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EcoLeaf Quantification Rules

Japan Environmental Management Association for Industry

Prepared by:	Approved by:

Addenda

(Revision history)

Ver. No.	Date	Page		Approval
01	August 29th, 2014		Newly prepared by extracting Section 3 of the guidelines to accompany the production of the Base Document.	

EcoLeaf Quantification Rules

(Purpose)

Section 1: To define for an applicant business, the requirements, the procedures, and the like, pertaining to EcoLeaf quantification (preparing "quantitative environmental information for general public release" and "verification support materials" for verifying the grounds and calculation methods for the publication data) in the EcoLeaf environmental label program.

2. The "quantitative environmental information for general public release" consists of three types of information: a "product environmental aspect declaration (PEAD)", which presents its overview, a "quantitative environmental information data sheet (PEIDS)", which presents its details, and a "product data sheet (PDS)", which presents the actual measurement data and the setting values used in the preparation of the PEIDS.

3. The "verification support materials" consist of "breakdown data sheets", which show the basis for the calculation of the data entered in the product data sheet, "calculation documents", which show the basis for the calculation of the data entered in the PEIDS, and various "flow diagrams", which help understand these. All these verification support materials are handled as to be undisclosed.

(Range of Products Covered by EcoLeaf)

Section 2: The product range covered by the EcoLeaf environmental label includes industrial products, consumer durables or commodities, etc., which are not limited to final products and include intermediate products such as parts, materials or basic materials. In addition, services can also be included.

2. Product fields and product examples are indicated in the following, without limiting the coverage to these:

① Electronics (heavy electric equipment, home appliances, electronic equipment and parts, information and control devices)

② Metals (steel, non-ferrous metals, steel products, wires and bearings)

③ Chemicals (basic organic/non-organic chemicals, polymers, processed plastic products, semiconductors, fertilizers, agrochemicals, pharmaceuticals, films, inks and industrial gases)

④ Fibers (natural fibers, synthetic fibers, clothes and industrial textiles)

⑤ Pulp and paper

⑥ Rubbers and ceramics (various rubbers, cement, firebricks, and ceramics)

⑦ Machinery and precision machinery (industrial machines and equipment, machine tools, OA equipment's, cameras and clocks)

⑧ Transport equipment's (automobiles, motorbikes, railroad cars, ships and aircrafts)

⑨ Various products for consumer use (printed matters and publications, musical instruments, stationary and office supplies, and various products related to food clothing and shelter)

⑩ Architectures (buildings, homes, and civil engineering structures)

⑪ Energy (electric power, town gas, petroleum, coal, LNG, and LPG)

⑫ Foods and agricultural/forestry/fishery products

⑬ Services (information communication, distribution and others)

(**Preparing a Product Environmental Aspect Declaration (PEAD)**)

Section 3: The PEAD provides essential information compiled from the quantitative environmental information regarding a product in a way that is readily grasped by a user, which means that the presentation must be concise, by paying attention to uniformity and visuals. Consequently, the type and name of the product, the name of the information publisher, and the environmental aspects that are being emphasized, must be represented in a way that is readily understandable.

The contents represented in the PEAD are divided into five sections, with the contents of each section being established as follows:

2. A Section

In order to make clear which product the EcoLeaf environmental label covers, the product category name defined in the PCR is to be stated.

3. B Section

A field for basic information on the EcoLeaf environmental label preparer, in which the following matters are to be listed:

① Information publisher's logo and/or symbol mark

② Information publisher's name (business name)

③ Information publisher's contact information
(location, telephone number, web site URL, name of department in charge, etc.)

4. C Section

A field for basic information on the product under publication, in which the following items are to be stated concisely in order to allow the product overview to be grasped and identified objectively:

① Product name

② Product specifications (items specified in the PCR)

5. D section

A field for presenting a product overview in a manner that is visually easy to understand, in which the ranges in the product covered are to be made clear through photographs, illustrations or process flow diagram, etc. If these contain options, and the like, that are outside the scope covered by the EcoLeaf environmental label, the scope that is covered must be indicated clearly.

6. E section

The quantitative environmental information on the product is presented based on the data provided in the PEIDS, concretely and in a manner that is easy to understand. This section is the most important part of the PEAD, and is to be prepared based on the following agreed-upon matters:

(1) Items to be listed

The following three items are compulsory, while additions and modifications are possible on a product-to-product basis:

① Warming burden (CO_2 equivalents)

② Acidification burden (SO_2 equivalents)

③ Energy consumption [MJ]

(2) Life cycle stages considered

For the three compulsory items mentioned above in (1), the quantitative environmental information from the sum over all the life cycle stages subject to the preparation of the EcoLeaf environmental label (the extent is to be defined with the PCR) is to be provided. In addition, environmental information on a specific life cycle stage can also be listed along.

(3) Usage conditions setting

Conditions such as product usage duration and amounts are to be established in the PCR.

① Usage duration (example: __ years...)

② Usage amounts (example: _0,000 sheets, _ liters...)

(4) Method of representation

The basic method is the bar graph representation; however, other graphs, tables or text may be employed uniformly in each product category.

(5) LCA data supplemental explanation

A descriptive text to supplement the quantification data based on the LCA may be entered.

7. Other relevant eco-design information

Even if it is outside the scope of this program, other relevant eco-design information defined in individual PCR that is factually verifiable can be entered outside the PEAD field:

(1) Hazardous chemical compound information

(2) Eco-design system information

(3) Provision of information to users, each business

(4) Old vs. new comparison information on a business' own product

(Preparing a Product Environmental Information Disclosure Sheet (PEIDS))

Section 4: Definition of a PEIDS

PEIDS is a document for clearly presenting the quantitative environmental information on a product, which is a characteristic of a Type III environmental label.

The data listed in a PEIDS form the basis of the contents presented in the PEAD described in the previous section, and are results that are obtained through LCA calculations based on the data listed in the product data sheet, which is described below.

The constitution of a PEIDS is shown in Form 2 (at the end of the document), with the main portions being the results from an inventory analysis (upper part of the table) and an impact assessment (lower part of the table), respectively, of an LCA.

1. Life Cycle Stage

The life cycle stage names, which are the items across the PEIDS, are common to inventory analysis and impact assessment results, and consist of four stages: production, distribution, usage and disposal. The titles and specific contents are determined for each stage on a PCR-to-PCR basis. Especially for cases concerning services and products that are base materials, stages of their own may be defined on a PCR-to-PCR basis.

(1) Production Stage

This stage is divided into a base material production stage in which materials are made (for instance, iron steel production from iron ore, coal, etc.), and an article production stage in which the materials are processed and assembled to make parts and products.

(2) Distribution Stage

The stage in which the article produced in the production stage is transported to the place of use; the specific range of transportation, the transportation methods, the place of use, etc., are to be defined on a PCR-to-PCR basis.

(3) Usage Stage

This stage includes the product's power consumption while in operation and standby, the burdens accompanying the production and consumption of fuel required to use the product, and the burdens from the production, distribution, use and disposal of replacement parts and consumables. The specific conditions for usage, maintenance, etc., are defined on a PCR-to-PCR basis.

(4) Disposal Stage

This stage includes the recovery, transportation, separation, grinding, sorting, incineration, detoxification, landfilling, recycling and/or reuse processes, etc., up to the final disposal of an end-of-life product.

2. Data Groups

The data groups, which are the items down the PEIDS, consist of the following energy consumption, inventory analysis and impact assessment.

(1) Energy Consumption

In the PEIDS, an energy consumption field is provided separately, since energy consumption is intimately related to and overlaps with the energy resource consumption and the environmental output in the inventory analysis, and the resource depletion burdens and the environmental output burdens in the impact assessment, which are described below.

(2) Inventory Analysis

This is a list of LCA inventory analysis results, with the substance and energy input and output boundaries being unified and extending to natural environments. Therefore, comparability is maintained among the data listed the PEIDS.

The listed data groups (items down the table) consist of two environmental burden items: consumption and environmental discharge. The consumption burden item is divided into two major category items: exhaustible resources and renewable resources such as water and wood. The exhaustible resources further consist of energy resources such as coal and uranium ore, and mineral resources such as iron ore and bauxite. The environmental discharge burden item is divided into three groups: discharges into the atmosphere such as CO_2, into bodies of water such as BOD, and into soil.

(3) Impact Assessment

Up to the characterization analysis phase of the impact assessment defined in the LCA is included, and, similarly to the inventory analysis, comparability is maintained among the impact assessment results on the point that the boundaries are unified and extend to natural environments.

Similarly to the inventory analysis, the listed data groups (items down the table) are divided into two burden items: consumption and environmental discharge. The consumption burden item is divided into energy resource and mineral resource depletion burdens, while the environmental discharge burden item is subdivided into category items such as warming and acidification for the atmosphere, and eutrophication for bodies of water. The selection of category items is determined for each product category.

Section 5: Calculation Methods

The data for each of the above items listed in the PEIDS are calculated based on LCA procedures, according to the following methods:

1. Inventory Analysis

(1) Inventory Analysis Calculation Formula

In EcoLeaf, I, the amount of inventory at each stage, can be determined using formula (1), by summing the products between W, the relevant physical quantity, and a, the corresponding base unit.

$$I = \Sigma\,(a \times W) \qquad \cdots\cdots\cdots\cdots \quad (1)$$

I: amount of inventory (amount of crude oil extracted, amount of iron ore excavated, CO_2 output, etc.)

a: base unit (amount of inventory per unit physical quantity)

W: physical quantity (quantities used, quantities discharged, quantities treated, quantities transported, etc.)

(2) Base Units

① Definition of base units

Base units are background data (BGD) that are used when conducting an inventory analysis (LCI) and reside in a database, which is used in common. In general, the database consists of "unit process-type data", which describe power and raw material inputs and intermediate product and waste outputs for each processing step, and "process totaling data", which also add the steps that are upstream from it and provide descriptions tracing back to the amounts of crude oil and/or iron ore consumed.

② Types of EcoLeaf base units

The "process totaling data" scheme is adopted for the EcoLeaf base units, which includes the following two:

[Common Base Units]

Base units prepared by our office for the development of the EcoLeaf environmental label, which can be used commonly to all the product categories as background data for LCI calculations.

[PCR Base Units]

Base units created for each product category as necessary for the purpose of using them on a per-product-category basis, which can be used as background data for LCI calculations only in the same product category.

2. Impact Assessment

(1) Impact Assessment Calculation Formula

In EcoLeaf, P, the impact assessment quantity per category, such as global warming, at each stage can be determined using formula (2), by summing the products between I, the amount of a relevant inventory, and α, a per-category characterization factor:

$$P = \Sigma (\alpha \times I) \qquad \cdots\cdots\cdots\cdots \quad (2)$$

P: per-category impact assessment quantity (warming burden, acidification burden, etc.)

α: characterization factor (equivalent amounts of per-category reference substance)

I: amount of inventory (amount of crude oil, amount of iron ore, CO_2 output, etc.)

(2) EcoLeaf Characterization Factor

An example of characterization factor table (database) used for per-category impact assessment calculations is given in Appendix 3 (at the end of the document). In principle, this database is to be used in common within this program. For each category such as warming and acidification, characterization factors corresponding to inventory items such as CO_2, NOx and SOx are listed, with their definitions and sources clearly mentioned.

(Preparing a Product Data Sheet)

Section 6: The product data sheet provides input or setting data that are used to calculate the data given in the PEIDS. In other words, it is a sheet that indicates the input data and setting conditions used in the LCA calculations at each life cycle stage, in which data obtained by the label preparer through measurements or search-and-collection are listed.

Form 3 (at the end of the document) shows a product data sheet for an assembled product. The contents listed are as per items 1 to 5 of Section 6, and their specific contents are decided on a PCR-to-PCR basis.

1. Product Information

The raw materials and parts that constitute a product concerned are to be listed in mass per product. Information on recycled materials, reused parts, etc., which are used in the product, is also to be listed.

2. Production Site Information

The consumption and discharge amounts for the production (processing and assembly) of major parts and assembly of the final product within a site, which are specified for each PCR, are to be converted into per-product amounts and listed.

3. Distribution Stage Information

The transportation conditions for, e.g., a product, which are indicated in Section 4-1-(2), are to be listed along with the amounts of substances consumed and discharged during transportation converted into per-product amounts.

4. Usage Stage Information

Consumption or discharge amounts, including while in operation and standby, are to be converted into per-product amounts and listed. The information is to consist of usage-related information and replacements/consumables disposal information.

5. Disposal Stage Information

Information on an end-of-life product's recovery transportation, disposal processing and recycling/reuse processing is to be listed.

(Preparing Verification Support Materials)

Section 7: Verification support materials are undisclosed data that are used in the verifications for securing the objectivity, the reliability, the appropriateness, and the like, of a PEAD, a PEIDS and a product data sheet published in this program.

While there are differences depending on the product or service concerned, for an assembled product, the data consist of: ① parts configuration diagrams or various flow diagrams in order to grasp the overview of a product or a life cycle stage concerned; ② breakdown data sheets describing the data and calculation processes that back the contents to be listed in the product data sheet; and ③ calculation documents describing the calculation processes for the inventory analysis and impact assessment results in the PEIDS.

1. Product's Parts Configuration Diagram

As this is a document for the purpose of grasping a structural overview of a product or an overview of the major parts, and provides explanations that supplement the breakdown data sheet (for product), consistency with the latter is important.

A product's parts configuration diagram is shown in Form 4 (at the end of the document), with the example of a washing machine.

2. Flow Diagram

The flow diagram is for the purpose of clearly understanding a stage concerned or a process boundary, and consists of a production flow diagram and a stage flow diagram:

① Production Flow Diagram

As this flow diagram is for the purpose of grasping the range of processes for which data are collected at the production site, and provide supplemental explanation to the breakdown data sheet (for production site) described below, consistency with the latter is important. A production flow diagram is shown in Form 5-1 (at the end of the document).

② Stage Flow Diagram

As this flow diagram is for the purpose of grasping each of the distribution, usage and disposal stages in detail, and provides supplemental explanation to the breakdown data sheet (for stage) described below, consistency with the latter is important. A stage flow diagram is shown in Form 5-2 (at the end of the document).

3. Breakdown data sheets

These sheets show the calculation processes for the data listed in the product data sheet. The sheets are divided into three types: 1 (for product), 2 (for production site) and 3 (for stage).

① Breakdown Data Sheet 1 (for product)

A breakdown data sheet 1 is shown in Form 6-1 (at the end of the document): detailed data for the parts constituting the product concerned list the masses in detail by material, by process, and by assembly. Since its major results are to be listed in the product information field of the product data sheet, consistency with the latter is important.

② Breakdown Data Sheet 2 (for production site)

A breakdown data sheet 2 is shown in Form 6-2 (at the end of the document): listed in detail are the values of the production amounts for each product and the amounts of power and fuel used for a production site unit, and, the method for allocating these and the values per product concerned after allocation. As these results are to be listed in the production site information field of the product data sheet, consistency with the latter is important.

③ Breakdown Data Sheet 3 (for stage)

A breakdown data sheet 3 listing, e.g., the setting conditions of each life cycle stage is shown in Form 6-3 (at the end of the document): listed in detail are the means of transportation of the final product and the amounts transported, the electric power or fuel usage amounts while under use, masses by disposal processing step, and so on. As these results are to be listed in the corresponding distribution stage information, usage stage information and disposal stage information fields of the product data sheet, consistency with the latter is important.

4. Relevant Calculation Documents

The documents are divided into the two types below. The details are described in the verification document preparation manual.

① Relevant Calculation Document 1 (for Inventory Analysis)

This calculation document describes the concrete calculation processes up to the PEIDS listing stage, based on the product data sheet, following the inventory analysis calculation procedure of Section 5-1 and using various base units.

② Relevant Calculation Document 2 (for Impact Assessment)

This is a document describing the concrete calculation processes for the values listed in the impact assessment obtained by calculation using data from the PEIDS inventory analysis results and the appropriate characterization factors, and following the impact assessment calculation procedure of Section 5-2.

(Revision history)

The present rules are effective on August 29th, 2014.

Appendix 1

Form 1[F-01-03]

Product Environmental Aspects Declaration

A

No. XX-YY-ZZZ

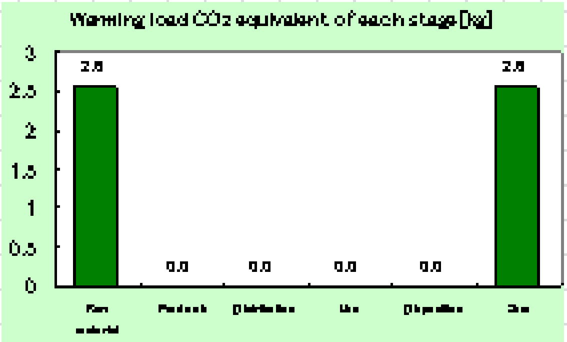
Date of publication

B

C

D

Consumption and discharge in a life cycle	All the stage sum totals
Global Warming (CO2 equivalent)	2.56kg
Acidification (SO2 equivalent)	.002kg
Energy resources (crude oil equivalent)	31MJ



Notes

1 Original LCA data is available on PEIDS (Product Environmental Information Declaration Sheet) and Product Data Sheet

2 Unified rules and requirements for EcoLeaf LCA, for intended product category, are available as a PCR (Product Category Rule)
Visit EcoLeaf website under JEMAI homepage at http://www.ecoleaf-jemai.jp/eng/ for details

3 Basic Units used for calculations are based on Japan domestic data at this time, due to a lack of base data to establish localized Basic Units for overseas locations adequately

[Supplemental environmental information]

PCR review was conducted by: < name and organization of the chair >
Independent verification of the declaration and data, according to ISO14025 ☐ internal ☐ external
Third party verifier: < name of the third party verifier *>

Programme operator: Japan Environmental Management Association for Industry, ecoleaf@jemai.or.jp

*In the case of an business entity certified as an Ecoleaf data collection system, the names of certification auditors are written.

Appendix 1

Form / [illegible]

Product Environmental Information Data Sheet (PEIDS)

Document control no.	[illegible]
Product vendor	
EcoLeaf registration no.	

[illegible]	
[illegible]	

PCR name		Product type			
PCR ID		[illegible] weight (kg)		Package (kg)		Weight total (kg)	

Indicators \ Life Cycle Stage				Unit	Production: Raw material	Production: Product	Distribution	Use	Disposal	Total
Energy Consumption				MJ						
				Mcal						
Inventory analysis	[illegible]	[illegible]	Energy	kg						
				kg						
				kg						
				kg						
			Material	kg						
				kg						
				kg						
				kg						
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				kg						
				kg						
				kg						
				kg						
				kg						
				kg						
				kg						
		Renewable resources		kg						
				kg						
	[illegible]	to Atmosphere		kg						
				kg						
				kg						
				kg						
				kg						
				kg						
				kg						
				kg						
				kg						
		to Water system		kg						
				kg						
				kg						
				kg						
				kg						
		to Soil system		kg						
				kg						
				kg						
				kg						
Impact assessment	[illegible]	Renewable resources		kg						
				kg						
	[illegible]	to Atmosphere		kg						
				kg						
				kg						
				kg						
		to Water system		kg						

[Notes for readers: EcoLeaf common rules]

[illegible]

[Notes for readers: Target product specific]

Appendix 1

Form SB-40400

Product data sheet

(Input data and parameters for LCA)

Document control no.	F-40400
Product vendor	
EcoLeaf registration no.	

PCR name			Process type				
LCA/LCI in charge of		Product weight (kg)		Packaging (kg)		Weight total (kg)	

1. Product information (per unit): parts etc. by material and by process/assembly method

	Breakdown of primary materials				Weight breakdown of parts, which are to apply Processing / Assembly (Item 2)			
	Material name	Weight (kg)	Material name	Weight (kg)	Process name	Weight (kg)	Process name	Weight (kg)
Product								
	Subtotal		Subtotal					
	Total				Subtotal		Subtotal	

Note

2. Production site information (per unit): Consumption and discharge/emission for production/processing/assembly within the site.

SOx and NOx should be indicated in SO2, NO2 equivalent.

Consumption	Classification								
	Distribution								
	Quantity								
	Note								
	Classification								
	Distribution								
	Quantity								
	Note								
Emission Discharge	Classification								
	Distribution								
	Quantity								
	Note								

Note

3. Distribution stage information (per unit): means, distance, loading ratio, consumptions and emissions/discharges

Distribution	Means of transportation								
	Conditions								
	Quantity								
	Note								

Note

4. Use stage (per unit): use condition (mode, term including active mode, standby mode and maintenance)

4.1 Product and accessories subject to this analysis

Product	Classification									
	Distribution									
	Quantity									
	Note									

Note

4.2 Disposal/Recycle information on consumables and replacement parts

Consumables	Classification									
	Distribution									
	Quantity									
	Note									

Notes

5. Disposal/Recycle stage information (per product): process method and scenarios

Scenario	Classification									
	Distribution									
	Quantity									
	Note									
	Classification									
	Distribution									
	Quantity									
	Note									

Notes

6. Others

Appendix 1

Document control no.	F-04s-02

Flow Diagram of Product Parts

Form 4

Breakdown sheet name	Breakdown data sheet (Type 1: for product)

Product vendor	

PCR name		Product type					
PCR-No.		Product weight (kg)		Package (kg)		Weight total (kg)	

List of main component units and parts

Part type (select)	No	Unit (assembly) name	No	Part type	Main part name
Part/material A					
Part/material B					
Part/material C					

Product structure diagram

Example of model diagram

Document control no.	F-05s-02

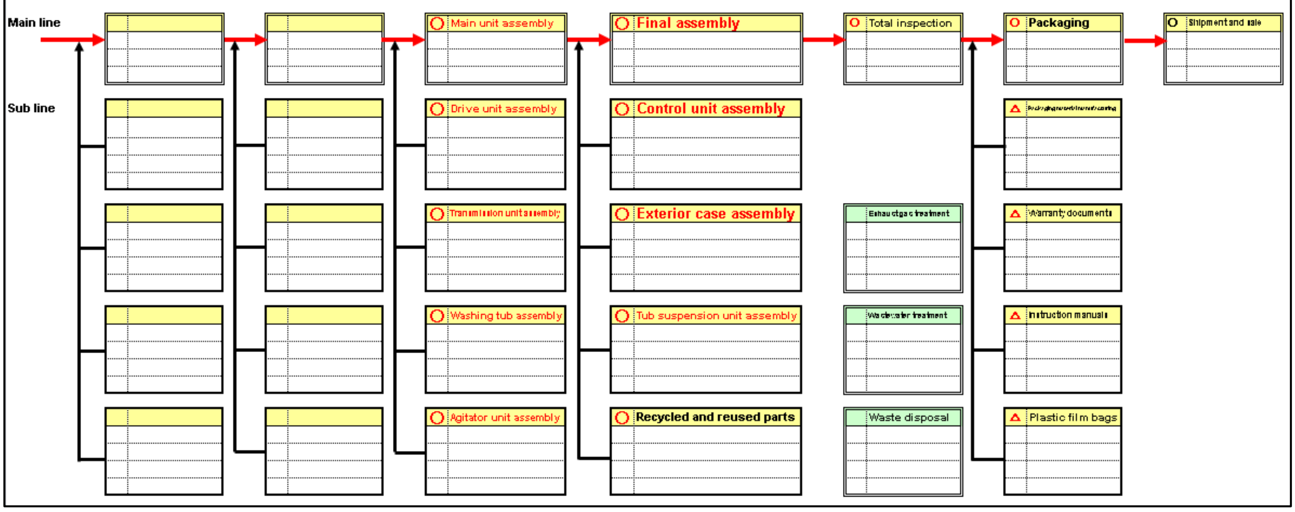
Form 5-1

Flow chart	1. Manufacturing flow chart

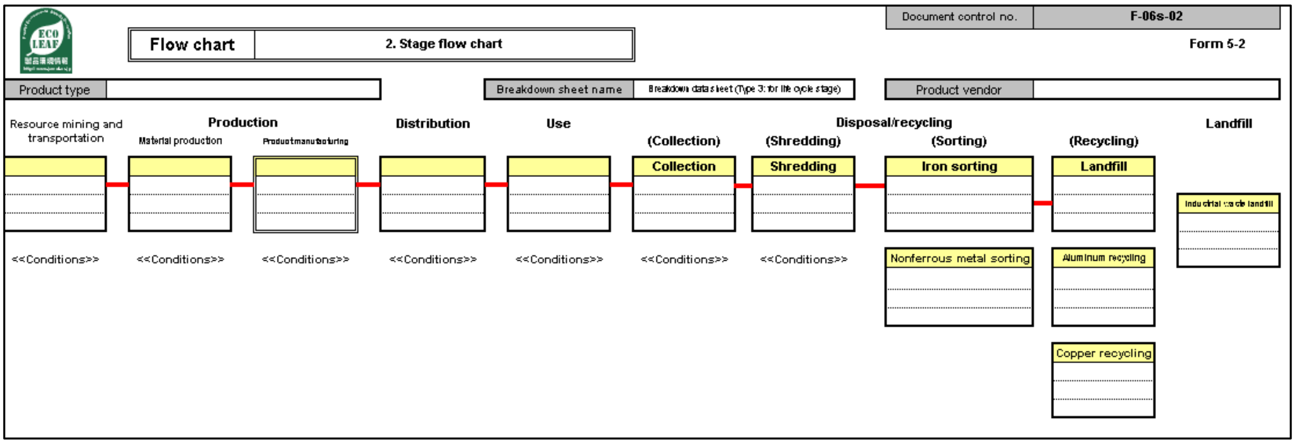
Breakdown sheet name	Breakdown data sheet (Type 2: for manufacturing site)

Product vendor	ABC Manufacturing Co., Ltd.

<<Part type>> (select)		
	O	Environmental burdens (electricity, fuel, etc.) associated with the process are included in the manufacturing site data (classified as internal manufacturing)
	△	Environmental burdens (electricity, fuel, etc.) associated with the process are partly included in the manufacturing site data (classified as partly internal manufacturing)
	▲	Environmental burdens (electricity, fuel, etc.) associated with the process are not included in the manufacturing site data (classified as external or outsourced manufacturing)



Appendix 1



Breakdown data sheet (Type 1: for product)

Document control no.	F-07s-02

Prepare a new document with reference to A.4 in Annex A of ISO/JIS 14041.

Product name		Sheet name	
Type		Base stage	

Conducted by		Sheet completed		Report to	
Fiscal year covered		Start month		End month	

<<Part type>> (1) Part/material A (calculation of environmental burdens from processing and assembly is not required), (2) Part/material B (calculation of environmental burdens from processing is required), (3) Part/material C (calculation of environmental burdens from processing and assembly is required)

<<Processing and assembly type>> processing methods (pressing, molding, casting, etc.), assembly methods (under 100 g, under 1 kg, 1 kg and over, etc.)

No	Item: Component parts / Product data sheet item							Material mass by category (kg): Metal				Paper/wood	Synthetic resin			Rubber	General parts	Recycled parts	Reused parts	Total
	Unit name	Part name	Part type	Material	Mass (kg)	Main processing type	Assembly type	[illegible]	[illegible]	Aluminum plate (kg)	Cu plate (kg)	Paper (kg)	PP (kg)	PS (kg)	Epoxy resin [illegible] (kg)	[illegible]	Mounted circuit board (kg)	Recycled parts	Reused parts	
1																				
2																				
3																				
4																				
5																				
6																				
7																				
8																				
9																				
10																				
11																				
12																				
13																				
14																				
15																				

Sum total	Classification	Breakdown of sum total	Item													
	Material production	[illegible]	Total mass (kg)													
	Processing (select)	Part/material B + Part/material C	Processing type	[illegible] (kg)	[illegible]											
			Total mass (kg)													
	Part assembly (select)	Part/material C	Assembly type	Part assembly (kg)												
			Total mass (kg)													

Appendix 1

Document control no.	F-08s-02

Breakdown data sheet (Type 2: for manufacturing site)

Usage (processing) method of data associated with EMS (Environmental Management System) described in ISO/JIS14001.

Product name		Sheet name	
Type		Base stage	

Conducted by		Sheet completed on		Report to	
Fiscal year covered		Start month		End month	

1. Products manufactured within the same site

	Product name												Total
Allocation item (select)													
Allocation basis													

2. Site consumables

[illegible]	Name (unit)	Amount	Duration (month)	/month	/unit	Allocation selection	Supplementary explanation	Remarks
Energy								
Energy								
Material								

3. Site emissions

[illegible]	Name	Amount	Duration (month)	/month	/unit	Allocation selection	Supplementary explanation	Remarks
Water system								
Water system								

Document control no.	F-09s-02

Breakdown data sheet (Type 3: for life cycle stage)

Prepare a document in compliance with A.4 in Annex A of ISO/JIS14041.

Product vendor	

Product name		Conducted by		Sheet completed on	
Type		Fiscal year covered		Report to	

Life cycle stage	Data classification (select)	Item			Amount	Explanation	Impact type	Sheet name	Base stage
		Main category	Subcategory	Name (unit)					
Distribution									
Use									
Disposal									
Recycle									

Appendix 1

LCI計算書(　[illegible]　) 製品種類(　[illegible]　)
[illegible](　版)

文書管理番号	F−37a−01

様式7−1

注）この原単位は、エコリーフ環境ラベル用に作成された専用のデータベースです。無断で他の目的で使用することを禁止致します。

	小分類 / インベントリ項目		1		2		3		4		5		6		合計
			配分比	評価値	配分比	評価値	配分比	評価値	配分比	評価値	配分比	評価値	配分比	評価値	
使用量		単位													
消費エネルギー		MJ													
		Mcal													
エネルギー資源		kg													
		kg													
		kg													
		kg													
鉱物資源		kg													
		kg													
		kg													
		kg													
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能可		kg													
		kg													
大気へ		kg													
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		kg													
		kg													
		kg													
水域へ		kg													
		kg													
		kg													
		kg													
		kg													
土壌へ		kg													
		kg													
		kg													
		kg													
出典															
	データ基準年														
	データ種類														
	データ品質														
	データ収集範囲(地理的)														
	備考														
[illegible]	製品用入力														
	サイト用入力														
	その他のステージ製造入力														
	その他のステージ使用入力														
	その他のステージ廃棄リサイクル入力														

LCI計算書(　集計：間接　)
原単位DB(　版)

文書管理番号	F−37a−01B

様式7−1

注）この原単位は、エコリーフ環境ラベル用に作成された専用のデータベースです。無断で他の目的で使用することを禁止致します。

	インベントリ項目		間接影響(リサイクル効果)						直接影響						合計
			素材製造	部品製造	物流	使用	廃棄・リサイクル	小計	素材製造	部品製造	物流	使用	廃棄	小計	
使用量		単位													
消費エネルギー		MJ													
		Mcal													
エネルギー資源		kg													
		kg													
		kg													
		kg													
鉱物資源		kg													
		kg													
		kg													
		kg													
		kg													
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		kg													
		kg													
能可		kg													
		kg													
大気へ		kg													
		kg													
		kg													
		kg													
		kg													
		kg													
		kg													
		kg													
		kg													
水域へ		kg													
		kg													
		kg													
		kg													
		kg													
土壌へ		kg													
		kg													
		kg													
		kg													

Appendix 2

EcoLeaf Environmental Label LCI Common Base Unit List (V2.1)

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No	Field	No	Base Unit Name	Amount W	Unit	Main Source	Remarks
1	Material Production (Metal)	1	Cold-Rolled steel plate	Produc-tion	kg	Environmental Management, Vol 31, No.6 (1995) P72-P84	From resource acquisition to material (plate) production
2		2	Electroplated steel Plate	Produc-tion	kg	Environmental Management, Vol 31, No.6 (1995) P72-P84	From resource acquisition to material (plate) production
3		3	Hot Dipped steel plate	Produc-tion	kg	Environmental Management, Vol 31, No.6 (1995) P72-P84	From resource acquisition to material (plate) production
4		4	Coated steel plate	Produc-tion	kg	Environmental Management, Vol 31, No.6 (1995) P72-P84	From resource acquisition to material (plate) production
5		5	Electromagnetic steel plate	Produc-tion	kg	Environmental Management, Vol 31, No.6 (1995) P72-P84	From resource acquisition to material (plate) production
6		6	Stainless Steel Plate	Produc-tion	kg	Environmental Management, Vol 31, No.6 (1995) P72-P84	From resource acquisition to material (plate) production
7		7	Cu Plate	Produc-tion	kg	Environmental Management, Vol 31, No.6 (1995) P72-P84	From resource acquisition to material (plate) production
8		8	Al Plate	Produc-tion	kg	For secondary and virgin metal ratios: Resources statistics annual report, 1992, P.98	From resource acquisition to material (plate) production
9		9	Zinc (Zn)	Produc-tion	kg	Research Institute for Resource Recycling and Environmental Pollution Control (Narita, 2000)	From resource acquisition to material (ingot) production
10		10	Tin (Sn)	Produc-tion	kg	Plastic Waste Management Institute: Evaluation Report on the Impact of the Increase in the Use of Plastic Products on the Global Environment, (1993, 3), P31-38	From resource acquisition to material (ingot) production
11		11	Electrolytic MnO2	Produc-tion	kg	The Chemical Society of Japan Ed.: Chemistry Handbook (Applied Chemistry Edition) 2nd Revision, P216, Maruzen (1973)	From resource acquisition to material (ingot) production
12		12	Metallic Manganese (Mn)	Produc-tion	kg	National Institute of Resources (1988)	From resource acquisition to material (ingot) production
13		13	Electrical Lead (Pb)	Produc-tion	kg	Research Institute for Resource Recycling and Environmental Pollution Control (Narita, 2000)	From resource acquisition to material (ingot) production
14		14	Gold (Au)	Produc-tion	kg	Survey by the Research Institute for Resource Recycling and Environmental Pollution Control (Sugita, 1999)	From resource acquisition to material (ingot) production
15		15	Silver (Ag)	Produc-tion	kg	Survey by the Research Institute for Resource Recycling and Environmental Pollution Control (Sugita, 1999)	From resource acquisition to material (ingot) production
16	Material Production (Inorganic Chemistry)	1	Glass	Produc-tion	kg	Environmental Management, Vol.31, No.6 (1995), P.81	From resource acquisition to material (pellet) production
17		2	Cement	Produc-tion	kg	From Cement Association of Japan "Cement Handbook" 2000 Edition, P21, 1999 Data (Base Unit).	From resource acquisition to material production
18		3	Calcined Lime (CaO)	Produc-tion	kg	Statistical Survey of Energy Consumption (1996) and Resource Annual Report (1996)	From resource acquisition to material production
19		4	Hydrochloric Acid (HCl)	Produc-tion	kg	Chemical Industry Statistics Annual Report (1996)	From resource acquisition to material production
20		5	Sulfuric Acid (H2SO4)	Produc-tion	kg	Research Institute for Resource Recycling and Environmental Pollution Control (SRI), 1998	From resource acquisition to material production
21		6	Nitric Acid (HNO3)	Produc-tion	kg	CMC, 1994, P.167	From resource acquisition to material production
22		7	Acetic Acid (CH3COOH)	Produc-tion	kg	CMC, 1994, P.173	From resource acquisition to material production
23		8	Hydrofluoric Acid (HF)	Produc-tion	kg	Environmental Management, Vol.31, No.6 (1995), P.82	From resource acquisition to material production
24		9	Sodium Hydroxide (NaOH)	Produc-tion	kg	The Chemical Society of Japan "Chemistry Handbook: Applied Chemistry Edition (2)", P.207, 1986	From resource acquisition to material production
25		10	Slaked Lime (Ca(OH)2)	Produc-tion	kg	Statistical Survey of Energy Consumption (1996) and Resource Annual Report (1996)	From resource acquisition to material production
26	Material Production (Synthetic Resin)	1	PE (High-density)	Produc-tion	kg	1993 Chemical Economy Research Institute Report, p103	From resource acquisition to material (pellet) production
27		2	PE (Low-density)	Produc-tion	kg	1993 Chemical Economy Research Institute Report	From resource acquisition to material (pellet) production
28		3	PP	Produc-tion	kg	1993 Chemical Economy Research Institute Report, p104	From resource acquisition to material (pellet) production
29		4	PS	Produc-tion	kg	NEDO-GET, 9410-1, P64	From resource acquisition to material (pellet) production
30		5	PVC	Produc-tion	kg	1993 Chemical Economy Research Institute Report, p81, 111	From resource acquisition to material (pellet) production
31		6	PBT (Polybutylene Terephthalate)	Produc-tion	kg	1993 Chemical Economy Research Institute Report, p89, 119	From resource acquisition to material (pellet) production
32		7	PC (Polycarbonate)	Produc-tion	kg	1993 Chemical Economy Research Institute Report, p88, 118	From resource acquisition to material (pellet) production
33		8	PC-ABS resin (70/30)	Produc-tion	kg	Distribution and addition with 70:30 from PC and ABS data; PC and ABS data have been prepared from the 1993 Chemical Economy Research Institute Report	From resource acquisition to material (pellet) production
34		9	POM (Polyacetal)	Produc-tion	kg	1993 Chemical Economy Research Institute Report, p87, 117	From resource acquisition to material (pellet) production

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Processed amount W (transportation burden amount: kg・km) = transportation mass (kg) × transportation distance (km) × 100 ÷ mass loading factor (%w)

No	Field	No	Base Unit Name	Amount W	Unit	Main Source	Remarks
35	Material Production (Synthetic Resin)	10	PVDC (Vinylidene Chloride Resin)	Produc-tion	kg	1993 Chemical Economy Research Institute Report, p83, 112	From resource acquisition to material (pellet) production
36		11	ABS	Produc-tion	kg	1993 Chemical Economy Research Institute Report, p79, 108	From resource acquisition to material (pellet) production
37		12	AS Resin	Produc-tion	kg	1993 Chemical Economy Research Institute Report, p80, 109	From resource acquisition to material (pellet) production
38		13	MMA Resin	Produc-tion	kg	1993 Chemical Economy Research Institute Report, p83, 113	From resource acquisition to material (pellet) production
39		14	PA66 (Polyamide 66)	Produc-tion	kg	1993 Chemical Economy Research Institute Report, p85, 115	From resource acquisition to material (pellet) production
40		15	PET	Produc-tion	kg	NEDO-GET-9410-1, P.36	From resource acquisition to material (pellet) production
41		16	Epoxy Resin (EP)	Produc-tion	kg	1993 Chemical Economy Research Institute Report, p92, 123	From resource acquisition to material (pellet) production
42		17	Rigid Urethane Foam	Produc-tion	kg	1993 Chemical Economy Research Institute Report, p96, 126	From resource acquisition to material (pellet) production
43		18	Soft Urethane Foam (for Automobile)	Produc-tion	kg	1993 Chemical Economy Research Institute Report, p95, 125	From resource acquisition to material (pellet) production
44		19	Soft Urethane Foam (for Bedding)	Produc-tion	kg	1993 Chemical Economy Research Institute Report, p94, 124	From resource acquisition to material (pellet) production
45		20	Unsaturated Polyester (UP)	Produc-tion	kg	1993 Chemical Economy Research Institute Report, p97, 127	From resource acquisition to material (pellet) production
46		21	Acrylonitrile Resin	Produc-tion	kg	1993 Chemical Economy Research Institute Report, P81, 110	From resource acquisition to material (pellet) production
47		22	Phenol Resin (PF)	Produc-tion	kg	1993 Chemical Economy Research Institute Report, P81, 110	From resource acquisition to material (pellet) production
48	Material Production (Rubber)	1	Nitrile-butadiene rubber (NBR)	Produc-tion	kg	Rubber Industry Manual, The Chemical Daily: 13599 Chemical Products	From resource acquisition to material (pellet) production
49		2	Styrene-butadiene rubber (SBR)	Produc-tion	kg	CRC Research Institute, March 1999, Survey Report, P66	From resource acquisition to material (pellet) production
50		3	Natural rubber	Produc-tion	kg	Malaysian Rubber Board homepage	From resource acquisition to material (pellet) production
51		4	Butadiene rubber (BR)	Produc-tion	kg	CRC Research Institute, March 1999, Survey Report	From resource acquisition to material (pellet) production
52	Material Production (Organic Chemistry)	1	Ethylene	Produc-tion	kg	NEDO-GET-9410, P26	From resource acquisition to material production
53		2	Xylene	Produc-tion	kg	NEDO-GET-9410, P26	From resource acquisition to material production
54		3	Carbon Tetrachloride (CCl4)	Produc-tion	kg	Used data from: CMC "Costs of Chemicals in the 80's", Volume 2, P281, 1979	From resource acquisition to material production
55		4	Methanol (CH3OH)	Produc-tion	kg	Research Institute for Resource Recycling and Environmental Pollution Control SRI (1998) New Zealand: in charge of methanol	From resource acquisition to material production
56		5	Naphtha	Produc-tion	kg	NEDO-GET-9410, P24	From resource acquisition to material production
57		6	Propylene	Produc-tion	kg	NEDO-GET-9410, P26	From resource acquisition to material production
58		7	Styrene	Produc-tion	kg	NEDO-GET-9410-1, P64	From resource acquisition to material production
59		8	Toluene	Produc-tion	kg	NEDO-GET-9410, P26	From resource acquisition to material production
60		9	Trichloro ethane	Produc-tion	kg	Environmental Management, Vol.31, No.6, 1995, P.83	From resource acquisition to material production
61		10	Trichloro ethylene	Produc-tion	kg	CMC, 1994, P191	From resource acquisition to material production
62		11	Acetone	Produc-tion	kg	CMC, 1994, P196	From resource acquisition to material production
63	Material Production (Organic Gas)	1	CFC 11	Produc-tion	kg	Used data from: CMC "Costs of Chemicals in the 80's", Volume 2, P281, 1979	From resource acquisition to material production
64		2	CFC 12	Produc-tion	kg	Used data from: CMC "Costs of Chemicals in the 80's", Volume 2, P281, 1979	From resource acquisition to material production
65		3	HFC-134a	Produc-tion	kg	Environmental Management, Vol.31, No.6 (1995) P.82	From resource acquisition to material production
66		4	HFC-245fa	Produc-tion	kg	Survey on the Impact of Thermal Insulation Materials on Global Warming, NEDO-GET-9709 (1998)	From resource acquisition to material production
67	(Wood and Paper)	1	Corrugated cardboard	Produc-tion	kg	Paper Pulp Handbook, 1998 Edition, and others, Japan Paper Association, 1998, 4 issue and others	From resource acquisition to material production
68		2	Cardboard	Produc-tion	kg	Paper Pulp Handbook, 1998 Edition, and others	From resource acquisition to material production

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No	Field	No	Base Unit Name	Amount W	Unit	Main Source	Remarks
69	Material Production (Wood and Paper)	3	Paper (Western style)	Production	kg	Paper Pulp Handbook, 1998 Edition, and others	From resource acquisition to material production
70		4	Wood chip (Japan domestic)	Production	kg	Evaluation Report on the Impact of the Increase in the Use of Plastic Products on the Global Environment, Plastic Waste Management Institute, March 1993, (1993) P151-2	From resource acquisition to material production
71		5	Wood chip (imported)	Production	kg	Evaluation Report on the Impact of the Increase in the Use of Plastic Products on the Global Environment, Plastic Waste Management Institute, March 1993, (1993) P151-2	From resource acquisition to material production
72		6	Raw wood (imported)	Production	kg	Evaluation Report on the Impact of the Increase in the Use of Plastic Products on the Global Environment, Plastic Waste Management Institute, March 1993, (1993) P151-2	From resource acquisition to material production
73		7	Raw wood (Japan domestic)	Production	kg	Evaluation Report on the Impact of the Increase in the Use of Plastic Products on the Global Environment, Plastic Waste Management Institute, March 1993, (1993) P151-2	From resource acquisition to material production
74	Parts Production (General)	1	Semiconductor Circuit Packaging	Production	kg	Koseki: Proceedings in Chemical Engineering, Vol. 24, No. 6, p934-939 (1996)	Up to the production of resin-packaged semiconductor chip (with terminals)
75		2	Multilayer substrate	Production	kg	Koseki: Proceedings in Chemical Engineering, Vol. 24, No. 6, p934-939 (1996)	Up to the production of layered substrate (6 layers)
76		3	Assembled circuit board	Production	kg	Koseki: Proceedings in Chemical Engineering, Vol. 24, No. 6, p934-939 (1996)	Up to the production of substrate comprising semiconductor package mounted on layered substrate
77		4	Compressor	Production	kg	From materials by the Association for Electric Home Appliances	From LCA calculations taking into account the processing and assembly in the production of constituent materials
78		5	Medium-sized motor	Production	kg	From the by Japan Waste Management Association literature	From LCA calculations taking into account the processing and assembly in the production of constituent materials
79	Parts Production (Battery)	1	Alkaline-Manganese dry battery	Production	kg	Hiroshi Takatsuki and Shin-ichi Sakai: Hazardous Waste, Chuohoki (1993) P63 Source: Tokuji Murata: Reconsidering the Easy Use of Dry Batteries, Current Chemistry, October 1991 issue, P18-23	Only the production of constituent materials (zinc, MnO2, Fe) has been taken into account
80		2	Manganese dry battery	Production	kg	Hiroshi Takatsuki and Shin-ichi Sakai: Hazardous Waste, Chuohoki (1993) P63 Source: Tokuji Murata: Reconsidering the Easy Use of Dry Batteries, Current Chemistry, October 1991 issue, P18-23	Only the production of constituent materials (zinc, MnO3, Fe) has been taken into account
81		3	Lead-acid storage battery	Production	kg	P78, (1993), source: Japan Lead Zinc Development Association Ed.: Zinc Handbook (1975)	Only the production of constituent materials (lead, H2SO4, PP) has been taken into account
82	Parts Production (Others)	1	Cleansing agent	Production	kg	Japan Institute of Energy Journal, Vol. 75 (12), p1050 (1996)	Electric power and heavy oil energies taken into account with naphtha and NaOH as raw materials
83		2	Ink	Production	kg	Setting based on CO2: electric power/heavy oil = 8/2	From the energy ratio (electric power/heavy oil = 8/2) (raw material: crude oil)
84		3	Lubricant	Production	kg	Setting based on CO2: electric power/heavy oil = 8/2	From the energy ratio (electric power/heavy oil = 8/2) (raw material: crude oil)
85	Processing	1	Press Forming: Iron	Production	kg	Chemical Economy Research Institute: Basic Materials Energy Analysis Survey Report, 1993, 9, p135-136 (1993)	Power consumption for pressing 350ml steel can
86		2	Press Forming: Nonferrous metal	Production	kg	Chemical Economy Research Institute: Basic Materials Energy Analysis Survey Report, 1993, 9, p135-136 (1993)	Power consumption for pressing 350ml aluminum can
87		3	Injection molding	Production	kg	Chemical Economy Research Institute: Basic Materials Energy Analysis Survey Report, 1993, 9, p135-136 (1993)	Power consumption during production of LDPE bottle cap
88		4	Blow molding	Production	kg	Plastic Waste Management Institute: Considerations Similar to LCA regarding Plastic General Waste, 1995, 3 (1995) P23	Power consumption during PO and PVC molding
89		5	Glass molding	Production	kg	Chemical Economy Research Institute: Basic Materials Energy Analysis Survey Report, 1993, 9, p135-136 (1993)	Power consumption for 633ml glass bottle
90	Assembly	1	Parts assembly	Production	kg	From the 2000 Environmental Label Report and Ver. 2 published data	Representative power consumption value for assembly including partial processing
91	Transportation	1	2-ton Truck	Transportation	kg.km	Plastic Waste Management Institute (1993) P31-33	Loading factor correction required due to the data being for 100% loading factor
92		2	4-ton Truck	Transportation	kg.km	Plastic Waste Management Institute (1993) P31-33	Loading factor correction required due to the data being for 100% loading factor
93		3	10-ton Truck	Transportation	kg.km	Plastic Waste Management Institute (1993) P31-33	Loading factor correction required due to the data being for 100% loading factor
94		4	15-ton Truck	Transportation	kg.km	Plastic Waste Management Institute (1993) P31-33	Loading factor correction required due to the data being for 100% loading factor

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No	Field	No	Base Unit Name	Amount W	Unit	Main Source	Remarks
95	Transportation	5	20-ton Truck	Transpor-tation	kg.km	Plastic Waste Management Institute (1993) P31-33	Loading factor correction required due to the data being for 100% loading factor
96		6	Freight by rail	Transpor-tation	kg.km	98 Energy Economics Statistics Overview, Energy Conservation Center, Japan, January 30th, 1998, p107	No loading factor correction required due to the data already including loading factor
97		7	Freight by ship	Transpor-tation	kg.km	98 Energy Economics Statistics Overview, Energy Conservation Center, Japan, January 30th, 1998, p107	No loading factor correction required due to the data already including loading factor
98		8	Freight by air	Transpor-tation	kg.km	98 Energy Economics Statistics Overview, Energy Conservation Center, Japan, January 30th, 1998, p107	No loading factor correction required due to the data already including loading factor
99	Electric Power and Fuel	1	Electric Power	Produc-tion	kWh	Matsuno (1998) for electrical power in Japan; OECD energy statistics for Foreign countries	Average data for Japan (thermal, hydraulic, nuclear, etc.)
100		2	Heavy oil as fuel	Produc-tion	kg	BUWAL-132 DSO2=85%	Includes discharges during fuel production and combustion
101		3	Diesel oil as fuel	Produc-tion	kg	BUWAL-132 S=0.4 % DSO2=85%	Includes discharges during fuel production and combustion
102		4	Kerosene as fuel kg	Produc-tion	kg	CO2: Environment Agency (1992); Nx, SOx: 1992 Science and Technology Agency	Includes discharges during fuel production and combustion
103		5	Gasoline as fuel kg	Produc-tion	kg	CO2: Environment Agency (1992); NOx, SOx: 1992 Science and Technology Agency	Includes discharges during fuel production and combustion
104		6	Furnace coal	Produc-tion	kg	BUWAL-132 S=0.67 % DSO2=85%	Includes discharges during fuel production and combustion
105		7	Furnace coke	Produc-tion	kg	Energy Utilization Rationalization (1995), P117	Includes discharges during fuel production and combustion
106		8	Furnace oil coke	Produc-tion	kg	Calculated from Chemical Process Collection (1969) P350 and emission factor	Includes discharges during fuel production and combustion
107		9	Furnace Town Gas m3	Produc-tion	m3	Institute of Energy Economics, Japan (1999)+BUWAL	Includes discharges during fuel production and combustion
108		10	Furnace LPG	Produc-tion	kg	BUWAL-132 SOX is ignored	Includes discharges during fuel production and combustion
109		11	Furnace LNG	Produc-tion	kg	BUWAL-132 SOX is ignored	Includes discharges during fuel production and combustion
110		12	Heavy oil	Produc-tion	kg	NEDO-GET-9410-1, P.24	Fuel production only
111		13	Diesel oil	Produc-tion	kg	NEDO-GET-9410-1, P.24	Fuel production only
112		14	Kerosene	Produc-tion	kg	NEDO-GET-9410-1, P.24	Fuel production only
113		15	Gasoline	Produc-tion	kg	NEDO-GET-9410-1, P.24	Fuel production only
114		16	Coal	Produc-tion	kg	Research Institute for Resource Recycling and Environmental Pollution Control (Kato, 2000)	Fuel production only
115		17	Coke	Produc-tion	kg	Energy Use Rationalization (1995)	Fuel production only
116		18	Oil coke	Produc-tion	kg	Chemical Process Collection (1969) p.350	Fuel production only
117		19	Town Gas m^3	Produc-tion	m^3	Institute of Energy Economics, Japan (1999)	Fuel production only
118		20	LPG	Produc-tion	kg	NEDO-GET-9410-1, P.24	Fuel production only
119		21	LNG	Produc-tion	kg	Chemical Economy Research Institute (1993)	Fuel production only
120	Utility (Gas)	1	Oxygen (O2) m3	Produc-tion	m3	Naonori Matsumoto: Low-temperature Engineering, Vol. 11, No.1, P35-42 (1984)	Power consumption during production by low-temperature separation method
121		2	Nitrogen (N2)	Produc-tion	kg	From an air analyzer manufacturer hearing (February 2001)	Power consumption taken into account
122		3	Hydrogen (H2) m3	Produc-tion	m3	Hearing Survey (1995)	Electrical power and diesel consumption with naphtha raw material (byproduct: steam)
123		4	Chlorine (Cl2)	Produc-tion	kg	The Chemical Society of Japan "Chemistry Handbook: Applied Chemistry Edition (2)", P.207, 1986	Electrical power and steam consumption with industrial salt raw material (byproduct: H2)
124		5	Ammonia (NH3)	Produc-tion	kg	Hearing Survey	Electrical power and diesel consumption with naphtha raw

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Processed amount W (transportation burden amount: kg·km) = transportation mass (kg) × transportation distance (km) × 100 ÷ mass loading factor (%w)

No	Field	No	Base Unit Name	Amount W	Unit	Main Source	Remarks
125	Utility (Water)	1	Industrial water	Production	kg	Tokyo City Data	Electrical power and water consumption; soil discharge
126		2	Clean water (kg)	Production	kg	Ministry of Health and Welfare: Japan Water Works Association, Time-based Analysis of Water Supply Statistics, Water Works Association Journal, Vol. 67, No. 8, p46-84 (1998)	Electrical power and water consumption; soil discharge
127		3	Ultrapure water	Production	kg	Semiconductor Substrate Technology Research Association: Science of Ultra-pure Water, 1990	Electrical power, clean water, industrial water and steam consumption
128		4	Steam	Production	kg	Japan Boiler Association: Boiler Almanac, 1999 Edition	Electrical power, kerosene and clean water (10% supply) consumption
129	Disposal and Recycling (Crushing and Sorting)	1	Shredding	Processing	kg	Environmental Management, Vol.31, No.7 (1995) P.95	From shredder electrical power consumption
130		2	Iron Sorting	Processing	kg	From the 1993 Engineering Advancement Association of Japan Trust Report	From magnetic sorter electric power consumption
131		3	Non-ferrous Metal Sorting	Processing	kg	From the 1993 Engineering Advancement Association of Japan Trust Report	From eddy current + pneumatic separator electric power consumption
132		4	Sorting: Plastics	Processing	kg	1993 Engineering Advancement Association of Japan Trust Report	From specific gravity separator electric power consumption
133	Disposal and Recycling (Incineration and Landfill)	1	General Waste Incineration and Landfilling as Ash	Processing	kg	Prepared through collaboration with four autonomous bodies (1999), including ash (15.5%)	Electric power, water and Ca(OH)2 consumption; atmospheric, water body and soil discharge
134		2	Incineration: Industrial waste	Processing	kg	Obtained from three industrial waste businesses (1999)	Electric power, heavy oil, water, Ca(OH)2, NaOH and HCl consumption; atmospheric discharge
135		3	Incineration: Biomass (paper)	Processing	kg	Prepared through collaboration with four autonomous bodies (1999) and corrected	Zero CO2 discharge from paper incineration origin
136		4	Landfill: General waste	Processing	kg	Prepared through collaboration with four autonomous bodies (1999)	Electric power, diesel oil and NaOH consumption; BOD, COD and SS discharge
137		5	Landfill: Industrial waste	Processing	kg	Obtained from three industrial waste businesses (1999)	Electric power, diesel oil and NaOH consumption; BOD, COD, SS, TN and TP discharge
138	Disposal and Recycling (Regeneration)	1	Recycle: to cold-rolled steel	Processing	kg	JEMAI (1995) p.118 Non-traditional Technology Report (1995), p.103	Electric oven melting + rolling = plate forming
139		2	Recycle: to copper plate	Processing	kg	Non-traditional Technology Report (1995), p.89	Electric oven melting + rolling = plate forming
140		3	Recycle: to Aluminum plate	Processing	kg	For secondary and virgin metal ratios: Resources Statistics Annual Report, 1992, P.98 For rolling: Non-traditional Technology Report, 1995, P.5	Electric oven melting + rolling = plate forming
141		4	Recycle: to Thermoplastic pellet	Processing	kg	Calculated with 60% thermal efficiency melting temperature (average value for PS, ABS, PC, PE, PP, etc.)	Melting + injection molding = pelletizing
142		5	Recycle: to corrugated cardboard	Processing	kg	Paper Pulp Handbook, 1998 Edition, and others	Corrugated cardboard production from used paper
143		6	Recycle: to Cardboard	Processing	kg	Paper Pulp Handbook, 1998 Edition, and others	Cardboard production from used paper
144		7	Recycle: to Paper	Processing	kg	Paper Pulp Handbook, 1998 Edition, and others	Paper production from used paper
145		8	Recycle: to Glass	Processing	kg	From Chemical Economy Research Institute: Basic Materials Energy Analysis Survey Report, 1993.9 issue, P129-130, Table 1-3-15	Glass melting + forming
146	Disposal and Recycling (Other)	1	Sewage processing	Processing	kg	Japan Resource Association Ed.: Life Cycle Energy in Big City Life, Anforume, January 13th, 1999, p.147-149	Electric power, heavy oil, NG, water, NaOH and Cl2 consumption
147		2	Decomposition: CFC 11	Processing	kg	Environmental Management, Vol.31, No.7 (1995) P.95	
148		3	Decomposition: CFC 12	Processing	kg	Environmental Management, Vol.31, No.7 (1995) P.95	

Appendix 3

EcoLeaf Characterization Factors V 2.1

Note: This characterization factors table is a dedicated database that has been created to implement the "EcoLeaf Environmental Label". Unauthorized use for other purposes is prohibited.

					1	2	3	4	5	6	7
			Sub-category		Consumption (depletion)		Discharge (atmosphere)				Discharge (water bodies)
	Inventory Item		Name (JEMAI Program)		Resource depletion	Energy	Global Warming	Acidification	Ozone Depletion	Photochemical Oxidant POCP	Eutrophication
		No	Definition	Unit	Inverse of (Recoverable) Reserves of World's Resources	Fuel Higher Heating Value	Global Warming Potential (GWP) 100-year	Acidification Potential (AP)	Ozone Depletion Potential (ODP)	Photochemical Ozone Creation Potential (POCP)	Eutrophication Index (NP)
Reference Substance					Iron Ore (iron content)	Crude Oil	CO_2	SO_2	CFC-11	Ethylene (ethylene=1)	PO_4
Resource Consumption	coal	1	coal reserves	kg							
	crude oil (as fuel)	2	oil reserves	kg							
	LNG	3	LNG reserves kg	kg							
	uranium ore (U)	4	U reserves	kg							
	crude oil (as material)	5	crude oil (as raw material)	kg							
	iron ore (Fe)	6	Fe reserves	kg							
	copper ore (Cu)	7	Cu reserves	kg							
	bauxite (Al)	8	Al reserves	kg							
	nickel ore (Ni)	9	Ni reserves	kg							
	chromium ore (Cr)	10	Cr reserves	kg							
	manganese ore (Mn)	11	Mn reserves	kg							
	lead ore (Pb)	12	Pb reserves	kg							
	tin ore (Sn)	13	Sn reserves	kg							
	zinc ore (Zn)	14	Zn reserves	kg							
	gold ore (Au)	15	Au reserves	kg							
	silver ore (Ag)	16	Ag reserves	kg							
	silica sand	17	silica sand (silica sand)	kg							
	halite	18	NaCl	kg							
	limestone	19	limestone (limestone)	kg							
	soda ash (natural soda ash)	20	soda ash (natural soda ash)	kg							
	wood	22	wood	kg							
	water	23	water	kg							
Discharge into Atmosphere	CO_2	1	CO_2	kg							
	SO_x	2	SO_x	kg							
	NO_x	3	NO_x	kg							
	N_2O	4	N_2O	kg							
	CH_4	5	CH_4	kg							
	CO	6	CO	kg							
	NMVOC	7	NMVOC	kg							
	C_xH_y	8	C_xH_y	kg							
	dust	9	dust	kg							
Discharge into Water Bodies	BOD	1	BOD	kg							
	COD	2	COD	kg							
	N total	3	N total	kg							
	P total	4	P total	kg							
	SS	5	SS	kg							
Discharge into Soil	Unspecified Solid Waste	1	Unspecified Solid Waste	kg							
	Slag	2	Slag	kg							
	Sludge	3	Sludge	kg							
	Low-level radioactive waste	4	Low-level radioactive waste	kg							