EcoLeaf Environmental Label Product Category Rules (PCR)

PCR No.	PCR Title	**Digital Duplicator**
AF –04		Digital Printer-Duplicator

Note: These rules have been prepared for the implementation of the EcoLeaf program. Use for any other purpose in whole or in part without permission is prohibited.

No.	Major key	Minor key	Class	Requirements
1	Pre-requisites for PCR develop-ment	Product	Definition	Digital duplicators are duplicators that incorporate the master-making function to digitally form images on masters. (Based on the description in the Japan Business Machine and Information System Industries Association standards JBMS-70-2001.)
2			Scope	Accessories include the following: ・Master, ink ・All packaging (except for those commonly used repeatedly) ・Manuals
3		Stage	Scope	All life cycle stages (all stages specified in the PEIDS of this program: production, distribution, use, and disposal/recycling) are covered.
4	Product Data Sheet (PDS) (LCI input data)	Production stage information (Product information)	Product materials or raw materials constitution	1) Those to be classified as Parts and Similar A ◊ Ink (black) ・For non-water materials (including surface active agent), the base unit "inks" is to be used. ・For water, the base unit "clean water" is to be used. When well water is used, the material burden is 0, but the processing burdens used for drawing up, etc. are to be entered into the calculations. ◊ Master ・The base unit "machine-made paper" is to be used judging from the ingredients composing the Japanese paper parts. ・For film parts (non-Japanese paper parts including adhesion), the base unit "PET" is to be used. However, for processing, processing energy data collected in-house are to be used (this is not to limit the use of individual base units). The Parts and Similar A materials are to be traced back to the MSDS material level. 2) Resource input amount The mass of materials which have reached the product stage, with the materials amounting to 90% or more of the total product mass to be categorized by types. The remainder is to be prorated and converted into a percentage. 3) Material names to be listed in the product data sheet The following 11 items: ordinary steel, SUS, aluminum, other metals, thermoplastic resin, thermosetting resin, rubber, glass, paper, semiconductor substrate, and wood. For those that are outside of these 11 items, the base unit names are to be listed. 4) Open recycling/reuse When open recycling/reuse is to be included, entry into the calculations is possible by setting up a scenario considered appropriate at each company, while paying attention to the items below. The soundness of the set up basis is subject to verification. (1) Processes that fall in the scope of "indirect impacts". (2) Deductions and burdens within the scope of "indirect impacts".

5		Production stage information (Production site information)	Materials and energy that are input / consumed / disposed of	1) Input and consumption items Electricity, fuel oil A, diesel fuel, kerosene, gasoline, LNG (town gas), LPG, city tap water, industrial water supply, groundwater, and solvent. However, for processing energies pertaining to supply, the burdens are to be traced back to the MSDS material level. 2) Emissions Not specified. Those deemed important at each company are to be listed. Transportation burdens for the input materials (raw materials and energy) are not to be entered into the calculation. 3) Byproducts and sub-materials Sub-materials and byproducts are not to be entered into the calculations. Sub-materials: Materials that are input at production sites, and not shipped with products. Byproducts: Those that are shipped out of production sites, but not shipped with products.
6		Distribution stage information	Product transportation conditions	1) Means of transportation to the user and the loading factors To be based on models established by each applicant company. 2) Quantification To be done with a total domestic transportation distance (transportation up to the place of use) of 100 km. When overseas production is included, overseas land, sea or air transportation is to be entered into calculations of domestic transportation burdens. Overseas transportation conditions can be set according to the actual conditions at each company, but the soundness of the set up basis is subject to verification. Disposal/recycling of the main unit packaging is to be entered into the calculations in No. 8 "Disposal/Recycling".
7		Usage stage information	Product usage conditions	1) Usage conditions (i) Number of prints per master: 200 sheets/master (ii) Number of master-makings per hour: 2 masters/hour (iii) Number of prints per hour: 400 sheets/hour (iv) Hours of operation per day: 8 hours/day (v) Days of operation per month: 20 days/month (vi) Usage period: 5 years (vii) Operating hours in 5 years: 9,600 hours (viii) Number of prints in 5 years: 3,840,000 sheets (vii) Number of master-makings in 5 years: 19,200 masters (x) Print speed: The speed at power on. (The applicable speed is to be stated in the PEIDS sheet.) (xi) Standard paper size: A4, image area ratio: 4 to 7% (Test Chart) The image area ratio used needs to be stated in the PEIDS sheet. (xii) Standard printing paper: High-quality or equivalent, 64 g/m^2 paper (xiii) Conditions for measurements: temperature 21±3ºC, humidity 65±10%, and leaving for 12 hours before measurement. (xiv) Method for measuring power consumption: The energy consumption efficiency is calculated using the following formula: E = (A + 7 × B) / 8 In this formula, E, A and B are to stand for the following values: E: Energy consumption efficiency (Wh) A: Amount of power consumed in one hour at power on of the machine (Wh) ・After power on, the first edition of master-making is done at default print speed using the test chart, and printing is done

				under the condition of the above-mentioned (i). Immediately after the finish of the process, the second edition of master-making is started under the same conditions, and printing is done under the condition of the above-mentioned (i). After that, the machine is to be left as it is. *Default: The speed is not changed after power on. B: Amount of power consumed in one hour at normal conditions (Wh) ・After the measurement of A, the low power mode and off mode are cleared, the first edition of master-making is done, and printing is done under the condition of the above-mentioned (i). Immediately after the finish of the process, the second edition of master-making is started under the same conditions, and printing is done under the condition of the above-mentioned (i). After that, the machine is to be left as it is. For machines with the printer function that have been left, the transition to the low power mode is permitted, but they must not go into the off mode. Also, machines without the printer function are permitted to go into the off mode or low power mode. <Machines with the printer function> Transition time to the low power mode: five minutes <Machines without the printer function> Transition time to the low power mode: five minutes Transition time to the off mode: For the machines on which the time can be changed manually by users or service persons, etc., it is to be set to five minutes. For the machines, the structure of which does not allow the change after shipment from the factory, the default value is to be used. <Machines with the printer function> cover the machines with the printer function, basically, the function of the digital duplicator, and include those connected to the network. They also include those that can be connected additionally (can be installed as an option). <Machines without the printer function> cover the machines that have the basic function of digital duplicator only, and do not function as a printer either by external control or as an option. <Low power mode> means the low power state into which the machine automatically goes after no operation is performed for a certain period of time. <Off mode> means the state where the power has been off with the automatic off function after a certain period of time. However, not all power sources need to be switched off. (xv) Amounts of masters used and disposed: The number of master-makings done in five years is to be the number of masters used. For the products that have functions to reduce the amount of masters used, 12.5% of the total amount is to be the target. However, when the data obtained from the actual figures are available, priority is to be given to that usage rate. (xvi) Amounts of ink used and disposed: Each company is to calculate the amounts by establishing appropriate formulas, for example, a formula with which the value that is no less than the actual amount

				used is calculated, assuming the conditions of the above-mentioned (i) to (xiv). (The ink left in the container after use is also to be entered into the calculations.) (xvii) Other conditions: Unless otherwise specified, the default value obtained when the rated power has been applied in the state of the installation after shipment from the factory (voltage variations at the machine-side input are within ±3% of the rating) is to be used. 2) The papers necessary in the usage stage are not to be entered into the burden calculations. 3) Quantities of regularly replaced parts and consumables used Items: Based on the maintenance plan at the time of the design, or on the maintenance plan. Quantities: Quantities used in five years based on the above, with fractions rounded up to integers. Transportation: A model in five years based on the above is to be established at each company. 4) Conditions for disposal and recycling of regularly replaced parts and consumables are set forth in No. 8 "Disposal/Recycling".
8		Disposal / recycling stage information	Product disposal / recycling conditions	1) Scenario set up The "End-of-life Product Disposal/Recycling Scenario" on the separate sheet is to be adopted. (i) The recovery routes are to have a scenario set up at each company. ・Reuse scenario ・Recycling scenario Material-specific recycling rates (= η) are to be established at each company. ・Non-reuse/non-recycling industrial waste management scenario (2) For non-recovery routes, the "General Disposal Scenario" (see separate sheet) is to be adopted. 2) Deduction scenario The "End-of-life Product Disposal/Recycling Scenario" on the separate sheet is to be adopted. 3) Recyclability and reusability criteria The criteria are to be defined individually at each company. 4) Product (parts) recovery rate When η2 is adopted, η2 = 80% is to be used, but the value η1 from actual figures at each company is also acceptable. 5) Number of reuses (i) For product reuse, N1, the number of times a product is reused after a usage period of five years, is to be set based on each company's design values. N1 is an integer. The above N1 is used for the burden calculation in the following formula: Product reuse deduction amount = "reusable amount" × "product recovery rate η_2 (or η_1)" × "reuse deduction ratio $N_1/(N_1+1)$" (ii) For consumables and replacement parts, an integer N2 is the number of times a target is reused during its lifetime, with fractions rounded up to integers. Also the burden is calculated using the above N_2 in the following formula: Parts burdens = "burdens until production of one part" × "number of parts used in five years (n)" Parts reuse deduction amount = "reusable amount" × "parts recovery rate (η_2 or η_1)" × "reuse deduction ratio $N_2/(N_2+1)$" × "number of parts used in five years (n)" *Note that the reusable amount, number of product reuses N_1 and number of parts reuses N_2 are set, basically, based on the past figures.

				However, design values can be used under unavoidable circumstances, for example, when no actual figure is available. However, when design values are used, they need to be reviewed at the point where actual figures have been collected. For setting the product (parts) recovery rate, past domestic, i.e. Japanese, figures can be used. 6) Concrete method for entering the processing burdens for products or parts that are disposed of without being recycled nor reused into the calculations The "End-of-life Product Disposal/Recycling Scenario" on the separate sheet is to be adopted. For the transportation of the products or parts that are disposed of without being recycled nor reused, the processing burdens are entered into the calculations using 60 km as the distance, 4t truck as the means for transportation, and 62% as the loading factor, or are set based on the past actual figures. 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 7) Open recycling/reuse When open recycling/reuse is to be included, entry into the calculations is possible by setting up a scenario considered appropriate at each company, while paying attention to the items below. The soundness of the set up basis is subject to verification. (1) Processes that fall in the scope of "indirect impacts" (2) Deductions and burdens within the scope of "indirect impacts" The recyclable or reusable amounts of the recycled/reused items are to be 100%, but the past figures at each company are also acceptable.
9	Product environmental information data sheet (PEIDS)	Inventory analysis	LCI calculation formula	1) LCI calculation formula The assembly burden in cases where there are no actual measurement data from the production site is to be product mass × 2 × assembly base unit. 2) Method for representing open recycling/reuse 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, and the breakdown of recycling effects is to be entered in the explanation field of the PEIDS.
10		Impact assessment	Category additions	The items "ozone layer destruction", "eutrophication", and "photochemical oxidant" are not to be included in the PEIDS.
11	Breakdown data sheet (relevant to product data sheet)	Data processing	Allocation	To be determined as appropriate at each company without being unified.
12		Data collection	Collection range	If data cannot be obtained, data that contain the conditions (including the base units) at the time of design or at the time of planning may be used as substitute.
13			Cut-off rules	If a cut-off is to be applied to an assembly burden, or others, a clear note to this effect is to be made, and the reasons for doing so are to be made clear.

<table>
<tr><td>14</td><td rowspan="3">Breakdown data sheet (relevant to PEIDS)</td><td rowspan="3">Database</td><td>Base unit database selection</td><td>1) For parts purchased according to the decisions made by each company, "parts assembly" of the common base unit table is to be adopted.
2) For the parts listed in the following table, the common base units specified in the table are to be used.

<table>
<tr><th colspan="2">PARTS</th><th>COMMON BASE UNIT</th></tr>
<tr><td colspan="2">Harnesses</td><td>Cu plate</td></tr>
<tr><td colspan="2">Heating units and board portions of thermal heads</td><td>Populated circuit board</td></tr>
<tr><td colspan="2">Thermal head base (heat sink)</td><td>Al plate</td></tr>
<tr><td colspan="2">CCD and sensors</td><td>Populated circuit board</td></tr>
<tr><td colspan="2">Among the power source boards and control boards, etc. (assembled boards)</td><td>_</td></tr>
<tr><td rowspan="4"></td><td>Portions other than the heavy transformers and heat sinks</td><td>Populated circuit board</td></tr>
<tr><td>Iron cores of transformers</td><td>_ _ steel plate (Note 1)</td></tr>
<tr><td>Copper wires of transformers</td><td>Cu plate</td></tr>
<tr><td>Installation frames as enclosures of transformers (cases)</td><td>_ _ steel plate (Note 1)</td></tr>
<tr><td colspan="2">Stepping motors, electromagnetic clutches, CD solenoids, and CD motors</td><td>Middle-sized motor</td></tr>
<tr><td colspan="2">Magnet catches</td><td>Electromagnetic steel plate</td></tr>
</table>

(Note 1) For steel plates, applicable ones are to be selected from the common base unit list in accordance with their materials.
Example) For SECC (electro-galvanized steel plate), "electroplated steel plate" is to be selected.</td></tr>
<tr><td>15</td><td>Base unit database additions</td><td>None</td></tr>
<tr><td>16</td><td>Characterization factor additions</td><td>None</td></tr>
</table>

17	Product environmental information	Product specifications	1) Print speed 2) Maximum paper size 3) Functions subject to verification (ADF, sorter, etc.)
18		Data publication contents	1) Statements "Warming burden, acidification burden, and energy consumption amount", which are defined as compulsory items (in the guideline), are to be stated, while whether to state the seven optional items (in the guideline) is a free choice. 2) Target life cycle stages For the three compulsory items (warming burden, acidification burden, and energy consumption amount), the total amounts throughout all life cycle stages are to be stated. Whether to state the individual life cycle stages is a free choice. *The burdens per piece of paper are to be stated for each of the above-mentioned three compulsory items. 3) Usage conditions setting Usage period (__ years) and used amounts (__0,000 sheets) are to be stated. *The used paper amounts (__0,000 sheets) are to be calculated based on the number of the sheets used per hour in the usage stage (the value common across the companies). 4) Representation method Any of text, table and graph can be selected. If open recycling/reuse is to be included, the "recycling effect" is not to be integrated with the actually generated burdens, and should be represented independently with a dotted line for each stage.
19	Other environmentally relevant information	Optional items	The following can be entered: 1) Type I and/or Type III environmental label 2) ISO 14001 certification acquisition 3) Certifications, accreditations or awards form national or industrial organizations

Information on the development/approval of this PCR

Name of Commission making the determination	PCR Deliberation Committee Representative: Youji Uchiyama Affiliation: University of Tsukuba, Graduate School		
PCR development/revision date	January 1, 2008	Validity period	February 1, 2014 to January 31, 2017

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

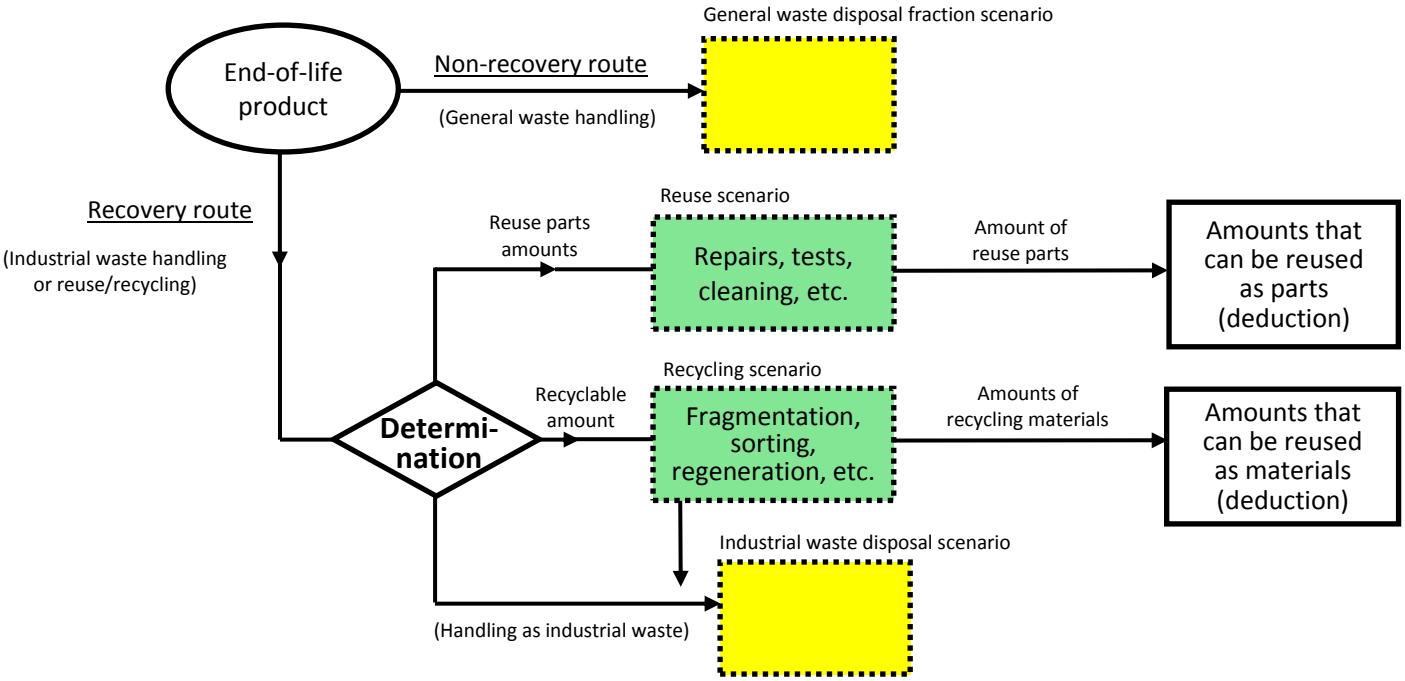
History of revisions, etc. for this PCR

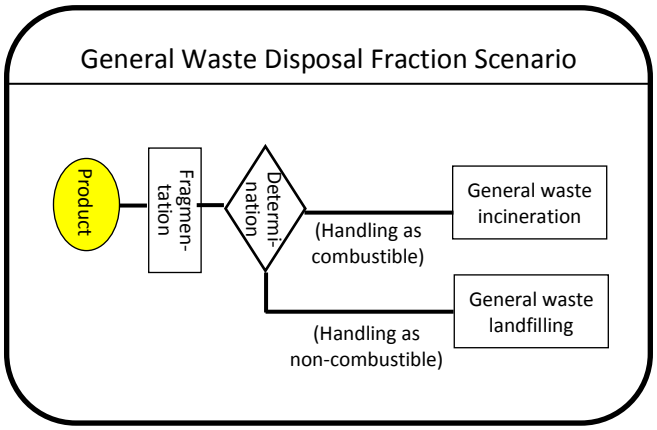
Date	Version No., etc.	Action taken
August 29, 2002	01	Development
March 1, 2004	02	Entry into the calculations of overseas transportation burden has been added; direct impacts/indirect impacts distinction in the recycling effects has been added; and quality-weighting factor has been removed.
September 29, 2004	03	-
January 1, 2008	04	(Item 5) The description of the byproducts and sub-materials has been added; (Item 6) Overseas land transportation has been added; (Item 7) The description of the International Energy Star has been deleted; and (Item 8) Corrections and additions to the product recovery rate, number of reuses, and final disposal distribution have been made.
February 1, 2011		Updated
February 1, 2014		Updated

<Separate Sheet>

Rev. 01 2004.3.1

End-Of-Life Product Disposal/Recycling Scenario





"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

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 (disposal/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