

Product-Category Rules (PCR)
for Preparing an Environmental Product
Declaration (EPD) for
Synthetic Fiber - Functional Fabrics

PCR 2013:1.0

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Taiwan Textile Federation

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1. General Information

This document is to be used as the product category rules (PCR) for the manufacturing of synthetic fiber - functional fabrics (“products”). The requirements specified in this PCR are intended to be used for EPDs certified in accordance with ISO 14025 standard. This document shall be valid until December 31, 2015.

This PCR was drafted by the Everest Textile Co., Ltd. Representatives from major Taiwanese manufacturers of similar products and stakeholders were invited by the Taiwan Textile Federation to the open consultation meeting held on May 29, 2013, to participate in the discussion and review of this PCR. The Environment and Development Foundation (EDF) then reviewed and approved this PCR on October 24, 2013.

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2. Company and product description

The EPD shall include information about the manufacturing company/organization. The information may include manufacturing process related information, and environmental related information, such as the environmental management system information. The information may also include special issues which the company/organization would like to emphasize, such as the products meeting certain environmental criteria, or environmental safety and health related information.

This PCR is applicable mainly to business-to-business (B2B) communications. The term “product” shall include its packaging materials.

2.1 Product group function

Synthetic fibers are artificial fibers made from petroleum chemicals through chemical synthesis. The synthetic fibers are long fibers which can be made into various fabrics. Functional fabrics are produced from these fabrics through the addition of functional additives which give the fabrics desirable functions, such as antibacterial, water adsorbing, fast-drying, breathable, waterproof, UV resistant, or water repellent.

2.2 Product components

The products’ main components/constituents include:

(1) Main materials:

Synthetic fibers can be made from one or more than one of the following synthetic fibers:

- Condensation Polymer:
Polyamide Fiber: Nylon 6, Nylon 6.6, Nylon 11

Polyester Fiber: PET, PBT, PTT

- Addition Polymer:

Polyacrylonitrile Fiber: PAN (or Acrylic Fiber)

Polyethylene Fiber: PE

Polypropylene Fiber: PP

Polyvinylalcohol Fiber: PVA

Polyvinylchloride Fiber: PVC

Polytetrafluoroethylene Fiber: PTFE

Polyurethane Fiber: PU

Poly Lactic Acid: PLA

(2) Secondary materials:

- Functional Additives: functional additives (e.g., water-repellent agent, antistatic agent, hygroscopic agent, antibacterial agent, ultraviolet blocking agent) and functional films (e.g., PU film, acrylic (PAN) film);
- Dyes: e.g., natural dye, synthetic dye.

(3) **Auxiliary materials:** e.g., paper tube for yarn, auxiliary materials (e.g., scouring agent, sizing agent, desizing agent, chemical material), color printing paper.

(4) **Packaging materials:** e.g., paper tube for fabric, packaging bags.

The data quality requirements for the main components/materials are described in Section 9 on calculation rules and data quality requirements. The EPD shall also include the secondary materials and packaging materials of the product, but their data quality requirements are different from those of the main components/constituents.

2.3 Product technical description

The product technical description part of the EPD may include but not limited to the following information:

- Product/Model number
- Size
- Color
- Content
- Physical properties, e.g.,
 - ◆ Tear Strength
 - ◆ Color Fastness to Light
 - ◆ Color Fastness To Washing
 - ◆ Abrasion Resistance
 - ◆ Color Fastness To Perspiration
 - ◆ Anti-pilling

- Functionality, e.g.,
 - ◆ Antibacterial
 - ◆ Moisture Transferring and Quick Drying
 - ◆ Water-Vapor Permeable and Liquid-Water Impermeable
 - ◆ UV Protective
 - ◆ Water Repellency

3. List of materials and chemical substances

The contents of the following materials and substances in the product shall be declared:

- All materials of the product (excluding packaging material) with weight ratio (material weight/product weight (excluding packaging)) $\geq 1\%$;
- All materials of the packaging with weight ratio (material weight/packaging weight) $\geq 1\%$;
- All substances/materials in the product restricted/regulated by legal and customer requirements.

For example:

1. Free formaldehyde content test
2. Banned azo dyes: content shall not exceed 30 ppm
3. Contain no cadmium, lead, antimony, tin and other heavy metals
4. Perfluorooctanoic acid (PFOA) and perfluorooctane sulfonate (PFOS) content test
5. Alkyl phenol ethoxylates (APEO) content test
6. Plasticizer content test
7. Isocyanate (isocyanates) content test
8. Organic solvent content test

The declaration of relevant information may only be made when appropriate evidences are available (for example, test reports from accredited laboratories/testing facilities). The following organizations may provide accreditation for testing facilities: Taiwan Accreditation Foundation (TAF), (Asia Pacific Laboratory Accreditation Cooperation (APLAC), International Laboratory Accreditation Cooperation (ILAC) or ILAC Mutual Recognition Arrangement (ILAC MRA). For definitions of testing methodology and confirmations of regulated hazardous substances based on the accredited laboratories' product testing methods, please refer to IEC 62321 Standard.

4. Declared unit

The declared unit is one (1) yard or kilogram of product, with its content indicated.

5. System boundaries

The main system boundaries for the declared product system are presented as follows:

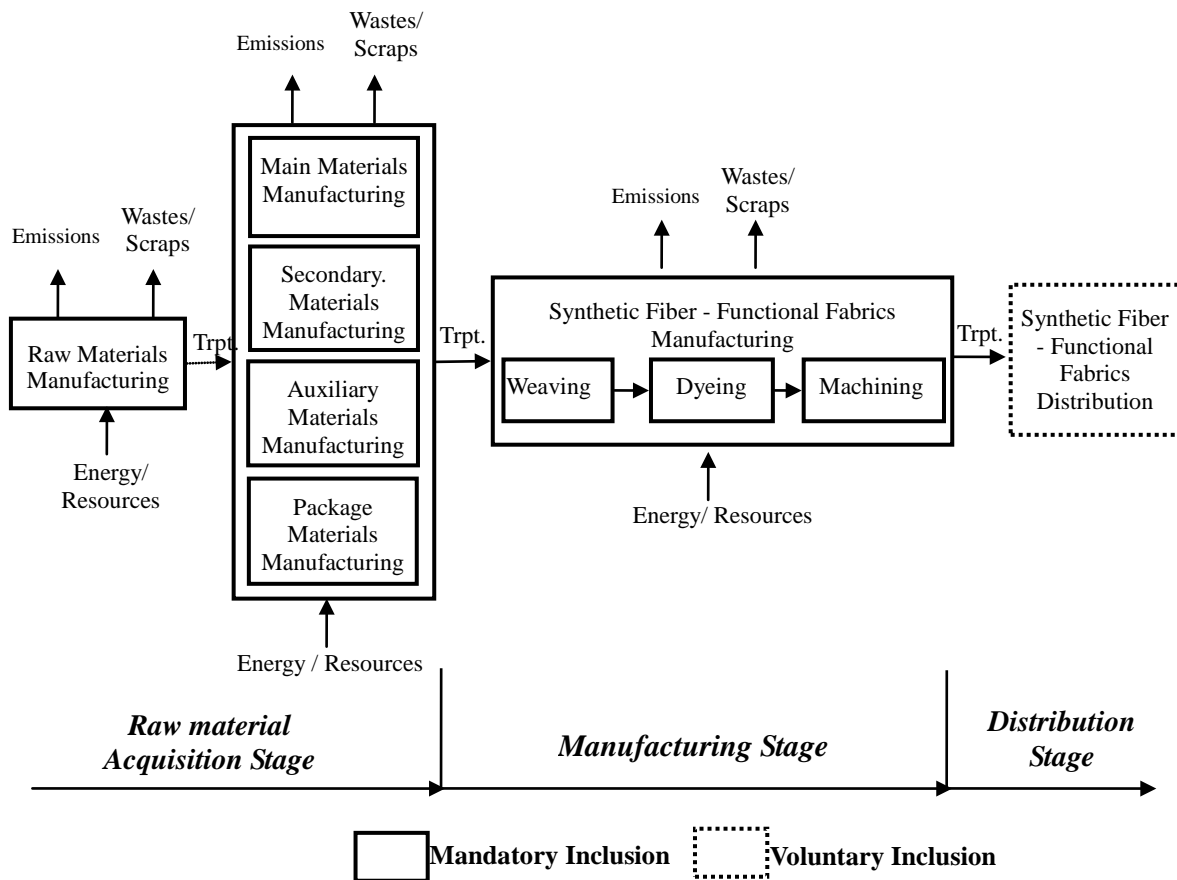


Figure 1 System boundary of the product system

As noted in Figure 1 above, the life cycle of the product covers three life cycle stages: raw material acquisition, product manufacturing, and distribution. The data quality requirements for the inventory process are described in Section 9 on calculation rules and data quality requirements.

Raw Materials Acquisition Stage

The LCA shall include information for the following unit processes:

- Production and extraction of raw materials used for the main, secondary, auxiliary and packaging materials, as well as relevant raw materials' forming and refining processes;
- Environmental impact of relevant processes for the manufacturing of main materials;
- Environmental impact of relevant processes for the manufacturing of secondary materials;
- Environmental impact of relevant processes for the manufacturing of auxiliary materials;
- Environmental impact of relevant processes for the manufacturing of packaging materials.

Reporting of information regarding the transportation of raw materials is optional (voluntary).

Manufacturing Stage

The LCA shall include information for the following unit processes:

- Manufacturing of products and generation of process waste; and
- Transportation of main, secondary, auxiliary and packaging materials to the product manufacturing plant.

Distribution and Marketing Stage

The LCA shall include information for the transportation from the manufacturing plant to the marketing sites with the following requirements:

- Transportation of products from the manufacturing plant to the downstream distributors/retailers; and
- Reporting of information regarding transportation of products from the downstream distributors/retailers to the consumers and waste treatment by the downstream distributors/retailers is optional.

5.1 Specification of different boundary settings

Boundary in time

The validity period for the LCA results presented in the LCA report shall be defined.

Boundary towards nature

If the manufacturing processes are located within Taiwan, the solid waste categories as defined in Taiwan's Waste Disposal Act shall be adopted. If the processes are located in other countries, equivalent legal requirements shall be considered.

The natural boundary of the system shall describe the boundary where the materials and energy resources flow from nature into the system, and where the water and air emissions and waste are released out of the system.

Only the quantity of the disposed waste needs to be considered; landfilling process does not need to be considered. If the waste is generated through wastewater treatment or incineration process, such waste should be included into the wastewater treatment or incineration process.

Boundaries in the life cycle

The boundaries in the product life cycle are described in Figure 1. The construction of the site and infrastructure, as well as the production of manufacturing equipment do not need to be included.

Boundaries towards other technical systems

Boundaries towards other technical systems describe the inputs of material and other components towards other systems, as well as outputs of materials towards other systems. For the inputs of recycled materials and energy towards the product manufacturing stage, the transportation between the recycling process and use of recycled materials shall be included in the data set. For the production of recyclable products during the manufacturing stage, the transportation towards

the recycling process shall be included.

(Note: Further explanations are provided in Section 7 on open-loop recycling.)

Boundaries regarding geographical coverage

The manufacturing stage may cover manufacturing processes located on any sites around the world. For processes located in a specific region, the data used should be representative of the region. The data for the main constituents shall be the specific regional data for the region where the process takes place (see Section 9). For ease of comparison, no matter where the emissions are generated, the same environmental impact parameters should be used for life cycle impact assessment (see Section 10).

6. Cut-off rules

For any impact category, if the sum of various impacts from a specific process/activity is less than 1% of the impact equivalent in that category, such a process/activity may be neglected during the inventory analysis. Nonetheless, the accumulated impact of neglected process/activity may not exceed 5%. Components and materials omitted from the LCA shall be documented.

(Note: This judgment for this “1% Rule” is based on the environment relevance assessment of material input to the system, and does not consider special and exceptional environmental impacts.)

7. Allocation rules

The main allocation rules shall be valid for the entire product system. For other secondary processes, other allocation rules may be defined; however, the use of these rules should be justified. Product-specific information should be preferentially collected in order to avoid the need for allocation. While selecting allocation rules, the following principles are recommended.

- **Multi-output**: The allocations are based on the changes in the resource consumption and pollutant emissions (for example, adopted quantity allocation for some main component, or surface allocation for some components), following the changes in the studied system’s output product or function or economical relationship.
- **Multi-input**: The allocation is based on actual relationship. For example, the manufacturing process’s emissions may be affected by the change in waste flow input.
- **Open loop recycling**: For the input of recycled materials or energy during the manufacturing stage of the product system, the transportation between the recycling process and the recycling to material use shall be included in the dataset. For the product which shall be recycled during the manufacturing stage, the transportation towards the recycling process shall be included.
- **Closed loop recycling**: For materials from the product system that are being recycled and reused within the same product system, the recycling ratio shall be considered to avoid double counting. The transportation and energy inputs from the recycling process to the reuse of materials shall be included in the dataset. For the product which shall be recycled during the manufacturing stage, the transportation towards the recycling process shall be included.

Notes:

- Allocation may be avoided through avoidance of dividing processes, for example as described in Section 6.3 of ISO/TR 14049; or through expansion of system boundary (for example as described in Section 6.4), so that the amended system shares the same product exchanges as the original system.

8. Units

The base units and derived units of the International System of Units (SI, *Système International d'unités*) shall be used preferentially.

Power & energy units:

- power unit: W
- energy unit: J

Specification units:

- length unit: m
- capacity unit: m³
- area unit: m²
- weight unit: kg

If necessary, prefixes may be used before the SI units:

- 10⁹ = giga, symbol "G"
- 10⁶ = mega, symbol "M"
- 10³ = kilo, symbol "k"
- 10⁻² = centi, symbol "c"
- 10⁻³ = milli, symbol "m"
- 10⁻⁶ = micro, symbol "μ"
- 10⁻⁹ = nano, symbol "n"

9. Calculation rules and data quality requirements

Data quality requirements for the raw material acquisition stage

- Generic data may be used for the extraction, production, forming, refining and transportation of the various materials used for the products. Please refer to Appendix I for the common sources of generic data.
- Generic data may be used for the manufacturing of the main, secondary, auxiliary and packaging materials used for the products.

Data quality requirements for the manufacturing stage

- Site specific data (for example, specific data for a manufacturing plant's manufacturing process or transportation data) shall be used for the product manufacturing processes including weaving, dyeing and post-processing. If other types of information are used, description of the information and rationale for using such information shall be provided. If there are multiple manufacturing sites, site specific data from a representative site may be used.

-Acidification	kg SO ₂ equivalent
-Photochemical oxidant formation	kg C ₂ H ₄ equivalent
-Eutrophication	kg PO ₄ ³⁻ equivalent
-Ozone depletion	kg CFC-11 equivalent

Note: For characterization factors of each impact category, please refer to *EPD Supporting Annexes*, Version 1.0 (2008-02-29), The International EPD Cooperation, downloadable from www.environdec.com.

Additional information

- Recyclable materials (optional)
- Waste (classification):
 - Hazardous waste as defined in Taiwan's Waste Disposal Act. Follow host countries' laws for sites outside Taiwan.
 - Other waste.
- Plastic parts marking: Where technologically possible, plastic parts of the product weighing ≥ 25 g shall be marked in accordance with the ISO 11469 and ISO 1043 Part 1/2/3/4, SPI or other international standard label to facilitate their identification and recovery at the end of life.
- Plastic packaging material marking: The Plastic packaging materials shall be labeled on the parts with SPI or other international standards for ease of sorting.

11. Recycling information

If practical, information for the constituents which can not be recycled and therefore should be disposed of properly during the end-of-life stage may also be included.

12. Other environmental information (Optional)

The EPD may cover information including technology adopted, site of product manufacturing and assembly, as well as information on other working environment, health and risk-related aspects.

If this PCR is to be used for product carbon footprint declaration purpose, in the declaration, information regarding commitment on GHG reduction should be included and shall ensure that the commitment is measurable, reportable and verifiable. The organization may also list environmental and energy management related information, such as awards, commendations and system certifications (e.g., ISO 14001, ISO 14064-1, IECQ HSPM) etc.

14. References

The EPD shall make reference to the following documents:

- EPD General Program Instructions, Version 1.0 (2008-02-29), The International EPD Cooperation, downloadable from <http://www.environdec.com/>;
- Relevant PCR documents
- The underlying LCA report

When available, the following documents shall also be referenced:

- Other documents and recycling instructions which verify and complement the EPD.

Appendix I – Generic Data Sources to Refer to

For processes located within Taiwan, Taiwan generic data or the data published by the commercial, industrial and energy competent authorities of the Republic of China (ROC) government, may be used. However, for other regions (such as EU), if there are more relevant generic data available, these data should be used instead. When data from the following generic databases are used, the most current and updated data should be used.

Material	Database
Packing materials, transport, Waste treatments	BUWAL 250
Steel, Primary copper, Copper products, Electricity, Fuels, Aluminum, Chemicals, Transports, Waste management	ELCD EIME (Environmental Information and Management Explorer) EcoBilan
Plastics	PE Plastics Europe (Association of Plastics Manufacturers in Europe) ELCD EIME (Environmental Information and Management Explorer) EcoBilan
Electronic components	ELCD EIME (Environmental Information and Management Explorer) EcoBilan
General Database	Ecoinvent The Boustead Model PE-GaBi DoITPro(Taiwan)

Appendix II – Reporting Format for the EPD

This appendix provides guidance information for the titles of sections, types of data and required information to be reported in the mandatory reporting part of the EPD. As a generic reporting template, the following titles and sub-titles are recommended:

(Refer to the PCR manual for the section numbering, the information in Italics are the recommended data/information for inclusion)

Introductory part

Each EPD should have an introduction part on the top part of the EPD which includes the following information:

- *Company/organization name*
- *Product name*
- *EPD registration number*

Description of the company/organization and product/service

Company/Organization

- *Description of company/organization*
- *Description of overall working environment, existing quality system and environmental management system*

Product and services (see Section 2)

- *Product's main applications*
- *Description of product specification, manufacturing process, manufacturing sites (if there are several sites)*
- *For product's environmental performance aspects, characteristics which may improve the usefulness of product*
- *Other types of relevant information, for example, special manufacturing processes with special advantages to the environment*

List of materials and chemical substances

- *Content declaration (see Section 3)*

Presentation of the environmental performance

- *Outline of the LCA methodology, for example, period of LCA, declared units, system boundaries (graphical presentation), cut-off and allocation rules, and data sources.*

Manufacturing stage (see Section 10)

Use stage (see Section 10)

- *Geographical region for product delivery*
- *Transportation data*
- *End-of-life information*

Information about Company and Certification Organization

Recycling information (see Section 11)

Other environmental information (see Section 12)

Information regarding certification (see Section 13)

- Names of certification and verification organizations
- Validity of certification certificates
- Compliance with legal and relevant requirements

References (see Section 14)

- relevant PCR documents
- EPD General Program Instructions, Version 1.0 (2008-02-29)
- underlying LCA study
- other supporting documents for LCA information
- other relevant documents regarding company/organization's environmental activities

Appendix III Abbreviations

Acronym	Common Name
APLAC	Asia Laboratory Accreditation Cooperation
CFP	Carbon Footprint of Product
EPD	Environmental Product Declaration
ErP	Energy Related Product
ILAC	International Laboratory Accreditation Cooperation
ILAC MAR	International Laboratory Accreditation Cooperation Mutual Recognition Arrangement
ISO	International Organization for Standardization
LCA	Life Cycle Assessment
PCR	Product Category Rule
RoHS	The Restriction of the use of certain Hazardous Substances in electrical and electronic equipment
SPI	Society of the Plastics Industry
TAF	Taiwan Accreditation Foundation
TEC	Typical Energy Consumption
Trpt	Transportation
WEEE	The Waste Electrical and Electronic Equipment Directive