Air conditioners [EDP 2003-65(1)]

1. General

1.1. Scope and definition

This requirement specifies technical considerations, declaration format and communication necessary for developing and issuing Environmental Declaration of Products(EDP).

- Common rules: It is general requirements for applying to the all of products
- Product-specific rules: It consists of reflecting the characteristics of each product

2.2. Terms and definitions

2.2.1. Functional unit: quantified performance of a product system for use as a reference unit in a life cycle assessment study.

2.2.2. Elementary flow: material or energy entering the system being studied, which has been drawn from the environment without previous human transformation. Material or energy leaving the system being studied, which is discarded into the environment without subsequent human transformation.

2.2.3. Reference flow: measure of the needed outputs from processes in a given product system required to fulfill the function expressed by the functional unit

2.2.4. Unit process: smallest portion of a product system for which data are collected when performing a life cycle assessment.

2.2.5. Data quality: characteristic of data that bears on their ability to satisfy stated requirements

2.2.6. Ancillary input: material input that is used by the unit process producing the product, but does not constitute a part of the product

2.2.7. Co-products: any of two or more products from the same unit process

2.2.8. Output: material or energy which leaves a unit process

2.2.9. System boundary: interface between a product system and the environment or other product systems

2.2.10. Impact category: class representing environmental issues of concern to which LCI results may be assigned

2.2.11. Raw material: primary or secondary material that is used to produce a product
2.2.12. Life cycle: consecutive and interlinked stages of a product system, from raw material acquisition or generation of natural resources to the final disposal
2.2.13. Life cycle inventory analysis: phase of life cycle assessment involving the compilation and quantification of inputs and outputs, for a given product system throughout its life cycle
2.2.14. Life cycle impact assessment: phase of life cycle assessment aimed at understanding and evaluating the magnitude and significance of the potential environmental impacts of a product system
2.2.15. Life cycle assessment(LCA): compilation and evaluation of the inputs, outputs and the potential environmental impacts of a product system throughout its life cycle
2.2.16. Life cycle interpretation: phase of life cycle assessment in which the findings of either the inventory analysis or the impact assessment, or both, are combined consistent with the defined goal and scope in order to reach conclusions and recommendations
2.2.17. Product: any goods or service
2.2.18. Product system: collection of materially and energetically connected unit processes which performs one or more defined functions
2.2.19. Intermediate product: input to or output from a unit process which requires further transformation
2.2.20. Final product: product which requires no additional transformation prior to its use
2.2.21. Input: material or energy which enters a unit process
2.2.22. Characterization factor: factor derived from a characterization model which is applied to convert the assigned LCI results to the common unit of the category indicator
2.2.23. Waste: any output from the product system which is disposed of

2. Common rules

2.1. Scope

The name and scope of a product to be studied shall be clearly described; if any components of the product are included in or excluded from the scope, they shall also be documented.

2.2. Function and functional unit

The function and functional unit of the product to be studied shall be defined to show its characteristics. If the functional unit does not sufficiently represent the function of the product, additional information on the characteristics of the product shall be described to complement the functional unit.

2.3. System boundaries

2.3.1. In principle, a product system should include all of the life cycle stages of a product, including raw material acquisition, production, use and disposal. However, some part of the life cycle stages may be excluded depending on the characteristics of the product. A process flow diagram for the stages included shall be drawn.

2.3.2. Inputs into and outputs from a unit process included within system boundaries should be elementary flows.

2.3.3. When defining system boundaries, any capital goods (e.g. subsidiaries, buildings, etc.) that are not directly associated with the production may be excepted.

2.3.4. System boundaries shall be classified as follows, and a process flow diagram shall be drawn for unit processes (including transportation) determined.

2.3.4.1. Raw materials acquisition and preparation phase

- This phase includes acquisition of raw materials for the product and production of intermediate products put into the manufacturing phase.

2.3.4.2. Manufacturing phase

- This phase includes the relevant processes for manufacturing the product, including the processes directly related to manufacturing of the product, the ancillary processes (utilities), the emissions treatment processes, etc.
- The processes related to manufacturing phase should be subdivided into appropriate unit processes.

2.3.4.3. Use phase

- This phase includes the use of the product by customers and its distribution. However, the items associated with its maintenance may be excluded.
- A use scenario shall be developed and applied, taking into account the characteristics, life, and use methods of the product.

2.3.4.4. End-of-life phase

- This phase is classified into recycling, incineration and landfill, depending on the materials and disposal method of the product.
- Use site-specific data on waste treatment whenever they are available, and the data shall be reported.
- Use proved statistical data on disposal of specific products and materials.
- If neither 3.3.4.4.2. nor 3.3.4.4.3. is applicable, a disposal scenario shall be developed and applied.

2.3.5. If the wastes resulted from the manufacturing or end-of-life phase are recycled into other product systems, i.e. an open loop recycling system, it shall be excluded from the system boundaries.

2.3.6. When the materials recycled through the open loop recycling system are used as inputs into any process, the recycling process shall be included within the system boundaries.

2.3.7. The incineration process shall be included within the system boundaries. When recovered heat is used for the system, it shall be deducted from the total environmental impact.

2.4. Cut-off rules

2.4.1. Mass, energy and environmental relevance shall be taken into account in order to apply cut-off rules for inputs.

2.4.2. Omitted components or materials should be documented and recorded.

2.5. Data categories

2.5.1. Data categories for inputs should include the materials (both raw and ancillary materials), water and energy that are used throughout the product life cycle.

2.5.2. Data categories for outputs shall include the products, co-products and environmental emissions (emissions to air, emissions to water, wastes, etc.).

2.5.3. Data categories for environmental emissions shall include those that are defined in the Clean Air Conservation Act, Water Quality Preservation Act and Waste Management Act and the site-specific items that are independently defined by the site. The wastes are classified into recyclable wastes, wastes to be landfilled and wastes to be incinerated.

2.5.4. In addition to the air emissions defined in the Clean Air Conservation Act, other relevant emissions, such as carbon dioxide, shall also be included.

2.5.5. The name of environmental emissions from which data should be collected shall be reported.
2.5.6. The name of the materials should be International Union of Pure and Applied Chemistry (IUPAC) or usual name.

2.6. Data quality requirements

2.6.1. In principle, site-specific data (measured, calculated, etc.) should be used. If site-specific data are not available, data on similar products or processes may be used.
2.6.2. The site-specific data shall be the average data cumulated for the latest 1 year within 3 years after the day when the certification was applied for. However, for a new product manufactured less than 1 year, cumulative average data of the period ranging from the time of the beginning of manufacturing to the time of data collection can be used.
2.6.3. Technology coverage, e.g. technology and method used for production or data measuring, shall be determined by the technical level and methods in the site.
2.6.4. If it is difficult to use site-specific data, generic data obtained from published sources, e.g. Life Cycle Inventory Analysis Database (hereafter referred to as 'National LCI Database') developed by the government, should be used.
2.6.5. When generic data is used, priority should be given in the order of geographical coverage, time-related coverage, and technology coverage.
2.6.6. When data on similar products or processes or generic data are used, or there are data gaps, its reasons and validity should be reviewed and documented.

2.7. Data collection and calculation

2.7.1. Data collection should include the items specified in the data categories and those below. When any data items are difficult to measure, they should be calculated by an appropriate method, and its justification should also be documented.

- Data sources and data collection techniques
- Data (including gaps) processing procedures
- Assumptions
- Data processing techniques and results

2.7.2 The data collection and calculation for each life cycle stage shall be made in accordance with the procedures below:

2.7.2.1. Raw materials acquisition and preparation phase

- Depending on the data quality requirements, either site-specific or generic data may be used. Generic data shall be applied in the order of:

1) National LCI database of the country

2) Average data of the relevant industries, e.g. APME, IISI, etc.

3) Generic data, e.g. software-contained data, etc.

- When inputs are supplied by multiple suppliers, data collection should in principle be conducted for all of the suppliers. However, when validity is proved, representative data may be used, and the criteria for selecting the representative data shall be justified.

2.7.2.2. Manufacturing phase

- For the manufacturing phase, site-specific data should in principle be collected. The validity of data on inputs into and outputs from each unit process should be verified using material or energy balances.

- If the quantity of carbon dioxide emissions is not measured in site, calculate it using the emissions factors given by Intergovernmental Panel on Climatic Change (IPCC).

- In principle, site-specific data should be collected for the incineration and wastewater treatment processes. If it is difficult to collect site-specific data, generic data may be used. When general wastes and specific wastes are separated and incinerated individually, data on general wastes and specific data should be used; when wastes are separated according to materials and incinerated individually, data on each material should be applied.

- Data Collection Form for Unit Process provided in Annex 2 (Instructions for Life Cycle Assessment Report) shall be used for site-specific data on the unit processes defined in the manufacturing phase.

- Data shall be collected from each unit process. If necessary, unit processes may be further subdivided.

- If the product is manufactured in multiple production lines, data should in principle be collected from all of the lines. However, when the characteristics of the production lines are similar, data may be collected from a representative production line; the validity of criteria for selecting the representative production line should be justified.

- When inputs are supplied by multiple suppliers, data should in principle be collected from all of the suppliers. However, when validity is proved, data from a representative supplier may be used, and the criteria for selecting the representative supplier should be justified.

2.7.2.3. Use and End-of-life phase

- Data shall be collected and calculated according to 2.3.4.

2.7.2.4. For the transportation, actual data, e.g. tonnage and distance transported for each transportation mode, shall be collected. When the products are delivered by multiple transportation modes, a representative transportation mode may be defined and data may be collected from it; the validity of selecting the representative transportation mode should be justified. Empty return is not taken into account.

2.8. Allocation rules

2.8.1. Basis for allocation in the manufacturing phase shall be made in accordance with the allocation procedures defined in ISO 14041(Environmental management - Life cycle assessment - Goal and scope definition and inventory analysis).

2.8.2. For the ancillary processes and wastewater/waste treatment processes, allocation should be made on the basis of production, i.e. weight or number of the products.

2.8.3. For the combined heat and power generation, allocation should be made on the basis of energy.

2.8.4. For the plastic molding processes (injection molding etc), allocation should be made on the basis of the weight of molded product.

2.8.5. For the painting and plating processes, allocation should be made on the basis of surface area of the surface-treated product.

2.9. LCI results

2.9.1. When there is an upstream process for a unit process, site-specific data collected from the unit process shall be linked to the upstream process. The data shall be quantified in terms of the functional unit so as to be used to produce life cycle inventory analysis results.

2.9.2. In the inventory analysis, inputs and outputs shall be separately described as follows:

- Inputs shall include natural resources, water and energy. When any upstream flow that is relevant to the inputs is not traced, the inputs should be expressed as 'untraceable inputs.'
- Outputs shall include products, co-products and environmental emissions (e.g. emissions to air, emissions to water, wastes, etc.). When any downstream flow that is relevant to the outputs is not traced, the outputs should be represented as 'untraceable outputs.'

2.10. LCIA characterization factors

2.10.1. Resource depletion: Guinee, 2001 with modification for crude oil, natural gas, hard coal and soft coal. Reserve basis, Sb-equivalents
2.10.2. Global warming potential: IPCC (1994-95, direct effect), the Time horizon 100 years, CO2-equivalents
2.10.3. Ozone depletion potential: WMO (World Metrological Organization 1999), CFC11-equivalents
2.10.4. Acidification potential: Heijungs et al, 1992 (updated with Hauschild & Wenzel, 1998), SO2-equivalents. For SOx and NOx, the characterization factors for SO2 and NO2 are used, respectively.
2.10.5. Eutrophication potential: Heijungs et al, 1992(with some modifications), PO4-3-equivalents
2.10.6. Photochemical ozone creation potential: Derwent et al, 1998 (updated in Jenkin & Hayman, 1999; included inorganic substances Derwent et al, 1996), in high NOx, C2H2-equivalents. For VOCs and non-methane VOCs, Heijungs et al., 1992 shall be referred to.

3. Product-specific rules

3.1 Scope

This requirement is applied to household air conditioner product (hereafter referred to as ‘air conditioner’) that are the air cooling air conditioner for exclusive use and the air cooling-heating complex air conditioner of heat pump method using refrigerants cycle without classification in accordance with the form, setup method of the air conditioner. Basic accessories offered, their packaging materials as well as product itself are also subject to this requirement.

3.2 Function and functional unit

3.2.1. Function: Air cooling function and air cooling-heating complex function

※ Additional function: Oxygen generation, Negative ion generation, and timer, etc.

3.2.2. Functional unit: one air conditioner (the unit by which product is sold, but in cases of multi form, it shall be the occasions putting on the indoor machinery at most number)

※ Product specification: Air cooling or heating capacity, size (width×height×depth), weight, power consumption, and the quality of the material

3.3. System boundaries

3.3.1. The system boundaries shall be determined in accordance with the procedures in the common rules and those described below:

3.3.1.1. Raw materials acquisition and preparation phase: Cumulative mass contribution of the inputs (except water and energy) to the product manufacturing phase shall be analyzed in order to establish cut-off rules.

3.3.1.2. Manufacturing phase: This phase includes component-manufacturing and product assembly processes. It also includes processes related to the manufacturing of the product [the processes directly related to the manufacturing of the product, ancillary processes (utility), and treatment of wastewater, and wastes].

3.3.1.2.1. Main component-manufacturing processes: Main components carry out main functions of the air conditioner, and as the components necessarily required to make up the product, for these processes, site-specific data shall be collected. When the main inputs or processes defined are changed, such modifications should be considered and it shall be included within system boundaries.

<Main component-manufacturing processes>

Indoor machinery

Component	Function and Process Description
Fan drive motor assembly component	- Drive the fan, so discharge cool or warm air producing in the air conditioner to the outside - Make the fan drive motor through the coil winding process, the rotor assembly, the outer combination, printing circuit board adhesion, and inspection process

Front surface cover	- Support and protect the main inner components - Make the whole surface cover through the process coating the plastic or steel sheet with paint and the process molding these
Air flow direction system assembly component	- Induce to be produced cool or warm air flow produced in the air conditioner to the direction wanted - Assemble the components including the motor, so make the air flow direction system assembly component
Chassis	- Support and protect the main inner components of indoor machinery - Make the chassis through coating the raw material (steel sheet, plastic, etc.) with paint and molding, welding
Fan assembly component	- Spin to be connected in the indoor machinery motor, and make the cool or warm air flow be produced - Mold the raw material (plastic, steel sheet, etc.), so that, make the fan through manufacturing and assembling the fan
Evaporator assembly component	- As the heat exchanger in the inner side, absorb the inner heat, so change refrigerants of liquid form flowing into the inside to the vapor state - Make the evaporator through processing Fin and inserting refrigerants pipe laying, welding, inserting the linking tube inspection, welding, and leaking inspection
Air guide duct	- Induce the air flow produced due to the fan up to the air flow direction system (The induction tube assembly component to form the induced road of ventilation air) - Make the air shot induction tube through molding of the raw material (zinc galvanizing, steel sheet, and plastic, etc.)
Fixing board	- Adhere to the indoor machinery on the wall, so fix it - Make the fixing board through molding of cutting, drilling, and bending, etc. of raw materials (steel sheets, etc.)
drainpipe assembly component	- Discharge the condensed water formed in the indoor machinery - Make the drainpipe through molding and joining of raw materials

- Outdoor machinery

Component	Function and Process Description
Fan drive motor assembly component	- Drive the fan, so discharge the air flow - Make the fan drive motor through the coil winding process, the rotator assembly, outer combination, printing circuit board adhesion, and inspection process
Condenser assembly component	- As the heat exchanger in the outside, discharge the heat of vapor form refrigerants of high temperature high pressure flowing to the inside, and change to the liquid form - Make the condenser through the processing process of Fin processing, refrigerants pipe laying bending, inserting, welding, and drying, etc., leaking inspection, and dry process
Compressor assembly component	- Compress the refrigerants of vapor state absorbing the heat in the evaporator, then change them to the high temperature high pressure state, after that, send to the condenser - Make the compressor through assembling and coating the components by processing of rollers, cylinders, bearing, and crankshaft, etc. and welding, surface handling and motor manufacturing with paint
Fan	- Spin to be connected in the outdoor machinery motor, and discharge the cool or warm air flow - Make the fan by molding the raw materials (plastic or steel sheets, etc.)
Cover assembly component	- As the top board and the side cover of the outdoor machinery, support and protect the main inner components - Make the cover through coating the raw materials (plastic or steel sheets) with paints and molding
Bottom board assembly component	- Support the main inner components of the indoor machinery - Make the bottom board through the low board molding process using the raw material (steel sheet, etc.) via coating with paints and the process welding the low board

	and volt and the process welding the Subsidiary components (the supporting stand, etc.)
Motor supporting stand	- Support and fix the fan drive motor - Make the motor supporting stand through the steel sheet molding process

- Commonness

Component	Function and Process Description
PCB (Printing circuit board) assembly component	- Carry out the action control, communication function, power management, indication function - Make the PCB assembly component through putting in the PCB and inserting the circuit components, auto soldering, and inspection
Metal pipe and connecting assembly component	- To make up the refrigerants cycle connecting the compressor, the evaporator, and the condenser - Make the metal pipe and connecting assembly component through molding of cutting and bending of metal pipe, welding and assembling the connecting components (service valve), etc.
Pipe laying linking the indoor□ outdoor machinery	- Connecting both the indoor machinery and the outdoor machinery, to make up the refrigerants cycle - Make pipe laying linking the indoor□outdoor machinery through molding of cutting and bending, etc. of the copper tube
Box and inner buffer	- Protect the air conditioner indoor, outdoor machinery true form from the out side shock, and make the transportation easily - Include the box manufacturing and the inner buffer manufacturing

3.3.1.2.2. Other component-manufacturing processes: Other components mean those that less contributes to the whole air conditioner product system than main component-manufacturing processes. In cases of other components, site-specific data are not necessarily to be collected, but generic data on the component materials may be used. Depending on the characteristics of the product, new processes may be added. For other components, there are the

manual, the filter assembly components of the indoor machinery, remote controller, power cable, and refrigerants, etc.

3.3.1.2.3. Product assembly processes: As the assembly process is necessarily the needed process when assembling air conditioner, site-specific data should be collected. When the processes defined are changed, such modifications can be applied and it shall be included within system boundaries.

<Product assembly processes>

Process	Description
Assembly, inspection, packaging process	- Making up the contracting, insertion, and efficiency inspection process, etc. - Assembling the product putting in the component, completing the product through the control and inspection of the function, and packaging the finished product
Ancillary process	- Including the process manufacturing the utility (steam, compressed air) put in the process and the discharge matters treatment process

3.3.1.3. Use phase: The standard scenario of the use phase of the air conditioner is as followings, and the matters related to maintenance and repair of the product shall be excluded. When opening the environmental record to the public, the used time used to the producing basis shall be documented. In cases of the air cooling-heating complex air conditioner, power consumption by air cooling and power consumption by heating shall be divided, and the total electric power consumption should be produced and documented.

- Total electric power consumption = Yearly used time × Power consumption × Product‘s life span

▪Yearly used time:

- Air cooling air conditioner for exclusive use - Supposing to 176 hours
- Air cooling-heating complex air conditioner - Supposing to air cooling: 176 hours, air heating: 269 hours

▪Power consumption: air cooling or air heating power consumption declared on the product

▪Product‘s life span: Supposing to 7 years (The term of components holding)

3.3.1.4. End-of-life phase

3.3.1.4.1. Product recovery rate: A set of products are supposed to be recovered, treated to dispose the whole quantity.

3.3.1.4.2. Treatment of the recovered product: The collected product shall be disassembled by materials, so it is supposed to be recycled, incinerated, or landfilled.

- Recycling: The materials of kinds of paper, copper, aluminum, steel and PS, ABS, ABS+PC, PP, PE, and PC, etc. are supposed to be recycled. Recycling is done, but the materials not mentioned above should prove the fact to be actually recycled. Calculation of recycling rate shall be applied in accordance with the priority order as followings.

1) Actual recycling rate: The recycling rate based on the actual results shall be applied and the based document should be presented.

2) Statistics of recycling rate: The materials included in the statistics of recycling rate officially announced in the Ministry of Environment shall apply the recycling rate by materials in each. However, in cases that the recycling rate of the specific material is not documented, the recycling rate information of the material group being able to include the relevant material can be used.

3) Target of recycling: The materials not included in the statistics of recycling rate officially announced in the Ministry of Environment shall apply the living target of recycling of the recycling object making public in the Ministry of Environment.

※ In cases of using the statistics of recycling rate or target of recycling, the latest data opened to the public in the standards of certifying request point of time must be used.

- Incineration: Suppose that the materials that can be incinerated among the materials not recycled are incinerated.

- Landfill: Suppose that the materials that can not be incinerated (the metal kinds, the glass kinds, and the ceramic ware kinds, etc.) among the materials not recycled is landfilled.

3.3.1.4.3. Refrigerant: Suppose that 90% of refrigerant included in the product shall be recovered, so kept in the storing place.

3.3.2. Transportation

3.3.2.1. Raw material and materials transportation: The transportation within raw materials acquisition and preparation phase is included in the database. Therefore, it doesn't need to be considered.

3.3.2.2. Parts and component transportation: The raw materials, the subject materials transported to the product manufacturing phase don't need to be considered.
3.3.2.3. Transportation within ‘product manufacturing site’: As the transportation between the components manufacturing process and the assembly process within the product manufacturing phase and the transportation among the processes within the components manufacturing process and the assembly process, in cases of happening the delivery among the production companies only, it shall be considered. However, the cases of the subsidiary components manufacturing process shall be excluded.
3.3.2.4. Product transportation: As the transportation between the manufacturing phase and the use phase, the delivery from the production site to the distribution center is included. However, the delivery from the distribution center to the customer, from the customer to the disposal phase shall be excluded.

3.4. Cut-off rules

3.4.1. The cut-off rules shall be determined in accordance with the procedures in the common rules.
3.4.2. The cut-off rules shall be set out in such a way that the quantity of inputs into the manufacturing phase should be more than 99 percent on the basis of cumulative mass contribution. Only, when calculating the total amount of inputs in order to set up the system boundaries in accordance with cut-off rules, the amount of fuel used and the amount of water used of process cooling water, washing water, etc. should not be considered, and must be included in the system boundaries without concern with cut-off rules.

3.5. Data categories

3.5.1. The data categories shall be determined in accordance with the procedures in the common rules.

3.6. Data quality requirements

3.6.1. The data quality requirements shall be determined in accordance with the procedures the common rules.

3.6.2. For main component-manufacturing and product assembly process and wastewater/wastes treatment process in the manufacturing phase, which are determined in the system boundaries, site-specific data shall be collected.

3.7. Data collection and calculation

3.7.1. The data collection and calculation shall be made in accordance with the procedures set out in the common rules.

3.7.2. Raw materials acquisition and preparation phase

3.7.2.1. For components not included in main component-manufacturing processes, data calculated by considering the material composition and composition ratio of them shall be applied.

3.7.3. Manufacturing phase

3.7.3.1. Division of the business place: Although some among main component-manufacturing processes are located outside, the site-specific data should be collected.

3.7.3.2. Electronic components: The representative data can be used considering the quality and capacity.

3.7.4. Use phase

3.7.4.1. The environmental impact resulted from the use phase of air conditioner is related to the power consumption. The total electric power consumption shall be calculated according to the standard scenario defined in 3.3.1.3. Then the environmental impact is produced.

3.7.5. End-of-life phase

3.7.5.1. The environmental impact resulted from the end-of-life phase of air conditioner is related to the decomposition progress and the disposal of the materials decomposed, etc. The standard scenario defined in 3.3.1.4. shall be applied, so the environmental impact of the end-of-life phase shall be produced.

3.7.6. Transportation

3.7.6.1. Transportation of the components, products should be included according to the standards defined in 3.3.2.

3.8. Allocation rules

3.8.1. Basis for allocation shall be made in accordance with the procedures in the common rules.

3.8.2. The basis for allocation for each production line should be determined by the number of products manufactured and the capacity.

3.8.3. The allocations rules for each product should be determined by the number of the products manufactured.
3.8.4. In cases recycled from the disposal phase after use to the other product system, cut-off methodology shall be applied.

LCA Implementation Report Instructions

General

1.1. General information
- Name of your company or site:
- Business registration number:
- Physical location of your site:
- Name of the representative:
- Product category relevant to your product:
- Name of your product:
- Phone number: (Facsimile number)
- Contact person: (E-mail)

1.2. Information on LCA implementation
- LCA period:
- LCA practitioner:

LCA information

1. Scope

The results of the LCA implemented for the certification of EDP shall be described here. The considerations to be reviewed for each phase of the LCA implementation shall be set out as the items in the report.

The items to be filled in separately are described, taking into account the characteristics of the product. They shall be described in a manner that the validity of the LCA implementation is established.

The product to be declared
- General information of the product to be declared shall be specified here. After certified, the information shall be properly written on the 'General Information' in the EDP Certificate(Separately provided).

- The requirements defined in the 'Instructions and Certification Requirements for Environmental Declaration of Products' and the items below shall be documented.

•Name of the product

•Characteristics of the product: Information on the characteristics of the product shall be described to show its function; the description should avoid a dispute about its fairness.

2. Function and functional unit

- The function and functional unit defined in the 'Instructions and Certification Requirements for Environmental Declaration of Products' shall be described here.

3. Product system and system boundaries

3.1. Process flow diagram and scope of product system

- Throughout the life of the product from raw material extraction through manufacturing, transportation, use and disposal, the process flow diagram and the scope of the product system defined in the ‘Instructions and Certification requirements for Environmental Declaration of Products’ shall be described here.

3.2. System boundaries

- The system boundaries shall be described in brief, based on the life cycle stages included in the scope of the product system.
- When an assumption is made or limitations occur during the design of the system boundaries, they shall be documented.
- When any processes are excluded from the system boundaries according to cut-off rules, its justification shall be documented.
- The process flow diagram, showing the unit processes included in the system boundaries and the flows between them, shall be drawn in a manner that the unit processes and data used are clearly understood; the sources of the data used shall be documented in the 'Data Collection Report' provided in the 'Data Collection and Calculation.'

3.3. Cut-off rules

- When cut-off rules are applied, they shall be documented, based on the form below; the items defined in the 'Instructions and Certification requirements for Environmental Declaration of Products' shall be applied.

<Cumulative mass contribution>

Serial No.	Unit Process	Input	Unit	Quantity of input	Cumulative mass	Cumulative percentage (%)	Remarks
Total							

※ Remarks include the values of the items that are included due to specific reasons (e.g. environmental relevance), although excluded by cut-off rules.

-Serial No.: Number of each unit process, which is determined by the applicant for EDP, to manage the data effectively
-Unit process: Name of the unit process to which the relevant input is put
-Input: Raw materials or ancillary inputs, of which the cumulative mass contribution is analyzed, in the order of their quantity
-Mass: Quantity of the inputs that are put into the manufacturing phase, according to a specific criterion (e.g. production of a specific product, yearly production, etc.); a mass unit (e.g. kg, ton) shall be uniformly used.
-Energy: Quantity of the inputs that are put into the manufacturing phase, according to a specific criterion (e.g. production of a specific product, yearly production, etc.); an energy unit (e.g. MJ) shall be uniformly used.
-Cumulative mass contribution: Mass contribution of each material shall be calculated by: [Quantity of the input / total quantity of the input] x 100; each contribution shall be summed up to produce cumulative mass contribution.
-Environmental relevance: When any hazardous substances are undoubtedly expected o be discharged during the manufacturing or use phase, they shall be separately documented.

4. Data categories

- For each of the data categories that are defined in the 'Instructions and Certification Requirements for Environmental Declaration of Products,' the items of the data to be collected from the life cycle inventory analysis (LCI) shall be determined and described.

5. Data quality requirements

- The quality requirements of the data to be collected from the LCI shall be documented.

- When data other than site-specific data, among the data quality requirements defined in the 'Instructions and Certification Requirements for Environmental Declaration of Products,' are used, their justification should be clearly documented according to the form below:

Serial no.	Unit process	Input/Output		Items, facts and reasons of inadequacy of the data quality requirements
		Input		
		Output		
		Input		
		Output		
		Input		
		Output		
		Input		
		Output		

6. Assumption and limitations

- Any assumptions defined during the LCA shall be documented in detail, and possible results for each assumption shall be described.

7. Data collection and calculation

- Based on the process flow diagram, data on the inputs into and outputs from each unit process shall be collected. The collected data shall be described in the form below.

- It shall be written that the collection and calculation of data from each unit process were made in accordance with the methods and procedures set out in the 'Instructions and Certification Requirements for Environmental Declaration of Products.'

<Data collection report>

Serial no.		Unit Process	

[General information]

Record date		Data recorder	
Description for unit process			

[Data quality]

Time-related coverage	
Geographical coverage	
Technology coverage	

[Inputs into the unit process]

Data category	Material name (Raw material, energy, water)	Unit	Quantity	Data collection	Connection information	Transportation	
						Distance	Mode

[Outputs from the unit process]

Data category	Material name (Raw material, energy, water)	Unit	Quantity	Data collection	Connection information	Transportation	
						Distance	Mode
product							
coproduct							
Emissions to air							
Emissions to water							
Waste							

[Basis on data collection (if data was collected by calculation or estimation)]

Data category	Material name	Basis on data collection

·Serial no.: Number or abbreviation, to search the unit process easily.
·Unit process: Name of the unit process
·Record date: Latest date of the record
·Data recorder: Name of the person recording the data
·Description: Function and coverage of each unit process
·Time-related coverage: Representative time-related coverage of the unit process; data on materials with different time-related coverage shall also be included
·Geographical coverage: Geographical coverage of the unit process, e.g. Korea, Ulsan, Yeocheon, etc.
·Technology coverage: Technological coverage of the unit process
·Raw material: Those that are put into the unit process; the ancillary inputs, which are not contained in the final products, shall be included.
·Energy: Electricity, steam and fossil fuel (e.g. gasoline, fuel oil), which are used as energy; electricity used in offices or control rooms shall not be included, but only electricity put into the manufacturing processes shall be included.
·Water: 'Industrial Water' for that directly outsourced; an appropriate name for that internally processed
·Material: IUPAC or idiomatic name as much as possible; the same materials with different composition shall be filled in together.
·Unit: That of mass shall be kilogram (kg) or gram (g); that of energy shall be MJ. The unit of energy given as that of mass or volume shall be converted to MJ.
-Quantity: That of inputs and outputs in terms of specific requirements
-Data collection: When data was collected by measurement, each of the input and output parameters shall be written as A; by calculation, as B; by estimation, as C. When data was collected by a method other than those above or by two of them, the method of data collection shall be described in the 'Justification of Data Collection.'
-A(measured): Data on the quantity of fuel/energy consumption and environmental emissions that were measured by equipment measured and then simply averaged

-B (calculated): Data on the inputs or outputs (e.g. carbon dioxide) that were calculated based on scientific, theoretical backgrounds in combustion engineering, thermodynamics, stoichiometry, mechanical engineering, etc.
-C (estimated): Data on the inputs or outputs that were estimated from relevant publications or similar processes
·Transportation: Distance from the source of raw materials to the site and transportation mode. The transportation mode shall be described in detail (e.g. 00 ton truck, ocean carrier, ocean cargo ship, etc.). When the raw materials are transported through various routes and by several modes, the relevant field in the form may be too small to fill in the data; in this case, this item may be written in a separate document.
·Product: Product or semi-product resulted from the unit process
·Co-products: That simultaneously produced with the product; usable for any of other product systems
·Emissions to air: Those emitted to the nature or from air filter equipment may be included. The emissions to nature includes dust, CO2, NOx, SOx, CO, etc. The gas put to the air filter equipment may be expressed as 'discarded gas'; the serial numbers of the air filter equipment shall be written in the field of information linked.
·Emissions to water: Almost materials put to wastewater treatment equipment; the name of the material may be 'wastewater.' If any material is directly put from the unit process to water system, the name of the material shall be filled in.
·Waste: Generic and specific wastes resulted from the manufacturing processes, including the sludge filtered by the wastewater treatment equipment. The names of the waste shall be in accordance with those in the table below:

<Examples of solid wastes according to solid waste classification in Korea>

General waste		Specific waste
Incombustible	Combustible	
Slag, ash and dust, construction waste, metal/glass, sand, lime waste, gypsum waste, etc.	Paper, wood, synthetic polymer waste, animal carcass, sludge, etc.	Acid waste, alkali waste, oil waste, organic solvent waste, synthetic polymer waste, dust, sludge, etc.

·Treatment: Serial numbers of the treatment processes of air or water emissions that are not treated through the air filter or wastewater treatment equipment shall be filled in. Emissions to the nature shall be expressed as 'emissions to nature'.
·Connection Information: Name and year of the database linked for each material, or the name of a unit process to which the materials are delivered
·Justification: data source or procedures when the data were collected by calculation or estimation

8. Allocation rules

- It shall be written that the allocation defined in the 'Instructions and Certification Requirements for Environmental Declaration of Products' was made; the allocation factors and procedures shall be described in detail.
- The allocation that is not defined in the 'Instructions and Certification Requirements for Environmental Declaration of Products' shall be made in accordance with the procedures in ISO 14041; the procedures shall be described.

9. Life cycle inventory analysis (LCI) results

- The LCI results shall be individually described for each of the phases of extraction and production of raw materials and manufacturing on the form below; the applicant for EDP shall modify it properly.

<Report for each phase>

	Data category	Raw materials acquisition and preparation phase and manufacturing phase		
		Name	Unit	Quantity
Input	Resource			
	Water			
	Energy			
	Untraceable input			
Output	Product, Co-products			
	Emissions to air			

	Emissions to water			
	Waste			
	Untraceable output			

	Data category	Use phase		
		Name	Unit	Quantity
Input	Resource			
	Water			
	Energy			
	Untraceable input			
Output	Product, Co-products			
	Emissions to air			
	Emissions to water			
	Waste			
	Untraceable output			

	Data category	End-of-life phase		
		Name	Unit	Quantity
Input	Resource			
	Water			
	Energy			
	Untraceable input			
Output	Product, Co-products			
	Emissions to air			
	Emissions to water			
	Waste			
	Untraceable output			

<Life Cycle Inventory>

	Data category	Life Cycle Inventory		
		Name	Unit	Quantity
Input	Resource			
	Water			
	Energy			
	Untraceable input			
Output	Product, Co-products			

	Emissions to air			
	Emissions to water			
	Waste			
	Untraceable output			

- When a sensitivity analysis for part of the items was made to check the validity of the LCI results, or the sensitivity of the results according to the assumption or allocation method was analyzed, it shall be documented.

10. Life cycle impact assessment, LCIA

- The characterization factors for each impact category, which are defined in the 'Instructions and Certification Requirements for Environmental Declaration of Products,' shall be applied to describe the LCIA.
- The LCIA results shall be individually described for each stage of extraction and production of raw materials and manufacturing, use and disposal on the form below; the applicant for EPD shall modify it properly.

Environmental impact category	Raw materials acquisition and preparation phase and manufacturing phase	Use phase	End-of-life phase	Total
Resource depletion (kg Sb-eq/unit)				
Global warming potential (kg CO2-eq/unit)				
Ozone depletion potential (kg CFC11-eq/unit)				
Acidification potential (kg SO2-eq/unit)				
Eutrophication potential (kg PO4-3-eq/unit)				
Photochemical ozone creation potential (kg C2H4-eq/unit)				

- Among the LCI results, the items linked to the characterization factors shall be described according to the form below:

<Examples of the category of global warming potential>

Name	Quantity(kg)			Characterization factor ($kgCO_2$-eq/kg)	LCIA result		
	Raw materials acquisition and preparation phase and manufacturing phase	Use phase	End-of-life phase		Raw materials acquisition and preparation phase and manufacturing phase	Use phase	End-of-life phase

Environmental Declaration of Products Formats

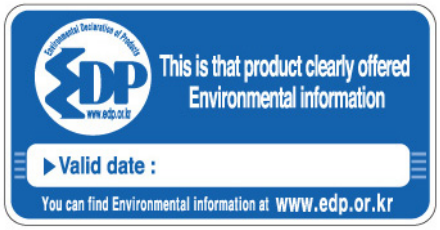
1. Name

Environmental Declaration of Products(EDP)

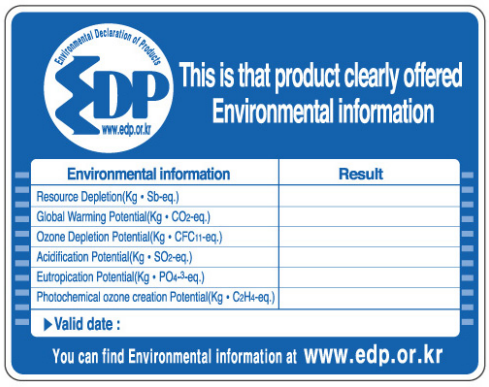
2. Labels on product

2.1. Type 1

2.2. Type 2



2.3. Type 3



Note.

1. The colors of the logo background and the words 'EDP Certified' shall be PENTONE 286C and PENTON 115C, respectively.
2. In case of 4-color print: the colors of the logo background and the words 'EDP Certified' shall be C100+M70 and Y100, respectively.
3. In case of black and white print: when the logo background is below 50 percent black, the words shall be 100 percent black; when over 50 percent black, the words be 100 percent white.

4. Data of life cycle impact assessment results shall be expressed in terms of the exponential function (○.○E±○○, or ○.○×10±○○)

3. EDP Certificate (Separately provided)

EDP

The environmental information of this product is as follows:

1. **General information**

- Certified by : - Certification no. : - Valid time :

Manufacturer				Product picture
Product name		Product group		
Functional unit (to be sold)				
Characteristics				

- Remarks

2. **Environmental impact**

Category	unit	Raw materials acquisition and preparation phase and manufacturing phase	Use phase	End-of-life phase	Total
Resource depletion					
Global warming potential					
Ozone depletion potential					
Acidification potential					
Eutrophication potential					
Photochemical ozone creation potential					

- Note) The transportation before shipping the products shall be included in the extraction and production of raw materials; that from the shipping to the use by customers shall be in the use phase; that after the use shall be in the end-of-life phase.

***3.* Inputs and outputs (if demanded by customers)**

Category		Name	Unit	Quantity
Input	Resource			
	Water			
	Energy[1)]			
	Untraceable input			
Output	Emissions to air			
	Emissions to water			
	Waste			
	Untraceable output			

- Energy only used from the manufacturing stage to the disposal stage

***4.* Other information**

For example, information on the environmental management system of the manufacturer or EPD of the product is here.

Note

1. Data of life cycle impact assessment results shall be expressed in terms of the exponential function (○.○E±○○, or ○.○×10±○○)

2. Data of life cycle inventory analysis results whose values are below the decimal point shall be expressed in terms of the exponential function (○.○ E±○○ or ○.○×10○○). To ensure comparability of the life cycle inventory analysis results, measurement units such as g for weight, cm3 for volume, MJ for energy, Bq for radiation, etc. shall be used.