

Eco Mark Product Category

Product Certification Criteria for “Products Using Photovoltaic Cells Version 1.0” (Draft)

Japan Environment Association
Eco Mark Office

Contents

1.	Environmental Background	1
2.	Applicable Products	2
3.	Terminology.....	3
4.	Certification criteria	5
4-1	Environmental criteria	5
4-1-1	Common Criteria.....	5
4-1-2	Category A: Residential photovoltaic power generation systems.....	8
4-1-3	Category B: Small-scale power generator and charger	9
4-1-4	Category C: Installed product (for residential use, industrial use, or public use).....	9
4-1-5	Category D: Mobile and vehicle-mounted products.....	10
4-1-6	Category E: Photovoltaic modules	10
4-1-7	Category F: Power conditioners for small-output photovoltaic power generation.....	11
4-2	Quality criteria	11
5.	Certification Procedures	11
5.1	Certification procedures for environmental criteria	11
5-1-1	Certification procedures for common criteria	11
5-1-2	Category A: Residential photovoltaic power generation system	14
5-1-3	Category B: Small-scale power generator and charger	15
5-1-4	Category C: Type of usage of the product (for residential use, industrial use, or public use).....	16
5-1-5	Category D: Mobile and vehicle-mounted products.....	17
5-1-6	Category E: Photovoltaic battery modules	17
5-1-7	Category F: Power conditioners for small-output photovoltaic power generation.....	18
5.2	Certification procedures for quality criteria	18
6.	Other Requirements	18

1. Environmental Background

In order to effectively implement the United Nations Framework Convention on Climate Change (UNFCCC), which came into force in March 1994, its first protocol, the Kyoto Protocol, was adopted at the third session of the Conference of Parties (COP3) to the UNFCCC. This protocol imposed limits on the emissions of greenhouse gases, including carbon dioxide (CO₂), by developed nations. The Kyoto Protocol required Japan to reduce the emissions of greenhouse gases by 6% relative to the emission levels in 1990. Since the Kyoto Protocol entered into force on February 16, 2005, Japan is required to achieve this reduction target according to the UNFCCC. These greenhouse gases consist mostly of CO₂, which originates from energy production and usage, and most of them are emitted through the burning of fossil fuels. The main measures to combat global warming in Japan are therefore related to policies for reductions in energy consumption and policies that promote alternatives to fossil fuels through the development and proliferation of technologies that substitute for fossil fuels. The main alternatives to the use of fossil fuel energy are nuclear power generation and renewable sources of energy. Japan is emphasizing the development and proliferation of photovoltaic power generation as a form of renewable energy.

The first oil crisis in 1973 triggered the development of solar cells in Japan. The government's Sunshine Project started in 1974, which was a major project for the development of photovoltaic cells. The Sunshine Project was succeeded by the New Sunshine project in 1993, resulting in the rapid proliferation of photovoltaic power generation in the 1990s due to the cost-effectiveness of technological developments and political support, such as a system of subsidies for the installation of photovoltaic power generation facilities. This political support enabled the cumulative capacity of photovoltaic power generation facilities to rise to more than 1,100 MW by 2004. As a result, Japan has the largest number of photovoltaic power generation facilities in the world. The production base that supports the introduction of photovoltaic power has also become well established. As a result, Japan accounts for about 50% of the world's total production, making Japan the largest producer of photovoltaic cells in the world. This cumulative level of production, however, is far below the 4,820 MW goal for fiscal 2010 set by the government. This requires further cost reductions through technological innovation and additional support for technological proliferation.

Compared to general commercial electric power production and primary batteries, the photovoltaic cell has the potential to reduce the environmental burden in relation to the following aspects.

- (1) Reduction of the amount of fuel and materials (fossil reserves and rare metals) used for commercial electric power generation and primary batteries (silicon, the material used for silicon-based photovoltaic cells, is a ubiquitous resource that is virtually unlimited)
- (2) Reduction of the generation of waste (photovoltaic cells have a long life and may be reused or recycled.)
- (3) No gases contributing to global warming are emitted when the cells are in use.
- (4) Improvement of maintenance and user-friendliness, including replacement of the primary batteries, refilling fuel, and transportation.
- (5) Reduction in the facilities and construction work required in relation to power supply

It has been considered that the Eco Mark should be given in recognition of the potential of photovoltaic cells to reduce the environmental burden and this standard has been established as a result.

On the other hand, it has also been recognized that the production of photovoltaic cells also consumes resources and in their manufacture emit gases that contribute to global warming, use hazardous materials, and any used photovoltaic cells also become waste, thus imposing a burden on the environment just as much as products that do not use photovoltaic energy. Of the environmental burdens associated with photovoltaic cell production, manufacturers are required to further reduce the amount of chemical substances used in manufacturing. Concerning the recovery, recycling, or reuse of photovoltaic cells, up to now no recovery system for products using photovoltaic cells has been established. Residential photovoltaic power generation systems, which account for most of the market, are considered to be part of the construction. Thus, quantities of used photovoltaic cells are expected to be generated in the future as buildings are demolished and replaced. Accordingly, it is highly possible that photovoltaic power generation systems could be recovered as a part of construction waste. Thus, photovoltaic cells that come onto the market in future should be required to be designed in consideration of the 3Rs (Reduce, Reuse, and Recycle) for the product. Products using photovoltaic cells can be either incinerated or buried. In order to prevent hazardous materials from entering the environment when photovoltaic cells are disposed of, there should also be investigation of how to reduce the usage of hazardous materials in the production of the cells in the first place.

2. Applicable Products

This category covers silicon photovoltaic modules and products that use photovoltaic cells as power sources. This category does not cover compound semiconductor cells (refer to “3. Terminology”) and products using them as sources of power. In addition, systems using photovoltaic cells together with wind power generation or hydroelectric power generation systems are also covered.

Products covered by this category shall be residential photovoltaic power generation systems, traffic signs, streetlights, and other products smaller than these. Large-scale photovoltaic power generation systems or facilities for buildings or public places are excluded.

Products classified under this category are shown in Table 1.

Table 1 Applicable products

Product category		Japan standard product categories
Category A: Residential photovoltaic power generation system		
	Residential power generation system (Output: less than 20 kW) The components are as follows: <ul style="list-style-type: none"> • Photovoltaic module • Power conditioner • Connecting box • Cable • Module external frame, frame, and supporting construction 	30 212 Photovoltaic power generation system
Category B: Small-scale power generator/ charger		
	Power generator	30 212 Photovoltaic power generation system
	Charger (mobile)	30 212 Photovoltaic power generation system

Category C: Installed products (for residential use, industrial use, or public use)		
Products for residential use	Residential outdoor lighting equipment (Garden lights, garage lights, and door lights, etc.) Ventilation fans	62 214 Incandescent outdoor lighting equipment 62 223 Fluorescent outdoor lighting equipment 62 233 HID lighting outdoor equipment 60 62 Ventilation fans
Industrial products	Feeding equipment used in farming Pumps and related devices	40 131 Fish farming equipment 31 1 Pumps
Products for public use	Traffic signs or instruction signs Road rivets/visual road markings Marine signs/buoys Street lights/road lights Lights in tunnels Alarm systems Disaster prevention/safety equipment Telemeters for precipitation, water level, and wind direction, etc.	95 31 Road signs 41 541 Light emitting signaling systems/equipment 62 214 Incandescent outdoor lighting equipment 62 223 Fluorescent outdoor lighting equipment 62 233 HID lighting outdoor equipment 41 5 Alarming systems and signaling equipment 63 65 Environmental monitoring equipment
Category D: Mobile and vehicle-mounted products		
Leisure goods Commodities	Lights/lanterns Radios	62 24 Flashlights 60 24 Radio receivers
Stationery/office equipment Learning materials/toys	Electronic calculators Learning materials/toys, etc.	59 41 Electronic calculators 89 5 Toys and dolls
Vehicle-mounted goods	Car accessories	57 59 Car maintenance equipment/systems
Category E: Photovoltaic modules		
	Photovoltaic modules (planer-type photovoltaic modules with an output of 10 W or more)	Photovoltaic modules complying with JIS C 8918 1998 or C 8939 1995
Category F: Power conditioners for small-output photovoltaic power generation		
	Power conditioners for small-output photovoltaic power generation	Power conditioners for small-output photovoltaic power generation that comply with JIS C 8980 1997

3. Terminology

- Photovoltaic cell: Smallest constituent unit of a photovoltaic sell for photovoltaic power generation (cited from JIS C 8960 2004)
- Photovoltaic sub-module: Smallest unit of multiple photovoltaic cells formed on an undividable substrate (cited from JIS C 8960 2004.)
- Photovoltaic module: Smallest power generation unit with a standard output, constituting a photovoltaic cell or photovoltaic sub-modules enclosed in a container to provide them with resistance to environmental conditions (cited from JIS C 8960 2004. Refer to

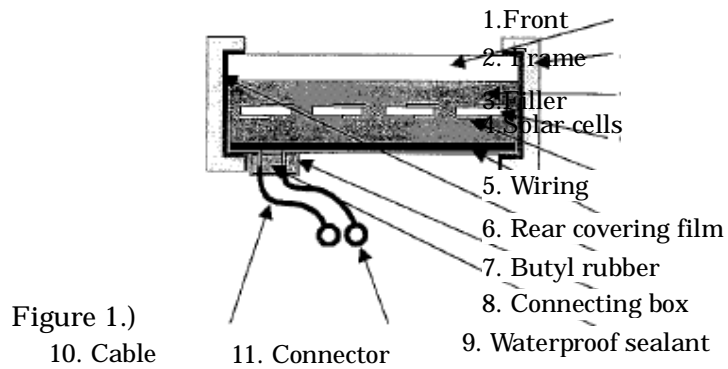


Figure 1 Photovoltaic module illustration

- Photovoltaic panel: An assembly of mechanically connected multiple photovoltaic modules for installation on site (cited from JIS C 8960 2004.)
- Photovoltaic array: An assembly in which the photovoltaic modules or panels are mechanically connected using a photovoltaic frame and/or base or other components, and that are electrically connected (cited from JIS C 8960 2004.)
- Silicon photovoltaic cell: A photovoltaic cell using silicon as the semiconductor material. Major types of this cells are single-crystal, multi-crystal, and amorphous cells.
- Compound semiconductor cell: A photovoltaic cell using compound semiconductors consisting of multiple types of elements. This battery is categorized by its constituent elements: III-V compound, II-IV compound, and I-III-VI₂ compound cells. The major types are GaAs, InP, CdS/CdTe, and CuInSe₂ photovoltaic cells (cited from JIS C 8960 2004.)
- Photovoltaic power generation system: A general term for systems and accessories that convert photovoltaic energy to electricity using photovoltaic effects and that supply power suitable for loading (cited from JIS C 8960 2004.)
- Residential photovoltaic power generation system: A photovoltaic power generation system for installing in residences. These systems consist of components such as photovoltaic modules, power conditioners, connecting boxes, distribution boards, voltmeters, and batteries with support frames for installing the various components and wiring. This product category targets photovoltaic power generation systems with an output of less than 20 kW (Article 48, Section 4 of the enforcement regulations of the Electric Utility Law (Ministerial ordinance No. 77 of the Ministry of Economy, Trade and Industry of October 18, 1996.)
- Power conditioner: A system for converting the output of photovoltaic arrays to the prescribed power, consisting of or part of the main line controlling/monitoring systems, DC conditioners, inverters, DC/DC interfaces, AC/AC interfaces, and AC line interfaces (cited from JIS C8960 2004.)
- Rated load efficiency: One of the load efficiencies of the power conditioner. The rate between AC output power (effective electric power) and DC input power. This efficiency is usually shown as a percentage

(%) (cited from JIS C 8960 2004.)

- Nominal maximum output: The nominal value of the maximum output in a basic state. The basic state is defined as a state with a module temperature of 25 degrees Celsius, a spectral distribution of AM1.5 global photovoltaic radiation standard sunshine (refer to JIS C 8911 1998,) and an irradiance of 1000 W/m².
- Lead-acid battery for photovoltaic power generation: A generic term for lead-acid batteries used in photovoltaic power generation systems. In a narrow sense, this means lead-acid batteries designed to satisfy the required quality for photovoltaic power generation systems (cited from JIS C 8960 2004.)
- Renewable energy: Energy sources in which the resource is constantly being regenerated and thus does not become depleted, including wind power and photovoltaic radiation.
- Prescription constituent: Constituents added on purpose to provide products with certain properties. This type of constituent does not include impurities that are inevitably admixed in the manufacturing processes.

4. Certification Criteria

4-1. Environmental criteria

4-1-1. Common criteria

- (1) In the manufacturing of products, local environmental laws and regulations as well as agreements on preventing air pollution, water contamination, noise, odor and emission of hazardous materials shall be observed.
- (2) Instruction manuals (user manuals) offered to applicants shall satisfy the following items, a - c.
 - a. The manual shall have a method of binding that does not cause problems for waste paper recycling (See the Attachment 1) .
 - b. No chlorine compounds shall be used in the pulp bleaching process for the paper that is used.
 - c. The paper shall contain 70% or a higher proportion of recycled paper pulp. Item C is not applicable to manuals printed overseas.
- (3) The packaging of the products shall be considered resource saving, easy-to-reuse and recyclable.
- (4) Compounds that deplete the ozone layer (Attachment 2), including CFC substitutes, shall not be used in manufacturing the packaging materials
- (5) The plastic materials used for packaging shall not contain polymers containing halogens or organic halogen compounds as recipe constituents.
- (6) The contents of the documents supplied with the product shall correspond to the product category shown in Table 2, providing users with information such as notes on the use and disposal of the product. The documents supplied with the product referred to here shall include all the documents supplied with the product, such as instruction manuals, as well as descriptions on the packaging and packing materials.
- (7) Maintenance and repair service systems shall be established, and repairs shall be carried out at the request of the xusers. As part of the maintenance and repair service system, the following information shall be provided at the request of users.
 1. Maintenance and repair coverage (service contents)
 2. Time required for maintenance or repair

3. Maintenance or repair costs

The documents supplied with the product shall include information on the availability of maintenance and repair services, information on items 1-3 above, a contact address, and the means of obtaining further information (refer to Table 2.)

(8) Plastic parts of the product shall not contain PBB (polybromobiphenyl,) PBDE (polybromodiphenyl ether,) or short-chain chlorinated paraffins (containing a chain carbon of 10 – 13, and a chlorine content of 50% or more) as the prescription constituents.

(9) None of the constituents of the product shall contain lead, cadmium, hexavalent chromium, or mercury as prescription constituents. Lead-based solder shall not be used. This standard, however, shall not apply to secondary batteries, to which the individual standards for each product category shall apply.

Table 2 Information supplied, classified by product category

Item	Category A: Residential photovoltaic power generation systems	Category B: Power generators and chargers	Category C: Installed products	Category D: Mobile and vehicle-mounte d products	Category E: Photovoltaic modules	Category F: Power conditioners
Information provided to the users that is written in the documents supplied with the product. Related to (6) and (7.)						
(a) Installation and usage conditions	XX	XX	XX	XX	XX*1	XX
(b) Description of the performance and structure	XX*2	XX*3	XX*3		XX*4	XX
(c) Information on the types of secondary batteries, recovery requests, replacement guidelines and requests for cooperation in recycling (only for products using secondary batteries.)	XX	XX*5	XX	XX*5		
(d) Information on consumables (only for products using consumables. This includes information on the type of battery and bulb, and their means of replacement.)	XX	XX	XX	XX	XX	XX
(e) Guarantee period	XX	XX	XX	XX	XX	XX
(f) Contact address for product information	XX	XX	XX	XX	XX	XX
(g) Explanation concerning non-liability in designing a total system for photovoltaic power generation, the combination of equipment, and the installation.					X*6	X*6
(h) Precautions for disposing of the product		XX*7	XX*7	XX*7		
(i) Maintenance and repair services are available. Information (j) – (l) is available. Contact addresses and methods for obtaining the information.	XX*8	XX*8	XX*8	XX*8	XX*8	XX*8
Information available on request from users, including maintenance and repair. Related to certification criteria (7)						
(j) Maintenance service coverage and contents	XX	X	X	XX	XX	XX
(k) Repair coverage and contents	XX	XX	XX	XX	XX	XX
(l) Time and cost for maintenance/repair	XX	XX	XX	XX	XX	XX

XX: Required X: Desirable for providing information or not required Blank: not necessarily required

*1: Residential photovoltaic power generation systems shall satisfy 4-1-6 (24.) For other types of products, depending on each application, the installation and usage conditions shall be included for those who design or produce photovoltaic power generation systems. The information should include installation conditions, conditions for installing the final products, and safety installation and dismantling (including precautions against electric shocks and burns.)

*2: As for the display of the performance and structure of the photovoltaic battery arrays used for residential photovoltaic power generation systems, the system performance shall be described according to Table 1 in “JIS C 8952 1996 (how to describe photovoltaic battery arrays)”

*3: Products corresponding to stand-alone type photovoltaic power generation systems shall include descriptions of their performance according to Table 4 of “JIS C 8905 1993 (rules for stand-alone type photovoltaic power generation systems) Mobile power generators or chargers under Category B, however, shall be excluded.

*4: Descriptions according to either “JIS C 8918 1998 (crystalline photovoltaic modules)” or “JIS C 8939 1995 (amorphous photovoltaic modules)” shall be provided.

*5: Description example for cases where the secondary batteries or products are not recovered: “This product uses a lithium battery as a secondary battery. Refer to page xx in the instruction manual for replacement. Bring the used battery to a local recycling station for recycling scarce materials.”

*6: Eco Mark applicants cannot be responsible for designing the combination of equipment and installation using products that will be certified as photovoltaic modules or power conditioners alone. This explanation may be clearly written in the instruction manual to notify the users, if required.

*7: Description example: “Please inquire of the shop about dismantlement and the removal so that there are fears of electric shocks and accidents.” (Category A), “Please take care not to be electric shocked at the time of dismantlement of the products.”(Category E)

*8: Description example: “Take out any alkaline button batteries before disposing of the product. Take the battery to a button battery recycling box or station.” “ This product can be disposed of after each component has been being separated and sorted according to the material used.” “Properly dispose of the waste oil generated when disposing of this product as industrial waste.” “When disposing of this product, follow the disposal methods designated by the local government.”

*9: Description example: “Maintenance and repair services are available. Please contact xx department at the following phone number xxx-xxxx for maintenance and repair coverage, time and costs. Please also contact our web site www.xxxx.shuri.co.jp.”

4-1-2. Category A: Residential photovoltaic power generation systems

(10) Products using aluminum alloys for the module external frame, frames, or supporting construction shall use aluminum whose raw material is partly secondary aluminum metal (recycled shredded metal)

(11) The output of photovoltaic modules for residential photovoltaic power generation systems shall be guaranteed for ten years or longer. (Requirement for the Guarantee)

The guaranteed output of photovoltaic modules shall be stated in the documents supplied with the product such that the percentage of output that is guaranteed to either the nominal maximum output or the maximum output, which are described in JIS C 8918 1998 (for crystalline photovoltaic battery modules) and JIS C 8939 1995 (for amorphous photovoltaic modules). In addition, the conversion efficiency of the photovoltaic module calculated at the maximum output above shall also be included. The conversion efficiency shall be calculated based on the equation described in a) effective conversion efficiency for JIS C 8960 2004 (terminology for photovoltaic power generation) 305 "Conversion efficiency."

(12) The power conditioner for residential photovoltaic power generation systems shall be designed and manufactured so that 90% or more of its conversion efficiency will be maintained for a service period of five years or longer. (Requirement for the Design for Long-use)

The conversion efficiency described here shall be the rated load efficiency with one-fourth of the load. The rated load efficiency shall be the one described in JIS C 8961 1993 (how to measure the efficiency of power conditioners for photovoltaic power generation systems.)

(13) When secondary batteries are used as a part of residential photovoltaic power generation systems, lead, cadmium, mercury or their compounds may be used. However, a system in which secondary batteries using lead, cadmium, mercury or their compounds should be recoverable from the users and then recycled or properly disposed of, shall be implemented and maintained.

(14) Among photovoltaic modules for residential photovoltaic power systems, products to which JIS C 8956 2004 (residential photovoltaic array (roof mounting type)) is applicable shall comply with JIS C 8956 2004. An installation manual, in which the wiring, the effect on the construction (ensuring strength and waterproofing treatment,) and safety are considered, shall be supplied with the product and provided to the construction company. The installation manual shall also describe the safety aspects of removing and dismantling the product (including precautions against electric shocks and burns.)

For products to which JIS C 8956 2004 (residential photovoltaic arrays (roof mounting type)) do not apply, an installation manual, in which the means of making the most effective use of power generation by photovoltaic arrays in consideration of the effects of installation, operation, removal/dismantling on the strength and construction, and safety (including precautions against electric shocks and burns) are described, shall be supplied with the product and provided to the construction companies.

(15) Technical guidance for workers concerning the installation of photovoltaic power generation systems in residences shall be provided.

4-1-3. Category B: Small-scale power generators and chargers

(16) Small-scale power generators and chargers are divided into the following three types.

1. Photovoltaic cells only are used
2. Photovoltaic cells and secondary batteries only are used.
3. Photovoltaic cells are used in the product with primary batteries or other power sources (power lines) in combination. The photovoltaic cells supply 50% or more of the total power supplied by the product.

For products classified under Category 1 or 2, the products shall be so designed and manufactured that sufficient power is supplied using the photovoltaic cells alone. For products classified under Category 3, the products shall be so designed and manufactured as to satisfy condition 3 under the standard operating conditions expected from the specifications.

(17) Secondary batteries used in the products may use lead, cadmium, mercury or their compounds. However, a system for the recovery of the secondary batteries using lead, cadmium, mercury or their compounds from the users, and their proper recycling or proper disposal shall be implemented and maintained.

For small-scale chargers, the certification standard 21 may be applied instead.

4-1-4. Category C: Installed product (residential use, industrial use, or public use)

(18) Products with photovoltaic cells categorized according to the type of usage are divided into the following three types.

1. Photovoltaic cells only are used
2. Photovoltaic cells and secondary batteries only are used.
3. Photovoltaic cells are used in the product with primary batteries or other power sources (power lines) in combination. The photovoltaic cells supply 50% or more of the total power consumed by the product.

For products classified under category 1 or 2, the products shall be so designed and manufactured that sufficient power is supplied from the photovoltaic cells alone. For products classified into category 3, the products shall be so designed and manufactured as to satisfy condition 3 under the standard operating conditions expected from the specifications.

(19) Secondary batteries used in products may use lead, cadmium, mercury or their compounds. However, a system for the recovery of the secondary batteries that use lead, cadmium, mercury or their compounds from the users, and their recycling or proper disposal shall be implemented and maintained.

4-1-5. Category D: Mobile and vehicle-mounted products

(20) Mobile and vehicle-mounted products using photovoltaic cells are divided into the following three types.

1. Photovoltaic cells only are used
2. Photovoltaic cells and secondary batteries only are used.
3. Photovoltaic cells are used in the product with primary batteries or other power sources (power lines) in combination. The photovoltaic cells supply 50% or more of the total power consumed by the product.

For products classified under category 1 or 2, the products shall be so designed and manufactured that sufficient power is supplied by the photovoltaic cells alone. For products classified under category 3, the products shall be so designed and manufactured as to satisfy condition 3 under the standard operating conditions expected from the specifications.

(21) Products using secondary batteries shall use recyclable batteries such as nickel-cadmium batteries, nickel hydride batteries, lithium batteries, or small sealed batteries. These secondary batteries may use lead, cadmium, mercury or their compounds. The product shall be so designed that users can remove the secondary batteries when disposing of the product after use, and the batteries can be recycled. If the product has a structure by which users are unable to remove the secondary batteries, a system for the recovery of the used products shall be established.

4-1-6. Category E: Photovoltaic modules

(22) Products using aluminum alloys for the module frame, frames, or supporting structures shall use aluminum in which the raw material used is partly aluminum secondary metal (recycled shredded metal.)

(23) The output of the photovoltaic modules for residential photovoltaic power generation systems shall be guaranteed for ten years or longer. (Requirement for the Guarantee)

The guaranteed output of photovoltaic modules shall be described in the documents supplied with the product in such a manner that the percentage of output is guaranteed to be either the nominal maximum output or maximum output, which are described in JIS C 8918 1998 (crystalline photovoltaic modules) for crystalline photovoltaic modules and JIS C 8939 1995 (amorphous photovoltaic modules). In addition, the conversion efficiency of the photovoltaic module calculated according to the maximum output above shall also be included. The conversion efficiency shall be calculated based on the equation described in a) effective conversion efficiency of JIS C 8960 2004 (terminology for photovoltaic power generation) 305 "Conversion efficiency."

(24) Among photovoltaic modules for residential photovoltaic power systems, products to which JIS C 8956 2004 (residential photovoltaic array (roof mounting type)) are applicable shall comply with JIS C 8956 2004. An installation manual, in which wiring, the effects on the construction (securing strength and waterproof treatment,) and safety are considered, shall be supplied with the installation manual, and described to the construction company. The installation manual shall also describe safety procedures for removing and dismantling the product (including precautions against electric shocks and burns.)

For products to which JIS C 8956 2004 (residential photovoltaic arrays (roof mounting type)) do not apply, an installation manual, in which the means of making the most effective use of power generation from photovoltaic arrays in consideration of the effects of installation, operation, and removal/dismantling on the strength

and construction, as well as safety (including precautions against electric shocks and burns) should be described, and these shall be supplied with the product and provided to the construction companies.

Products used for applications other than residential photovoltaic power generation systems shall be required only to satisfy (a) in Table 2 of the certification standard (6.)

4-1-7. Category F: Power conditioners for small-output photovoltaic power generation

(25) The power conditioners for small-output photovoltaic power generation systems shall be designed and manufactured so that 90% or more of the conversion efficiency will be maintained for a service period of five years or longer. (Requirement for the Design for the Long-use)

The conversion efficiency described here shall be rated with load efficiency at one-fourth of the loading. The rated loading efficiency shall be that described in JIS C 8961 1993 (measurement of the efficiency of power conditioners for photovoltaic power generation systems).

4-2. Quality criteria

(26) Products shall satisfy one of the following quality conditions.

1. Products covered by an official quality standard, such as JIS, shall satisfy that quality standard.
2. If the product is not covered by the standard in 1 above, the product shall meet the standard voluntarily defined by the related industry
3. If the product is not categorized under 1 or 2, individual quality standards shall be established to sufficiently control the quality.

5. Certification Procedures

5-1. Certification procedures for environmental criteria

5-1-1. Certification procedures for common criteria

(1) Certification criteria 4-1-1 (1) [Issuer of the certificate: the manufacturing plant of the final product]

Compliance with this item shall be included in the attached certificate. A certificate (Table form: 13X-5) shall be submitted to show that the manufacturing plant of the final product has been abiding by and not violated laws, including environmental regulations for the area where the plant is located, for the last five years (or since the plant was started)

(2) Certification criteria 4-1-1 (2)

Compliance with this item shall be included in the attached certificate.

(3) Certification criteria 4-1-1 (3) [Issuer of the certificate: Applicant]

Compliance with this item shall be included in the attached certificate. A document shall be submitted describing the product packaging conditions and packaging materials in detail and what was taken into consideration to achieve resource saving, reuse, and recycling (supplemented by figures and photographs.)

(4) Certification criteria 4-1-1 (4)

Compliance with this item shall be included in the attached certificate.

(5) Certification criteria 4-1-1 (5)

Compliance with this item shall be included in the attached certificate.

(6) Certification criteria 4-1-1 (6)

Compliance with this item shall be included in the attached certificate. A copy of the corresponding part of the documents attached to the product shall also be

submitted.

(7) Certification criteria 4-1-1 (7) [Issuer of the certificate: Applicant]

Compliance with this item shall be included in the attached certificate. A copy of the corresponding part of the documents attached to the product shall also be submitted, describing the servicing system, including the contact address for the users, the maintenance and repair service system, and the guarantee system. In particular, for residential photovoltaic power generation systems, the responsibility of the equipment manufacturer, construction materials manufacturer, distributing agent, housing contractor, construction company, managing company, and related companies shall be described. Figures and tables may be used for this description (refer to Table 3-1, and 3-2.)

Table 3-1 Description of the responsibilities for contacting, maintenance, repair, and guarantees (Category A: Photovoltaic power generation system)

	Equipment manufacturer	Distributing agent	Construction company
Manufacturing equipment	X		
Repair equipment	X		
Instruction manual	Prepared	Description for the users	
Seminars for designing and construction	Prepared	Participated	Participated
Standard specifications and construction specifications	Prepared	Complied with	Complied with
Equipment guarantee	X		
Distribution		X	
Design system		X	
Guarantee system		X	
Management of construction		X	
Construction			X
Maintenance and repairs		Implemented	
Installation and repair of wiring			X
Contact by the users		Received	

→ If an inspection indicates the need for repair, contact those concerned to implement the repairs.

Table 3-2 Description of the responsibilities for contacting, repair, and guarantees (Category D: Mobile and vehicle-mounted products)

	Equipment manufacturer	Distributor
Manufacturing equipment	X	
Repair equipment	X	
Instruction manual	Prepared ←	
Equipment guarantee	X	
Distribution		X
Contact by the users		Received

→ If an inspection indicates the need for repairs, contact those concerned to implement the repairs.

(8) Certification criteria 4-1-1 (8) [Issuer of the certificate: Quality management or the manufacturing plant for the final product]

Compliance with this item shall be included in the attached certificate.

A certificate (Table form: 13x-2) shall be submitted stating that no corresponding chemicals have been added as constituents in the manufacturing process.

(9) Certification criteria 4-1-1 (9) [Issuer of the certificate: Quality management or the manufacturing plant for the final product]

Compliance with this item shall be included in the attached certificate.

A certificate (table: 13x-2) shall be submitted stating that no corresponding heavy metals or compounds have been added as constituents in the manufacturing process.

5-1-2. Category A: Residential photovoltaic power generation system

(10) Certification criteria 4-1-2 (10) [Issuer of the certificate: aluminum suppliers]

Compliance with this item shall be included in the attached certificate.

A certificate (Table form: 13x-1) shall be submitted indicating that secondary raw material have been used.

(11) Certification criteria 4-1-2 (11)

Compliance with this item, the guarantee period, output, guaranteed output, and conversion rate shall be included in the attached certificate. The corresponding part of the document supplied with the product shall be submitted. The certificate attached shall describe the repair and guarantee system if the prescribed output is not obtained. The manual described in 5-1-1 (7,) which describes the maintenance, repair, and guarantee system, may describe this item.

(12) Certification criteria 4-1-2 (12) [Issuer of the certificate: Quality management or the manufacturing plant for the final product]

Compliance with this item shall be included in the attached certificate.

Conversion ratio before shipment, operating conditions that were assumed in designing the power conditioner, the installation conditions, combinations of photovoltaic modules shall be shown, stating and verifying that the system can maintain 90% or more of its conversion ratio before shipment for a service period of five years or longer (Table form: 13x-4.)

(13) Certification criteria 4-1-2 (13) [Issuer of the certificate: Applicant]

The attached certificate shall describe the compliance with this item, the type of secondary battery used, the use or non-use of lead, cadmium, or mercury. A certificate shall be submitted describing the system for the recovery and reuse of the used batteries, and that the recycling of materials (recovery, reuse, and materials recycling systems) has been established. If a document supplied with the product describes the items defined in the standard, the corresponding part may be submitted instead.

(14) Certification criteria 4-1-2 (14) [Issuer of the certificate: Applicant]
 Compliance with this item shall be included in the attached certificate. Table 4 indicates the items that the installation manual is required to contain. In addition, the means for the provision of the installation manual from the preparer to the installation companies should be designated.

Table 4 Items required to be included in the installation manual

Item	Contents
Photovoltaic power generation system overview	Basic configuration of the system
Installation of the photovoltaic modules	Installation position
	Installation direction
	Installation pitch and arrangement
Installation methods	Wiring
	Fixing metals
	Securing strength (fixing load, system weight, snow weight, wind pressure, and earthquake force)
	Waterproofing treatment
Securing safety in installation	Securing safety for work at higher locations
	Maintaining working conditions
	Securing safety in disassembling the system
Securing safety for wiring work	Preventive measures against electric shocks and burns.

(15) Certification criteria 4-1-2 (15) [Issuer of the certificate: Applicant]
 Compliance with this item shall be included in the attached certificate. A copy of the document shall be submitted verifying that training for installation workers has been implemented, including the implementation guidelines for training systems.

5-1-3. Category B: Small-scale power generators and chargers

(16) Certification criteria 4-1-3 (16) [Issuer of the certificate: Applicant]
 Compliance with this item shall be contained in the certificate attached. For products classified under category 1 or 2, a certificate (Table form: 13x-3) shall be submitted, including information on the electric energy supplied (including the basis of the calculation) based on the specification of the applicable product and the basis for calculation of the capacity of the photovoltaic cells loading (including the expected amount of power generation.)

For products classified under 3, a certificate (Table form: 13x-3) shall be submitted, including information on the electric energy supplied (including the basis of the calculation) based on the specifications of the applicable product and the basis of the calculation of the capacity of the photovoltaic cell loading (including the expected amount of power generation,) changing the conditions from photovoltaic cells to other power sources, changing the conditions from other power sources to photovoltaic cells, methods for charging the secondary battery (if used,) and the electric power supplied from the batteries (including the equations and conditions for the calculation) that is calculated based on the information

(17) Certification criteria 4-1-3 (17) [Issuer of the certificate: Applicant]

The certificate attached shall describe the compliance with this item, the type of the secondary batteries used, the use or non-use of lead, cadmium, or mercury. A certificate shall be submitted, describing the systems for the recovery and reuse the used- batteries and for recycling materials (recovery, reuse, and materials recycling systems) that have been established. If a document supplied with the product describes the items defined in the standard, the corresponding part may be submitted instead.

For small chargers, if the secondary batteries are not recovered, a document shall be submitted stating that the system is so designed that users can remove the batteries, and that a product recovery system has been established for cases where the products are so designed that users cannot remove the batteries.

5-1-4. Category C: Installed product (residential use, industrial use, or public use)

(18) Certification criteria 4-1-4 (18) [Issuer of the certificate: Applicant]

Compliance with this item shall be included in the attached certificate. For products classified under category 1 or 2, a certificate shall be submitted including information on the electric energy supplied (including the basis of the calculation) based on the specification of the applicable product and the basis of the calculation of the capacity of the photovoltaic cell loading (including the expected amount of power generation.)

For products classified under 3, a certificate shall be submitted, including information on the electric energy supplied (including the basis of the calculation) based on the specification of the applicable product and the basis of the calculation of the capacity of the photovoltaic cell loading (including the expected amount of power generation,) changing the conditions from photovoltaic cells to other power sources, changing the conditions from other power sources to photovoltaic cells, the methods for charging the secondary battery (if used,) and the electric power supplied from the batteries (including the equations and conditions for the calculation,) that is calculated based on the information

(19) Certification criteria 4-1-4 (19) [Issuer of the certificate: Applicant]

The attached certificate shall include the compliance with this item and the type of the secondary batteries used. A certificate shall be submitted describing the systems for the recovery and reuse of the used batteries and for recycling materials (recovery, reuse, and materials recycling systems) that have been established. If a document supplied with the product describes the items defined in the standard, the corresponding part may be submitted instead.

5-1-5. Category D: Mobile and vehicle-mounted products

(20) Certification criteria 4-1-5 (20) [Issuer of the certificate: Applicant]

Compliance with this item shall be included in the attached certificate. For products classified under category 1 or 2, a certificate shall be submitted including information on the electrical energy supplied (including the basis of the calculation) based on the specification of the applicable product and the basis of the calculation of the capacity of the photovoltaic cell loading (including the expected amount of power generation).

For products classified under 3, a certificate shall be submitted including information on the electric energy supplied (including the basis of the calculation) based on the specification of the applicable product and the basis of the calculation of the capacity of the photovoltaic cell loading (including the expected amount of power generation,) changing the conditions from photovoltaic cells to other power sources, changing the conditions from other power sources to photovoltaic cells, methods for charging the secondary battery (if used) and the electric power supplied from the batteries (including the equations and conditions for the calculation) that is calculated based on the information

(21) Certification criteria 4-1-5 (21) [Issuer of certificate: Applicant]

The attached certificate shall describe the compliance with this item, the type of secondary batteries used, and the use or non-use of lead, cadmium, or mercury. Concerning the secondary batteries used for the product, a document shall be submitted stating that the system is so designed that users can remove the batteries and that a product recovery system has been established for cases where the product is so designed that users cannot remove the batteries.

5-1-6. Category E: Photovoltaic modules

(22) Certification criteria 4-1-6 (22) [Issuer of the certificate: aluminum suppliers]

Compliance with this item shall be included in the attached certificate.

A certificate (Table form: 13x-1) shall be submitted stating that secondary raw materials have been used.

(23) Certification criteria 4-1-6 (23)

For compliance with this item, the guarantee period, output, guaranteed output, and conversion rate shall be included in the attached certificate. A copy of the corresponding part of the document supplied with the product shall be submitted. The attached certificate shall describe the repair and guarantee system if the prescribed output is not obtained. The item required in this section may be added to 5-1-1 (7,) which describes the maintenance, repair, and guarantee system, and may describe this item.

(24) Certification criteria 4-1-6 (24) [Issuer of the certificate: Applicant]
Compliance with this item shall be included in the attached certificate. Table 4 shows the items required to be included in the installation manual for the photovoltaic modules for residential photovoltaic power generation systems. In addition, a means of providing the installation manual from the preparer to the installation companies shall be described.

5-1-7. Category F: Power conditioner for small-output photovoltaic power generation

(25) Certification criteria 4-1-7 (25) [Issuer of the certificate: Quality management or the manufacturing plant for the final product]

Compliance with this item shall be included in the attached certificate.

The conversion ratio before shipment, operating conditions that were assumed in designing the power conditioner, the installation conditions, and the combination with photovoltaic modules shall be shown, stating and verifying that the system can maintain 90% or more of its conversion ratio before shipment for a service period of five years or longer (Table form: 13x-4.)

5-2. Certification procedures for quality criteria

(26) A certificate (Example: 13x-6 or 13x-7) shall be submitted showing compliance with the laws, JIS standards, or voluntary standards that are applicable to the product. For “photovoltaic module” and “power conditioner” of Category A, and Category E or F, a certificate issued by JEF (Japan Electrical Safety Environment Technology Laboratories) may be submitted instead.

6. Other Requirements

(1) Product certification is classified into A –F as shown in Table 1 and is classified according the product function based on the Japan Standard Commodity Classification (6-7 figures) with brand names. The certification is not classified according to color or size.

If various combinations of system components such as photovoltaic modules, power conditioners, cables, and module external frames/frames/supporting construction can be selected for a residential photovoltaic power generation system, the Eco Mark can be provided to the total system if all the equipment used satisfies the certification standard.

(2) Displayed below the Eco Mark shall be a square frame with left-aligned environmental textual information inside (Figure 2.)

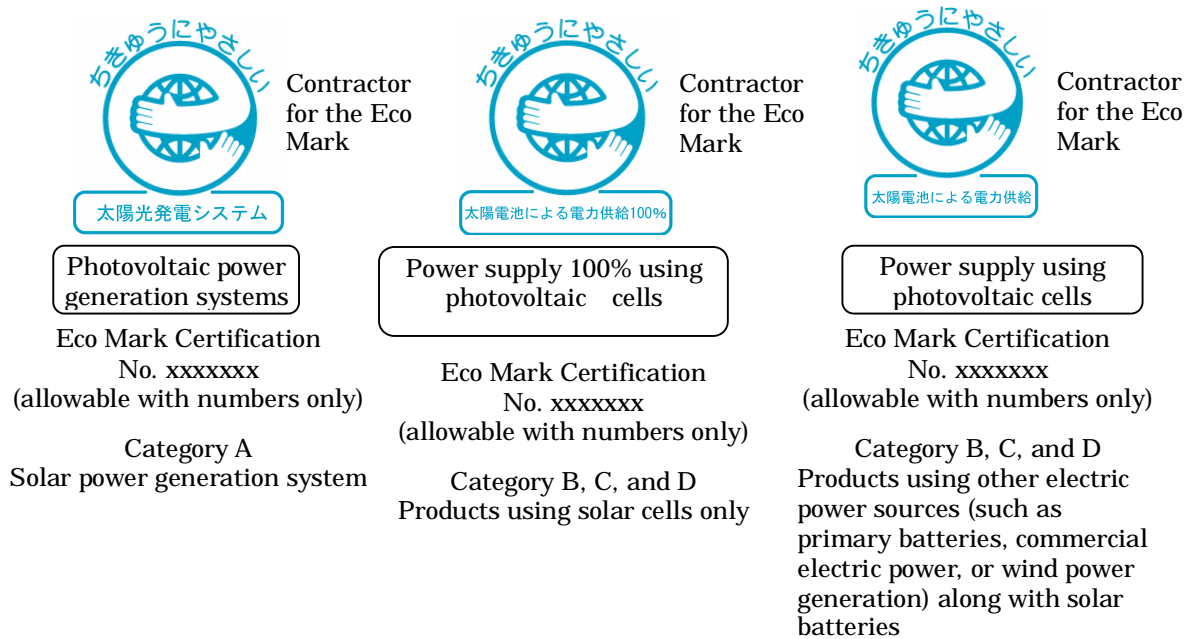
The text displayed in the frame shall be “photovoltaic power generation system” for Category A, “photovoltaic module” for Category E, and “power conditioner for photovoltaic power generation” for Category F.

For products that do not use electric power other than photovoltaic cells, classified into Category B, C, or D, the text displayed shall be “Power supply 100% using photovoltaic cells.” For products using other electric power sources (such as primary cells, commercial electric power, or wind power generation) along with photovoltaic cells, the text displayed shall be “Power supplied by photovoltaic cells.”

(3) Products in stock that have been manufactured during the contract period of a product already certified may have the text displayed under the Eco Mark and the certification number, in principle, for up to one year from the new contract date.

(4) The Eco Mark shall be used in accordance with the Eco Mark Usage Regulations Article 7 separately prescribed based on the Guidelines for Eco Mark Program Implementation.

(5) In principle, the products to be applied shall be free from “fire retardant” or “antimicrobial agent.” The product shall not have a text displaying “biodegradable plastics.” If a product uses or displays the agent for a specific reason, the product shall satisfy the regulations for “fire retardants,” “antimicrobial agents,” and “biodegradable plastics” based on the Guidelines for Eco Mark Program Implementation. Specifically, an application form for certifying Eco Mark products shall be submitted with information on the presence or absence of the agent, and the prescribed document shall be attached if the agent is used.



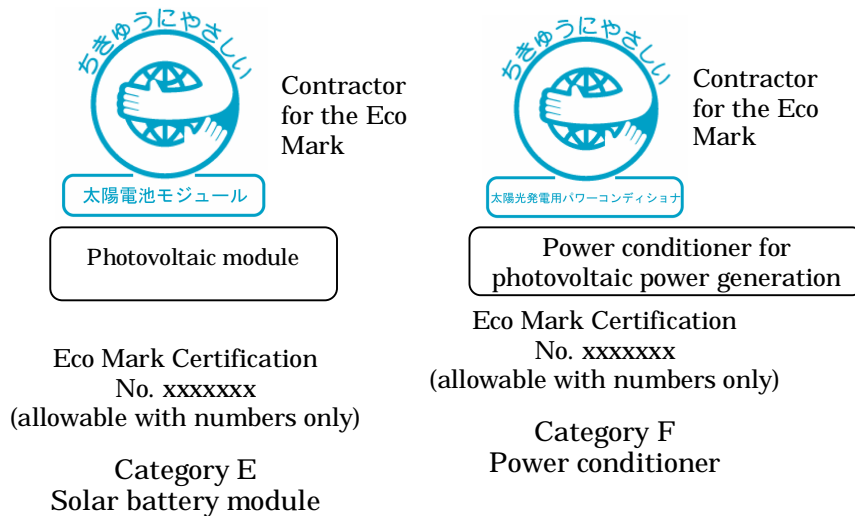


Figure 2 Example of Eco Mark Display

Scheduled to be established: April 1, 2006

These certification criteria and/or the product category will be revised or abolished when necessary.

Attachment 1

Inhibitory Factors for Waste Paper Recycling in 4-1-1(2)

- (1) Prohibitive (; metal material excluding bookbinder's staple, wire, etc.)
- (2) Hot-melt adhesive (excluding improved type of EVA hot-melt adhesives (difficult to be torn into narrow strips), polyurethane hot-melt adhesives and water-soluble adhesive)
- (3) UV ink, forming ink, gold/silver/pearl ink (excluding Eco Mark certified inks)
- (4) India paper
- (5) 3D printed matters (indicating that lenticular lenses are attached to the printed matter)
- (6) Aromatic supplements (aromatic agent, perfume, lipstick and so on)

Note: Definition of I. Regulation 3. "Prohibitive": Refer to "Quality Standard of Waste Paper" by Paper Recycling Promotion Center.

Attachment 2

Substances regulated in 4-1-1(2) and 4-1-3(10)

Specific chlorofluorocarbon (Five CFCs)	Trichlorofluoromethane	Hydrochlorofluorocarbon (HCFC)	Pentachlorofluoropropane
	Dichlorodifluoromethane		Tetrachlorodifluoropropane
	Trichlorotrifluoroethane		Trichlorotrifluoropropane
	Dichlorotetrafluoroethane		Dichlorotetrafluoropropane
	Chloropentafluoroethane		Chloropentafluoropropane
Other CFCs	Chlorotrifluoromethane		Tetrachlorofluoropropane
	Pentachlorofluoroethane		Trichlorodifluoropropane
	Tetrachlorodifluoroethane		Dichlorotrifluoropropane
	Heptachlorofluoropropane		Chlorotetrafluoropropane
	Hexachlorodifluoropropane		Trichlorofluoropropane
	Pentachlorotrifluoropropane		Dichlorodifluoropropane
	Tetrachlorotetrafluoropropane		Chlorotrifluoropropane
	Trichloropentafluoropropane		Dichlorofluoropropane
	Dichlorohexafluoropropane	Chlorodifluoropropane	
	Chloroheptafluoropropane	Chlorofluoropropane	
	Carbon tetrachloride		
	1,1,1-trichloroethane		
Hydrochlorofluorocarbon (HCFC)	Dichlorofluoromethane		
	Chlorodifluoromethane		
	Chlorofluoromethane		
	Tetrachlorofluoroethane		
	Trichlorodifluoroethane		
	Dichlorotrifluoroethane		
	Chlorotetrafluoroethane		
	Trichlorofluoroethane		
	Dichlorodifluoroethane		
	Chlorotrifluoroethane		
	Dichlorofluoroethane		
	Chlorodifluoroethane		
	Chlorofluoroethane		
	Hexachlorofluoropropane		
	Pentachlorodifluoropropane		
	Tetrachlorotrifluoropropane		
	Trichlorotetrafluoropropane		
Dichloropentafluoropropane			
Chlorohexafluoropropane			