions are reported and to revoke them if the breaches have been found to have occurred.

5.2 Design For Durability

Major changes	New criteria proposal.

AHWG1 criterion proposal

For consumer products the end-retailer would need to demonstrate that they had considered and implemented a minimum number of design improvement features that would make the product more durable for the consumer and have the potential to extend its useful life. Options could include:

- Stitching patterns
- Fabric re-enforcement in areas of wear
- Yarn selection and knitting patterns to reduce piling
- Other suggested design innovations…

Spare features such as fastenings and zips should also be made available, either to be provided with the product upon sale or via retailers or direct communication routes e.g. websites.

For specific high value garments (to be specified) repair services should be made available and/or promoted to consumers via retailers and direct communication routes e.g. websites. Repair services could be provided directly or via affiliations.

Assessment and verification: A design report is to be provided by the manufacturer and/or retailer identifying options, their potential benefit and the selected design feature(s). For specified types of garments evidence should also be provided for the availability of a repair service

Revised criterion proposal

Not proposed for further consideration. Elements of the original proposal to be incorporated into new proposal 4.3

AHWG1 technical discussion

Clothing design for greater product durability was highlighted by the preliminary report as a significant possible area of improvement. There could be the potential to encourage design innovation in line with areas of product innovation and differentiation by front runner brands such as US clothing brand Timberland who, for example, promote the additional durable features of their jean products [187]. Features could include double or triple stitching and the re-enforcement of areas of wear.

Whilst fixtures such as buttons and zips were not highlighted by the selected LCA studies as having significant environmental impacts from a production perspective, their loss or failure could result in an earlier disposal of the garment. A criteria could therefore be created that promotes greater longevity of garments by promoting the availability of spares – e.g. branded buttons, fasteners, zips – and aftercare repair services. The latter may be particularly applicable for higher value products e.g. outdoor clothing manufacturers such as the North Face offer this service via licensed retailers [188].

The most effective features and services to address, and the consumers perspective on maximising the lifespan of garments, will both require further investigation with input from stakeholders in order to refine the proposals for this criterion.

[187] Timberland, http://technology.timberland.com/en/category/apparel/

[188] The North Face, *Warranty and product care*, http://eu.thenorthface.com/tnf-eu-en/warranty-product-care/

Feedback from stakeholders

Comments from stakeholders suggested that whilst the proposal introduced a number of relevant ideas and was considered to be important it would be difficult to implement. The focus of the criterion requires clarification. There may also trade offs between greater durability and recyclability. The criterion may therefore be more relevant to extending the life of products.

The outdoor industry was cited as an example of best practice, with functional feedback being obtained from the field and product guarantees relating to functional integrity being provided with some products. Testing procedures are used to assess durability.

Proposal:

It is not proposed to develop this criterion proposal further.

Aftercare services are proposed to be incorporated into the proposals for new Criterion 4.3, thereby providing applicants with a wider range of options for compliance.

A new fitness for use criterion addressing the durability of finishes has also been proposed

5.3 Product Re-Use And Recycling

Major changes	New criteria proposal.
AHWG1 criterion proposal	
It is proposed that this criteria is applied to specific products in combination with a brand, retailer or manufacturers take-back route. Evidence would need to be provided based on feedback from remanufacturers on design improvements that would facilitate more efficient recovery of the fibres. Assessment and verification: Design report to be provided by the manufacturer and/or retailer identifying options, their potential benefit and the selected design feature(s) in conjunction with a specific take-back route.	
Revised criterion proposal	
Applicants that produce branded final products, or have a direct interface with textile consumers via retail stores or contractual agreements, shall make available at least one of the following textile recycling or re-use schemes. Schemes should enable consumers to return textile products for the purpose of either: 1. Repair or improvement of products in a way that facilitates continued use by the original purchaser; 2. Sorting and re-distribution of products so that they can be re-used by other consumers. An incentive should be provided for consumers to return their products; 3. Mechanical or chemical recycling of products into new clothing, accessories or interior textile products; 4. Mechanical or chemical recycling into other new products or components; Take-back of the product shall be arranged by the applicant, either directly via their own stores, via agreements with third parties or via payments made to accredited national producer responsibility schemes. The option selected should be made available for all ecolabelled product lines. Information about schemes should be provided to consumers on product labeling, in stores and via marketing and websites.	

Assessment and verification: The applicant shall provide information that demonstrates how the measure has been implemented. This shall include consumer-facing information, transaction records and waste contracts. Certifications provided by producer responsibility schemes shall be accepted as evidence.

AHWG1 technical discussion

This specific area was highlighted by the preliminary report as being of particular significance given the need to address the high and rising level of EU textile waste arisings. Estimates suggest that 14.6 million tonnes of waste are generated annually of which 3.9 m tonnes (27.5%) is estimated to be recycled or re-used [189].

The EU Ecolabel could promote the recycling of textiles by ensuring that EU Ecolabeled textiles can technically be recycled and/or by promoting the recovery and recycling of textiles, potentially through a combination of consideration at the design and material selection stage and through the promotion of retailer take-back schemes. Best practice is evidenced by US outdoor clothing brand Patagonia 'Common threads' and 'Capilene' polyester jacket recycling programmes. The product has been designed to form part of a closed loop garment take-back system to recover and chemically recycle the polyester fibre using Japanese manufacturer's Eco Circle system [190].

Consideration at an early design and materials selection stage can contribute to the design of closed loop recycling systems – so, for example, nylon 6 is technically currently preferable to nylon 6.6 but the availability of recycling options, as discussed in relation to the polyamide fibre criteria, is understood to currently be very limited. The ability to recycle fibre blends may also be an area for consideration – although often blends are chosen because they confer a fabric with benefits during the use phase [191].

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[189] Oakdene Hollins, *Studies on recyclable waste textiles in the context of the development of the End-of-Waste criteria for the EU Waste Framework Directive*, Report produced for JRC-IPTS European Commission, August 2010

[190] Teijin Fibres Ltd, *Eco Circle*, http://www.teijinfiber.com/english/products/specifics/eco-circle.html

[191] Kalliala,E.M, and P,Nousiainen, *Environmental profile of cotton and polyester-cotton fabrics*, AUTEX Research Journal Vol 1, No.1, 1999

Feedback from stakeholders

The end of life phase for textile products was felt to be an important focus for the revision. This criterion could be combined with Design for Durability.

The availability of take-back infrastructure and the economics of recycling are a consideration. Product closed loops are more costly because of the logistics. The important issue is to ensure products enter a take-back system. Options should include state controlled and private take-back schemes, with a preference for local recycling in order to avoid a shift of burdens as transport between continents would create significant environmental impacts. A number of LCA studies have looked at the benefits of recycling and re-use. Experience in France suggests that some products, such as blends create problems for the separation and recycling of fibres.

The material flow between retailers and wholesalers was also highlighted, including packaging and clothes hangers. The consumer could be better 'trained' to recycle clothes through messages on the packaging.

Examples were given of industry initiatives by Timberland (Earthkeepers 2.0), Marks & Spencers (with Oxfam) and Intimissimi (bra recycling into sound insulating board).

Follow-up research and proposed approach

A number of distinct areas of potential focus for the criterion were highlighted by stakeholders. For each area we have investigated evidence and examples that were cited:

Repairing and/or improving the product in support of continued use by the original purchaser

This approach has for a long-time been used by leading manufacturers of technical garments, with a focus by brands such as Berghaus, the North Face and Patagonia on products such as high performance jackets. Consumer are able to send garments to in-house or approved workshops where features such as taped seams, stitching

and waterproofing can be renewed [192]. The locations of these workshops may be regional, national or international. Data published by these manufacturers suggests that a substantial number of garments are repaired annually. To take one example, US manufacturer the North Face claims to have repaired 46,021 products globally in 2010 [193]. To the best of our knowledge an evaluation of the environmental benefits of these schemes has not been carried out.

Re-distribution of the product for further re-use by other consumers

A number of LCA studies have modelled the take-back cycles for the re-use of garments, with the overall consensus being that take-back for re-use has significant potential to deliver environmental benefits [194]. These studies assumed that consumers were able to return unwanted clothing to charities or recycling companies. In these systems clothing is collected and then sorted according to quality and suitability for re-sale. The EU re-use rate is estimated to be 7.3% (equivalent to approximately 1.1 m tonnes in 2009). A proportion is usually exported or downcycled into other products such as industrial wipers and non-woven fibre products.

Garments that have a higher re-sale value are critical in funding re-use schemes because the value of other end-markets has fallen substantially. A study in Denmark suggested that the purchase of 100 second hand garments by consumers would avoid the purchase of between 60 and 85 new garments, with the associated environmental benefits depending on the fibres [195].

This approach has been introduced by a number of EU retailers. A number of retailers such as the Gap, H&M and Marks & Spencers have introduced or trialled

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[192] Patagonia, *Recycled polyester*, http://www.patagonia.com/us/patagonia.go?assetid=2791 *and Patagonia supplier – Teijin*, http://www.patagonia.com/us/patagonia.go?assetid=68388

[193] The North Face, *Durable products*, http://eu.thenorthface.com/blog/eu/en/sustainability

[194] Woolridge, A.C, Ward, G.D, Phillips, P.S, Collins, M and S, Gandy, *Life cycle assessment for reuse/recycling of donated waste textiles compared to use of virgin material: a UK energy saving perspective*, Resources, Conservation and Recycling 46 (2006) 94–103 *and* Oakdene Hollins (2009) *Maximising Reuse and Recycling of UK clothing and textiles,* Report prepared for DEFRA

[195] Farrant, L, Olsen, S.I, & A.Wangel, *Environmental benefits from reusing clothes*, International Journal of Life Cycle Assessment (2010) 15:726–736

incentives to consumers [196]. Used goods that can be brought back to partner organisations, which are usually charities or social enterprises, and in some cases may be exchanged for store credits. Considerable consumer response has been reported by Marks & Spencers.

In France producer responsibility legislation has led to the establishment of take-back systems which retailers must pay into in order to meet their recycling requirements [197]. This appears to be stimulating sorting and reprocessing capacity, including the development of new equipment to shred clothing in order to recover fibres [198].

Mechanical or chemical recycling into textile products with a similar value and specification

This approach mainly focuses on polyester fabrics and has been introduced by technical clothing manufacturers WL Gore, Patagonia [199], Henri Lloyd [200] and Quiksilver. Consumers are able to return specifically labelled clothing items to the manufacturer via retailer networks. The garments are then returned to the original fabric manufacturer for chemical recycling into new polyester fibres.

Early attempts at this form of closed loop recycling did not meet with success. WL Gore decided to stop their 'Balance Project' in the early 2000's because of limited response from consumers [201]. Whilst schemes for the closed loop recycling of polyester are expanding, the current disadvantage is that because of the economies of scale required there are currently only two manufacturers able to chemically recycle polyester – Hyosung in Korea and Teijin in Japan – although it is notable that

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[196] Ecotextile New, *M&S recycles half a million in six weeks*, 18th June 2012 see also H&M, *Reduce, re-use and recycle*, http://about.hm.com/content/hm/AboutSection/en/About/Sustainability/Commitments/Reduce-Reuse-Recycle/consciousactions.html

[197] Eco TLC, http://www.ecotlc.fr/page-297-information-in-english.html

[198] Ecotextile News, *New from old*, April 2010 *see also* S.Frankenhuis & ZN http://www.frankenhuisenzoon.nl/

[199] Patagonia, *How to recycle Patagonia garments*, http://www.patagonia.com/us/patagonia.go?assetid=5175#recycle

[200] Henri Lloyd, *Blue Eco product line*, http://www.henrilloyd.com/sailing/blue-eco

[201] W.L.Gore, *Gore fabrics and the environment*, November 2007

Teijin has recently announced substantial plans for expansion of its Eco Circle system in China [202] and US manufacturer has initiated schemes to collect fibres [203]. A streamlined LCA carried out by Patagonia suggests that the environmental burdens associated with shipment from the EU to Japan are still substantially outweighed by the environmental benefits [204].

Mechanical or chemical recycling into high value products or components

This approach already exists in the wider market for textile recycling and has been explored by manufacturers such as Levi and retailers as Intimissimi [205]. Garments or items can be returned by consumers via retailer networks, with the potential benefit of creating cleaner, sorted waste streams for manufacturers. The garments are then used as the raw material to manufacture new products which benefit from the qualities of the specific textiles collected. Examples include insulation manufactured from denim [206], floor underlay and furniture and mattress fillings made from mixed fibres [207].

Cradle to cradle

Fibre and fabric chemistry can be modified in order to ensure that products can either safely biodegrade (in the case of natural fibres) or be recycled as 'technical nutrients' (in the case of synthetic fibres). Fibres must be screened in order to identify and eliminate hazardous substances that may prevent safe recycling or biodegradation.

Products can now be certified as being designed to be 'Cradle to Cradle' [208] – although the criterion and white lists of substances associated with certification are

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[202] Ecotextile News, *Joint venture boosts close-loop polyester textile recycling*, 9th August 2012

[203] Unifi, *Unifi launches the REPREVE textile take-back programme*, 27th November 2011, http://unifi.com/un_news_pr.aspx?id=43

[204] Patagonia, *Common Threads garment recycling programme: A detailed analysis*, http://www.patagonia.com/pdf/en_US/recycled_polyester.pdf

[205] Ecouterre, *Italian Lingerie Company Recycles Used Bras into Soundproof Insulation*, 12th August 2010, http://www.ecouterre.com/italian-lingerie-company-recycles-used-bras-into-soundproof-insulation/

[206] Bonded Logic, *Ultratouch denim insulation*, http://www.bondedlogic.com/

[207] Oakdene Hollins, *Studies on recyclable waste textiles in the context of the development of the End-of-Waste criteria for the EU Waste Framework Directive*, Report produced for JRC-IPTS European Commission, August 2010

[208] Cradle to Cradle Products Innovation Institute, http://www.c2ccertified.org/

not considered to be sufficiently transparent for the Ecolabel at this stage. Examples of companies that have certified products according to Cradle to Cradle include Victor Innovatex, Rohner Textil AG and Trevira CR [209].

Proposal:

It is considered that the focus of the criterion should be on the product itself as there is limited LCA evidence relating to packaging and, to a great extent, this is already addressed by the EU packaging regulations.

Whilst no single approach can be seen to represent a substantial proportion of the EU clothing market, or of specific niche markets, taken in combination they provide examples of the range of approaches being taken by the industry to reduce waste. Some of them initiatives of pro-active brands of retailers and some stimulated by national legislation.

An EU Ecolabel criterion could further encourage activity in this area by providing a clear focus on the collection of pre-sorted, high quality garments for re-use or recycling. Inclusion with a labelling scheme would also serve to engage with consumers on this issue and to stimulate innovation. This area of focus is of particular importance given rising EU textile waste arisings and the trend for short lived 'fast fashion'.

It is therefore proposed that the criterion is reframed in order to require applicants to implement at least one measure from a list of potential options. This would have the benefit of rewarding the different endeavours being made by industry whilst engaging with consumers and ensuring that the criterion is flexible.

[209] Cradle to Cradle Products Innovation Institute, *Certified products – textile and fabric*, http://c2ccertified.org/index.php/products/category/textile_fabric

5.4 Energy Saving Advice

Major changes	New criteria proposal.

AHWG1 criterion proposal

It is proposed that this criteria is fulfilled by the consumer labeling of garments and products:

- Temporary labelling and packaging should be used to promote consumer behaviour that will reduce washing temperatures and detergent use, as well as promoting full wash loads and the natural drying of textiles.

- Permanent GINETEX/care labeling should be used to support the energy saving aims of the criteria e.g. by lowering the advised washing temperature or by providing specific supporting advice in text form.

Assessment and verification: Evidence of labelling materials that accompany specific product lines is to be provided.

This should be supported by technical evidence of the potential benefits and practicality of the proposed measures for the targeted garment or fabric lines.

Revised criterion proposal

Applicants that produce branded products shall use marketing, packaging and swing tags to communicate energy saving measures to ecolabel consumers.

Applicants that have a direct interface with consumers via retail stores or websites should develop consumer-facing content and/or marketing material that communicates energy saving measures to ecolabel consumers.

Energy saving measures communicated should, as a minimum, include reduced recommended washing temperatures, the potential to minimise tumble drying, and washing and drying with full loads.

Care labelling may be altered to complement energy saving messages but this should not compromise the durability of the product. The print on the care tag must be indelible.

Assessment and verification: Applicants shall provide evidence in the form of example marketing material, packaging and swing tags. Where care labelling is

proposed to be altered in order to complement energy saving messages then the durability of the product must be tested according to ISO 6330.

AHWG1 technical discussion

The preliminary report highlighted the use phase as the most significant phase for textile environmental improvements. Although user behavior is not within the remit of the EU Ecolabel to regulate, the whole life significance of the use phase does suggest that opportunities to influence consumer choices should be explored.

One option for influencing user behavior is to provide consumers with information on how to save energy in combination with appropriate washing detergents. This approach has been adopted by UK retailer Marks & Spencers as part of their Plan A programme . Consumers have been encouraged to wash clothing at 30°C or less and with a full load, claiming at least 40% energy savings compared to average washing patterns [210]. Moreover, this approach can also be reflected in the swing tags and packaging provided with products or by using the GINETEX care labelling stitched into products in order to provide recommended energy and/or washing advice.

Feedback from stakeholders

At the first AHWG stakeholders noted that habits may vary by country (e.g. more line drying in south of Europe which may be complemented by higher temperature washing). Some products have care labels which apply across the EU so there was concern as to whether the advice might have to varied between different parts of Europe.

The criterion should ensure that any amendments to the guidance ensures that a garment is still cleaned adequately and does not deteriorate in quality. A distinguishment should be made between domestic and industrial/professional laundry conditions. The latter use less energy and chemicals.

Levi's Care Tag for the Planet initiative was highlighted. The use of messages printed oon packaging was suggested in addition to care labels.

[210] Marks & Spencers, *Keep clothes clean at 30 degrees*, http://plana.marksandspencer.com/you-can-do/climate-change/15/

Follow-up research and proposed approach

Identifying measures to promote

Whilst LCA studies highlight the importance of the use phase there are relatively few examples of the industry engaging with consumers to influence behaviour once they have purchased products. The IMPRO textile study modelled the improvement potential associated with a number of specific measures [211].

- Washing: Washing frequency, selected programme/options, programme temperature and load size;
- Drying: Drying frequency, selected programme/options, programme temperature and load size;
- Ironing: Ironing frequency, ironing time and ironing temperature.

Three measures were selected for modelling on their basis of their potential as highlighted by literature – washing temperature, tumble drying frequency and optimised loading of washing machines and tumble dryers. Load capacity optimisation and reduced washing temperatures were reported to have the greatest improvement potential across the selected LCA midpoint indicators. Ironing is more readily influenced by changes in easycare finishes and the introduction of fibre blends.

Survey data which has been used to inform the Ecodesign implementing actions for washing machines suggest that there is significant potential to reduce washing temperatures, although the potential varies across Europe and is not consistent with climatic variations [212]. The estimated average washing temperature in the EU 27 is 45.8 ^{o}C, although 60^{o}C is used for 23% of washes, and the average load is 3.2 kg based on an average of 4.6 wash cycles per household per week. Figure 3.3.1 summarises temperature setting choices for selected European countries.

[211] JRC-IPTS European Commission, *Environment Improvement Potential for Textiles (IMPRO*), Publication draft, May 2012

[212] ISIS, *Lot 14: Domestic washing machines and dishwashers*, Preparatory study for Ecodesign, December 2007

Tumble drying is influenced by ownership levels, which on average are 35%, and climatic conditions [213]. With drying being more costly there is a greater incentive to make more efficient use of the machine and to line dry whenever feasible. Optimisation of washing machine or tumble drying loads is, to some extent, also influenced by perceptions of cleanliness and convenience. Consumer research suggests that whilst habits relating to perceptions of cleanliness are difficult to change, and that convenience and cost are also important factors, there is significant evidence that they can be influenced [214].

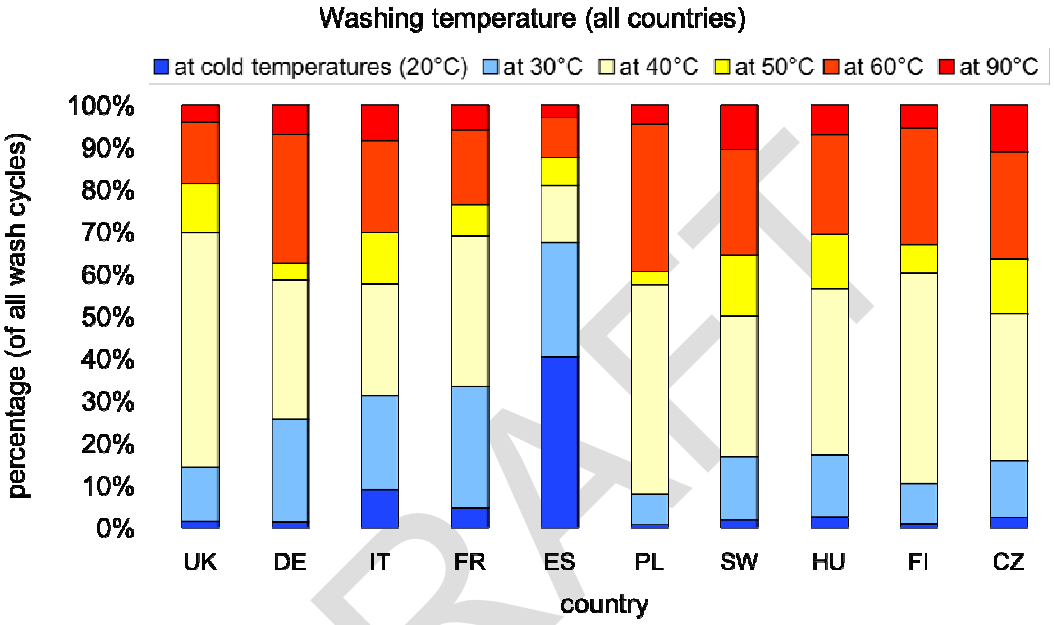

Figure 3.3.1 Temperature setting of washing machines in European countries

Source: ISIS (2007)

Examples from industry

The most high profile examples are Marks & Spencer in the UK and the Levi brand. The former has taken a multi-layered approach, using publicity campaigns,

[213] Price Waterhouse Coopers, *Lot 16 - Ecodesign of dryers, Preparatory studies for Ecodesign requirements*, March 2009

[214] Fisher T., Cooper T., Woodward S., Hiller A., and Goworek H. (2008) *Public Understanding of Sustainable Clothing*, A report to the Department for Environment, Food and Rural Affairs

messages on packaging and amendments to care labelling being used [215]. The latter has focussed on publicity campaigns and messages on packaging [216]. Literature on behavioural change and the environment suggests that the tailoring of the message and approach to different markets results in a greater impact. Joint marketing of low temperature detergents has also been undertaken.

Proposal:

The focus of the criterion should be broadened so that it recognises the potential to use marketing campaigns and packaging to communicate behavioural changes that may save energy and water during the use phase.

Specific measures that have been identified as having the greatest energy saving potential must, as a minimum, be communicated to consumers.

If care labelling is altered to complement energy saving messages then the durability of the product must be assured through suitable testing procedures based on washing and drying cycles [217]. The ink on the care label must be indelible to ensure the durability of the guidance.

[215] Marks & Spencers, *Keep clothes clean at 30 degrees*, http://plana.marksandspencer.com/you-can-do/climate-change/15/

[216] Levi Strauss & Co, *A care tag for our planet*, http://www.levistrauss.com/news/press-releases/care-tag-our-planet-levi-s-care-tags-promote-donating-goodwill-1-25-10

[217] Home Laundry Consultative Council, *Care labelling and standards*, http://www.care-labelling.co.uk/carelabellingstandards.html

~~*4.5 Avoidance Of Air Freight*~~

Major changes	• It is not proposed to take this criterion forward
AHWG1 criterion proposal	
It is proposed that this criteria is fulfilled by text accompanying the ecolabel that specifies that no fibre or fabric element of the finished product has been air freighted up to the point of sale. Retailers may also wish to provide their own separate labeling. *Assessment and verification: Documentary evidence to be provided of shipping and transit routes for fibres, finished textiles and/or finished products.*	
Revised criterion proposal	
The criterion is not proposed for further consideration.	

AHWG1 technical discussion

The preliminary report highlighted how the distribution phase is responsible for about 10% of the overall environmental impacts of textile products. The LCA studies selected assumed that long distance shipment is dominated by shipping (92%). Air transportation was assumed to be 8%. According to the LCA studies selected, per tonne-kilometre, air transportation has an approximately 100 times greater climate change impact than shipping [IMPRO, 2009].

The LCA findings showed a reduction in the environmental impact of approximately 40% if the air freight was lowered to a 4% modal share of distribution. Whilst care would need to be taken to ensure that a new environmental burden is created if clothes that are shipped require additional biocide treatments, the evidence still appears to point to there being a significant potential benefit.

Whilst the modal split may vary between product lines and retailers, and the Ecolabel should not be used to restrict trade, it is possible that an approach could be adopted similar to food labeling initiatives in the UK by retailers Marks & Spencers and Tesco.

Products that have been air freighted are identified on product labels. In this way consumer choice and transparency are promoted.

Feedback from stakeholders

At the first AHWG clarification was requested with regard to the LCA data used to justify the criterion – is it based on improvements across all the midpoints rather than just CO_2 emissions. Shipping was understood to perform better on CO_2 emissions but not on other emissions such as sulphur due to use of bunker fuel.

It was considered that the proposal may not always be realistic because of the lead-times within the industry. Air freight may therefore be needed to avoid having stock remaining.

It was suggested that the criterion could be retained as a CSR reporting issue rather than as a specific criterion with a labelling requirement.

Proposal:

Based on the views of stakeholders and the need to focus the attention on the use phase and end of life phase it is not proposed to take this forward.