



Product Category Rule (PCR) Guidance

For preparing an Environmental Product Declaration (EPD) for the Product Category:

PRINTERS AND MULTI-FUNCTION PRINTING UNITS

VERSION 2 (April 2018)

VALID THROUGH April 2023

UL 10004

Product Category Rules for Printers, UL 10004

Second Edition, Dated April 23, 2018

Summary of Topics

The Second Version of the Product Category Rules for Printers, UL 10004 has been issued.

Subject to these terms and conditions and those in any other agreements between you and UL Environment, Underwriters Laboratories Inc. (UL) and/or their representatives, you are hereby granted a limited, non-exclusive, non-transferable license to use the Product Category Rules (PCR) solely for your internal, non-commercial business purposes. The PCR is not being sold, and other than the limited license granted herein UL retains all rights, title and interest (including exclusive ownership) in the PCR and all copyright therein. UL reserves the right to regain possession of the PCR from you at any time. When no longer needed, you agree to destroy the PCR (if in hardcopy form) or delete and purge the PCR from your files (if in electronic form). No part of the PCR may be reproduced, modified, stored in a retrieval system, or transmitted in any form by any means, whether electronic, mechanical photocopying, recording, or otherwise without prior written permission of UL or UL Environment. You further agree not to create any derivative works from the PCR or remove or alter any copyright or other proprietary notices in the PCR. The limited license to use the standard shall automatically terminate upon your breach of any of the terms and conditions herein or any other agreement between you and UL, UL Environment and/or their representatives.

UL Environment provides this PCR “as is” without warranty of any kind, either expressed or implied, including but not limited to, the implied warranties of merchantability or fitness for any purpose.

In no event will UL Environment, UL or any of their affiliates be liable for any special, incidental, consequential, indirect or similar damages, including loss of profits, lost savings, loss of data, or any other damages arising out of the use of or the inability to use this PCR, even if UL Environment or UL or their authorized representative has been advised of the possibility of such damage. In no event shall UL Environment’s or UL’s liability for any damage ever exceed the price paid for the license to use this PCR, regardless of the form of the claim.

Users of the electronic versions of UL Environment’s Product Category Rules agree to defend, indemnify, and hold UL Environment, ULI, their affiliates and each of their respective trustees, officers, employees, agents and representatives harmless from and against any loss, expense, liability, damage, claim, or judgment (including reasonable attorney’s fees) resulting from any error or deviation introduced while purchaser is storing an electronic PCR on the purchaser’s computer system.

Versions overview

Version	Description	History
1	Printers and Multifunction Printing Units, initial publication	December 2012
2	• Update of v1 by original committee to include conventional Ink Jet printers within scope and remove the scope exclusion on printers with speeds greater than 75 ppm. • Update of impact assessment methodologies to TRACI 2.1 and ReCiPe2016. • Table of Contents added for ease of navigation and general style reformatting • General restructuring under sections “Goal and Scope, Requirements for the LCA,” “Data, Calculation and Reporting requirements,” “Use Stage Calculations,” and Content of the EPD”. • Clarification provided for system boundaries, particularly end of life as it pertains to reuse and recycling, as well as priority of primary vs secondary data.	April 2018

Editor's Note

This proposed PCR is based on revisions made to existing PCRs that address laser printers and other imaging devices. In an effort to harmonize this PCR with existing PCRs, the Laser Printers (EDP 2004-26[0]) PCR from Korea and the Electro-photographic and Inkjet Printer PCR from JEMAI were used as references. These PCRs were expanded to reflect global manufacturing data availability, conformity with existing imaging equipment environmental standards, and conformity with reference standards (PAS 2050, ISO 14065). Revisions/discussion points to make this PCR applicable to the U.S. include: units, functional unit, impact assessment methods, testing methods and requirements, use phase options, references, and standards.

This PCR is intended to serve the global B2B and B2C markets, reflecting the global manufacturing and distribution networks for these products. It is expected that region-specific versions of these PCR will not differ significantly.

1	General Information	5
1.1	Identification of Product.....	5
1.2	Geographic Coverage	5
1.3	Period of Validity	5
1.4	Public Comment.....	6
1.5	PCR Review Panel.....	6
1.6	Other Relevant Product Category Rules	6
2	Definitions and Acronyms	7
2.1	Symbols and Abbreviations.....	11
3	Requirements for the Life Cycle Assessment.....	11
3.1	Functional Unit	12
3.2	Product Lifetime	12
3.3	System Boundaries	12
3.4	Cut-off Criteria.....	15
3.5	Allocation Rules	16
4	Data, Calculation, and Reporting Requirements.....	17
4.1	Data sources and data quality requirements	17
4.2	Transport.....	20
4.3	Selection of the waste management method	20
4.4	Electricity grid	20
5	Use Stage Calculations.....	21
5.1	Energy Consumption.....	21
5.2	Consumable Use.....	21
5.3	Paper and Media Consumption (Optional)	22
6	Content of the EPD.....	24
6.1	EPD Summary	24
6.2	Product Description	24
6.3	Life Cycle Inventory Results.....	26

6.4	Life Cycle Impact Assessment Results	27
6.5	Assumptions and Estimations	29
6.6	Description of Data and Period under Consideration	30
6.7	Data Quality	30
6.8	Background Data	30
6.9	Allocation and Methodological Principles	30
6.10	Standards and Laws	30
6.11	Additional Environmental Information.....	31
6.12	Additional Life Cycle Scenarios.....	31
6.13	References.....	31
6.14	Verification	31
7	References.....	32

1 General Information

The intended application of this Product Category Rules (PCR) document is to provide guidance and requirements for developing Environmental Product Declarations (EPDs) based on Life Cycle Assessments (LCA) for printers and multi-function devices that address all relevant environmental aspects of the product life cycle, pursuant to the international standards mentioned below. The users of this PCR will be manufacturers of printers and multi-function devices and other interested parties and will enable EPDs that support comparable, informed, and objective evaluation of these products.

This document was developed under the UL Environment Type III EPD Program, operating in conformance with the following international standards:

- ISO 14025 - Environmental labels and declarations -- Type III environmental declarations -- Principles and procedures
- ISO 14040, Environmental management -- Life cycle assessment -- Principles and framework
- ISO 14044, Environmental management -- Life cycle assessment -- Requirements and guidelines

The rules and requirements of the UL EPD Program are defined in the UL General Program Instructions, available at: <http://industries.ul.com/environment/transparency/product-category-rules-pcrs>.

The information contained in an EPD created using this PCR is intended to complement or inform existing environmental labels for imaging equipment (e.g., EPEAT, EPA, Blue Angel). This PCR facilitates the creation of EPDs that will also satisfy optional criteria within the IEEE 1680.2 standard for imaging equipment.

1.1 Identification of Product

This product category rule is applicable to output devices including copiers, digital duplicators, fax machines, multifunction devices (MFDs), and printers that use high-temperature technologies such as electrophotography (EP) and solid ink (SI), and those that provide comparable functionality. It is not intended for low-temperature technologies, nor for large-format or small-format products. Not included are EP printers using continuous form paper or printers using paper sizes larger than A3.

1.2 Geographic Coverage

This PCR is primarily intended to serve the global B2B market, however, its use in the B2C market is not precluded. If intending to use in the B2C market, the EPD must be available at the point of purchase and data shall receive third-party verification. It is expected that region-specific versions of these PCRs will not differ significantly.

1.3 Period of Validity

This PCR is valid for 5 years and is subject to annual review by UL Environment.

1.4 Public Comment

In accordance with the UL Environment General Program Instructions, this PCR is made freely available for public comment for at least one calendar month and open to all public comments. Comments received from identifiable sources are addressed and responses will be provided upon request.

This document was posted for public comment from January 9, 2018 to February 16, 2018. Public comments were received from thinkstep, Inc.

1.5 PCR Review Panel

The panel review of Version 1 of this PCR was conducted by:

Chairperson

Lise Laurin
EarthShift, LLC
31 Leach Road
Kittery, Maine 03904
lise@earthshift.com

Panel Member

Marcos Esterman, Ph.D.
Associate Professor
Rochester Institute of Technology
Kate Gleason College of Engineering
81 Lomb Memorial Drive
Rochester, NY 14623-5603
mxeeie@rit.edu

Panel Member

Tim Strecker
Environmental Program
Manager
Hewlett-Packard Company
3000 Hanover Street
Palo Alto, CA 94304-1185
Tim.strecker@hp.com

1.6 Other Relevant Product Category Rules

In an effort to harmonize this PCR with existing PCRs, the Laser Printers (EDP 2004-26[0]) PCR from Korea and the Electro-photographic and Inkjet Printer PCR from JEMAI were used as references. These PCRs were expanded to reflect global manufacturing data availability, conformity with existing imaging equipment environmental standards, and conformity with reference standards (PAS 2050, ISO 14065).

2 Definitions and Acronyms

Automatic Duplexing

The capability of a copier, fax machine, MFD, or printer to produce images on both sides of an output sheet, without manual manipulation of output as an intermediate step. A product is considered to have automatic duplexing capability only if all accessories needed to produce duplex output are included with the product upon shipment. [EPA, 2006]

Consumable

A consumable is a replacement product integral to the functioning of the imaging equipment product with the intent, when depleted or worn, to be replaced or replenished by the user during the normal usage and life span of the imaging equipment product. Note: Consumables may include: toner, toner containers, toner bottles, toner cartridges, waste toner cartridges, ink cartridges, ink heads, ink sticks, ribbon ink, thermal paper, copy paper, imaging units, transfer belts, transfer roller, fusers, drum maintenance units, and other associated items. Items not intended to be replaced or replenished by the user would be not be considered consumable supplies, but rather "spare parts". [IEEE 1680.2:June 2011]

Consumer

Individual member of the general public purchasing or using goods, property or services for private purposes. [ISO 14025:2006]

Continuous Form

Products that do not use a cut-sheet media format, and that are designed for applications such as printing of bar codes, labels, receipts, banners, and engineering drawings.

Continuous form products can be of small, standard, or large format. [EPA, 2012]

Copier

A product whose sole function is to produce paper duplicates from paper originals. This definition is intended to cover products that are marketed as copiers, and upgradeable digital copiers (UDCs). [EPA, 2006]

Ecosphere flow

Material or energy entering the system being studied that has been drawn from the environment without previous human transformation, or material or energy leaving the system being studied that is released into the environment without subsequent human transformation [ISO 14044:2006]

Electro-photographic (EP)

A marking technology characterized by the illumination of a photoconductor in a pattern representing the desired output image via a light source, development of the image with particles of toner using the latent image on the photoconductor to define the presence or absence of toner at a given location, transfer of

the toner to the final print media, and fusing to cause the output to become durable. For purposes of this specification, Color EP products simultaneously offer three or more unique toner colors, while Monochrome EP products simultaneously offer one or two unique toner colors. This definition includes Laser, Light Emitting Diode (LED), and Liquid Crystal Display (LCD) illumination technologies. [EPA, 2012]

Environmental impact

Any change to the environment, whether adverse or beneficial, wholly or partially resulting from an organization's environmental aspects. [ISO 14001:2004]

Functional unit

Quantified performance of a product system for use as a reference unit. [ISO 14040:2006]

Facsimile (Fax) Machine

A product whose primary functions are (1) to scan paper originals for electronic transmission to remote units, and (2) to receive electronic transmissions for conversion to paper output. A fax machine may also be capable of producing paper duplicates. Electronic transmission is primarily over a public telephone system, but may also be via a computer network or the Internet. This definition is intended to cover products that are marketed as fax machines. [EPA, 2012]

Inkjet (IJ)

A marking technology characterized by the deposition of colorant in small drops directly to the print media in a matrix manner. For purposes of this specification, Color IJ products offer two or more unique colorants at one time, while Monochrome IJ products offer one colorant at a time. This definition includes Piezo-electric (PE) IJ, IJ Sublimation, and Thermal IJ. This definition does not include High Performance IJ. [EPA, 2012]

Intermediary Flow

A product, material or energy flow occurring between unit processes of the product system being studied. [ISO 14044:2006]

Large Format

Products designed for A2 media and larger, including those designed to accommodate continuous-form media greater than or equal to 406 mm wide. Large-format products may also be capable of printing on standard-size or small-format media. [EPA, 2012]

Life cycle

Consecutive and interlinked stages of a product system, from raw material acquisition or generation from: natural resources to final disposal. [ISO 14040:2006]

Multifunction Device (MFD)

A product that performs two or more of the core functions of a Printer, Scanner, Copier, or Fax Machine. An MFD may have a physically integrated form factor, or it may consist of a combination of functionally

integrated components. MFD copy functionality is considered to be distinct from single-sheet convenience copying functionality sometimes offered by fax machines. This definition includes products marketed as MFDs, and “multi-function products” (MFPs). [EPA, 2012]

Packaging

All products made of any materials of any nature to be used for the containment, protection, handling, delivery and presentation of goods, from raw materials to processed goods, from the producer to the user or the consumer. 'Non-returnable' items used for the same purposes shall also be considered to constitute packaging. 'Packaging' consists only of a) sales packaging or primary packaging, i.e. packaging conceived so as to constitute a sales unit to the final user or consumer at the point of purchase; b) grouped packaging or secondary packaging, i.e. packaging conceived so as to constitute at the point of purchase a grouping of a certain number of sales units whether the latter is sold as such to the final user or consumer or whether it serves only as a means to replenish the shelves at the point of sale; it can be removed from the product without affecting its characteristics. [IEEE 1680.2:June 2011]

Primary data

Any data gathered by direct measurement, estimations or calculation.

Printer

A commercially-available imaging product that serves as a hard copy output device, and is capable of receiving information from single-user or networked computers, or other input devices (e.g., digital cameras). The unit must be capable of being powered from a wall outlet or from a data or network connection. This definition is intended to cover products that are marketed as printers, including printers that can be upgraded into MFDs in the field. [IEEE 1680.2:June 2011]

Product category rules (PCR)

Set of specific rules, requirements and guidelines for developing Type III environmental declarations for one or more product categories. [ISO 14025:2006]

Product category

Group of products that can fulfill equivalent functions. [ISO 14025:2006]

Product Family

A group of product models that are (1) made by the same manufacturer, (2) subject to the same ENERGY STAR qualification criteria, and (3) of a common basic design. Product models within a family differ from each other according to one or more characteristics or features that either (1) have no impact on product performance with regard to ENERGY STAR qualification criteria, or (2) are specified herein as acceptable variations within a product family. For Imaging Equipment, acceptable variations within a product family include: a) Color, b) Housing, c) Input or output paper-handling accessories, d) Electronic components not associated with the marking engine of the Imaging Equipment product. [EPA, 2012]

Scanner

A product whose primary function is to convert paper originals into electronic images that can be stored, edited, converted, or transmitted, primarily in a personal computing environment. This definition is intended to cover products that are marketed as scanners. [EPA, 2012]

Secondary data

Data sources from published or unpublished data articles, reports or studies.

Small Format

Products designed for media sizes smaller than those defined as Standard (e.g., A6, 4"x6", microfilm), including those designed to accommodate continuous-form media less than 210 mm wide. [EPA, 2012]

Solid Ink (SI)

A marking technology characterized by ink that is solid at room temperature and liquid when heated to the jetting temperature. This definition includes both direct transfer and offset transfer via an intermediate drum or belt. [EPA, 2012]

Standard Format

Products designed for standard-sized media (e.g., Letter, Legal, Ledger, A3, A4, B4), including those designed to accommodate continuous-form media between 210 mm and 406 mm wide. Standard-size products may also be capable of printing on small-format media. [EPA, 2012]

Third party

Person or body that is recognized as being independent of the parties involved, as concerns the issues in question. "Parties involved" are usually supplier ("first party") and purchaser ("second party") interests. [ISO 14024:1999]

Type III environmental declaration

Environmental declaration providing quantified environmental data using predetermined parameters and, where relevant, additional environmental information. The predetermined parameters are based on the ISO 14040 series of standards, which is made up of ISO 14040 and ISO 14044. The additional environmental information may be quantitative or qualitative. [ISO 14025:2006]

Typical Electricity Consumption (TEC)

For the purposes of this specification, a method of comparing product energy performance via an evaluation of typical electricity consumption (measured in kilowatt-hours) during normal operation over a specified period of time, as specified in Section 8 of the ENERGY STAR Imaging Equipment test method. [EPA, 2012]