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06/2025

Final report

The Implementation of the EU Textile Strategy

Terminology and definitions as a basis for the
derivation of possible ecodesign requirements

by:

Dirk Jepsen, Frederike Bartzsch & Anna Falkenstein
Ökopol – Institut für Ökologie und Politik GmbH, Hamburg

Dr. Edith Claßen

Hohenstein Institut, Bönningheim
Dr. Maike Rabe & Dr. Markus Muschkiet

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Abstract: The implementation of the EU Textile Strategy

In connection with the planned implementation of the EU Textile Strategy (COM (2022) 141 final), the aim of the project was to identify relevant terms relating to aspects of the material efficiency of clothing textiles and, if necessary, to specify them. These terms are to be used as a basis for the derivation of possible Ecodesign requirements.

Kurzbeschreibung: Die Umsetzung der EU-Textilstrategie

Im Zusammenhang mit der geplanten Umsetzung der EU Textilstrategie (KOM (2022) 141 final), war es Ziel des durchgeführten Sachverständigengutachtens, relevante Begriffe zu Aspekten der Materialeffizienz von Bekleidungstextilien zu identifizieren und ggf. zu konkretisieren. Diese Begriffe sollen als Grundlage für die Ableitung möglicher Ökodesign-Anforderungen herangezogen werden können.

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List of abbreviations

AATCC	American Association of Textile Chemists and Colorists
ASTM	American Society for Testing and Materials
COM/KOM	Commission of the European Union
DE-UZ	DE-UZ German Ecolabel (Blauer Engel)
DIN	Deutsche Institut für Normung e.V. (German Institute for Standardisation)
ECOS	Environmental Coalition on Standards
EN	European standard
EU	European Union
ISO	International Organization for Standardization
JRC	Joint Research Center
UBA	German Environment Agency

Summary

In connection with the planned implementation of the EU Textile Strategy (COM (2022) 141 final), the aim of the project was to identify relevant terms relating to aspects of the material efficiency of clothing textiles and, if necessary, to specify them. These terms are to be used as a basis for the derivation of possible Ecodesign requirements.

The work steps outlined below were carried out to address the above objective:

- ▶ Step 1: Identification of relevant basic conceptual structures and terms from the draft of the EU Ecodesign Regulation.
- ▶ Step 2: Checking the transferability of the relevant basic terminology to the field of clothing textiles and comparing the terms with other available definitions.
- ▶ Step 3: Research and compilation of terms that would in principle be suitable for formulating performance and information requirements for textile clothing during its use phase.
- ▶ Step 4: Preparation and implementation of a workshop with experts to present and discuss the compiled terms.
- ▶ Step 5: Incorporation of feedback from the expert round.

In order to make the results of the work as compatible as possible with the processes at the EU level, the following order of priority was used to identify, check and, if necessary, concretise the relevant terms:

1. terms used in the draft of the EU Ecodesign Regulation and other documents from the context of its implementation
2. terms used in other EU regulations
3. terms in (harmonised) standards and industry standards
4. terms found in the relevant research literature

Relevant terms from the draft of the EU Ecodesign Regulation

Following the analysis of the terminology in the draft of the EU Ecodesign Regulation with a view to a possible definition of material efficiency related Ecodesign requirements for textile clothing, some important results were identified:

There is a clear and hierarchical system of central terminology for the generally binding definition of mandatory Ecodesign requirements in general and material efficiency-related requirements in particular.

- ▶ Most of the **“basic terminology”** used in the draft regulation with a view to establishing mandatory Ecodesign requirements can also be used with sufficient clarity for clothing textiles.
- ▶ The basic environmental **product aspects** to be assessed and, where appropriate, made mandatory (according to Article 5) can also be used in relation to clothing textiles.
- ▶ The **product parameters** required for the operationalisation or measurability of the product aspects (according to Annex I), on the other hand, can only be directly transferred to clothing textiles to a limited extent. Here, further underpinning with textile-specific terms and term systems is required.

Therefore, in the project framework, the relevant specific product parameters were derived for the product aspect of “**durability/reliability**” of **clothing textiles** in relation to the typically expected utility/functional properties. These are:

- ▶ Resistance to stresses from usage
- ▶ Maintainability and/or refurbishability
- ▶ Repairability and/or manufacturing

As a basis for an objectified and transparently interpretable performance assessment of these three product parameters, further underpinning by concrete performance parameters, performance requirements and performance testing are required.

The experts compiled corresponding definitions of terms, test norms and test standards as well as existing performance requirements. These are systematically prepared and presented in the overall report. The following results can be summarised:

For the product parameter “resistance to stresses from usage”

No standardised usage models could be identified with which the resistance to stresses from usage can be assessed and/or subsequently classified into classes of performance.

- ▶ A wide set of defined performance parameters is available:
 - both for basic functions & functionalities
 - as well as for resistance to
 - Mechanical impacts
 - Chemical impacts
 - Physical impacts.
- ▶ Standardised Performance testing methods are available for these performance parameters almost throughout.

For the product parameter “maintainability and/or refurbishability”

- ▶ Standardised terms are available for the basic processes of maintenance (washing, cleaning, drying, ...) of clothing textiles.
- ▶ In the area of refurbishment, on the other hand, there is a lack of corresponding standardised terminology, e.g. for the renewal of functional equipment.
- ▶ Both (standardised) models for the individual processes and assumptions on the type/number of different “usual” washing & cleaning processes during the intended service life of the clothing textiles could be found. With regard to the practical relevance of these assumptions, however, there were justified doubts during the expert discussions. This means that (also) here, a possible future definition of performance requirements or classes of performance will probably require further technical coordination.
- ▶ Suitable standardised test specifications exist for a large number of performance parameters.

For the product parameter “Repairability and/or remanufacturing”

- ▶ The terminology from the draft EU of the Ecodesign Regulation for the process of repair can largely also be transferred to clothing textiles without restriction.
- ▶ The process of “upgrading” in its present definition states the possibility of improving functionality or performance. An aspect that was classified as rather inappropriate for clothing textiles from the point of view of the experts involved.
- ▶ Many of the proposals for performance parameters on reparability from the draft of the EU Ecodesign Regulation can also be applied in principle to clothing textiles. However, these parameters must i) be further operationalised for each product group and ii) depend on which accompanying structures are (to be) established in the market environment of repair.

Zusammenfassung

Im Zusammenhang mit der geplanten Umsetzung der EU Textilstrategie (COM (2022) 141 final) war es Ziel des durchgeführten Vorhabens, relevante Begriffe zu Aspekten der Materialeffizienz von Bekleidungstextilien zu identifizieren und ggf. zu konkretisieren. Diese Begriffe sollen als Grundlage für die Ableitung möglicher Ökodesign-Anforderungen herangezogen werden können.

Zur Bearbeitung der vorstehenden Zielstellung wurden die nachfolgend skizzierten Arbeitsschritte durchgeführt:

- ▶ Schritt 1: Identifikation relevanter grundlegender Begriffsstrukturen und Begriffe aus dem Entwurf der EU-Ökodesign-Verordnung.
- ▶ Schritt 2: Prüfung der Übertragbarkeit der relevanten Grundbegriffe auf den Bereich der Bekleidungstextilien und Abgleich der Begrifflichkeiten mit weiteren verfügbaren Definitionen.
- ▶ Schritt 3: Recherche- und Zusammenstellung von Begriffen, die grundsätzlich geeignet wären, Leistungs- und Informationsanforderungen an textile Bekleidung während ihrer Nutzungsphase zu formulieren.
- ▶ Schritt 4: Vorbereitung und Durchführung eines Workshops mit Fach-Expert*innen zur Vorstellung und Diskussion der zusammengestellten Begrifflichkeiten.
- ▶ Schritt 5: Einarbeitung von Feedback aus der Expert*innen-Runde.

Um die Arbeitsergebnisse möglichst direkt anschlussfähig an die Prozesse auf der EU-Ebene auszugestalten, wurde bei der Identifikation, Prüfung und ggf. Konkretisierung entsprechender Begrifflichkeiten nach der folgenden Rangfolge vorgegangen:

1. Begriffe aus dem Entwurf der EU-Ökodesign-Verordnung und anderen Dokumenten aus dem Kontext ihrer Umsetzung
2. Begriffe aus anderen EU-Regelungen
3. Begriffe (harmonisierter) Normen und Branchen-Standards
4. Begriffe aus der einschlägigen Forschungsliteratur

Einschlägige Begrifflichkeiten aus dem Entwurf der EU-Ökodesign-Verordnung

Die durchgeführte Analyse der Begrifflichkeiten des Entwurfes der EU-Ökodesign-Verordnung mit dem Blickwinkel auf eine mögliche Festlegung materialeffizienzbezogener Ökodesign-Anforderungen für textile Bekleidung ergab einige wichtige Ergebnisse:

Es gibt ein klares und hierarchisches System zentraler Begrifflichkeiten zur allgemein verbindlichen Festlegung verbindlicher Ökodesign-Anforderungen im Allgemeinen und materialeffizienzbezogener Anforderungen im Speziellen.

- ▶ Die meisten, im Verordnungsentwurf mit Blick auf die Festlegung verbindlicher Ökodesign-Anforderungen verwendeten, „**grundlegenden Begriffe**“ lassen sich mit ausreichender Klarheit auch für Bekleidungstextilien verwenden.
- ▶ Die grundlegenden, zu prüfenden und ggf. verbindlich zu unterlegenden umweltbezogenen **Produktaspekte** (gemäß Artikel 5) können auch in Bezug auf Bekleidungstextilien verwendet werden.

- ▶ Die zur Operationalisierung oder Messbarkeit der Produktaspekte notwendigen **Produktparameter** (gemäß Anhang I) lassen sich dagegen nur begrenzt direkt auf Bekleidungstextilien übertragen. Hier bedarf es der weiteren Unterlegung mit textilspezifischen Begriffen und Begriffssystemen.

Im Projektrahmen wurden deshalb für den **Produktaspekt der „Haltbarkeit/Zuverlässigkeit“ von Bekleidungstextilien**, die im Verhältnis zu den typischerweise erwarteten Nutzen-/Funktionseigenschaften relevanten spezifischen Produktparameter abgeleitet. Dies sind:

- ▶ Widerstandsfähigkeit gegen Belastungen aus der Nutzung
- ▶ Wartbarkeit und/oder Überholbarkeit
- ▶ Reparierbarkeit und/oder Aufarbeitbarkeit.

Als Basis für eine objektivierte und transparent interpretierbare Leistungs-Beurteilung dieser drei Produktparameter bedarf es einer weiteren Unterlegung durch konkrete Leistungsparameter, Leistungsanforderungen und Leistungsprüfungen.

Von den Gutachter*innen wurden entsprechende Begriffsdefinitionen, Prüfnormen und Prüf-Standards sowie vorliegende Leistungsanforderungen zusammengestellt. Diese werden im Gesamtbericht systematisch aufbereitet und dargestellt. Zusammenfassend lassen sich die folgenden Ergebnisse benennen:

Für den Produktparameter „Widerstandsfähigkeit gegen Belastungen aus der Nutzung“

- ▶ Es konnten keine standardisierten Nutzungsmodelle identifiziert werden, mit der die Widerstandsfähigkeit gegen Belastungen aus der Nutzung beurteilt und/oder später in Leistungsklassen eingeteilt werden kann.
- ▶ Es ist ein breites Set an definierten Leistungsparametern verfügbar:
 - sowohl für grundlegende Funktionen & Funktionalisierungen
 - als auch für die Widerstandsfähigkeit gegen
 - Mechanische Belastungen
 - Chemische Belastungen
 - Physikalische Belastungen.
- ▶ Es liegen für diese Leistungsparameter fast durchgehend normierte Leistungsprüfmethoden vor.

Für den Produktparameter „Wartbarkeit und/oder Überholbarkeit“

- ▶ Für die grundlegenden Prozesse der Wartung (Waschen, Reinigen, Trocknen, ...) von Bekleidungstextilien liegen standardisierte Begrifflichkeiten vor. Im Bereich der Überholung fehlen dagegen z. T. entsprechend standardisierte Begrifflichkeiten z. B. für die Erneuerung funktionaler Ausrüstungen.
- ▶ Es konnten sowohl (standardisierte) Modelle für die einzelnen Prozesse als auch Annahmen zur Art/Anzahl der unterschiedlichen „üblichen“ Wasch- & Reinigungsprozesse während der vorgesehenen Nutzungsdauer der Bekleidungstextilien gefunden werden. In Bezug auf die Praxisnähe dieser Annahmen gab es im Rahmen der Expert*innen-Diskussionen allerdings

begründete Zweifel. D. h. (auch) hier bedarf es für eine mögliche zukünftige Festlegung von Leistungsanforderungen oder Leistungsklassen voraussichtlich einer weitergehenden Fachabstimmung.

- ▶ Für eine größere Zahl von Leistungsparametern liegen geeignete normierte Prüfvorgaben vor.

Für den Produktparameter „Reparierbarkeit und/oder Aufarbeitbarkeit“

- ▶ Die Begrifflichkeiten aus dem Entwurf der EU-Ökodesign-Verordnung für den Prozess der Reparatur lassen sich weitgehend ohne Einschränkung auch auf Bekleidungstextilien übertragen.
- ▶ Der Prozess der „Nachrüstung“ konstatiert in seiner vorliegenden Definition die Möglichkeit der Verbesserung der Funktionalität oder Leistung. Ein Aspekt, der für Bekleidungstextilien aus Sicht der beteiligten Expert*innen als eher nicht passend eingeordnet wurde.
- ▶ Viele der Vorschläge für Leistungsparameter zur Reparierbarkeit aus dem Entwurf der EU-Ökodesign-Verordnung an die Reparierbarkeit lassen sich vom Prinzip her auch auf Bekleidungstextilien übertragen. Diese Parameter sind dabei allerdings i) durchgehend produktgruppenspezifisch weiter zu operationalisieren und ii) abhängig davon, welche begleitenden Strukturen im Marktumfeld des Reparierens etabliert werden (sollen).

1 Background and objectives of the project

1.1 Context

The EU Textile Strategy of March 2022¹ refers comprehensively to the challenges associated with the planned shift towards a sustainable and circular economy-oriented textile industry.

First and foremost, this EU Strategy addresses the planned introduction of mandatory ecodesign requirements in the area of starting points and measures to address these challenges (section 2).

Here, the EU Commission specifically plans to „develop binding product-specific ecodesign requirements to increase textiles’ performance in terms of durability, reusability, reparability, fibre-to-fibre recyclability and mandatory recycled fibre content, to minimise and track the presence of substances of concern and to reduce the adverse impacts on climate and the environment.“²

1.2 Assignment of tasks and approach

Against this background, the Federal Environment Agency has commissioned the project „The implementation of the EU Textile Strategy – Terminology and definitions as a basis for the derivation of possible ecodesign requirements“. The aim of the project is to concretise and define relevant terms on aspects of material efficiency for the field of clothing textiles³. These terms are to serve as a basis for the derivation of possible ecodesign requirements.

In order to work on the above objective, the following work steps were carried out in two project phases:

Analysis and research (desktop research)

- ▶ Step 1: Identification of relevant basic term structures and terms from the draft of the EU Ecodesign Regulation.
- ▶ Step 2: Examination of the transferability of the relevant basic terminology to the field of clothing textiles and comparison of the terms with other available definitions.
- ▶ Step 3: Research and compilation of terms that would in principle be suitable for formulating performance and information requirements for textile clothing during its use phase.

Phase 2: Discussion and feedback (expert workshop)

- ▶ Step 4: Preparation and implementation of a workshop with experts to present and discuss the compiled terms.
- ▶ Step 5: Incorporation of feedback from the expert round. The results of the workshop are included in sections 4 to 6.

¹ See COM (2022) 141 final.

² Cf. *ibid.*, p.3.

³ In accordance with the EU Labelling Regulation for Textile Products (EU/1007/2011), clothing products e.g. made of leather (or other substrates of non-textile materials) are not considered. Shoes, bags, decorative articles, home textiles or furniture (upholstery) fabrics are also not the subject of this project. Clothing textiles that are specifically intended for the area of "personal protective equipment" (PPE) or other workwear are also excluded from the research - due to their special functional requirements as well as the specific usage situations.

To ensure that the results of the work are as directly compatible with the processes at the EU level as much as possible, the following order of priority was used to identify, check and, if necessary, concretise the relevant terms:

1. Terms from the draft of the EU Ecodesign Regulation and other documents from the context of its implementation (note: all terms originating from this draft regulation are set in “fuchsia” in this document)
2. Terms from other EU regulations
3. Terms of (harmonised) standards and industry standards
4. Terms from the relevant research literature

2 The concept of “material efficiency”

2.1 Material efficiency as a guiding principle of product policy

Improving the so-called “material efficiency” of products over their entire life cycle and thus reducing the negative environmental impacts associated with material production have been among the central guiding principles of European environmental policy for many years.⁴

A systematic understanding of the concept of material efficiency is an important prerequisite for the definition of binding minimum requirements for apparel textiles in this area.

2.2 Approaches on increasing material efficiency

The environmental policy goal of increasing material efficiency is based on the fundamental consideration that the technical materials produced using natural resources should be used as efficiently as possible within the technosphere in order to provide the maximum civic/functional benefit for a defined quantity of technical materials.

There are three basic approaches to increasing material efficiency:

Approach I: Increasing the efficiency of the materials used in the product itself

The efficiency of the material going into the product itself (“material input in the narrower sense”) can be increased by implementing the following approaches⁵:

1. With the same amount of (similar) material, an increased benefit is provided. This can typically be done by:
 - a) Prolonged use for the same purpose / by the same user
 - b) A repeated (re)use (if necessary after reprocessing or preparation for reuse).
 - c) More intensive use (e.g. through sharing concepts) in the same (total) period of use.
2. The same benefit is achieved by reducing the amount of (similar) material used. This can partly be achieved by
 - d) implementation of “lightweight construction” concepts, i.e. checking whether the quantities of material used for the various components of the overall product can be reduced without impairing the required (functional) benefit. Functional “upgrading” of the material, e.g. through appropriate structuring⁶ and/or functionalisation⁷, is also part of this approach to material efficiency.

The latter approach (d), however, is rather less relevant for clothing textiles according to the experts.

⁴ See, for example, the comments in EEB (2015): Delivering resource-efficient products - How ecodesign can drive a circular economy in Europe, p. 11 ff.

⁵ Cf. the comments by Jepsen, Dirk in: EcoDesign Kit - Ökodesign-Prinzipien “Ressourceneffizienz”, <https://ecodesignkit.de/oekodesign-prinzipien/ressourceneffizienz>, last checked 12.06.2023.

⁶ In the case of metallic materials, for example, through the corresponding “alignment” of the lattice networks or, in the case of plastics, through a targeted extension/strengthening or entanglement of the polymer chains.

⁷ This is usually done by adding appropriate functionalising additives or (in the case of metals) alloying components.

Approach II: Increasing the efficiency of the materials used in the (entire) production chain

The efficiency of the total materials used for the production of the product (including the material expenses for the production processes, etc. = material input in the broader sense) can also be increased beyond the approaches already mentioned above by:

- ▶ materials are used for the same functional benefit that require less (preliminary/auxiliary) material for their production.
In particular, these are typically recycled materials (recyclates). In principle, however, “primary” materials from more (material-)efficient pre-production chains can also “pay into” this ecodesign strategy.

Clearly set apart from these two levels of consideration is the third fundamental approach to increasing material efficiency.

Approach III: Increasing the resource efficiency of materials used throughout the manufacturing chain

In applying this frame of reference, not only the pure quantities of (“similar”) materials are taken into account, but also the demands on “natural resources” associated with their respective extraction and production - i.e. not only “material quantities” are considered, but also the effects of material use on natural resources such as natural soils, biodiversity, groundwater resources, etc. This perspective is particularly relevant for basic material alternatives such as wool, cotton or synthetic fibres - which are relevant in some areas of the textile industry.

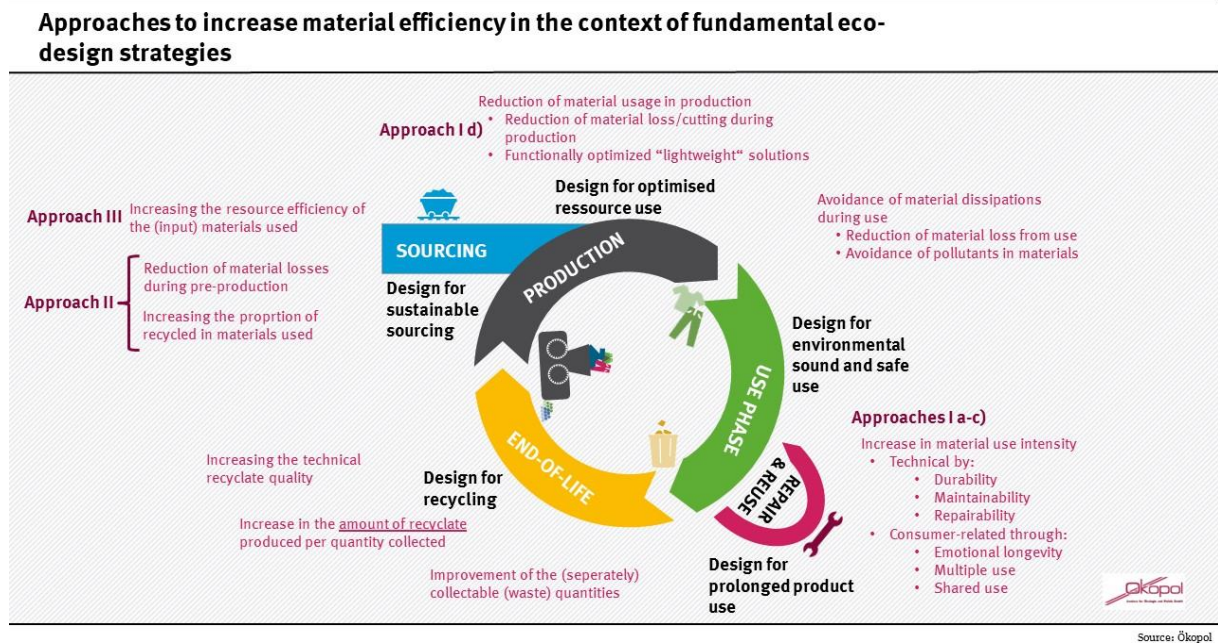
This perspective is undoubtedly of great ecological importance, especially for the basic material alternatives such as wool, cotton or synthetic fibres, which are relevant in some areas of the textile industry. However, there are (unchanged) fundamental methodological challenges and uncertainties in the assessment of corresponding material substitutions.

2.3 Starting points for increasing material efficiency within the framework of basic ecodesign strategies

Figure 1 below shows how the approaches described above for increasing material efficiency can be assigned to the basic ecodesign strategies⁸ that can be effective along the various stages of a circular product life cycle.

⁸ The systematisation of eco-design strategies on which the chart is based was developed and published by Ökopol for the publication ECOS (2019).

Figure 1: Approaches to increase material efficiency in the context of basic ecodesign strategies



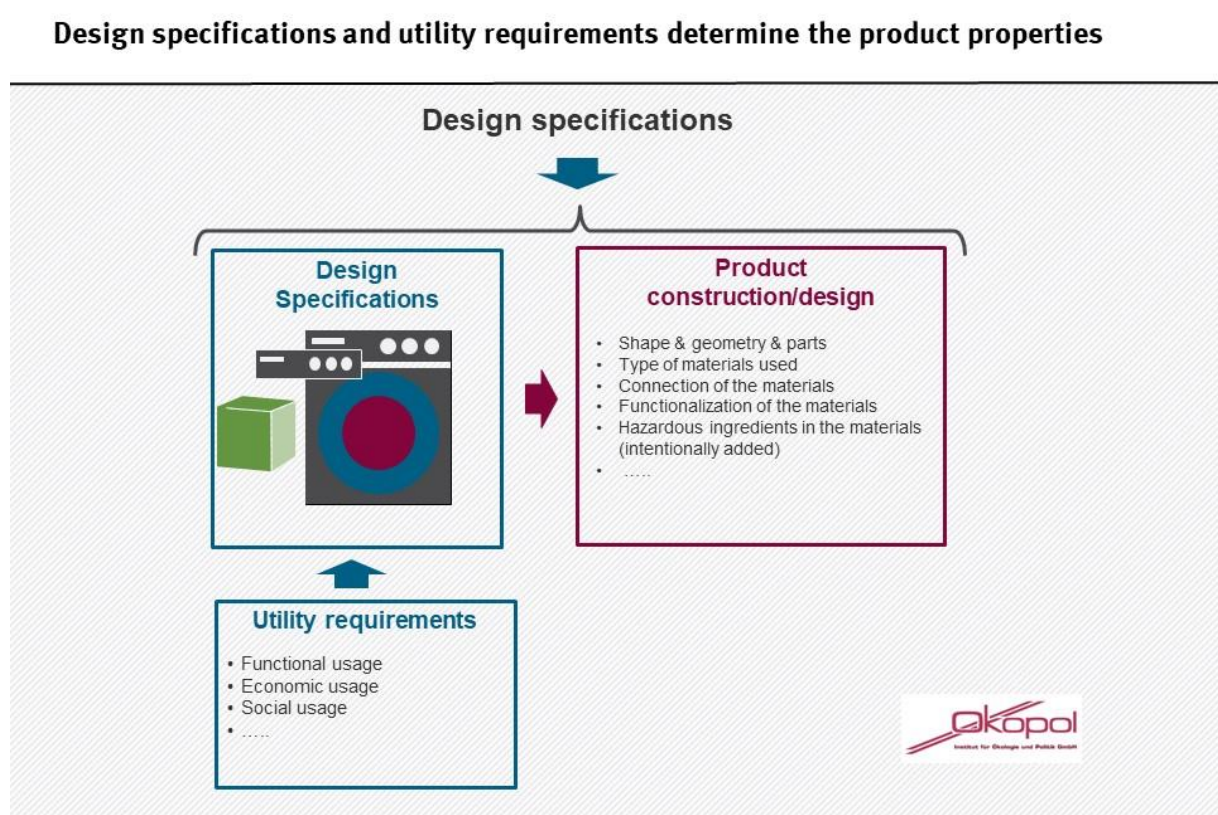
Source: Ökopool, own illustration

This project focuses on requirements for “technical” product design within the design strategy “Design for prolonged product use”.

3 The relationship between Ecodesign requirements and environmental impacts

For the further work in this project, it is important to precisely understand the interplay of benefit requirements and ecodesign requirements, corresponding design variants and product properties and the resulting environmental impacts in the upstream and downstream processes of product manufacture and product use/disposal. Therefore, these interrelationships are explained again step by step in the following. The following illustration shows how basic product properties are (or can be) defined by ecodesign requirements.⁹

Figure 2: Design requirements and utility requirements determine the product properties



Source: Ökopoi

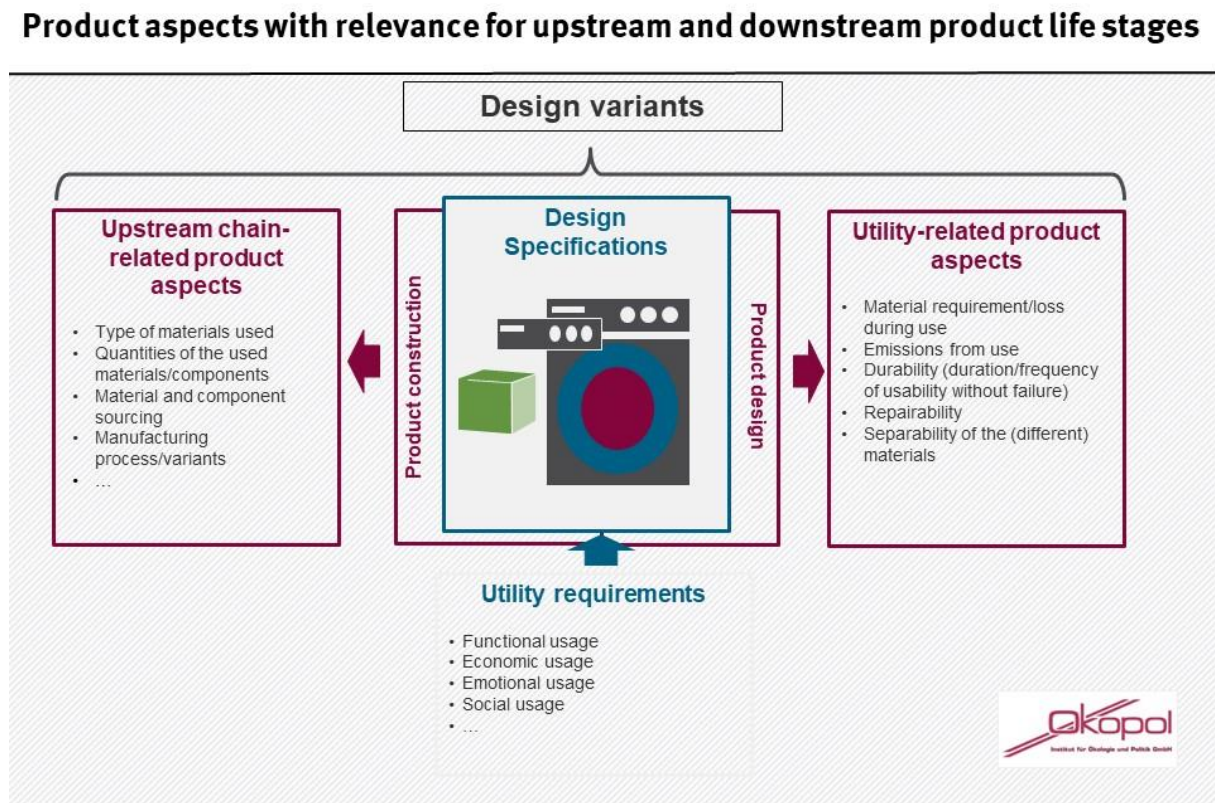
Source: Ökopoi, own illustration

It is important here that the product benefits remain constant for different possible design solutions ("design variants") or that the corresponding utility requirements are implemented.

The product properties defined in the design process result in "product aspects" that are relevant with regard to the environmental impact in the upstream or downstream life cycle stages. The following diagram also shows this schematically.

⁹ The methodological differentiation into product and process properties was developed by Jepsen et al 2010-2012 as part of the research project "Integration of resource efficiency into the Ecodesign Directive", FKZ 370895 300 (unpublished).

Figure 3: Product aspects with relevance for the upstream and downstream life cycle stages



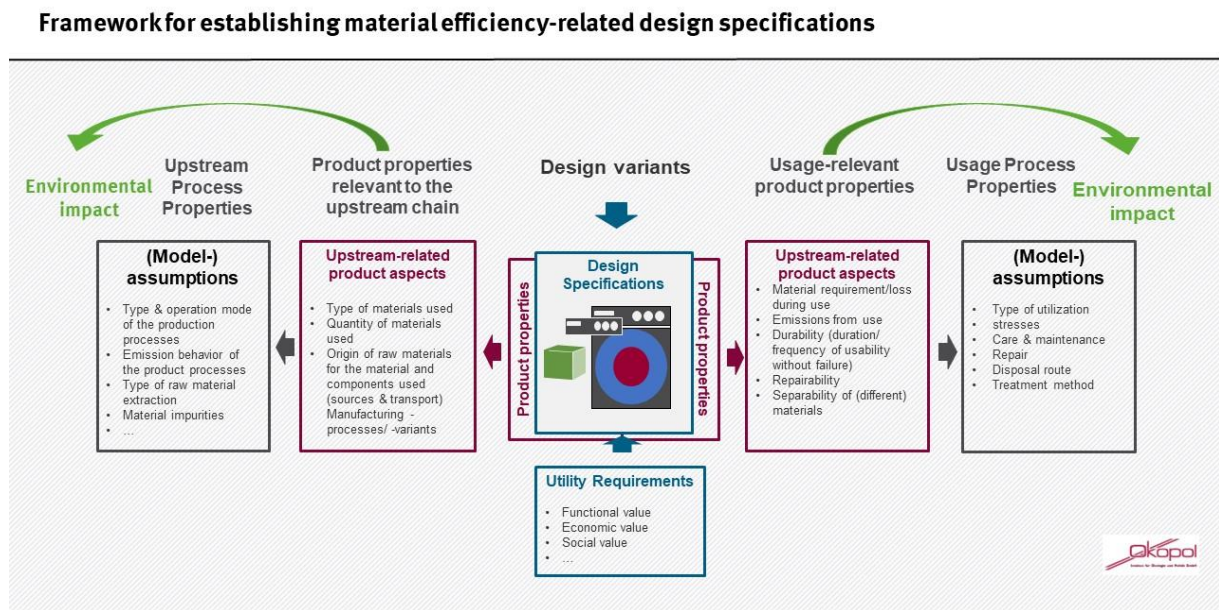
Source: Ökopool

Source: Ökopool, own illustration

However, the environmental impacts or, more precisely, the intended environmental benefits of an ecodesign approach do not result from the changed product aspects as such, but only from their influence on the respective upstream and downstream processes or process chains.

If the environmental effects are to be estimated and assessed, it is necessary to make (model) assumptions about the characteristics of the upstream and downstream processes (e.g. the specific type and manner of use or subsequent disposal). The following diagram shows this relationship schematically.

Figure 4: Framework for determining material efficiency-related ecodesign requirements



Source: Ökopol, own illustration

3.1 Definition of specifications for ecodesign requirements

3.1.1 Derivation of classes of performance

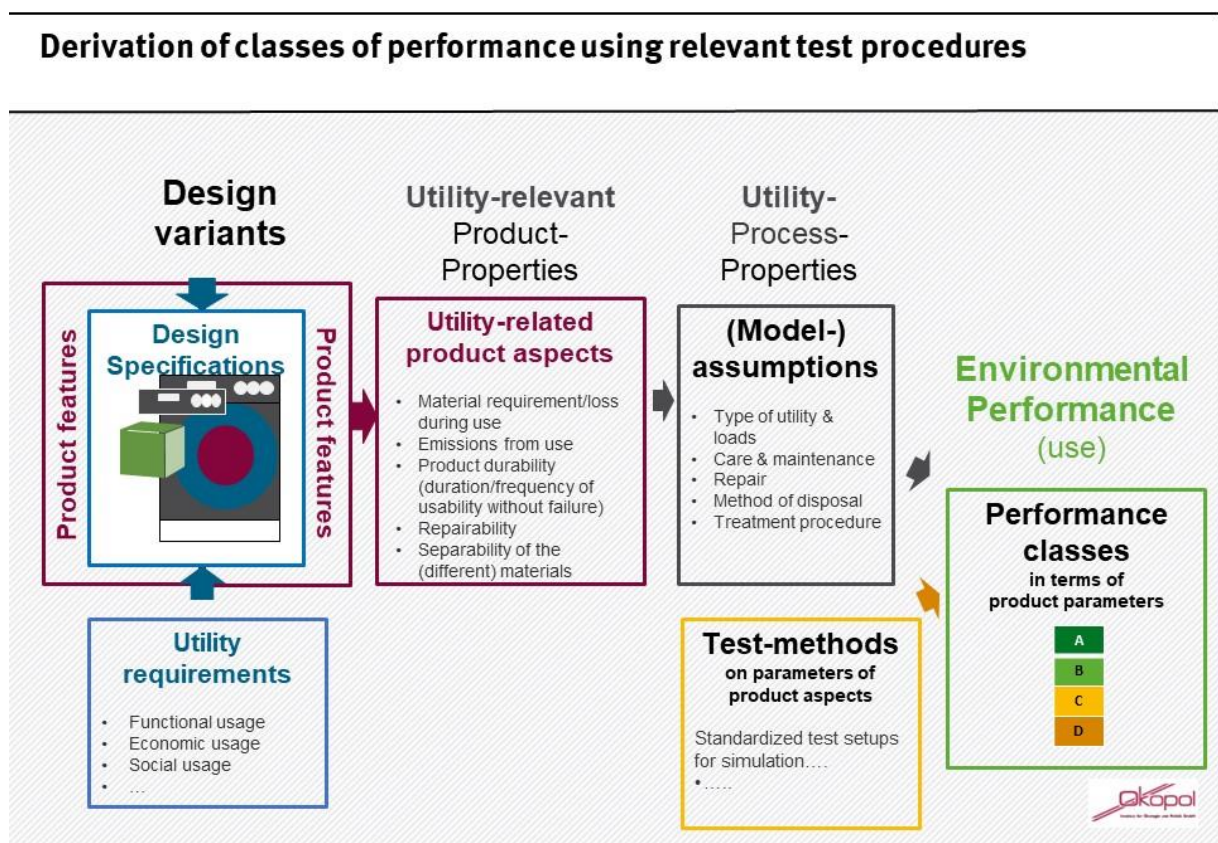
In order to be able to define binding specifications for ecodesign requirements in the area of material efficiency (but also in other areas) in a clear and legally secure manner based on these methodological relationships, it is necessary to determine the environmental “performance” of the various products determined by the design.

For this purpose, appropriate product test procedures are used for various “performance parameters” that are related in content to the relevant product aspects, where available. By reverting to the (model) assumptions, e.g. for the process of a typical use, the (environmentally relevant) performance of the respective design variant or the respective concrete product can thus be “measured”.

From a larger number of correspondingly “measured” performance values for different design variants or products that all provide the same (functional) benefit, either benchmarks for the (environmental) performance or discrete (environmental) classes of performance can be derived in this way.

On this basis, a concrete (new) design or product can be assigned to a more or less “good” class of performance on the basis of its measured performance values.

Figure 5: Derivation of classes of performance using relevant test procedures



Source: Ökopol

Source: Ökopol, own illustration

The benchmarks for (environmental) performance or classes of performance established as outlined can become the subject of regulatory minimum requirements in the process of establishing binding product specifications.

Either in the form of “May be placed on the EU market?” – “Yes/No” or in the form of mandatory consumer information, e.g. the requirement to indicate the respective class of performance of the product.

3.1.2 Necessity of precise terminology and corresponding definitions

For a legally secure formulation of legally binding ecodesign requirements or (minimum) performance requirements, it is necessary that precise and standardised terminology is used in the various areas of this regulatory concept, i.e. especially in the area of functional product aspects, product/performance parameters and performance testing/measurement.

With regard to the field of clothing textiles, which is the focus here

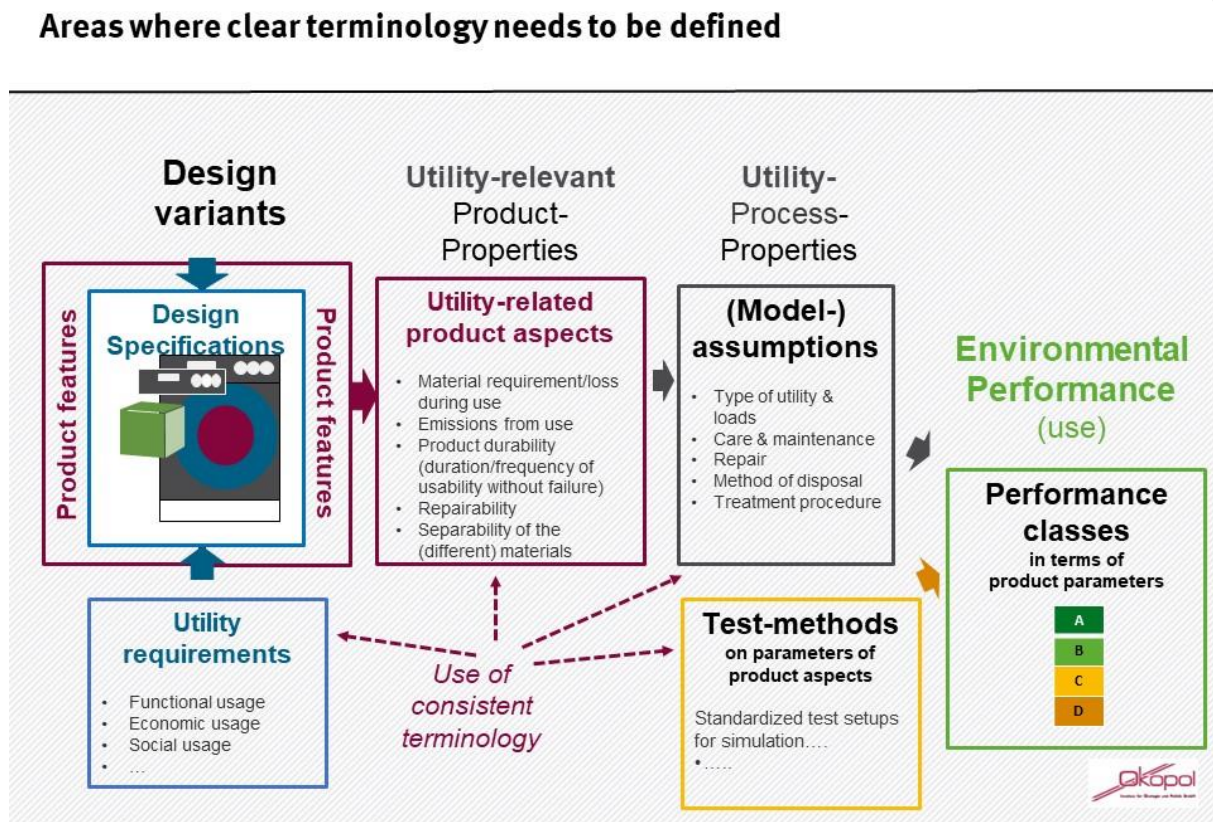
- ▶ the basic terminology of the EU Ecodesign Regulation can be applied appropriately to clothing textiles;
- ▶ the product aspects relevant to material efficiency from the Ecodesign Regulation can be transferred to corresponding product aspects for clothing textiles;

- ▶ product parameters/performance parameters that are suitable for operationalising (performance measurement) the relevant product aspects can be identified for clothing textiles.

In which areas are there still gaps in the conceptual systems that should be closed by definitional specifications?

The following illustration shows a schematic overview of the areas:

Figure 6: Areas in which clear terminology needs to be defined



Source: Ökopol

Source: Ökopol, own illustration

4 Identification and definition of standardised terms

4.1 Relevant terminology in the draft of the EU Ecodesign Regulation

As a basis for the further work, it was necessary to systematically check the key articles of the draft of the new EU Ecodesign Regulation for terms that are relevant for the definition of binding minimum requirements for material efficiency.

In each case, it was also examined whether they can be applied to clothing textiles - in the context of the task of the project - or whether, if necessary, synonymous terms of the same kind already have to be found.

4.1.1 Relevant terms in the area of Article 1: Subject matter and scope of application

Below is the wording of Article 1, which sets out, among other things, what the ecodesign requirements, which will be further specified in the delegated acts, may specify. In the subsequent articles (cf. Article 5 below), “product aspects” are referred to in this context.

The terms marked in “**fuchsia**” are relevant here and in the context of the other articles for the definition of binding requirements for material efficiency.

Article 1

Subject matter and scope

(1) *This Regulation establishes a framework to improve the environmental sustainability of products and to ensure free movement in the internal market by setting **ecodesign requirements** that products shall fulfil to be placed on the market or put into service. Those ecodesign requirements, which shall be further elaborated by the Commission in delegated acts, relate to:*

*(a) product **durability** and **reliability**;*

*(b) product **reusability**;*

*(c) product **upgradability, reparability, maintenance and refurbishment**;*

(d) the presence of substances of concern in products;

(e) product energy and resource efficiency;

*(f) **recycled content** in products;*

*(g) product **remanufacturing and recycling**;*

(h) products' carbon and environmental footprints;

(i) products' expected generation of waste materials.

*This Regulation also establishes a **digital product passport** ('product passport'), provides for the setting of mandatory green public procurement criteria and creates a framework to prevent unsold consumer products from being destroyed.*

(2) ***This Regulation shall apply to any physical good** that is placed on the market or put into service, including **components and intermediate products**. However, it shall not apply to [...]*

4.1.2 Relevant terms in the area of Article 2: Definition of terms

Article 2 of the draft of the new EU Ecodesign Regulation lists and defines a large number of terms relevant for the correct interpretation and implementation of this Regulation.

4.1.3 Article 3: Free movement of goods

The wording of this article is relevant to the current project only insofar as it clarifies that products may in principle only be placed on the EU domestic market if they comply with the specific “ecodesign requirements” laid down in delegated acts.

4.1.4 Article 4: Authority to adopt delegated acts

This article also does not contain any "new" terms that are relevant in the context of this project.

However, it is important to explicitly clarify once again that the product aspects of Article 5 (see below) must be worked through completely for all product groups to be regulated. An exception applies if individual aspects are explicitly declared as not relevant for the respective product group.

Extract from Article 4, sentence (1):

“(…) The empowerment to adopt ecodesign requirements includes the power to establish that no performance requirements, no information requirements or neither performance nor information requirements are necessary for certain specified product parameters referred to in Annex I.”

4.1.5 Article 5: Ecodesign requirements

Article 5, sentence 1 explicitly states:

“(1) The Commission shall, as appropriate to the relevant product groups and with due consideration for all stages of their life cycle, establish ecodesign requirements to improve the following product aspects:

- (a) durability;*
- (b) reliability;*
- (c) reusability;*
- (d) upgradability;*
- (e) reparability;*
- (f) possibility of maintenance and refurbishment;*
- (g) presence of substances of concern;*
- (h) energy use or energy efficiency;*
- (i) resource use or resource efficiency;*
- (j) recycled content;*
- (k) possibility of remanufacturing and recycling;*
- (l) possibility of recovery of materials;*
- (m) environmental impacts, including carbon and environmental footprint;*
- (n) expected generation of waste materials.”*

Above, the terms relevant for requirements in the context of increasing material efficiency (here the “product aspects”) have again been marked in “**fuchsia**”. In part, these terms are defined in the context of Article 2.

Important in this context is the explicit reference in sentence (2) with regard to the importance of the question of “product group classifications” for the further implementation process of the EU Ecodesign Regulation:

*“(2) Ecodesign requirements shall be established for a **specific product group**.*

However, where two or more product groups display technical similarities allowing a product aspect referred to in paragraph 1 to be improved based on a common requirement, ecodesign requirements may be established horizontally for those product groups.”

Against the background of this importance, the experts have carried out a search for existing product/product group classifications for clothing textiles in Annex I: Classification of (clothing) textiles into -product/goods groups.

With regard to a discussion of possible “classes of performance” for clothing textiles, which may be necessary later on within the framework of the current project, the explanations in sentence (5) also appear to be important. Here it is stated:

“(5) Ecodesign requirements shall meet the following criteria:

- (a) there shall be no significant negative impact on the functionality of the product, from the perspective of the user;*
- (b) there shall be no adverse effect on the health and safety of persons;*
- (c) there shall be no significant negative impact on consumers in terms of the affordability of relevant products, also taking into account access to second-hand products, durability and the life cycle cost of products;*
- (d) there shall be no disproportionate negative impact on the competitiveness of economic actors, at least of SMEs;*
- (e) there shall be no proprietary technology imposed on manufacturers or other economic actors;*
- (f) there shall be no disproportionate administrative burden on manufacturers or other economic actors.”*

Of particular importance for the current project is a). Here, it becomes clear that the other functional quality (“functionality” of the respective products, in this case “clothing textiles”) should be kept as constant as possible when implementing the ecodesign requirements from an environmental perspective. Conversely, this means that the aspect of the functional quality of the clothing textiles should also be clearly defined and further operationalised by means of corresponding parameters. A further concretisation of the terms for this area of functional quality(ies) is not found in the draft regulation.

4.1.6 Article 6: Performance requirements

With regard to the central questions of term clarification in the current project, Article 6 is of particular importance. Here, sentence (1) clarifies that with regard to the various product aspects (cf. Article 5 above), the products must fulfil **specific performance requirements**. And sentence (2) goes on to say:

“(2) Performance requirements referred to in paragraph 1 shall be based on the product parameters referred to in Annex I and shall, as appropriate, include:

- (a) minimum or maximum levels in relation to a specific product parameter referred to in Annex I or a combination thereof;
- (b) non-quantitative requirements that aim to improve performance in relation to one or more product parameters referred to in Annex I;
- (c) requirements related to the functional performance of a product.”

It is noteworthy here that Annex I sorts, groups and names the product aspects differently than Article 5. This is particularly significant insofar as no clear terminology is found here as a design objective of product design (e.g. reparability), but rather requirements for the design of the supporting processes in the life cycle (e.g. in the form of “simple repair”).

4.2 Conclusions from the analysis of relevant terms of the EU Ecodesign Regulation

The analysis of the terminology of the draft of the EU Ecodesign Regulation with a view to a possible definition of material efficiency related ecodesign requirements for textile clothing revealed some important results:

here is a clear and hierarchical system of central terminologies for the generally binding definition of mandatory ecodesign requirements in general and material efficiency-related requirements in particular.

At the superordinate level, these are **basic terminology** such as.

- ▶ product, product group, ...

At the level of the selection of ecodesign requirements, these are initially the **environment-related product aspects**.

- ▶ Aspects such as durability, reparability, recyclability, etc. are specifically named in the draft regulation.

However, the other product aspects (“product qualities”), which describe the other functional quality (functioning) of the products, are also on this level. These are not further specified in the draft regulation. However, they are relevant in the phrasing of the ecodesign requirements, as they should not be impaired by the improvement of the environmental product aspects.

On the level of the actual phrasing of requirements for these product aspects, this is followed by the various **product parameters**, which

- ▶ make the product aspects “measurable” and thus their optimisation operationalisable.

With regard to the transferability of this conceptual system to the field of clothing textiles, the following conclusions can be drawn:

- ▶ Most of the **“basic terminology”** used in the draft regulation with a view to establishing mandatory ecodesign requirements can also be used with sufficient clarity for clothing textiles.
- ▶ The basic environmental **product aspects** to be assessed and, where appropriate, made mandatory (according to Article 5) can also be used in relation to clothing textiles.

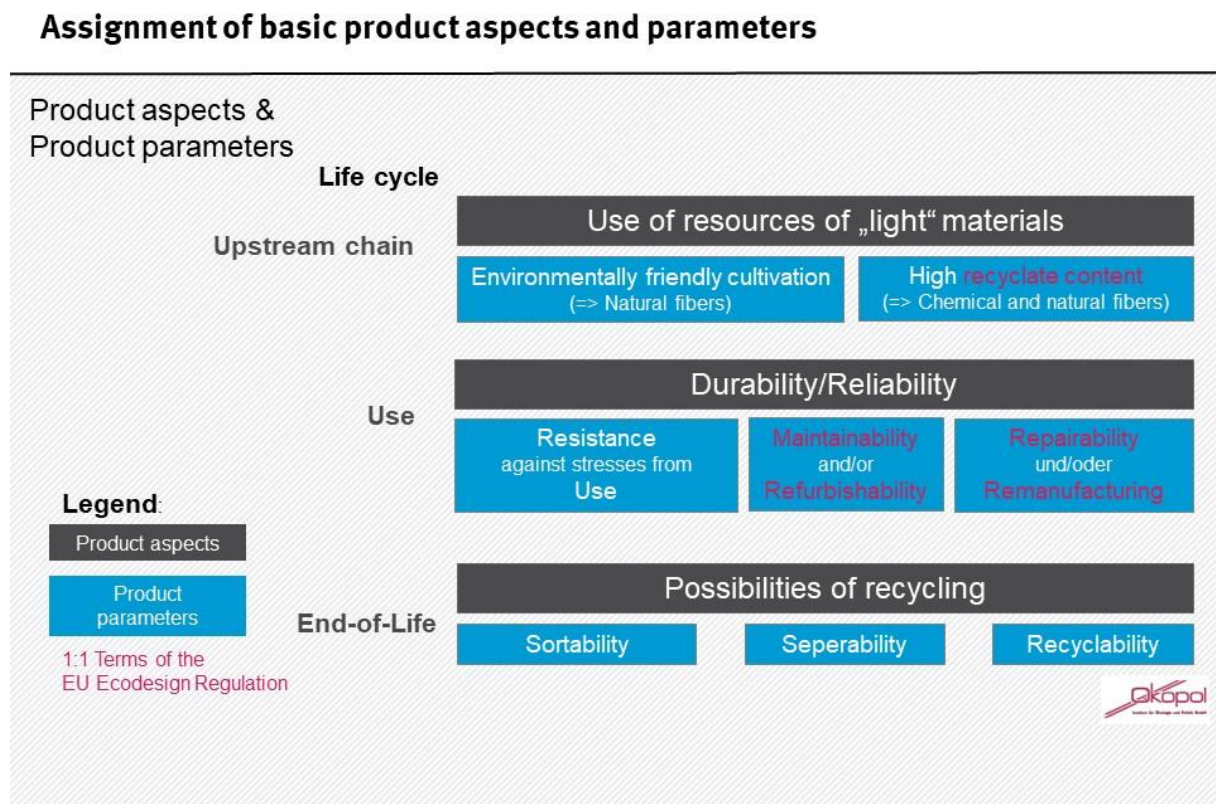
- ▶ On the other hand, the **product parameters** required for the operationalisation or measurability of the product aspects (according to Annex I) can only be directly transferred to clothing textiles to a limited extent. Here, further underpinning with textile-specific terms and term systems is required.

5 Suggestions for the structuring of terms

5.1 Basic product aspects and product parameters

The following Figure 7 shows how the environmental product aspects and corresponding product parameters from the draft of the EU Ecodesign Regulation can be structured in relation to the life cycle of clothing textiles.

Figure 7: Assignment of basic product aspects and parameters



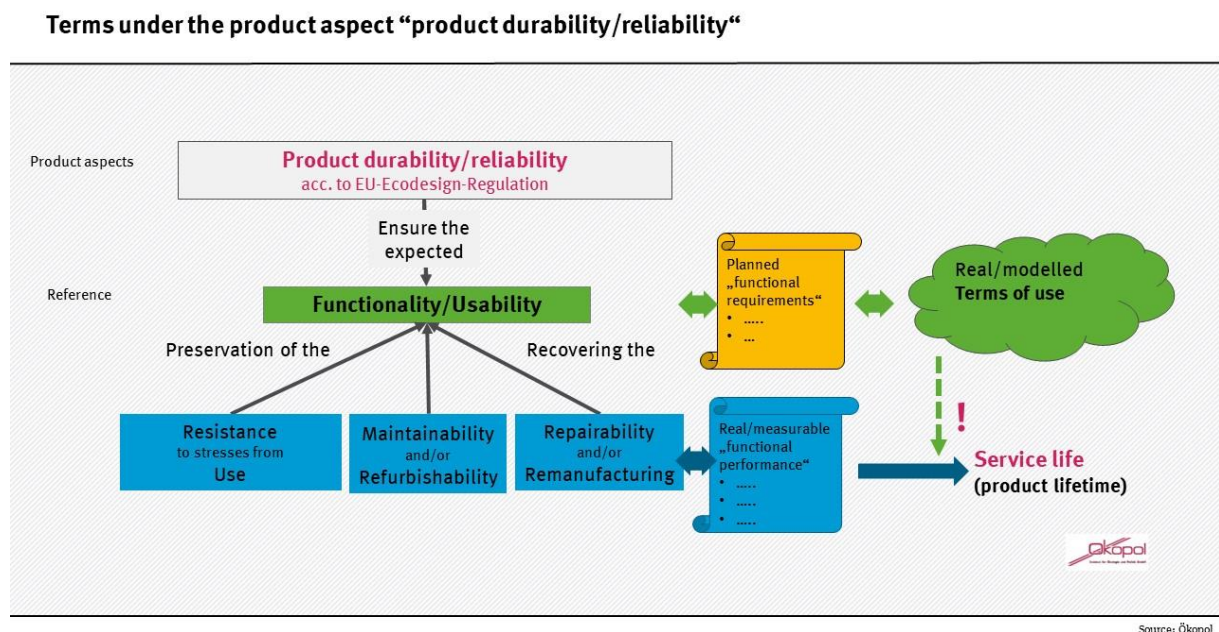
Source: Ökopool

Source: Ökopool, own illustration

5.2 Structuring in the product aspect “durability/reliability”

The product aspect “durability/reliability” during product use, which is the focus of the work, can be structured with regard to the interaction of central terms - as shown in the following Figure 8.

Figure 8: Terms within the product aspect “durability/reliability”



Source: Ökopal, own illustration

The starting point is the **functional requirements for the clothing textiles**. These functional requirements are defined as ecodesign requirements in the design process and must be fulfilled consistently in the environmental optimisation process.

If an environmental product aspect such as “durability/reliability” is to be improved, the **specific product parameters** that are relevant with regard to “durability/reliability” must be derived from the general utility/functional properties of the apparel textile specified in the product quality.

Here they are the:

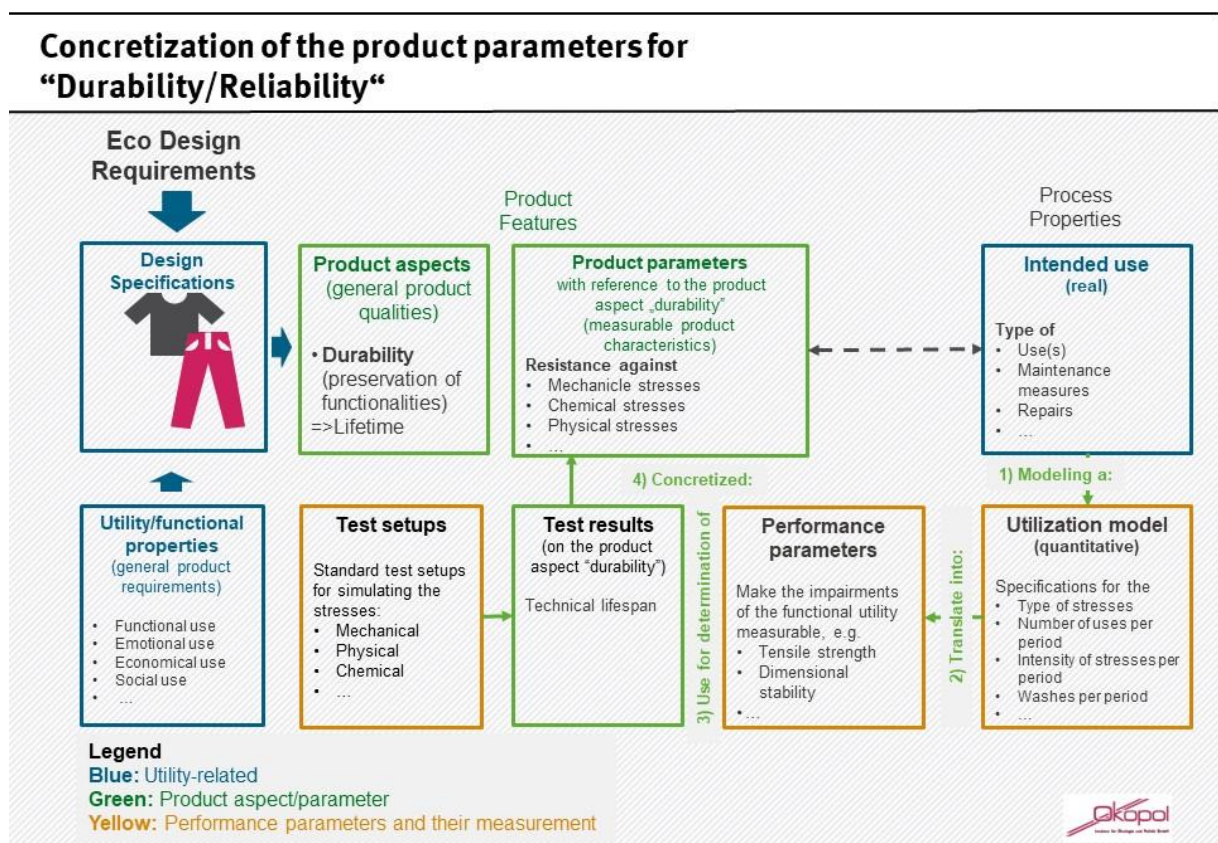
- ▶ Resistance to stresses from usage
- ▶ Maintainability and/or refurbishability
- ▶ Repairability and/or remanufacturing¹⁰

As a basis for an objectified and transparently interpretable performance assessment of these three product parameters, further underpinning by concrete performance parameters, performance requirements and performance testing are required.

These relationships can be seen also in the following Figure 9.

¹⁰ Linguistically, it would be better expressed as "possibility for remanufacturing".

Figure 9: Concretisation of the product parameters for “durability/reliability”



Source: Ökopol, own illustration

The central challenge of the project was to identify and compile possible suitable concretisations for the elements shown in “yellow” in the illustration.

These suggestions of the experts are described below separately according to the three basic product parameters.

6 Proposals for performance parameters for the product aspect durability/reliability

6.1 Proposals for the product parameter “Resistance to stresses from usage“

In the area of this product parameter, a search was carried out for the following elements:

- ▶ Standardised utilisation process models
for identifying and evaluating the relevant stresses/limitations on functionality from use (ideally differentiated according to clothing types)
- ▶ Performance parameters
 - Basic functions & functionalities
 - Resistance to
 - Mechanical stresses
 - Chemical stresses
 - (Further) physical stresses

As well as for operationalising the performance assessment on the performance parameters corresponding:

- Performance testing methods
- Performance requirements

6.1.1 Results on: “Standardised utilisation process models”

No freely available¹¹ (standardised) process models could be identified that describe and quantify the types of different "usual" stresses during the intended use of the clothing textiles.

6.1.2 Results on: “Basic Functions & Functionalisation”

With regard to the functional quality of clothing textiles to be maintained in the context of the discussion on durability/reliability, a variety of basic functions/functionalisation are possible or possibly of importance, depending on the type of garment.

In the following Table 1, corresponding functions/functionalisation are listed, which are underpinned by relevant test standards.

¹¹ It is acknowledged that individual companies in the field of apparel textiles have such "model assumptions" as part of their product planning and quality assurance, but these are not published.

Table 1: Definitions of possible functionalisations/functions

Performance parameters	Definition, (standard) requirements and test methods
Permeability¹²	Determination of the permeability of fabrics (important for outdoor and rain jackets, among other things, so that an appropriate air exchange is guaranteed).
Performance requirements	- No (standardised) standard requirements
Performance testing	DIN EN ISO 9237 Determination of permeability of fabrics Test device for measuring air permeability, determination of flow velocity by means of a flow meter/volumetric counter meter. Indication of the air permeability in mm/s.
Water repellent property¹³	Describes the water-repellent properties of fabrics (important for outdoor jackets/rainwear).
Performance requirements	- No (standardised) standard requirements
Performance testing	DIN EN 29 865 - Determination of the water-repellent properties of surface materials by means of the rain shower test known as Bundesmann method device: rain shower test known as Bundesmann method for simulating a defined artificial rain. Specification: Visual assessment of the wetting of the material compared to reference photographs, assessment of whether water can be seen on the surface of the sample and specification of the amount of water that was absorbed by the sample material (specification in %) on the one hand and penetrated through the sample on the other (specification in ml). DIN EN ISO 4920 - Determination of water-repellent properties of sheet materials after spray test Test apparatus: Test apparatus according to ISO 4920 (from funnel over a clamping ring). Specification: Visual assessment of the wetting of the material compared to reference images, assessment of whether water spots are visible on the sample surface (grades 5 to 1).
Water pressure resistance¹⁴	Describes the resistance of a textile fabric to the penetration of water; describes the behaviour of textile surfaces that are exposed to water pressure for a short or medium period of time.
Performance requirements	- No (standardised) standard requirements
Performance testing	DIN EN ISO 811 - Determination of resistance to water penetration (hydrostatic pressure test) Test device: hydrostatic pressure device Specification: pressure in cm water column
Crease resistance¹⁵ (more correctly: crease recovery angle of textile surfaces)	Describes the ability of a fabric to recover from creases.

¹² Cf. UBA (2022).

¹³ Ibid.

¹⁴ Ibid.

¹⁵ Ibid.

Performance parameters	Definition, (standard) requirements and test methods
Performance requirements	- No (standardised) standard requirements
Performance testing	DIN EN ISO 2313-1 - Determination of the recovery from creasing of a test specimen by measuring the crease recovery angle - Part 1: Method with horizontal fold edge of the test specimen Test apparatus: Press for loading the specimen, measuring instrument for measuring the crease recovery angle Specification in degrees (angle measurement)
Correct fit of interlinings¹⁶	Interlinings should adhere to the upper/lower fabric and not curl up. If interlinings curl, the appearance will be significantly affected.
Performance requirements	- No (normed) standard requirements, but Specification of the Procurement Office of the Federal Ministry of the Interior; according to this, the samples are laid out smoothly during the adjustment to the normal climate. The sample, size 30 × 30 cm, is placed in tap water for ten minutes. It must not roll during the water storage and, after it is removed from the water, during drying in the normal climate. Likewise, the sample must not roll when it is ironed in a dry and moist state.
Performance testing	No standard - but test procedure of the BMI (see above)
Easy-care¹⁷ (also non-iron and wrinkle free finish)	Property of a textile to show a wrinkle free appearance after washing (i.e. not needing to be ironed).
Performance requirements	- No (standardised) standard requirements
Performance testing	ISO 7768 - Textiles - Method for evaluating the smooth appearance of fabrics after household washing and drying. Test equipment: Washing and drying equipment according to DIN EN ISO 6330 as well as DIN EN ISO 3175, observation in a viewing board Visual assessment of the sample surface (according to SA 5 to SA 1; with intermediate stages)
Performance of zippers¹⁸	Description and test methods for the properties of the various zip fasteners
Performance requirements	- No (standardised) standard requirements
Performance testing	DIN EN 16732 - Zip fasteners - Specification This European Standard specifies performance levels and test methods for the following properties of zip fasteners manufactured from interlocking components attached to textile tapes: Strength of puller attachment, Strength of the indivisible zip, Strength of the bottom stop Strength of the upper stop, Strength of open end slide fastener box, Lateral strength after endurance test,

¹⁶ Cf. BeschA (2004).

¹⁷ Cf. UBA (2022).

¹⁸ Ibid.

Performance parameters	Definition, (standard) requirements and test methods
	<p>Lateral strength of slide fastener, Strength of the slider locking device when the separable zip is open, and also Torque strength of the slider. Test equipment: The standard contains a number of corresponding different test methods:</p> <p>Key figures obtained by the zip fastener in various tests</p>
Strength of zippers¹⁹	Describes the strength of zippers
Performance requirements	- No (standardised) standard requirements
Performance testing	<p>ASTM D2061-07(2021) Standard Test Methods for Strength Tests for Zippers Test apparatus: Various test methods depending on the test methods, Specification: depending on test methods</p>
Force required to disengage snap fasteners and other fasteners²⁰	Describes the force that must be applied to open push buttons
Performance requirements	- No (standardised) standard requirements
Performance testing	<p>ASTM D4846-96(2021) Standard Test Method for Resistance to Unsnapping of Snap Fasteners Test apparatus: Extension machine Specification: Tensile force in N</p>
Water vapour resistance (ret) breathability²¹	Comfort parameter ²² , describes the ability to allow water vapour to escape from the inside of a textile to the outside.
Performance requirements	<p>- No (standardised) standard requirements The following values apply for the measurement of R_{et} (classification according to Hohenstein) very good: smaller 6 good: between 6-13 satisfactory: between 13-20 insufficient: greater than 20</p>
Performance testing	<p>So-called cup methods: e.g. ASTM E96/E96M-22ae1 Standard Test Methods for Gravimetric Determination of Water Vapor Transmission Rate of Materials Test apparatus: gravimetric method Indication: moisture transfer (water or water vapour) in "g/m²/24hrs".</p>

¹⁹ Cf. UBA (2022).

²⁰ Ibid.

²¹ Cf. OTTO (2023).

²² Comfort can change with washing, so these parameters are important for long-term use. Only basic comfort is recorded here, special tests are useful for some products.

Performance parameters	Definition, (standard) requirements and test methods
	DIN EN ISO 11092 Textiles - Physiological effects - Measurement of thermal and water vapour transmission resistance under steady-state conditions (sweating guarded-hotplate test) Test device: sweating guarded hotplate Specification of the thermal resistance in m ² Pa/W
Thermal resistance (R_{ct})/ thermal insulation²³	Comfort parameter, describes the thermal insulation of textiles (winter jackets, thermal underwear).
Performance requirements	- no (standardised) standard requirements for clothing textiles
Performance testing	DIN EN ISO 11092 - Textiles - Physiological effects - Measurement of thermal and water vapour transmission resistance under steady-state conditions Test device: sweating guarded-hotplate test Specification: Thermal resistance in -transfer in “m ² K/W”.
UV protection finishing²⁴	Describes the protection of clothing against UV rays
Performance requirements	According to DIN EN 13758-2, the UV protection factor (UPF) must be greater than 40. DIN EN 13758-2 Textiles: Protective properties against ultraviolet solar radiation - Part 2: Classification and labelling of garments
Performance testing	DIN EN ISO 13758-1 Textiles _ Protective properties against ultraviolet solar radiation - Part 1: Test method for clothing textiles DIN EN ISO 13758-2 UV-protective clothing - Test device: Spectrophotometer Test apparatus: Spectrophotometer Specification: of the UV protection factor in “UPF”

- Relevant standardised test methods and procedures are available for a total of eight functions/functionalisations. However, standardised performance requirements are (almost) lacking throughout.

6.1.3 Results for: Resistance to mechanical stresses

Table 2: Definitions for performance parameters, requirements & test methods related to resistance to mechanical stresses from use

Performance parameters	Definition, (standard) requirements and test methods	Relevant for
Tensile strength²⁵ (also (maximum) tensile force)	Tensile strength is the force required to tear a fabric in two by applying a longitudinal force over a specified distance of the fabric.	Fabric

²³ Cf. OTTO (2023).

²⁴ Ibid.

²⁵ Cf. UBA (2022).

Performance parameters	Definition, (standard) requirements and test methods	Relevant for
Performance requirements	- No (normed) standard requirements, but ECLA document ²⁶ with suggestions for * minimum tensile strength * maximum tensile elongation for a range of garment-textile product groups	
Performance testing	Two test methods are available (tested in weft and warp direction). Measurements can be made dry or wet. DIN EN ISO 13934-1 (2013) - Textiles - Tensile properties of textile fabrics - Part 1: Determination of maximum tensile force and elongation of maximum force using the strip method DIN EN ISO 13934-2 (2014) - Textiles - Tensile properties of textile fabrics - Part 2: Determination of maximum tensile force using the grab method apparatus: Constant rate of extension machine Specifications: Maximum tensile force is measured in N, and elongation in %.	
Tear property²⁷	Tear resistance is a mechanical property and describes how much force must be applied to prevent a tear from continuing when a cut occurs.	Fabric
Performance requirements	- No (standardised) standard requirements, but ECLA document ²⁸ with proposals for minimum and premium requirements for a number of garment-textile product groups	
Performance testing	Testable by means of the standard DIN EN ISO 13937 - Tear properties of textile fabrics - Part 1 to Part 4, Test device Part 1: Drop pendulum device (ballistic pendulum method according to Elmendorf) Testing device Part 2: Constant rate of extension machine (metrological check of the device according to ISO 10012-1, e.g. Zwick). Testing device Part 3: Constant rate of extension machine (tear test with wing shaped test specimens) Test apparatus Part 4: Constant rate of extension machine (tear strength with tongue shaped specimens) Specification: The measurement result is the force (tear property force) in N	
Bursting properties²⁹ (also bursting ability, bursting pressure)	Describes the strength of knitted fabrics, as the tensile strength of these cannot be measured.	Knitted fabric; knitted fabrics

²⁶ EURATEX 2006.

²⁷ Cf. UBA (2022).

²⁸ EURATEX (2006).

²⁹ Cf. UBA (2022).

Performance parameters	Definition, (standard) requirements and test methods	Relevant for
Performance requirements	- No (standardised) standard requirements, but in the ECLA document ³⁰ and in the PPE standards it is suggested to use a plate with a 7.3 cm ² opening for the test according to DIN EN ISO 13938-2. The minimum requirement is then 200 kPa.	
Performance testing	Bursting pressure and bursting bulge are determined. Measurement is carried out with bursting pressure measuring device (hydraulic and pneumatic). DIN EN ISO 13938-1:2020-02 Textiles - Bursting properties of fabrics - Part 1: Hydraulic method for the determination of bursting pressure and bursting bulge (ISO 13938-1:2019); German version EN ISO 13938-1:2019 DIN EN ISO 13938-2:2020-03 Textiles - Bursting properties of textile fabrics - Part 2: Pneumatic method for the determination of bursting pressure and bursting bulge (ISO 13938-2:2019); German version EN ISO 13938-2:2019 In both methods, the burst pressure is measured (in kPa). The two methods give comparable results up to 800 kPa. Clothing textiles can therefore be tested with both methods, as values for burst pressure are usually up to 800 kPa. Specifications: The burst pressure (kPa) and the burst bulge (mm) are measured.	
Seam strength³¹	The seam strength makes a statement about the strength of the seam. The destruction of a seam usually means the end of the textile product's life if the fabric tears. If only the sewing thread is torn, it can be repaired. The reason for the breakage is reported and is considered useful information for improving the seam.	Seams in textile surfaces
Performance requirements	- No (standardised) standard requirements, but There is the standard for personal protective equipment. The PPE product standard EN 343:2019 – “Protective clothing - Protection against rain” sets the requirement of min. 200 N for the Performance testing except for materials with an elongation of more than 50 %.	
Performance testing	Examination according to DIN EN ISO 13935-1:2014 - Textiles - Tensile tests on seams in textile fabrics and made-up textile articles - Part 1: Determination of maximum tensile strength of seams using the strip tensile test. DIN EN ISO 13935-2:2014 - Textiles - Tensile tests on seams in textile fabrics and made-up textile articles - Part 2: Determination of maximum tensile force by the grab tensile test Testing device: Tensile testing machine with constant testing speed (in accordance with the requirements of ISO 10012).	

³⁰ EURATEX (2006).

³¹ Cf. UBA (2022).

Performance parameters	Definition, (standard) requirements and test methods	Relevant for
	Specifications: Seam maximum tensile force in N	
Fabric yarn slippage resistance in woven fabrics³²	Describes the determination of the resistance that the thread systems in a fabric offer to displacement caused by the seam. If the fabric slips out of a seam, the fabric can be ripped - this must be prevented.	Fabric
Performance requirements	- No (standardised) standard requirements, but ECLA document ³³ with suggestions for * minimum seam strength (in N) * maximum seam opening (in mm) for a range of garment-textile product groups	
Performance testing	DIN EN ISO 13936-2004 - Textiles - Determination of the sliding resistance of yarns in fabric seams - Part 1: Fixed seam opening method Testing machine: Tensile testing machine with constant test speed (measuring system must comply with ISO 10012-1). Specification: tensile force in N, seam opening in mm	
Colour fastness to rubbing³⁴	Rubbing fastness is the resistance of the colour of textiles to rubbing and soiling against other textiles.	All
Power requirement	- no (standardised) standard requirements, but Blue Angel (DE-UZ 154): “The colour fastness to wet rubbing must be at least levels 2-3 according to ISO 105 (grey scale A 03). Level 2 is accepted for indigo dyed denim. This requirement does not apply to white products or end products that are neither dyed nor printed. The colour fastness to dry rubbing must be at least level 4 according to ISO 105 (grey scale A 03). Level 3-4 is accepted for indigo dyed denim. This requirement does not apply to white products, end products that are neither dyed nor printed, curtains or similar textiles intended for interior decoration...”. or according to OEKO-TEX® Standard 100: The colour fastness (dry) must achieve a minimum rubbing fastness number of 4 in all product classes from 1-4 (baby, with skin contact, without skin contact, furnishing materials). For colourants such as pigments, vat or sulphur dyes, a rubbing fastness number of 3 is permitted. No requirements are defined for so-called “wash-out” articles. See also ECLA document ³⁵ .	
Performance testing	Rubbing fastness can be tested in dry and wet condition. DIN EN ISO 105-X12 - Textiles - Tests for colour fastness - Part X12: Colour fastness to rubbing, Test device: Testing is carried out according to friction with a suitable test device with reciprocating linear friction	

³² Cf. UBA (2022).

³³ EURATEX (2006).

³⁴ Cf. UBA (2017) & Hohenstein Academy (2023): Reibechtheit.

³⁵ EURATEX (2006).

Performance parameters	Definition, (standard) requirements and test methods	Relevant for
	movement. Colour change is determined with the aid of the grey scale DIN EN ISO 105-A03. Indication in unit number of colour change.	
Resistance to pilling and abrasion of fabrics³⁶	Describes a method for determining the resistance to pilling, fuzzing and matting of textile fabrics under mechanical loads.	All
Power requirement	- No (standardised) standard requirements, but Blue Angel (DE-UZ 154): Nonwoven materials and knitted garments, accessories and blankets made of wool, wool blends and polyester (including fleece) must have a pill resistance of at least 3. Cotton blend fabrics used for garments shall have a pill resistance of at least 3. Polyamide tights and leggings shall have a pill resistance of at least 2. ECLA document ³⁷ with suggested minimum & premium requirements for woven fabrics, raised surface fabrics & knitted fabrics.	
Performance testing	DIN EN ISO 12945-1 - Textiles - Determination of the tendency of textile fabrics to pilling, fluffing or matting of the surface - Part 1: Method using the pilling test kit DIN EN ISO 12945-2 - Textiles - Determination of the tendency of textile fabrics to pill, lint or mat the surface - Part 2: Modified Martindale method Test apparatus: These are methods for determining the resistance to pilling, fuzzing and matting of textile fabrics using a rotating pilling test box with cycle counter. Details: The assessment of the samples is done with visual assessment according to DIN EN ISO 12945-4. The assessment of pilling, fuzzing and matting is done in grades from 1-5.	
Resistance to rubbing³⁸	Abrasion is the resistance experienced by a fabric when rubbed against surfaces. The standardised tests describe the abrasion resistance to sample destruction (end point of the test) by examination at specified intervals, this method being applicable to samples made of all textile fabrics including nonwovens, but excluding those textile fabrics for which it has been declared that they are used only for low abrasion.	All
Power requirement	- No (standardised) standard requirements, but Blue Angel (DE-UZ 154): Socks - tested in the heel area -, carpets without coating for private households and workwear must have an abrasion resistance of at least 15,000 abrasion cycles. Contract textiles must have an abrasion resistance of at least 20,000 abrasion cycles. ECLA document ³⁹ with proposals for minimum & premium requirements for a number of textile product groups	

³⁶ Cf. UBA (2017).

³⁷ EURATEX (2006).

³⁸ Cf. UBA (2022).

³⁹ EURATEX (2006).

Performance parameters	Definition, (standard) requirements and test methods	Relevant for
Performance testing	DIN EN ISO 12947-2 - Textiles - Determination of abrasion resistance of textile fabrics by the Martindale method - Part 2: Determination of sample degradation Test apparatus: Abrasion testers (e.g. Martindale) Specification: Number of abrasion cycles of the test interval	
Elasticity & stretchability ⁴⁰	Elasticity is the ability to return to the initial size and shape immediately after the force causing the deformation is removed.	All elastic & stretchy textiles
Performance requirements	- No (standardised) standard requirements	
Performance testing	DIN EN ISO 20932-1 - Textiles - Determination of elasticity of textile fabrics - Part 1: Strip tests Test equipment: Constant rate of extension machine Specification: tensile force in N	
Resistance to bending (flexing) ⁴¹	Describes the resistance of textile fabrics to damage by bending - only applies to coated textiles (e.g. rainwear).	Only coated textile surfaces ⁴²
Power requirement	- No (standardised) standard requirements	
Performance testing	DIN EN ISO 7854 - Textiles coated with rubber or plastics - Determination of resistance to damage by bending Test equipment: Bending tester according to ISO 132 Specifications: made after visual assessment of the overall appearance (creasing, cracking, flaking and discolouration) according to grades between 0-3, intermediate values are possible.	
Resistance to stringing (snagging) ⁴³	Describes the resistance to thread pulls of textile surfaces	All
Performance requirements	- No (standardised) standard requirements	
Performance testing	ASTM D3939/D3939M-13(2017) Standard Test Method for Snagging Resistance of Fabrics (Mace) Test device: cylinder with hook Indication: visual rating (indication from 1 - 5)	

- Standardised test methods and procedures are available for resistance to many mechanical loads. However, standardised performance requirements are (often) lacking. Z. However, relevant requirements of the Blue Angel eco-label DE-UZ 154 and/or proposals from the draft ECLA document of the Euratex technical clothing group are available.

⁴⁰ Cf. UBA (2022).

⁴¹ Cf. UBA (2022).

⁴² Textile products must consist of at least 80% textile fibre in order to be considered textile products according to the definition of the EU Textile Labelling Regulation.

⁴³ Cf. UBA (2022).

6.1.4 Results for: Resistance to chemical stresses

Table 3: Definitions for performance parameters, requirements & test methods related to Resistance to chemical stresses from use

Performance parameters	Definition, (standard) requirements and test methods	Relevant for
Colour fastness to transpiration⁴⁴	Resistance of the colour of textiles of all types and in all states of processing to the action of human perspiration.	All
Performance requirements	- No (standardised) standard requirements, but Blue Angel (DE-UZ 154): “The colour fastness to perspiration (acid and alkaline) must be at least levels 3-4 according to ISO 105 (grey scale A 03) (colour change and staining). A level of 3 is nevertheless accepted when fabrics are both dark coloured (standard depth > 1/1) and made of regenerated wool or contain more than 20% silk. This requirement does not apply to white products, end products that are neither dyed nor printed, furniture fabrics, curtains or similar textiles intended for interior decoration.” OEKO-TEX® Standard 100: Colour fastness to acidic and alkaline perspiration must achieve a score between 3-4 in all four existing product classes (baby, with skin contact, without skin contact, furnishing materials). In addition, there is the test category “saliva and perspiration fastness” for product class 1 “baby”, whereby the clothing textiles must score “genuine”.	
Performance testing	The test is carried out using the test method DIN EN ISO 105-E04 - Textiles - Tests for colour fastness - Part E04: Colour fastness to perspiration. This is a method for determining the resistance of the colour of textiles of all types and in all states of processing to the action of human perspiration. The test is carried out after incubation in alkaline or acid sweat solution. Test equipment: Various possible (e.g. laboratory dyeing unit) Heating cabinet Specification: The grey scale is used to evaluate the change in colour according to ISO 105-A02 and the staining according to DIN EN ISO 105-A03. Test device: spectrometer or colorimeter Specification: When testing with spectrometer or colorimeter, the evaluation of the change of colour is done according to ISO 105 A0 and the staining according to ISO 105-A04. The instrumental or numerical fastness number of the colour is measured.	
Colourfastness to saliva and sweat⁴⁵	Resistance of the colour of textiles to the action of human saliva and perspiration	All
Performance requirements	- No (standardised) standard requirements, but Blue Angel (DE-UZ 154) “The textile materials must be colour fast to the effects of saliva. The remaining dyed materials must be colour fast to the effects of saliva and perspiration. This corresponds to level 5 of the currently valid standard DIN 53160	

⁴⁴ Cf. UBA (2017).

⁴⁵ Cf. UBA (2017).

Performance parameters	Definition, (standard) requirements and test methods	Relevant for
	Parts 1 and 2. This requirement applies to babies and children up to 36 months old. This requirement does not apply to white products or end products that are neither dyed nor printed.” OEKO-TEX® Standard 100: The colour fastness to saliva and perspiration must be rated “genuine” for garment textiles in product class 1 “baby”.	
Performance testing	DIN 53160-1 and -2 are test methods for determining the colour fastness of articles of daily use. Part 1: Test with welding simulant Part 2: Test with welding simulant Test materials and equipment: filter paper, desiccator (DIN 12491), heating cabinet (DIN 12880) Specification: The discolouration is determined with the help of the grey scale (DIN EN ISO 105 B03). The colour fastness number is indicated.	
Colourfastness to water	Resistance of the colour of textiles to the action of water	All
Performance requirements	according to OEKO-TEX® Standard 100: When testing colour fastness to water, a score between 3-4 must be achieved in product class 1 “baby”. In the remaining three product classes 2-4 (with skin contact, without skin contact, furnishing materials), a rubbing fastness score of at least 3 is required.	
Performance testing	DIN EN ISO 105-E01 - Textiles - Tests for colour fastness - Part E01: Colour fastness to water Textile sample is immersed in water with an accompanying fabric and then placed in an appropriate testing device for pressing. Finally, the colour change is determined. Indications: Authenticity number is determined by means of the grey scale and/or instrumentally.	
Colourfastness to chlorinated water	Resistance of the colour of textiles to the action of chlorinated water	All
Performance requirements	- No (standardised) standard requirements	
Performance testing	DIN EN ISO 105-E03 - Textiles - Colour fastness testing - Part E03: Colour fastness to chlorinated water (swimming pool water) Test device: Water bath with rotating shaft Indication: Authenticity number is determined by means of the grey scale and/or instrumentally.	
Colour fastness to washing⁴⁶	Resistance of the colour of textiles in household and/or commercial laundry	

⁴⁶ Cf. UBA (2017).

Performance parameters	Definition, (standard) requirements and test methods	Relevant for
Performance requirements	- No (standardised) standard requirements, but Blue Angel eco-label (DE-UZ 154): "...The stain resistance and colour fastness to washing in accordance with the care instructions must be at least levels 3-4 according to ISO 105 (grey scale A 03). This requirements does not apply to end products that are clearly labelled with "dry clean only" or equivalent labelling (insofar as these products are generally labelled accordingly in practice). In addition, it does not apply to indigo dyed denim, white products, end products that are neither dyed nor printed, or to non-washable furniture fabrics." The test is carried out using the test method DIN EN ISO 105-C06 (single wash at the temperature indicated on the end product with perborate powder).	
Performance testing	DIN EN ISO 105-C06 - Textiles - Tests for colour fastness - Part C06: Colour fastness of household and commercial linen Testing device: mechanical testing device with rotating axis and integrated containers Test equipment: grey scale and/or spectrometer/colourimeter The grey scale is used to evaluate the change in colour according to ISO 105-A02 and the staining according to ISO 105-A03. Indications: The instrumental staining scale rating is measured.	

- Standardised test methods and procedures are available for resistance to some chemical stresses from use. However, standardised performance requirements are (mostly) lacking. Z. However, relevant requirements of the Blue Angel eco-label DE-UZ 154 and the OEKO-TEX® Standard 100 are available.

6.1.5 Results for: Resistance to physical stresses

Table 4: Definitions for performance parameters, requirements & test methods related to Resistance to physical loads from use

Performance parameters	Definition, (standard) requirements and test methods	Relevant for
Colour fastness to light⁴⁷	Resistance of the colour of textiles of all types and in all processing states to the effects of natural daylight. Light fastness or light resistance describes the constancy of colours and dyes under prolonged exposure to light. Long and intensive exposure to radiation can cause various changes in the material such as fading, yellowing or brittleness	all
Performance requirements	- No (standardised) standard requirements	
Performance testing	The test is carried out using the test method DIN EN ISO 105-B02 Textiles - Colour fastness tests: Part B02: Colour fastness to artificial light: Xenon arc light The test method allows the determination of the resistance of the colour of textiles of all types and in all processing states to the action of artificial light corresponding to natural daylight	

⁴⁷ Cf. Hohenstein Academy (2023): Lichtechtheit.

Performance parameters	Definition, (standard) requirements and test methods	Relevant for
	(D65). The method can also be used for white (bleached or optically lightened) textiles. Details: The change is indicated with authenticity number.	
Colour fastness to artificial weathering⁴⁸	Describes the resistance to colour changes against artificial weathering. However, the following test method can also be used to determine the ageing behaviour of the textile to be tested - exposure to light and moisture (rain) is investigated and can be used for outdoor textiles (outdoor clothing).	All
Performance requirements	- No (standardised) standard requirements	
Performance testing	DIN EN ISO 105-B10 - Textiles - Tests for colour fastness - Part B10: Artificial weathering - Exposure to filtered xenon arc radiation Describes a method of exposing textiles to artificial weathering in a xenon arc tester, including exposure to water and water vapour, to determine the weather resistance of the colour of textiles. The exposure takes place in a test chamber with a filtered xenon arc light source simulating solar spectral irradiance according to CIE 85:1989 ⁴⁹ , Table 4. The method can be used to determine both the colour fastness and the ageing behaviour of the textile to be tested - light exposure and exposure to moisture (rain) are investigated and can be used for textiles used outdoors (outdoor clothing/awnings). Test equipment: for exposure: xenon arc beam device; for evaluation: grey scale/colourimeter Indications: A) as the numerical value of the fastness number of the grey scale (1 to 5); or B) as the numerical value of the colour change as a result of the spectrophotometric measurement, additionally also given as the fastness number of the grey scale; or C) as “satisfactory” or “unsatisfactory”, when tested against a control material.	
Colour fastness against sublimation/fading⁵⁰ (during storage)	Describes the resistance of dyed or printed textiles of all types and in all processing states to the sublimation of dyes during storage.	All
Performance requirements	- no (standardised) standard requirements -	
Performance testing	DIN 54056 - Testing of colour fastness of textiles - Determination of colour fastness of dyeings and prints to sublimation during storage Testing device: Heating cabinet in which the samples are placed in frames; Specification: Determination of the fastness number using the grey scale (DIN EN 20105-A02 and DIN EN 20105-A03)	

⁴⁸ Cf. UBA (2022).

⁴⁹ has been replaced by CIE 241:2020.

⁵⁰ Cf. UBA (2022).

- ▶ Standardised test methods and procedures exist for resistance to a range of physical loads. However, standardised performance requirements are (consistently) lacking.

6.2 Proposals for the product parameter “maintainability and/or refurbishability”

For the range of these product parameters, a search was carried out for the following elements:

- ▶ Identification of the terminology for the relevant processes in the field of apparel textiles
- ▶ Standardised process models for identifying and evaluating the relevant stresses/restrictions on functionality from care and maintenance (ideally differentiated by garment type)
- ▶ Performance parameters
 - Resistance to impairment from the care and maintenance activities (“washing & cleaning”) in terms of
 - Mechanical functions
 - Colourfulness
 - Restorability of functional equipment
 - Availability of information on
 - Intended/permissible maintenance measures
 - Restoration of functional equipment

As well as for the operationalisation of the performance assessment on these performance parameters corresponding

- Performance testing methods
- Performance requirements

6.2.1 Results for the identification of the terminology for the relevant processes

In the case of clothing textiles, regular cleaning of the products is an inseparable part of “normal” use for both functional and emotional/social reasons. Whether the cleaning is done as (wet) washing or (dry) cleaning depends on the properties of the textiles used.

To restore the functional properties, further care procedures (such as ironing) and also the renewal of functional finishes (such as impregnation) are also used.

The following Table 5 shows the terms identified for these different processes.

Table 5: Terms used in the context of the processes for maintenance & refurbishing of garment textiles

Term	Description/Definition	Source
Maintenance	A measure carried out to maintain a product in a condition in which it can function as expected.	EU Ecodesign Regulation Draft, (COM (2022) 142 final)

Term	Description/Definition	Source
Cleaning	<p>Professional dry cleaning: Process of cleaning textile items by treatment with solvents (excluding water), usually used in dry cleaning by professionals NOTE: This process consists of cleaning, rinsing and spinning. This is followed by appropriate drying and refurbishing.</p>	DIN EN ISO 3758: (marking of care symbols)
Washing	<p>Operation intended to clean textile articles in an aqueous bath. NOTE: Washing includes all or some of the following operations in appropriate combinations: Soak, pre-wash and main wash - usually carried out using heat, mechanical energy and the addition of detergent or other products - and rinsing; Removal of water, i.e. spinning or wringing, carried out during and/or at the end of the above processes. These operations can be carried out by machine or by hand.</p>	DIN EN ISO 3758 (Care labelling) - Washing
Drying	<p>Process carried out on textile items after washing to remove any remaining water (or moisture). 2.4.1 Tumble drying (Drying in tumble dryer): Process carried out after washing and mechanical removal of water from a textile article with the intention of removing the remaining water by treatment with hot air in a tumble dryer. 2.4.2 Natural drying: operation carried out after washing on textile articles with the intention of removing the remaining water by drying on the line, drying from the dripping wet condition, drying in the lying condition and, where appropriate, in combination with drying in the shade 2.4.2.1 line drying: operation carried out after washing and mechanical removal of water from a textile article with the intention of removing the remaining moisture by hanging on the clothesline or a clothes hanger 2.4.2.2 Drying lying down: operation carried out after washing and mechanical removal of water from a textile article with the intention of removing the remaining moisture by drying lying down 2.4.2.3 Drying dripping wet on the line: operation carried out after washing without mechanical removal of water from a textile article with the intention of removing the remaining moisture by hanging the wet articles on the clothesline or a clothes hanger 2.4.2.4 Drying lying dripping wet: operation carried out after washing without mechanical removal of water on a textile article with the intention of</p>	Care labelling DIN EN ISO 3758: 2.4 Drying

Term	Description/Definition	Source
	removing the remaining moisture by laying down the wet articles.	
Refurbishing	The preparation or modification of an item that is waste or a product to restore its performance or functionality, as determined within the scope of the intended use, performance level and maintenance originally intended during the product development phase, or to comply with applicable technical standards or legal requirements, resulting in a fully functioning product again	EU Ecodesign Regulation Draft, (COM (2022) 142 final)
Preparation for reuse	Any recycling procedures of testing, cleaning or repair in which articles or components of articles that have become waste are prepared in such a way that they can be re-used without further pre-treatment.	EU Ecodesign Regulation Draft, (COM (2022) 142 final)
Ironing	Ironing and pressing Process carried out on a textile article with a suitable appliance using heat, pressure and possibly steam to restore its shape and appearance.	DIN EN ISO 3758: (marking of care symbols) 2.5
Impregnate	- No standardised terminology	

- For the basic processes of maintenance (washing, cleaning, drying, ...) of clothing textiles, standardised terminology is available.
In the area of refurbishing (or preparation for reuse), there is a lack of corresponding standardised terminology for the renewal of functional equipment.

6.2.2 Results for: “Standardised process models”

According to the study on the environmental optimisation potential of textiles (JRC 2014)⁵¹, normal garments are washed between 25 and 50 times and underwear 104 times. According to the same study, care has a large share in the environmental impact of the use phase.

In addition, studies show that a good understanding of care instructions is also important from a consumer perspective, as compliance with these care instructions is an important element in maintaining both the functionality and the visual appearance of the apparel textiles.

To carry out a robust assessment of the performance/quality of the products in question in the various processes of care/cleaning & refurbishing, it is necessary to have appropriate “process models” available.

The following Table 6 summarises available definitions and descriptions of these process conditions.

⁵¹ Cf. JRC 2014 page 52f.

Table 6: Available definitions for the specification of processes in the context of washing and cleaning operations of clothing textiles

Processes and process conditions	Definitions & Description
Number of wash-clean cycles⁵²	<p>No standard washing/cleaning models available over the standard life cycle (e.g. in the form of standard types and numbers of washing/cleaning operations for different garment textiles or similar), but:</p> <p>JRC (2014)⁵³ Assumptions on washing numbers in the life cycle of apparel textiles</p> <p>Stockings (knitted or crocheted): 104 washes</p> <p>T-shirts, waistcoats, vests etc.: 50 washes</p> <p>Briefs, panties, pants, etc. (knitted or crocheted): 104 washes</p> <p>Gloves (knitted or crocheted): 4 washes</p> <p>Shirts or blouses (except knitted or crocheted): 25 washes</p> <p>Shirts or blouses (knitted or crocheted): 25 washes</p> <p>Jerseys, pullovers, jumpers: 50 washes</p> <p>WRAP (2017)⁵⁴, number of washing cycles during the entire service life:</p> <p>T-Shirt: 56</p> <p>Socks: 62</p> <p>Jeans: 30</p> <p>Shirts: 40</p> <p>Knitwear: 30</p>
Wash-clean sequence	
Wet wash households	<p>DIN EN 60456:2023-04; VDE 0705-456:2023-04 Washing machines for household use - Method for measuring the performance characteristics (IEC 60456:2010, modified + Cor. 1:2011). Specifically describes with which standard laundry, which standard detergent and with which standard dirt washing machines are tested.</p> <p>Up to now, laboratories have often used standardised washing machines; in some cases, household washing machines are also used, so that slightly different test results may be possible. Therefore, a standardised procedure is indispensable.</p>
Dryer household	DIN EN 61121:2020-08; VDE 0705-1121:2020-08 Clothes dryers for household use - Methods for measuring the performance (IEC 61121:2012, modified)
Wet Laundry Industry	EN ISO 10472-2 Safety requirements for washing machines - Washing machine Dryer ⁵⁵
Dryer industry	EN 10472-4 Safety requirements for washing machines-dryers ⁵⁶
Dry cleaning	<i>No suitable source identified so far</i>

⁵² In the expert workshop, it was pointed out that the number of washes indicated in the cited studies is in some cases significantly higher than the usual practical expectation/design parameters.

⁵³ JRC 2014.

⁵⁴ WRAP 2017.

⁵⁵ Note by the authors: These are security requirements. No suitable source has yet been identified for "performance requirements".

⁵⁶ Note by the authors: These are security requirements. No suitable source has yet been identified for "performance requirements".

- ▶ No freely available⁵⁷ (standardised) process models could be identified that describe and quantify the type and number of slightly different “common”
- ▶ washing and cleaning processes during the intended service life of the apparel textiles.

6.2.3 Results on performance parameters

The above compilation shows that in many cases the “standard process models” necessary for a complete performance assessment are not yet available. Notwithstanding this, the corresponding definitions/descriptions can be presented for a number of performance parameters. The same applies to the associated performance requirements and performance test methods.

Corresponding information is compiled in Table 7 below:

Table 7: Available performance parameters, requirements and test methods in the context of washing and cleaning operations of garment textiles

Performance parameters	Definitions, requirements and test methods	Suitable for
Information on the type of “intended/permissible” washing/cleaning operations ⁵⁸ .	Care instructions: Instructions for care and cleaning in the form of textile care symbols. For household laundry, the specifications of GINETEX ⁵⁸ or according to ISO EN DIN 3758 apply. For household laundry, corresponding washing and drying procedures for testing the textile are defined in DIN EN ISO 6330. For industrially washable textiles, the standard DIN EN ISO 15797 applies, which prescribes industrial washing and finishing procedures for testing workwear.	All
Performance requirements	- No legally binding obligation to pass on care instructions, but Blue Angel eco-label (DE-UZ 154): “ ... In addition, care and cleaning information must be provided in the form of textile care symbols in accordance with the guidelines of GINETEX or ISO EN DIN 3758. The standards ISO 15797 and ISO 10023 apply to industrial washing textiles.”	
Dimension stability during washing and drying ⁵⁹	Defines a maximum level for changes in the dimensions of garment textiles after washing and drying. This depends on the washing process.	All
Performance requirements	- No (standardised) standard requirements, but Blue Angel eco-label (DE-UZ 154): “After washing and drying according to the care instructions, the dimensions on the finished textile may only change within the scope of specified values (dimensional change after washing and drying in +/- %).”	

⁵⁷ It is known that individual companies in the field of clothing textiles have such “model assumptions” as part of their product planning and quality assurance, but these are not published.

⁵⁸ <https://www.ginetex.ch/>

⁵⁹ Cf. UBA (2017).

Performance parameters	Definitions, requirements and test methods	Suitable for
	<p>In DE-UZ 154 there is a table for various textile materials and end products (with values between +/- 3 and 8%)</p> <p>The test is carried out using the test methods DIN EN ISO 6330 and DIN EN ISO 5077, taking into account the following change: three washing cycles at the temperatures indicated on the end product with drying in the tumble dryer after each washing cycle, unless other drying methods are indicated on the end product.</p>	
Performance testing	<p>DIN EN ISO 5077 (2008) - Textiles - Determination of the dimensional change in washing and drying.</p> <p>Testing device: This tests the change in length and width with a measuring tape. Specifications: Dimensional change is given in %.</p> <p>These washing procedures can be used to investigate dimension stability: DIN EN ISO 6330 (2012) - Textiles - Non-commercial washing and drying methods for testing textiles DIN EN ISO 15797 (2018) - Textiles - Industrial washing and finishing methods for testing workwear DIN EN ISO 3175-2 (2017) - Textiles - Professional care, dry-cleaning and wet-cleaning of textile fabrics and garments - Part 2: Method for testing the behaviour during cleaning and after-treatment using perchloroethylene (tetrachloroethene) DIN EN ISO 3175-3 (2017) - Textiles - Professional care, dry-cleaning and wet-cleaning of textile fabrics and garments - Part 3: Method for testing the performance of cleaning and after-treatment with hydrocarbon solvents. DIN EN ISO 3175-4 (2018) - Textiles - Professional care, dry-cleaning and wet-cleaning of textile fabrics and garments - Part 4: Method for testing performance of cleaning and finishing using simulated wet cleaning</p>	
Resistance to seam slippage after washing	<p>During washing, seams can shift and the product can become shapeless and unusable.</p>	All
Performance requirements	- No (standardised) standard requirements	
Performance testing	<p>DIN EN ISO 13936-1 (2004) - Textiles - Determination of resistance to sliding of yarns in woven seams - Part 1: Fixed seam opening method DIN EN ISO 13936-2 (2004) - DIN EN ISO 13936-1 (2004) - Textiles - Determination of resistance to sliding of yarns in woven seams - Part 2: Fixed force method (method 2 is also suitable for elastic fabrics) Testing device: Tensile testing machine with constant speed Specification: tensile force in N</p>	

Performance parameters	Definitions, requirements and test methods	Suitable for
Seam twisting/resistance to twisting after washing⁶⁰	After washing and drying, the textile surfaces can twist; this disturbs the visual appearance in particular, but also the fit.	All
Performance requirements	- No (standardised) standard requirements	
Performance testing	ISO 16322-1:2005-06 Textiles - Determination of twist after washing - Part 1: ready-made knitwear - changing the angle of rotation of the rows of stitches in percentages Device: Angle measurement Indication: in % of change	
Colour fastness to washing⁶¹	An important aspect of garments is colour, which should not change over the period of use. This property can be achieved by determining the resistance of the colour of textiles of all types and in all states of processing to household washing or commercial washing processes as applied to normal textiles commonly used in the home.	All
Performance requirements	- No (standardised) standard requirements, but Blue Angel eco-label (DE-UZ 154): The stain resistance and colour fastness to washing in accordance with the care instructions must be at least levels 3-4 according to ISO 105 (grey scale A 03). This requirements does not apply to end products that are clearly labelled with “dry clean only” or equivalent labelling (insofar as these products are generally labelled accordingly in practice). In addition, it does not apply to indigo dyed denim, white products, end products that are neither dyed nor printed, or to non-washable furniture fabrics.” The test is carried out using the test method DIN EN ISO 105-C06 (single wash at the temperature indicated on the end product with perborate powder). according to OEKO-TEX® Standard 100: When testing colour fastness to water, a score between 3-4 must be achieved in product class 1 “Baby”. In the remaining three product classes 2-4 (with skin contact, without skin contact, furnishing materials), a rubbing fastness score of at least 3 is required.	

⁶⁰ Cf. UBA (2022).

⁶¹ Cf. UBA (2017).

Performance parameters	Definitions, requirements and test methods	Suitable for
Performance testing	DIN EN ISO 105-C06 (2010) - Textiles - Tests for colour fastness - Part C06: Colour fastness of household and commercial laundry. This is tested with the grey scale or with a spectrometer or colorimeter. The grey scale is used to assess the change in colour according to ISO 105-A02 and the staining according to ISO 105-A03. The spectrometer or colorimeter is used to assess the change in colour according to ISO 105 A05 and the staining according to ISO 105-A04. The instrumental staining scale rating is measured.	
Colour fastness to chemical cleaning (dry cleaning)⁶²	Describes the resistance of the colour of textiles of all types and in all processing states to the processes of dry cleaning.	
Performance requirements	- No (standardised) standard requirements	
Performance testing	DIN EN ISO 105-D01 (2010) - Textiles - Tests for colour fastness - Part D01: Determination of dry cleaning fastness using perchloroethylene solvent Note: Chemicals other than perchloroethylene may be used. Test apparatus: mechanical test apparatus consisting of a water bath and rotating containers, grey scale (ISO 105-A02 & ISO 105-A03) Indication: fastness number	
Wash resistance of the water repellent finish⁶³	Resistance of the water-repellent finish to washing/cleaning processes	Only with water-repellent finish
Performance requirements	- No (standardised) standard requirements, but Blue Angel eco-label (DE-UZ 154): "The functionality of the water repellent finish must still be 80 out of 90 after 5 domestic washing and drying cycles at 40 °C or after 5 industrial washing and drying cycles at a minimum of 75 °C. In the case of industrial washing cycles, the temperature for garments with taped seams may be reduced to 60 °C. Care instructions on the reimpregnation of the product must be supplied with the textile."	
Performance testing	DIN EN ISO 4920 Textiles - Determination of water-repellent properties (spray method) This spraying method can be used to determine the water-repellent properties of textile fabrics with or without a water-resistant or water-repellent finish, in which the surfaces are wetted with water using a defined spraying device. The fabrics are wetted with water and the visual assessment is done by scores from 0 to 5.	

⁶² Cf. UBA (2017) & Öko-Institut (2023).

⁶³ Cf. UBA (2017).

Performance parameters	Definitions, requirements and test methods	Suitable for
	<p>Performance testing (according to DIN EN ISO 6330 for household washing cycles or DIN EN ISO 15797 for industrial washing cycles)</p> <p>DIN EN 29 865 - Determination of water-repellent properties of sheet materials by means of the rain shower test known as Bundesmann method</p> <p>Test device: Rain shower test known as Bundesmann method for the simulation of a defined artificial rainfall</p> <p>Indication: Visual assessment of the wetting of the material compared to reference photographs, assessment of whether water can be seen on the underside of the sample and indication of the amount of water that has been absorbed by the sample material (indication in %) and that has penetrated through the sample material (indication in ml).</p>	
Wash resistance of the flame retardant finish⁶⁴	Resistance of the flame retardant finish to washing/cleaning processes.	Only with flame retardant equipment
Performance requirements	- No (standardised) standard requirements, but Blue Angel eco-label (DE-UZ 154): "Washable end products must also retain their functionality after 25 industrial washing and drying cycles in accordance with the care instructions."	
Performance testing	DIN EN ISO 12138 Textiles - Non-commercial washing methods for textiles prior to the flammability test. The standard specifies procedures for evaluating the possible effects of repeated non-commercial washing at selected washing temperatures on the flammability properties of textile fabrics.	
Wash resistance of the easy-care finish⁶⁵	Resistance of the easy-care finish to washing/cleaning processes	Only with easy-care finish
Performance requirements	- no (standardised) standard requirements, but Blue Angel eco-label (DE-UZ 154) (also called non-iron and wrinkle free finish): "Natural fibre products must achieve an SA-3 fabric smoothness grade and blended natural and synthetic fibre products an SA-4 fabric smoothness grade after 10 domestic washing and drying cycles at 40 °C."	
Performance testing	ISO 7768:2009-04 Textiles - Method for the evaluation of the smooth appearance of fabrics after household washing and drying. This standard describes a method for assessing the smooth appearance of fabrics after one or more waxing treatments. The assessment is based on a smoothness ranking from SA 5 to SA 1.	

⁶⁴ This performance parameter was deliberately included here, irrespective of the general exclusion of PPE and other workwear, since in Scandinavia, among other countries, baby clothing is sometimes equipped with flame-retardant features.

⁶⁵ Cf. UBA (2017) & UBA (2022).

Performance parameters	Definitions, requirements and test methods	Suitable for
Colour fastness during ironing⁶⁶	Describes the preservation of colour fastness during (multiple) ironing	
Performance requirements	- No standardised requirements	
Performance testing	DIN EN ISO 105-X11 (1994) - Textiles - Tests for colour fastness - Part X11: Determination of colour fastness to ironing; tests for colour change due to ironing. Indication: authenticity number by comparison with corresponding grey scale	
Possibility for re-impregnation	Refreshing the water-repellent function	
Performance requirements	- No standardised requirements	
Performance testing	Verification can be carried out in the same way as the original function test (e.g. water repellency). These are described above.	
Possibility to refresh the flame protection	Refreshing can happen e.g. by heat/pressure (ironing).	
Performance requirements	- No standardised requirements	
Performance testing	Checking is done in textile service companies like the testing of the original function. In households, the functions cannot be replicated with the test methods because the test equipment is missing.	
Possibility to refresh the crease protection	Note: A crease protector can no longer be renewed	
Performance requirements	- <i>not applicable</i> -	
Performance testing	- <i>not applicable</i> -	
Availability of instructions for updating functional equipment	No standardised requirements, standards or other specifications were identified. However, there are instructions for outdoor jackets, for example, that ironing can improve the function, but there are no specifications from the standardisation. The difficulty here is that the test methods are not available in the household and therefore the test can only be carried out with simple scenarios that can be recreated in everyday life.	

- Suitable test specifications could be identified for a larger number of appropriate performance parameters. Standardised performance requirements, on the other hand, do not seem to exist.

⁶⁶ Cf. UBA (2022).

6.3 Proposals for the product parameter “reparability and/or refurbishability”

For the range of these product parameters, a search was carried out for the following elements:

- ▶ Identification of the terminology for the relevant processes in the field of apparel textiles
- ▶ Standardised process models for identifying and evaluating the requirements for the relevant processes
- ▶ Performance parameters with regard to
 - Reparability of the product
 - Support for the repair processes

In addition in each case

- Performance testing methods
- Performance requirements

6.3.1 Identification of the terminology for the relevant processes

The draft EU Ecodesign Regulation already contains definitions of terms for the conceivable processes in this area. The following Table 8 shows this again.

Table 8: Available definitions for processes in the context of garment textile repair & remanufacturing.

Process designation	Description/Definition	Source	transferable
Repair	A measure carried out to return a defective product or waste to a condition in which the intended use is fulfilled.	EU Ecodesign Regulation Draft, (COM (2022) 142 final)	Yes
Reprocessing	An industrial process in which a product is manufactured from items that are wastes, products or components and in the course of which at least one change is made to the product that affects the safety, performance, purpose or nature of the product that is normally marketed with a commercial guarantee.	EU Ecodesign Regulation Draft, (COM (2022) 142 final)	Partly
Retrofit	The improvement of the functionality, performance, capacity or aesthetics of a product.	EU Ecodesign Regulation Draft, (COM (2022) 142 final)	No
Functionalise again	A treatment measure for the renewed production of textile functionalisations		Yes

- ▶ As noted, the terminology for the process of repair can also be applied without restriction to clothing textiles.

- ▶ The term “reprocessing” can also be applied to clothing textiles, e.g. when considering how a used winter coat is (re)placed on the market after cleaning, impregnation and replacement of the inner lining for renewed use. However, the description in the draft EU Ecodesign Regulation also contains less “appropriate” specifications here, such as “ ... industrial process, for ...”.
- ▶ The process of “retrofitting” in its present definition states the possibility of improving functionality or performance - aspects that are rather inapplicable to apparel textiles.⁶⁷

The following research on performance parameters therefore focuses on the process of repair or the product parameter of reparability.

6.3.2 Results on performance parameters below the product parameter reparability

The reparability of clothing textiles undoubtedly has a significant influence on the useful life of textiles. To date, however, there is no standard for assessing or defining the reparability of textiles. The same applies to remanufacturing and retrofitting. However, these two steps are currently (still) clearly secondary in their practical relevance to the question of durability/reliability.

Fasteners (i.e. buttons, zippers, laces, ribbons, etc.) are often among the first things to fail on garments such as jackets, trousers or shirts.⁶⁸ Accordingly, design-related difficulties in repairing a defective zipper or the inability to obtain a specific button can lead to the garment being discarded before the rest of the garment shows signs of wear.

It should be noted that the basic “technical” possibility of repair and access to appropriate spare parts are not the only aspects that have an impact on reparability. It also strongly depends on the users or consumers and their skills and willingness to repair. Although most people are able to sew on a button, research suggests that fewer and fewer people have the skills to carry out more complicated repairs such as altering a hem or plugging holes. At the same time, there has been a decline in the number of alteration tailors and similar service businesses in the market.

According to a 2020 ING report, about 50% of consumers do not repair clothes because they lack the skills or prefer to buy new (cheap) clothes (ING, 2020)⁶⁹.

Necessary distinctions

The above already makes it clear that different levels have to be considered when it comes to reparability:

1. The level of appropriate design of the product

The issue here is whether the garment product can be disassembled and reassembled from a technical perspective in such a way that the replacement of damaged “parts” is possible or whether a repair (such as the renewal of a seam) is technically possible - even without such a disassembly/replacement process.

2. The level of the (spare parts) market environment

This addresses the aspect of availability & accessibility of relevant exchange parts (“spare parts”) for the repairers. This also includes the availability/accessibility of relevant repair instructions.

Access to relevant spare parts and accessories, including instructions that allow for easy

⁶⁷ There is no objective standard for determining whether a changed aesthetic constitutes or can constitute an “improvement” over the product originally placed on the market.

⁶⁸ Nordic Council of Ministers (2018).

⁶⁹ ING 2020.

repair, can encourage consumers to repair the garment instead of throwing it away. This access can be provided, for example, together with the product at the time of purchase by providing the relevant spare parts, including (sewing) threads or yarn. Instructions for simple repairs that support end-user repair could be provided in different ways (point-of-sale, packaging insert, ...) or online.

3. The competence, equipment and proximity to the manufacturer of the repairers

It is very easy to see that there are fundamental differences in terms of reparability, depending on whether the “normal” user, an independent repair shop or a repair service close to the manufacturer is used as a reference process. In cases where self-repair is not an option, manufacturers who place textile clothing on the market can enter into service partnerships with repair providers or set up their own repair centres. In such cases, much more complex repairs can be carried out, with a correspondingly different range of required repair information and/or need for access to “specific spare parts”.

The following Table 9 lists the (product) parameters listed in Annex I of the draft EU Ecodesign Regulation in the context of reparability and shows the corresponding assessments and comments of the experts with regard to transferability for the field of clothing textiles.

Table 9 : Examination of terminology for product/performance parameters in the area of repair & refurbishment

(Product) parameters	Assessment/Commentary	Directly transferable
Availability and delivery time of spare parts	So far, no corresponding standardised performance requirements or similar available for clothing textiles. Therefore, there is always a need to define (presumably specifically for different groups of garment textiles defined “parts” lists) the spare parts that have to be kept in stock. In general, certainly: fasteners (buttons, press studs, zippers, Velcro fasteners, ...) In addition (on a case-by-case basis): separate parts (such as one-button linings, special suspenders, belt webbing, etc.) or for “combination products” (suit trousers/suit jackets, ...) For professional repair, possibly going beyond this: separable functional parts (sleeves, hoods, ..., e.g. for functional clothing).	Yes - but product group specific concretisation necessary
Compatibility with generally available spare parts	So far no corresponding standardised performance requirements or similar available for clothing textiles. Closely related to “availability of spare parts”. It is questionable what “generally available spare parts” are. So far, there are no standardised spare parts or components (such as standard zippers or similar) in the clothing textiles sector that could be “generally” available. Efforts in this direction could open up a reference for corresponding requirements, at least for fasteners.	Yes
Use of standard components	No corresponding standardised performance requirements or similar for clothing textiles available to date. Can on the one hand refer to “smaller/replaceable” standardised spare parts - (see above) and would then be a (at least theoretically) sensible operationalisable performance parameter.	Only partially

(Product) parameters	Assessment/Commentary	Directly transferable
	Beyond that, it becomes hardly operationalisable in the case of clothing textiles, given the variety of materials and shapes.	
Use of labelling standards for components and materials to identify them	Is currently regulated for the "textile materials" in the clothing products with textile labelling obligation. For other parts (such as fasteners or similar), however, no standardised ("component") definition or the like is yet available. Additional identifiers would be relevant and helpful for repairs if: <ul style="list-style-type: none"> - they are "specific" spare parts that are not generally available and can be ordered so "easily". - standard parts have actually been used, which can then be exchanged for similar standard parts. 	Yes - if further requirements are met
simple non-destructive disassembly and reassembly properties of fabrics	No corresponding standardised performance requirements or similar for clothing textiles available to date. Seems to be a reasonable and necessary performance parameter, especially with regard to the possibilities of replacing (standard) spare parts (see above). Simple" and "non-destructive" would certainly have to be further specified ("simple" e.g. via the type of tools required and/or the necessary (standard) time required.	Yes - depending on product
Modularity	So far, no corresponding standardised performance requirements or similar are available for clothing textiles. A modular construction of clothing is conceivable in some areas, e.g. winter jackets with button-in linings or similar. In principle, such a construction also makes a separate replacement, a separate repair of the different (construction) parts conceivable. However, such an approach is hardly applicable to most other clothing products (socks, shirts, etc.).	Yes - but narrowly limited to a few cases
Availability of repair instructions	No corresponding standardised performance requirements or similar for clothing textiles available to date. In principle, this can be operationalised in a meaningful way, but there is a clear distinction in the form for <ul style="list-style-type: none"> ▪ Repairs for private users ▪ Repairs with commercial suppliers 	Yes - but product group specific concretisation necessary
Number of materials and components used	No corresponding standardised performance requirements or similar for clothing textiles available to date. Not very relevant for durability (this may be different with regard to the product aspect of recyclability, which is not dealt with here).	No
Number and complexity of processes and tools required	No corresponding standardised performance requirements or similar for clothing textiles available to date. Relevant in special cases, e.g. when seams are welded or glued in functional clothing or similar. Seams are welded or glued. The repair of textiles is otherwise technologically a comparatively simple process (plugging holes, renewing	Rather - No

(Product) parameters	Assessment/Commentary	Directly transferable
	defective seams, sewing on buttons), at least when referring to the repair of complex technical devices (such as electrical appliances).	
Conditions for access to product data	No corresponding standardised performance requirements or similar for clothing textiles available to date. Could be relevant for professional repair facilities. For example, if seams are to be renewed, it is useful to know the sewing material, the seam construction and the processing parameters (stitch length, fabric thickness) in order to be able to select the machine settings.	If applicable for sub-areas
Conditions for access to or use of the required hardware and software	Not relevant so far (but could change after the introduction of a digital product passport, for example).	No
Access to test protocols or test equipment not generally available	No corresponding standardised performance requirements or similar for clothing textiles available to date. However, this could be relevant for the “refurbishment”, i.e. the fundamental renewal of the functional equipment by professional service providers.	Limited
Access to technologies protected by intellectual property rights	No corresponding standardised performance requirements or similar for clothing textiles available to date. However, this could be relevant for the “refurbishment”, i.e. the fundamental renewal of the functional equipment by professional service providers.	Limited
Availability of specific guarantees for remanufactured or refurbished products	No corresponding standardised performance requirements or similar for clothing textiles available to date. Could be an important aspect in repair offers by commercial repair facilities to strengthen consumer confidence.	If applicable Yes

- The above assessment by the experts shows that basic proposals for product/performance parameters for reparability can also be applied in principle to clothing textiles. However, the usefulness and operationalisability of these parameters must be i) further operationalised in a product group-specific manner and ii) dependent on which accompanying structures are (to be) established in the market environment of reparability. This applies, for example, to the aspect of standardising simple replacement parts (especially closures).

7 Expert workshops

7.1 Objectives of the expert participation

The preliminary results of the expert report were presented and discussed in a workshop with experts.

Representatives from the fields of production, trade, non-governmental organisations, specialist institutes and universities took part in the workshop.

The following aspects were to be examined very specifically in the joint expert discussion:

- ▶ Are there any important performance parameters missing for phrasing possible minimum ecodesign requirements for clothing textiles?
- ▶ Where do the existing performance parameters need to be further specified?
- ▶ For which performance parameters is a differentiation between different clothing textiles necessary?

7.2 Main results of the workshop

The derivation and the basic “hierarchical” structuring of the terms met with general agreement among the participating experts. In addition, further general aspects were discussed and individual performance parameters were specified.

Discussion of general aspects:

- ▶ The usefulness of mandatory ecodesign requirements based on the compiled performance parameters and their further concretisation was discussed. The experts and the German Environment Agency made it clear that the research carried out in the context of the report on the availability of terms, definitions and test standards in no way meant that the respective performance aspect should or will be the subject of a binding minimum ecodesign requirement.
- ▶ The connection of “durability” with performance parameters that “simply” represent an expectation of a good appearance (such as crease or ironing resistance) or “functioning” (such as “fading”) was discussed. Here it was explained that “durability” expresses that no events occur that challenge/impair the expected functioning. Therefore, there is a direct connection here.

Concretisation and addition of performance parameters:

- ▶ During the workshop and in its aftermath, concrete additions were made to other relevant performance parameters, some of which are also supported by test standards, such as “water vapour resistance” or “UV protection finishing”. These were included by the experts in the preparation of this final report.

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DIN EN ISO 12945-2:2021-04 Textilien - Bestimmung der Neigung von textilen Flächengebilden zur Pillbildung, Flusenbildung oder Verfilzung auf der Oberfläche - Teil 2: Modifiziertes Martindale-Verfahren (ISO 12945-2:2020); Deutsche Fassung EN ISO 12945-2:2020. Via: <https://www.din.de/de/mitwirken/normenausschuesse/nmp/veroeffentlichungen/wdc-beuth:din21:325445568>. Zuletzt aufgerufen am 10.05.2023.

DIN EN ISO 12945-4:2021-04 Textilien - Bestimmung der Neigung von textilen Flächengebilden zur Pillbildung, Flusenbildung oder Verfilzung auf der Oberfläche - Teil 4: Beurteilung der Pillbildung, Flusenbildung und Verfilzung durch visuelle Analyse (ISO 12945-4:2020); Deutsche Fassung EN ISO 12945-4:2020. Via: <https://www.din.de/de/mitwirken/normenausschuesse/nmp/veroeffentlichungen/wdc-beuth:din21:325445667>. Zuletzt aufgerufen am 31.05.2023.

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<https://www.din.de/de/mitwirken/normenausschuesse/nmp/veroeffentlichungen/wdc-beuth:din21:187071021>. Zuletzt aufgerufen am 10.05.2023.

DIN EN ISO 13934-2:2014-06 Textilien - Zugeigenschaften von textilen Flächengebilden - Teil 2: Bestimmung der Höchstzugkraft mit dem Grab-Zugversuch (ISO 13934-2:2014); Deutsche Fassung EN ISO 13934-2:2014 Via:

<https://www.din.de/de/mitwirken/normenausschuesse/nmp/veroeffentlichungen/wdc-beuth:din21:201413926>. Zuletzt aufgerufen am 14.02.23.

DIN EN ISO 13935-1:2014-07 Textilien - Zugversuche an Nähten in textilen Flächengebilden und Konfektionstextilien - Teil 1: Bestimmung der Höchstzugkraft von Nähten mit dem Streifen-Zugversuch (ISO 13935-1:2014); Deutsche Fassung EN ISO 13935-1:2014. Via:

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<https://www.din.de/de/mitwirken/normenausschuesse/nmp/veroeffentlichungen/wdc-beuth:din21:205201248>. Zuletzt aufgerufen am 10.05.2023.

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DIN EN ISO 13937-1:2000-06 Textilien - Weiterreißigenschaften von textilen Flächengebilden - Teil 1: Bestimmung der Weiterreißkraft mit dem ballistischen Pendel (Elmendorf) (ISO 13937-1:2000); Deutsche Fassung EN ISO 13937-1:2000. Via:

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DIN EN ISO 13938-2:2020-03 Textilien - Bersteigenschaften von textilen Flächengebilden - Teil 2: Pneumatisches Verfahren zur Bestimmung von Berstdruck und Berstwölbung (ISO 13938-2:2019); Deutsche Fassung EN ISO 13938-2:2019. Via:

<https://www.din.de/de/mitwirken/normenausschuesse/nmp/veroeffentlichungen/wdc-beuth:din21:318424529>. Zuletzt aufgerufen am 14.02.2023.

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DIN EN ISO 3175-2:2020-05 Textilien - Professionelle Pflege, Chemischreinigung und Nassreinigung von textilen Flächengebilden und Kleidungsstücken - Teil 2: Verfahren zur Prüfung des Verhaltens beim Reinigen und Nachbehandeln unter Verwendung von Perchlorethylen (Tetrachlorethen) (ISO 3175-2:2017, korrigierte Fassung 2019-12); Deutsche Fassung EN ISO 3175-2:2018. Via: <https://www.din.de/de/mitwirken/normenausschuesse/nmp/veroeffentlichungen/wdc-beuth:din21:320131741>. Zuletzt aufgerufen am 31.05.2023.

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DIN EN ISO 3175-4:2018-08 Textilien - Professionelle Pflege, Chemischreinigung und Nassreinigung von textilen Flächengebilden und Kleidungsstücken - Teil 4: Verfahren zum Prüfen der Leistung beim Reinigen und Finishen unter Einsatz der simulierten Nassreinigung (ISO 3175-4:2018); Deutsche Fassung EN ISO 3175-4:2018. Via: <https://www.din.de/de/mitwirken/normenausschuesse/nmp/veroeffentlichungen/wdc-beuth:din21:283434621>. Zuletzt aufgerufen am 31.05.2023.

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A Annex I: Classification of (clothing) textiles into -product/goods groups

For the possibility of further use of the project results in the coming implementation processes of the EU Textile Strategy or the EU Ecodesign Regulation, the connectivity to the specifications for “product groups” expected there is of high importance. Against this background, research was carried out in the first phase of the project into existing and possibly widely accepted structuring of “clothing textiles”.

The results are described below.

A.1 Classification of clothing textiles in official statistics

A.1.1 European Statistics (Eurostat)

All experiences from the previous implementations of the mandatory ecodesign requirements show that at the end of the technical discussions at the EU level, market-related product group structuring with more or less direct reference to the systematics of EuroStat (production and trade statistics) or relevant industry statistics were almost always used, but not very differentiated material-technical structuring options. These experiences should be taken into account.

For the further market-related differentiation of textile products, Council Regulation (EEC) No. 2658/87 on the tariff and statistical nomenclature and on the Common Customs Tariff is particularly relevant.

In its Annex I, the designations of the commodity groups that (also) form the basis of European trade statistics are found in the so-called “Combined Nomenclature”. This Annex I is adapted annually (or more frequently) by a corresponding implementing regulation to changes in international trade law, but also to changes due to new technological and/or market-related developments. The last complete update⁷⁰ was made by the COMMISSION'S IMPLEMENTING REGULATION (EU) 2021/1832 of 12 October 2021.

Section XI “Textiles and textile products” is relevant for textiles. The following figure shows the structure of this section:

⁷⁰ Subsequently, there were two more adjustments in other commodity areas.

Figure 10: Structuring of Section XI of Annex I of EU/2021/1832

SECTION XI	
TEXTILES AND TEXTILE ARTICLES	
50 SILK	384
51 WOOL, FINE OR COARSE ANIMAL HAIR; HORSEHAIR YARN AND WOVEN FABRIC	386
52 COTTON	390
53 OTHER VEGETABLE TEXTILE FIBRES; PAPER YARN AND WOVEN FABRICS OF PAPER YARN	398
54 MAN-MADE FILAMENTS; STRIP AND THE LIKE OF MAN-MADE TEXTILE MATERIALS	401
55 MAN-MADE STAPLE FIBRES	405
56 WADDING, FELT AND NONWOVENS; SPECIAL YARNS; TWINE, CORDAGE, ROPES AND CABLES AND ARTICLES THEREOF	412
57 CARPETS AND OTHER TEXTILE FLOOR COVERINGS	416
58 SPECIAL WOVEN FABRICS; TUFTED TEXTILE FABRICS; LACE; TAPESTRIES; TRIMMINGS; EMBROIDERY	419
59 IMPREGNATED, COATED, COVERED OR LAMINATED TEXTILE FABRICS; TEXTILE ARTICLES OF A KIND SUITABLE FOR INDUSTRIAL USE	422
60 KNITTED OR CROCHETED FABRICS	427
61 ARTICLES OF APPAREL AND CLOTHING ACCESSORIES, KNITTED OR CROCHETED	430
62 ARTICLES OF APPAREL AND CLOTHING ACCESSORIES, NOT KNITTED OR CROCHETED	440
63 OTHER MADE-UP TEXTILE ARTICLES; SETS; WORN CLOTHING AND WORN TEXTILE ARTICLES; RAGS ...	451

Source: Annex I of EU/2021/1832.

In the context of the current project, Chapter 61 “CLOTHING AND CLOTHING ACCESSORIES, WOVEN OR KNITTEN” and in particular Chapter 62 “CLOTHING AND CLOTHING ACCESSORIES, OTHER THAN WOVEN OR KNITTEN” are relevant, which structure the “classic” clothing textiles.

The internal structuring of these two chapters, distinguished by the “structure” (the type of textile) of the input materials, is largely comparable on the first level - the level of the so-called “four-digit”. Therefore, a correspondingly merged description is given below.

Table 10: Structuring of Chapters 61 and 62 from Annex I of the Regulation of EU/2021/1832

Combined nomenclature	Description(s) of goods
6101/6201	Men's or boys' overcoats, car coats, capes, cloaks, anoraks, windcheaters, wind-jackets and similar articles, other than those of heading 6103/6203
6102/6202	Women's or girls' overcoats, car coats, capes, cloaks, anoraks, windcheaters, wind-jackets and similar articles, other than those of heading 6104/6204
6103/6203	Men's or boys' suits, ensembles, jackets, trousers (including breeches and similar trousers), bib and brace overalls and shorts (other than swimwear)
6104/6204	Women's or girls' suits, ensembles, jackets, dresses, skirts, divided skirts, trousers, breeches (including knee breeches and similar trousers), bib and brace overalls and shorts (other than swimwear)
6105/6205	Shirts, for men or boys
6106/6206	Blouses and shirts, for women or girls
6107/6207	Men's or boys' pants, briefs, nightshirts, pyjamas, bathrobes, dressing gowns and similar articles
6108/6208	Women's or girls' slips, petticoats, briefs, panties, nightdresses, pyjamas, negligees, bathrobes, dressing gowns and similar articles
6109	T-shirts and singlets , knitted or crocheted
6110	Jerseys, pullovers, cardigans, waistcoats and similar articles, including knitted or crocheted undercoats
6111/6209	Clothing and clothing accessories, for infants
6112/6211	Tracksuits, ski suits, swimming costumes and trunks

Combined nomenclature	Description(s) of goods
6212	Brassières, girdles, corsets, braces, garters and the like, and parts thereof, whether or not knitted or crocheted
6113 00	Garments of knitted or crocheted fabrics of heading No 5903 - Textile fabrics impregnated, coated, covered or laminated with plastics (other than those of heading 5902) 5906 - Rubberised textile fabrics, (other than those of heading 5902) 5907 - Other textile fabrics impregnated, coated or covered; painted canvas for theatrical scenery, studio back-cloths or the like
6213	Handkerchiefs and decorative handkerchiefs
6114	Other knitted or crocheted garments
6214	Shawls, scarves, mufflers, veils and the like
6115	Pantyhose, tights, stockings, socks and other hosiery, including degressive compression hosiery (for example, varicose vein stockings), knitted or crocheted
6215	Ties, bow ties (e.g. cross ties) and tie scarves
6116/6216	Finger gloves, gloves without fingertips and mittens
6117/6217	Other made-up clothing accessories, parts of garments or of clothing accessories

Within the commodity groups (colloquially called “four-digit”), there are further number ranges (colloquially at the level of “six-digit” or “eight-digit”).

- ▶ the subdivisions into the individual types of goods (i.e. for product group 6101/6202 “coats” versus “capes” versus “anoraks” etc.)
- ▶ and below that, the differentiations according to materials (i.e. the original fibres, such as “wool”, “cotton”, “silk”, etc.).

In chapter 62, “work and occupational clothing” is also found at each of these lower levels.

Behind the colloquial terms such as four-digit or eight-digit is the clear system of European customs tariffs. The following Figure 11 explains the structure of these number ranges.

Figure 11: Systematic structure of the European customs tariff numbers

Code number	Formal structure
49	Chapter - harmonised system
4901	Heading - harmonised system
4901 99	Subheading - harmonised system
4901 9900	Subheading - combined nomenclature
4901 9900 00	Subheading - TARIC/Community use
4901 9900 00 9	Code number - Electronic customs tariff/national use

Source: Zoll

The structure of the product groups (GG) of the German trade statistics is, by nature, largely identical to that at the EU level. The following figure also shows the total table of contents for Section XI “Textiles and textile products”.

Figure 12: Structuring of Section XI of the List of Goods for Foreign Trade Statistics 2022 (Destatis 11/2021)⁷¹

Abschnitt XI	
Spinnstoffe und Waren daraus	
50	Seide 323
51	Wolle, feine und grobe Tierhaare; Garne und Gewebe aus Rosshaar 325
52	Baumwolle 328
53	Andere pflanzliche Spinnstoffe; Papiergarne und Gewebe aus Papiergarnen 334
54	Synthetische oder künstliche Filamente; Streifen und dergleichen aus synthetischer oder künstlicher Spinnmasse 336
55	Synthetische oder künstliche Spinnfasern 340
56	Watte, Filze und Vliesstoffe; Spezialgarne; Bindfäden, Seile und Taue; Seilerwaren 346
57	Teppiche und andere Fußbodenbeläge, aus Spinnstoffen 350
58	Spezialgewebe; getuftete Spinnstofferzeugnisse; Spitzen; Tapisserien; Posamentierwaren; Stickereien . . . 352
59	Getränkte, bestrichene, überzogene oder laminierte Gewebe; Waren des technischen Bedarfs, aus Spinnstoffen 355
60	Gewirke und Gestricke 360
61	Kleidung und Bekleidungszubehör, aus Gewirken oder Gestricken 363
62	Kleidung und Bekleidungszubehör, ausgenommen aus Gewirken oder Gestricken 372
63	Andere konfektionierte Spinnstoffwaren; Warenzusammenstellungen; Altwaren und Lumpen 382

Source: German statistics (Destatis 11/2021)

Annex I contains a pdf version of the complete list of goods (Destatis 11/2021).

Since on the internal market always applies:

Sales volume on the domestic market = domestic production volume - export volume + import volume, production statistics are always important in addition to (foreign) trade statistics. The production statistics, or more correctly the goods index for production statistics, is broken down into corresponding goods groups (BP numbers).

Below is the structuring of Division 14 – “Clothing” at the level of goods groups and classes from the current list of goods (GP 2021).

⁷¹ English version could not be found (last checked November 2023).

Figure 13: Structuring of the goods nomenclature for production statistics (GP 2019) in Division 14 - Clothing⁷²

Bekleidung	
Bekleidung (ohne Pelzbekleidung)	141
Bekleidung aus Leder oder rekonstituiertem Leder (einschl. Mänteln) (ohne Bekleidungszubehör, Schuhe und Kopfbedeckungen)	1411
Arbeits- und Berufsbekleidung	1412
Sonstige Oberbekleidung (ohne Arbeits- und Berufsbekleidung)	1413
Wäsche	1414
Bekleidung und Bekleidungszubehör, a.n.g.	1419
Pelzwaren	142
Bekleidung aus gewirktem oder gestricktem Stoff	143
Strumpfwaren	1431
Bekleidung a.n.g., aus Gewirken oder Gestricken	1439
Veredlung von Erzeugnissen dieser Güterabteilung (ohne Bekleidung aus textilen Stoffen)	1499

Source: German statistics (Destatis 2018)

The further subdivision below the groups and classes of goods into types of goods can be found in the excerpt from the Güterverzeichnis für Produktionsstatistiken (GPO 2019), Division 14 - Bekleidung (Destatis, 2018).

As a result, it can be stated:

- ▶ The official statistics have a comparatively differentiated breakdown in the field of clothing textiles, so that it seems possible and feasible to define an appropriate classification of product groups on this basis for the implementation process of the EU Ecodesign Regulation.

A.2 Further “common” classifications of clothing textiles into product groups

In addition to analysing the classifications of the relevant official statistics, the experts also examined which other classifications are used for the field of clothing textiles, e.g. by trade associations and similar actors. and similar actors.

The research included the following sources:

- Scientific publications
- Association statistics
- Company-related divisions

⁷² English version could not be found (last checked November 2023).

The results of this research can be summarised as follows:

- ▶ It has not yet been possible to find a uniform industry-wide classification for clothing textiles outside of official statistics.
- ▶ A helpful classification was proposed by ECLA⁷³. It differentiates according to:⁷⁴
 - Trousers and shorts
 - Skirts
 - Jackets
 - Coats/Raincoats
 - Knitwear
 - Pyjamas and nightwear
 - Shirts, dresses and blouses
 - Lingerie and underwear
 - Swimwear
 - Lining (not a category of its own, but an important component of many different clothing products).

⁷³ EURATEX 2006.

⁷⁴ Quoted from OVAM 2021 page 11.