Product-Specific Criteria for EP and IJ Printer (PCR No: AD-04)

Note: These standards have been prepared for the development of EcoLeaf™ environmental labels. Use for any other purpose without consent of the EcoLeaf™ program office is strictly prohibited.

No.	Major key	Minor key	Class	Requirements
1	Pre-conditions	Target product	Description	Output devices for the computers in general use in homes, offices, and other places, using either the ink jet (IJ) technology or the electrophotographic (EP) technology. Not included are, EP printers using continuous form paper, or printers using paper sizes larger than A3.
2			Scope	Accessories include the following. EP: Photoreceptor, toner, carrier (integrated cartridges for printers that use them) IJ: Printhead, ink • All packaging (except for packaging that is used repeatedly in general application) • Accessories for performing functions include printer drivers provided on floppy disks, CD-ROMs, or other media, and manuals provided in printed form, CD-ROMs, or other forms.
3		Stage	Scope	All lifecycle stages (all stages specified in the PEIDS of this program: manufacturing, distribution, use, discarding, and recycling)

No.	Major key	Minor key	Class	Requirements
4	Product data sheet (PDS) Input data for the LCI: Lifecycle inventory analysis	Manufacturing stage information (product information)	Product materials or ingredient makeup	1) Items classified as class A parts (see section 3.4 of implementation guidelines): <u>EP Printers</u> Photoreceptor Notes: 1. Concerning cylinder processing: • Use processing energy data collected in house (when in-house data collection is possible). • See No. 14 when in-house data collection is impossible. 2. Use processing energy data collected in house for processing from making cylinder to applying coating. Toner Note: Use processing energy data collected in house. Carrier Note: Same conditions as toner. <u>IJ Printers</u> Printhead Ink Notes: 1. All ink constituents are treated as water, and the intensity for "water" is used, but this does not restrict the use of individual intensities. 2. For processing, use the processing energy data obtained in house. To evaluate materials in class A parts, go back to the MSDS material level. 2) To determine resource input amounts, use material mass for the stage at which materials become products, get a breakdown of the masses of the materials making up at least 90% of total product mass, and prorate the rest to come out to 100%. 3) The 11 materials listed on the product data sheet are: "Normal steel, Stainless steel, aluminum, other metals, thermoplastic resins, thermosetting resins, rubber, glass, paper, semiconductor substrates, and wood." For other materials, list their intensities. 4) Open recycling and reuse When open recycling and reuse are included, each company can calculate these categories by creating scenarios considered appropriate, and while taking careful note of the following items. The soundness of scenario bases is subject to verification. (1) Processes regarded within the scope of "indirect effects" (2) Deductions and impacts within the scope of "indirect effects"

No.	Major key	Minor key	Class	Requirements
5		Manufacturing stage information (production site information)	Material and energy inputs, consumption, and emissions	Input and consumption items Electricity, fuel oil A, diesel fuel, kerosene, gasoline, LNG (town gas), LPG, city tap water, industrial water supply, groundwater However, determine the impact of processing energy for class A parts by going back to the MSDS material level. Emissions Not specified. Each company should list those which it deems important. Transport impact for material inputs (raw materials and energy) is not factored in. Byproducts and sub-materials are not factored in. Sub-materials: Defined as materials input and discarded at manufacturing sites, and not shipped with products.
6		Distribution stage information	Product transport conditions	1) The means of transportation to the user and the loading factors are to be based on models established by each applicant company. 2) The quantification is to be done with a total domestic transportation distance (transportation up to the place of use) of 100 km. The product transportation from overseas to Japan is to include overseas land transportation and sea transportation, and the total distance figure is to be set by each company. Alternatively, it may be a value from an actual history at each company. 3) Disposal/recycling of the main unit packaging is to be entered into the calculations in No. 8 "Disposal/Recycling".

No.	Major key	Minor key	Class	Requirements
7		Usage stage information	Product usage conditions	1) Usage conditions IJ process: • Pattern to be printed: ISO/IEC-24712 • Number of prints: 10 sheets/day, 8 hours/day, 20 days/month, 12 months/year, 3 years of use. Note: Since 5 types of images are defined in ISO/IEC-24712, two sets per day are to be printed. • Printing mode: default mode for regular paper (ISO/IEC-24711) • Measurement of standby power consumption: standby power consumption conditions (hard/soft SWOFF state, when the power plug is connected) for the power plug to be measured in a connected state with the power outlet are to be set at each company. The conditions above are specified in description column on PEIDS. EP process: Patterns to be printed are as follows: Monochrome: K with printing rate of 5% Color: YMCK (four colors) with printing rate of 5% each Criterion for calculation shall comply with TEC test method of United States Environmental Protection Agency (EPA). (1) Number of prints per day for calculating the electricity consumption shall be the value specified in TEC test method (i.e. 0.5 ipm^2). (ipm: number of papers printed per minute in monochrome printing. Printing performance) (2) The usage period of the printer shall be five (5) years. (3) Therefore, total electricity consumption in five years shall be as follows: Total electricity consumption in 5 years = [TEC value] x 4 weeks x 12 months x 5 years (TEC value: weekly electricity consumption calculated from the number of papers printed per day) (For details, see appendix “Calculation Procedure of Electricity Consumption of and Quantity of Consumables Used on EP Printer.”) 2) The papers necessary in the usage stage are not to be included in the entities to be entered into the burden calculations 3) Quantities of regularly replaced parts and consumables used Items: Based on the plan at the time of the design, or on actual history. Quantities: Quantities used based on the above (EP: 5 years; IJ: 3 years), with fractions rounded up to integers. (For details on EP printer, see appendix “Calculation Procedure of Electricity Consumption of and Quantity of Consumables Used on EP Printer.”)

No.	Major key	Minor key	Class	Requirements
				Transport: Each company develops a model based on the above. 4) Conditions for disposal and recycling of regularly replaced parts and consumables are set forth in No. 8 "Disposal / Re-cycling"

No.	Major key	Minor key	Class	Requirements
8		Waste/ recycling stage information	Product waste/ recycling conditions	1) Scenario development Use the appendix: “Discarding and Recycling Scenarios for Scrapped Products.” • Recovery routes are those in each company’s scenarios which include transport. • Reuse scenario Recycling scenario Each company sets material-specific recycling rates (=η). • Industrial waste management scenario with no reuse or recycling. . For non-recovery route, use “Municipal Solid Waste Management Scenario” (see appendix). 2) Deduction scenario Use appendix: “Discarding and Recycling Scenarios for Scrapped Products.” 3) Criteria for determination of recyclability and reusability Each company decides on its own criteria. 4) Product recovery rate (the “part recovery rate” for consumables and replacement parts shall be the same) EP: η_2=40% IJ: η_2=1% Or, each company may use its own actual rate (η_1). 5) When products are reused Based on its design values, each company sets the number of times a product is reused (N_1) after the 5-year usage period. N_1 is an integer. To calculate the impact, use the above N_1: deduction amount for part reuse = “possible reuse amount planned at time of design by each company” x “product recovery rate η_2 (or η_1)” x “reuse deduction ratio $N_1/(N_1+1)$” 6) For consumables and replacement parts The number of times an item is reused during its lifetime is N_2, and the number of items used in 5 years is n, with fractions rounded up to integers. Impact calculation uses the above N_2 and n: part impact = “impact generated until one part is manufactured” x “number of items used in 5 years (n)” deduction amount for part reuse = “possible reuse amount planned at time of design by each company” x “product recovery rate η_2 (or η_1)” x “reuse deduction ratio $N_2/(N_2+1)$” x “number of items used in 5 years (n)” 7) Concrete method for entering into the calculations the processing burdens for products or parts that are not recovered The "End-of-life Product Disposal/Recycling Scenario" on the separate sheet is to be adopted. Regarding entry of the transportation burden into the calculations, 60 km as the distance, 4t truck as the means for transportation, and 62% as the loading factor, are to be used. Reference documents: Loading factors: Separate table No. 3 in the Notification No. 66 from the Ministry of Economy, Trade and Industry; Transportation distance: "Study Report for LCA Investigation Pertaining to Plastic Waste Management/Disposal", March 2001, from the Plastic Waste Management Institute. 8) Open recycling and reuse When open recycling and reuse are included, each company can calculate these categories by creating scenarios considered appropriate, and while taking careful note of the following items. The soundness of scenario bases is subject to verification. (1) Processes regarded within the scope of “indirect effects” (2) Deductions and impacts within the scope of “indirect effects”

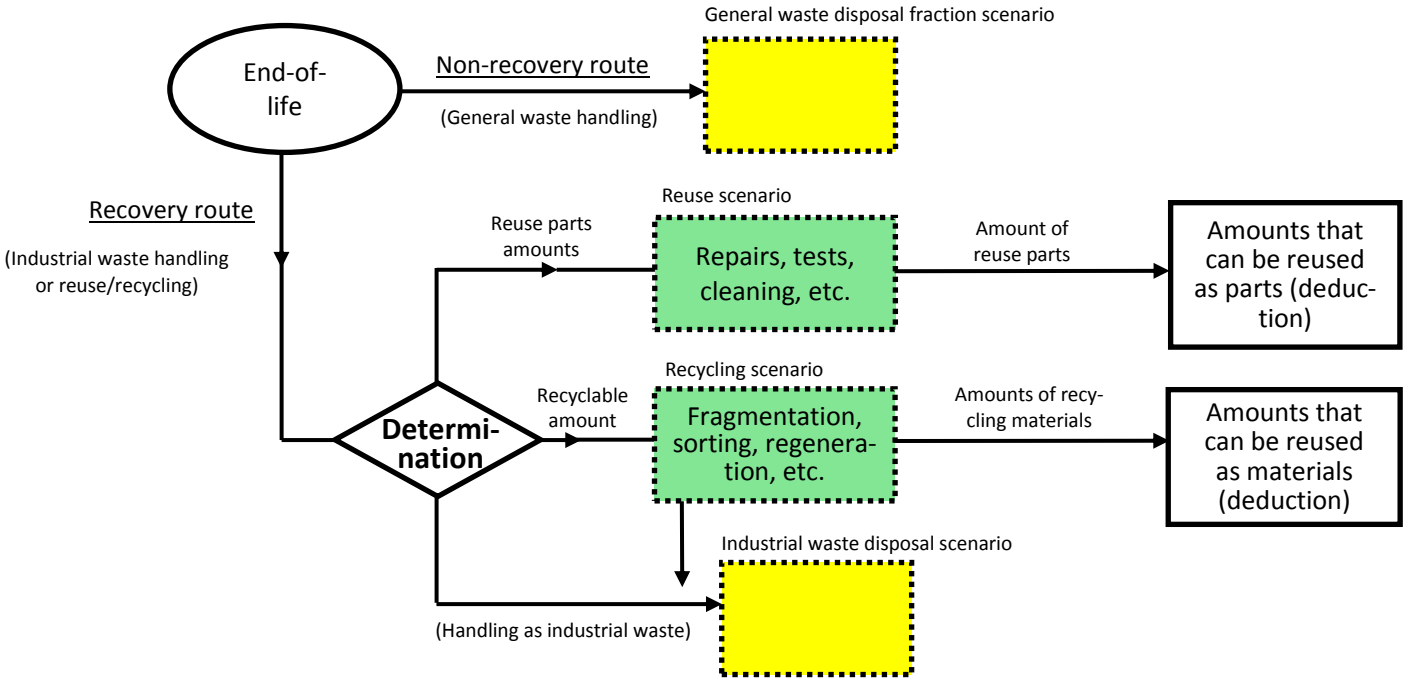
No.	Major key	Minor key	Class	Requirements
9	Product Environmental Information Disclo-	Inventory analyses	Lifecycle inventory calculation rules	When open recycling/reuse is to be included, indirect impacts and direct impacts are to be calculated separately, and among these, the indirect impact portions are to be represented as "recycling effects". In the PEIDS, the sum of the indirect impacts is to be entered in the "recycling effects" field.
10	Product Environmental Information Disclosure Sheet (PEIDS)	Impact analysis	Additional impact category	“Ozone layer depletion,” “eutrophication,” and “photochemical oxidants” deleted from the PEIDS.
11	Breakdown data sheet (PDS-related)	Data processing	Allocation rule	Not unified; each company decides as it sees fit.
12		Data collection	Coverage	When data are unobtainable, you may substitute data (including intensities) that include the conditions used in designing or planning.
13			Cut-off rules	When a cut-off is applied for assembly or other impact, note this fact and clearly state the reason.

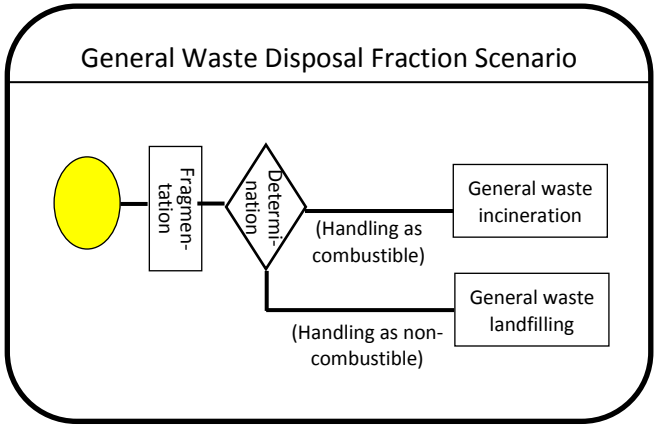
No.	Major key	Minor key	Class	Requirements
14	Break-down data sheet (PEIDS-related)	Database	Base unit database selection	1. For the assembly of purchased parts decided by each company, the base unit "parts assembly" is to be adopted. 2. For the photoceptor materials, the base unit "Al plate" is to be adopted. 3. Regarding iron oxide (if used), the base unit "cold-rolled steel plate" is to be used, without limiting the use of individual base units. 4. For the photoceptor drum processing, the base unit "non-ferrous press" is to be adopted. 5. For the ink composition, base unit class name "utility (water)" is to be adopted, without limiting the use of individual base units. For the above-mentioned base unit names, see the "base unit list".
15			Base unit database additions	None.
16			Addition of characterization factor	None.
17	Product environmental information	Product specification		EP Printers 1. Process (EP) 2. Monochrome/color 3. Print speed (monochrome/color) 4. Maximum paper size 5. Functions subjected to verification (two-side function and such). IJ process 1. Maximum paper size 2. Process (IJ)

No.	Major key	Minor key	Class	Requirements
18		Data disclosure		1. Items to list Compulsory items - “global warming impact, acidification impact, and energy consumption” - are specified (in the guidelines), while the 7 optional items (guidelines) may be listed as desired. 2. Life cycle stages included As desired. 3. Usage conditions List: period of use (X years), amount of use (X pages [in multiples of 10,000]) 4. Method of representation Use text, tables, and graphs as desired When open recycling and reuse are included: • Show recycling effectiveness with dotted lines independently for each stage, without integrating actual impact.
19	Other environment- related information	Optional items		The following may be entered: (1) Type I and/or Type III environmental label (2) Acquisition of ISO 14001 certification (3) Certificates, approvals, or awards from national or industry organizations (4) Information on hazardous substances

End-Of-Life Product Disposal/Recycling Scenario

Rev. 01 1st March 2004

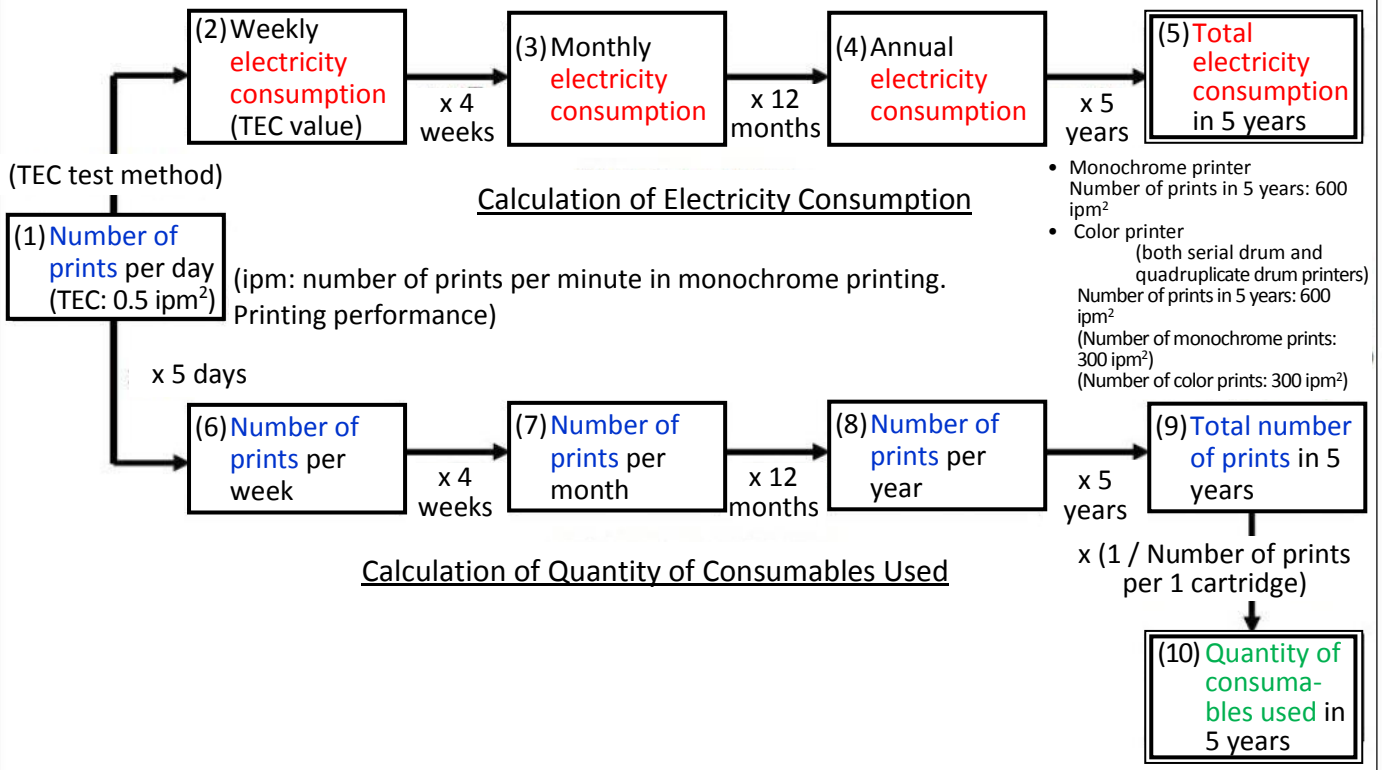




"Non-recovery route": route taken if entry into the calculations is made in terms of disposal as general waste (municipalities' responsibility)

"Recovery route": route taken if entry into the calculations is made in terms of disposal as industrial waste (businesses' responsibility) or reuse/recycling

Calculation Procedure of Electricity Consumption of and Quantity of Consumables Used on EP Printer



On the Changes in the Order of PCR Items Due to the Revision of the Product Category Rules (PCR) Development Rules (R-06)

Due to the May 1st, 2008 rule revision, the order of product category rules (PCR) items were changed.
As this PCR was developed prior to the rule revision, the order follows the previous item numbers.
Indicated below is the correspondence between PCR items before and after the rule revision.

<PCR items prior to rule revision>

No.	PCR items prior to rule revision
1	Product definitions
2	Product constitutive elements and evaluation units
3	Product life cycle stage
4	Raw materials/parts constitution
5	Production stage data collection conditions
6	Distribution stage data collection conditions
7	Usage stage data collection conditions
8	Disposal/recycling stage data collection conditions
9	LCI FGD/BGD data collection/processing
10	LCIA impact category
11	Allocation
12	Data collection range
13	Cut-off rules
14	LCI BGD approximation substitution
15	LCI BGD PCR base unit
16	LCIA BGD characterization factor additions
17	Product specifications
18	LCA data publication contents
19	Other environmentally relevant information

<PCR items after rule revision>

No.	PCR items after rule revision	Related forms
	[LCA examination range setting and label publication contents]	
1	Product definitions	—
2	Product constitutive elements and evaluation units	—
3	Product life cycle stage	—
4	Product specifications	PEAD
5	LCA data publication contents	PEAD
6	New-to-old product comparison	PEAD
7	Other eco-design relevant information	PEAD
	[System area and data collection conditions setting]	
8	Product raw materials/parts constitution	Breakdown DS (product) PDS
9	Article production stage modelling/data division, etc.	Breakdown DS (production site) PDS
10	Distribution stage modelling/data division, etc.	Breakdown DS (distribution) PDS
11	Usage stage modelling/data division, etc.	Breakdown DS (usage) PDS
12	Disposal/recycling stage modelling/data division, etc.	Breakdown DS (dispos-al/recycling) PDS
13	Cut-off rules	Breakdown DS (each stage), PDS
14	Collection data quality requirements	Breakdown DS (each stage), PDS
15	Collection data allocation	Breakdown DS (each stage), PDS
	[Inventory calculations]	
16	Approach to LCI calculation	Breakdown DS (each stage), PEIDS
17	LCI common base unit usage conditions	Breakdown DS (each stage), PEIDS
	[Life cycle impact evaluation (characterization)]	
18	LCIA impact category and characterization factor additions	Breakdown DS (each stage), PEIDS

Information on the development/approval of this PCR

Name of Commission making the determination	Representative: Youji Uchiyama Affiliation: University of Tsukuba		
PCR development/ revision date	Jan 01, 2008	Validity period	Feb 01, 2014 to Jan 31, 2017

Note: For the current PCR, the validity period is full 3 years from the development/renewal or revision with the purpose of continuation.

History of revisions, etc. for this PCR

Date	Version No., etc.	Action taken
June 3, 2002	01	Development
March 1, 2004	02	Entry into the calculations of overseas transportation burden has been added; direct impacts/indirect impacts distinction in the recycling effects has been added; and quality-weighting factor has been removed.
September 29, 2004	03	Distribution stage contents have been corrected
January 1, 2008	04	The following have been corrected in PCR-BM-01 (Item 6) sea and land transportations have been added; (Item 7) IJ process usage conditions have been corrected to latest criteria; (Item 8) distribution in the final disposal has been entered into the calculations; (Item 9) production site assembly burden calculation formula has been removed; and (Item 14) ink composition base unit has been corrected
February 1, 2011	-	Renewal
February 1, 2014	-	Renewal