EcoLogo[CM] Program
Certification Criteria Document

CCD-141
Digital Printing Services

Introduction

The EcoLogo[CM] Program is designed to support a continuing effort to improve and/or maintain environmental quality by reducing energy and materials consumption and by minimizing the impacts of pollution generated by the production, use and disposal of goods and services.

The average commercial print shop is not a major source of pollution, but the aggregate impacts on the environment from all shops is significant. In 1995, the EcoLogo[CM] Program introduced criteria for certifying those lithographic printing services demonstrating industry leadership in terms of environmental performance. These criteria address issues such as the use of chemicals that may adversely affect air, water and land. Certain volatilizing chemicals may contribute to the formation of ground level ozone or smog; toxic chemicals may go down the drains to eventually end up in freshwater or marine ecosystems; and solid wastes that are generated may be sent to landfills or incinerators for disposal.

The advent of digital printing technologies and processes has reduced several of the traditional impacts of the printing industry, primarily by reducing or avoiding the use of many commonly-used inks, washes and coatings. For example, the original criteria addressed several environmental impacts associated with "pre-press" operation. Digital printing effectively by-passes and eliminates any impacts from this stage.

The original criteria further categorized impacts from the printing and post-press stages of the operation. Digital printing methods once again eliminate many of the traditional ingredients associated with these stages (inks, fountain solutions, cleaners, blanket washes, inks, etc.). There are still potential impacts associated with digital printing, and depending upon the exact process used (laser-jet, ink-jet, thermal transfer, etc.), these could be related to energy efficiency, potential air and water emissions, and generation of solid wastes (waste papers, printing cartridges, etc.).

Similar to conventional lithographic printing, the post-press stage requires various adhesive materials which may volatilize. Moreover, certain binding materials may actually make the recycling of the printed product very difficult. Wastes such as scrap boards, paper, and excess adhesives may also be sent to landfills.

Throughout the digital process, there is also an opportunity to demonstrate environmental leadership through the use of materials (paper stock and other media, packaging materials, etc.) that include recycled content.

Based on a review of currently available life cycle information, the service category requirements will produce an environmental benefit through: a reduction in toxic emissions to the environment; a reduction in the quantity of materials going to landfill; and an encouragement of resource conservation.

Life cycle review is an ongoing process. As information and technology change, the requirements will be reviewed and possibly amended.

Notice

Any reference to a standard means to the latest edition of that standard.

The EcoLogo[CM] Program reserves the right to accept equivalent test data for the test methods specified in this document.

Notice of Intent

As of this document's publication date, there were no confirmed standards or criteria to specifically assess either the energy consumption, other performance parameters or environmental aspects of either CD image burners or ink/thermal transfer devices (including the inks, dyes, and/or resins therein). As both devices are known to be used within the digital printing industry, it is expected that future revisions of this document may include relevant certification criteria for each of these devices, as applicable.

Future revisions of this document may also address the issue of cold application binding adhesive VOCs through addition of a criterion specifying maximum VOC content.

Interpretation

1. In this criteria document:

   "ambient ozone concentration" means that concentration of ozone when measured in accordance with ASTM D5156-91 "Test Methods for the Continuous Measurement of Ozone in Ambient, Workplace, and Indoor Atmospheres (Ultraviolet Absorption") under the testing conditions stipulated in the German Blue Angel Guideline "Copiers" (RAL-UZ 62);

   "aromatic solvents" means any organic solvent that has a benzene ring in its molecular structure;

   "binding adhesives" mean adhesives used in the post-press stage for binding sheets of printed material together;

   "ASTM" means American Society for Testing and Materials;

   "CCITT" means International Telegraph and Telephone Consultative Committee;

   "CD" or **"compact disc"** means a widely used data storage media onto which text, images, music or other information is stored by means of a specialized laser. Some digital printing services use CD image burners or other technologies to print graphic images onto CDs' non-reading sides;

   "CD image burner" means a device that prints images onto the non-reading side of compact discs;

"CFCs" means chlorofluorocarbons;

"cold application binding adhesive" means an adhesive used to bind printed (paper) sheets together in a cold (i.e., room temperature) process (vs. hot melt process). Cold application binding adhesives are pastes that rely on the evaporation of volatile chemicals to bind and thus have relatively high VOC contents;

"computer equipment" means all computer equipment used in the pre-press and press stages of a digital printing operation, and includes *inter alia* personal computers (CPU, monitor, keyboard, etc.) used to compose, edit and layout images for printing, printers, digital publishing stations, CD image burners and network interfaces between these units;

"digital printing service" means a commercial or institutional printing service that has replaced conventional lithographic printing methods and technologies in both the pre-press and press stages of the printing process. A digital printing service may be part of a larger operation that utilizes both lithographic and digital printing. If so, any lithographic operations being assessed for EcoLogo[CM] certification must be reviewed against CCD-041 (Lithographic Printing Services);

"digital publishing machine" means a device utilized in certain digital printing services that incorporates document binding into its overall printing process , as done by laser- or ink-jet printers. A digital publishing machine may be part of a larger operation that utilizes other digital and/or lithographic printing;

"dust concentration" means that concentration when measured in accordance with ASTM D4532-92 "Test Method for Respirable Dust in Workplace Atmosphere" under the testing conditions stipulated in the German Blue Angel Guideline *Copiers* (RAL-UZ 62);

"energy-saver mode" means the condition that exists when the machine is not printing, has previously reached operating conditions but is consuming less power than when the machine is in stand-by mode;

"EPA" means the United States Environmental Protection Agency;

"halogenated solvent" means any organic solvent containing halogens including fluorine, chlorine, bromine and iodine;

"ink-jet printer" means equipment using mechanical pressure to transfer drops or a stream of droplets to the substrate in a pattern matched to a digital image file stored in the printer's memory;

"laser-jet printer" means equipment using the laser recording process. It uses a laser light to "write" a transmitted image onto a photosensitive drum. The sensitized areas around the drum attract toner in order to print the characters onto the page;

"noise" means an undesired sound;

"noise emission values" means those values when tested in accordance with ISO 7779 "Acoustics - Measurement of Airborne Noise Emitted by Computer and Business Equipment";

"post-press" means the assembly of the printed materials and consists of binding and finishing operations;

"ozone" means an unstable molecule (O_3) produced when oxygen decomposes in the presence of high voltage and electrical discharges;

"petroleum distillates" means high flash point, high boiling point distillates derived from the cracking of crude oil;

"pigment" means the fine solid particles of colorant used to give color to printing inks. Pigments are substantially insoluble in the vehicle and in water;

"press" means a printing production assembly composed of one or more units (sheet or web) to produce a printed substrate;

"printing cartridge" means an assembly used for printing, and depending on the style of machine, containing but not limited to, one or more of the following: a photosensitive element, a corona unit, a developer unit, a wiper wand and toner;

"printing ink" means a dispersion of a pigment in a vehicle that is transferred through the printing process to produce an image on a substrate;

"PVC" means polyvinyl chloride;

"reclamation" means recovering valuable materials or removing impurities from a waste;

"recycling" means reprocessing waste in a way that makes it useful again. Recycling focuses on the use, reuse or reclamation of waste;

"remanufactured printing cartridge" means a printing cartridge to which the following service has been performed: the disassembly of the cartridge, inspection, cleaning and adjustment of all components, repair where necessary, replacement of worn or damaged parts, reassembly and testing of the remanufactured cartridge, and, where applicable, removal of the remaining toner, replacement of the toner supply, and refurbishing organic photoreceptor cell (OPC) or replacing the OPC with a new or aftermarket cell;

"source reduction" means reducing or eliminating waste at its point of generation;

"spool core" means a physical construction (generally composed of plastic or metal) that contains a spool of tape, ribbon, film or other similar material, prior to utilization of that material in a printing process step;

"stand-by mode" means the condition that exists when the machine is not printing, has reached operating conditions, but has not yet entered into energy-saver mode;

"substrate" means the media which is printed or coated. Such media include, *inter alia*, paper, fabric and vinyl or other plastic films;

"thermal transfer printer" means equipment using heat to transfer a wax, resin or other dye-carrying medium to the substrate in a pattern matched to a digital image file stored in the printer's memory. Generally, this process is used in conjunction with film or plastic substrates;

"treatment" means removing harmful substances from the raw waste to the extent that the treated waste meets or exceeds local government regulations for the safe disposal of liquid and solid waste;

"unit" means the smallest complete printing component, composed of inking and dampening systems, of a printing press;

"use or reuse" means returning a waste material to the original process that generated the waste or employing it in another process as a substitute for an input material;

"vehicle" means the liquid portion of an ink that holds and carries the pigment, provides workability and drying properties, and binds the pigment to the substrate after the ink has dried;

"vegetable-based ink" means inks which contain materials whose origins are from plants (eg. tree sap, gum rosins, rubber); and

"volatile organic compound" or **"VOC"** means any organic compound which participates in atmospheric photochemical reactions. It excludes those organic compounds that the EcoLogo^{CM} Program designates as having negligible photochemical reactivity (see Appendix 1).

Category Definition

2. This category includes all digital printing services. These services may use one or more printing methodologies as further defined in the following subcategories:

   (a) laser-jet operations;
   (b) ink-jet operations; and
   (c) digital publishing operations.

   Note that other sub-categories (e.g., thermal transfer and CD image-burning operations) may be added

at a later date.

General Requirements

3. To be authorized to carry the EcoLogo[CM], the digital printing service must:

   (a) meet or exceed all applicable governmental and industrial safety and performance standards; and

   (b) be offered in such a manner that all steps of the process, including the disposal of waste products arising therefrom, will meet the requirements of all applicable governmental acts, by laws and regulations.

Product Specific Requirements

4. To be authorized to carry the EcoLogo[CM], the digital printing service must:

   (a) specifically provide an option for paper stock and other substrates that are either EcoLogo[CM] certified or include recycled content, and actively promote the use of such substrates to customers;

   (b) ensure that a minimum annual average of 20% of all paper stock used is either EcoLogo[CM] certified or includes recycled content;

   (c) not use plastic substrates that contain PVC;

   (d) make suitable arrangements for end-of-service-life disposal of computer equipment that is used in the pre-press and press stages. Such arrangements may include *inter alia:* specified equipment return/recycling within supplier agreements, donation to local schools or charities, and/or integration with local municipal recycling efforts;

   (e) send the following materials to recycling facilities, where such facilities exist:
   - *(i)* fine paper,
   - *(ii)* coated paper,
   - *(iii)* coloured paper,
   - *(iv)* newsprint and newspaper,
   - *(v)* corrugated cardboard,
   - *(vi)* pallets,
   - *(vii)* spent toner/ink cartridges,
   - *(viii)* film materials,
   - *(ix)* filter and filter bags,

(x) spool cores,
(xi) excess binding materials (metal staples, plastic spirals, etc.), and
(xii) defective/excess/waste CD's, as applicable;

(f) use binding adhesives that:
(i) are not be formulated or manufactured with the following: aromatic solvents, borax, any halogenated solvent, and/or mercury, lead, cadmium, hexavalent chromium or their compounds, and
(ii) do not contain formaldehyde in excess of 0.02% by weight of whole formulation, as measured by a test method acceptable to EcoLogo[CM] Program;

(g) if using cold application binding adhesives:
(i) must maintain records of each adhesive's VOC content,
(ii) seek out adhesives with the lowest practical VOC content, and
(iii) ensure VOC emissions are appropriately contained;

(h) ensure that binding agents are used, and residues disposed of, in accordance with instructions provided, so as to minimize health concerns and maximize performance;

(i) ensure that all electrically powered post-press equipment (including, *inter alia* knives, foot-or saddle-stitchers, shrink-wrapping machines, etc.) is turned off when not in use for periods in excess of 30 minutes; and

(j) ensure that when the final product is shipped in cardboard containers:
(i) the containers include recycled content, and
(ii) where applicable, packing material consist of paper scrap recovered from elsewhere in the process.

5. To be authorized to carry the EcoLogo[CM], the digital printing service must also meet criteria specific to its subcategory.

5.1 Digital printing services using laser-jet operations must exclusively use printers that either meet the EcoLogo[CM] requirements of CCD-35 (Office Machines) **OR** the following set of requirements:

(a) meet one of the following energy consumption requirements:
(i) as stipulated in Appendix 2 (Tables 1a, 1b or 1c, as appropriate) when tested in accordance with EPA's "Testing Conditions for Energy Star Measurement Printers", OR
(ii) are pre-programmed (by the machines' operator(s)) to revert to a standby or "sleep" mode after a period of no more than 60 minutes, OR
(iii) are accompanied by instructions that direct the printers' operator(s) to physically turn off the machine or set it to a standby mode whenever commencing an anticipated period of inactivity exceeding 60 minutes;

(b) not cause an ambient ozone concentration in excess of 0.04 mg/m^3;

(c) not cause a dust concentration in excess of 0.25 mg/m^3;

(d) where applicable, be compatible with remanufactured printing cartridges without voiding the original manufacturer's warranty; and

(e) include the following information in either an instruction manual or a product information sheet:
- *(i)* ambient ozone level being met and testing conditions used to determine the level,
- *(ii)* the procedure for changing ozone filters and the recommended frequency of filter replacement or service by the manufacturer, if applicable,
- *(iii)* dust concentration being met and testing conditions used to determine the level,
- *(iv)* the energy use in the printing mode of operation when tested in accordance with EPA's "Testing Conditions for Energy Star Measurement Printers", and
- *(v)* the noise emission values of the unit for both printing and energy-saver modes of operation, if applicable.

5.2 Digital printing services using ink-jet operations must:

(a) use printers which meet the energy consumption requirements as stipulated in Appendix 2 (Tables 1a, 1b or 1c as appropriate), when tested in accordance with EPA's "Testing Conditions for Energy Star Measurement Printers";

(b) use printing inks that either meet the EcoLogo^{CM} requirements of CCD-40 (Printing Inks) or the following:
- *(i)* not contain VOC's in excess of 4% by weight, when tested in accordance with the EPA's Test Method 24, or as calculated from records of the amounts of constituents used to make the product,
- *(ii)* not contain a combined total of petroleum distillates, calculated from records of the amounts of constituents used to make the product, in excess of 25%, by weight,
- *(iii)* not contain a sum, or incidental concentration levels, of lead, cadmium, mercury, or hexavalent chromium must in excess of 100 parts per million (by weight), and
- *(iv)* not contain either benzene, or halogenated solvents; and

(c) ensure that spent ink cartridges are either refilled for reuse, recycled or segregated from the waste stream and diverted to a register hazardous waste hauler, as appropriate to the digital printing service's jurisdiction.

5.3 Digital printing services using digital publishing operations must:

(a) meet the criteria as outlined in 5.1 and 5.2 that are relevant to the specific printing methodology used (i.e., laser or ink jet); and

(b) use binding adhesives that meet the criteria as outlined in 4(f) and 4(h).

Verification

6. To verify a claim that a product meets the criteria listed in the document, the EcoLogo[CM] Program will require access, as is its normal practice, to relevant quality control and production records and the right of access to production facilities on an announced basis.

7. Compliance with section 3(b) shall be attested to by a signed statement of the Chief Executive Officer or the equivalent officer of the manufacturer. The EcoLogo[CM] Program shall be advised in writing immediately by the licensee of any non-compliance which may occur during the term of the license. On the occurrence of any non-compliance, the license may be suspended or terminated as stipulated in the license agreement.

Conditions for EcoLogo[CM] Use

8. The EcoLogo[CM] may appear on wholesale or retail packaging, or on the product itself, provided that the product meets the requirements in this document.

9. It is recommended that a criteria statement appear with the EcoLogo[CM] whenever the EcoLogo[CM] is used in association with the digital printing service. The intent of this statement is to provide clarification as to why the product was certified and to indicate constraints to which the certification is limited. This is to ensure no ambiguity over, or misrepresentation of, the reason(s) for certification.

   The suggested criteria statement wording for this product type is "*Digital Printing Service*". The licensee may propose other wording for the criteria statement, but any such proposed wording must be approved by the EcoLogo[CM] Program.

10. All licensees and authorized users must comply with the Program's *Guide to Proper Use of the EcoLogo[CM]* regarding the format and usage of the EcoLogo[CM].

11. Any accompanying advertising must conform with the relevant requirements stipulated in this document, the license agreement and the Program's *Guide to Proper Use of the EcoLogo[CM]*.

For additional copies of this criteria document or for more information about the
EcoLogo[CM] Program, please contact:
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Appendix 1: Volatile Organic Compounds with Negligible Photochemical Reactivity

The list of volatile organic compounds (VOCs) designated by the EcoLogo[CM] Program as having negligible photochemical reactivity has been taken from the following two documents:

1. State of California Air Resources Board, Regulation for Reducing Volatile Organic Compound Emissions from Consumer Products, Appendix.
2. U.S. EPA VOC Definition, Federal Register, Volume 57, No. 22, 3 February 1992, Rules and Regulations, pg. 3945, sec.51.100.

This EcoLogo[CM] designated list includes the following compounds:

(a) acetone
(b) ammonium carbonate
(c) carbon monoxide
(d) carbonic acid
(e) ethane
(f) metallic carbides or carbonates
(g) methane
(h) methylene chloride (dichloromethane)
(i) cyclic, branched, or linear completely methylated siloxanes
(j) parachlorobenzotrifluoride (PCBTF)
(k) perchloroethylene (tetrachloroethylene)
(l) 1,1,1-trichloroethane
(m) trichlorofluoromethane (CFC-11)
(n) dichlorodifluoromethane (CFC-12)
(o) trichlorotrifluoroethane (CFC-113)
(p) dichlorotetrafluoroethane (CFC-114)
(q) chloropentafluoroethane (CFC-115)
(r) chlorodifluoromethane (HCFC-22)
(s) dichlorotrifluoroethane (HCFC-123)
(t) dichlorofluoroethane (HCFC-141b)
(u) chlorodifluoroethane (HCFC-142b)
(v) 2-chloro-1,1,1,2-tertrafluoroethane (HCFC-124)
(w) trifluoromethane (HFC-23)
(x) 1,1,1,2,3,4.4,5,5,5-decafluoropentane (HFC-43-10mee)
(y) pentafluoroethane (HFC-125)
(z) 1,1,2,2-tetrafluoroethane (HFC-134)
(aa) tetrafluoroethane (HFC-134a)
(bb) 1,1,1-trifluoroethane (HFC-143a)
(cc) 1,1-difluoroethane HFC-152a)
(dd) 3,3-dichloro-1,1,1,2,2-pentafluoropropane (HCFC-225ca)
(ee) 1,3-dichloro-1,1,2,2,3-pentafluoropropane (HCFC-225cb)
(ff) perfluorocarbons (classes of):
  (A) cyclic, branched, or linear, completely fluorinated alkanes
  (B) cyclic, branched, or linear, completely fluorinated ethers with no unsaturations
  (C) cyclic, branched, or linear, completely fluorinated tertiary amines with no unsaturations
  (D) sulfur-containing perfluorocarbons with no unsaturations with the sulfur bonds only to carbon and fluorine

Appendix 2: Energy Consumption Requirements

Source for all tables is *The ENERGY STAR ®"Printer/Fax" Agreement — Version 3.0*, November 2000, pp 6-8.

Table 1a: Energy Consumption Requirements for Monochrome Printers*

**for laser, ink-jet and thermal transfer printers*

Product Speed[1] (pages per minute)	Average Power Consumption Stand-by or "Sleep" Mode (watts)	Default Time to Sleep Mode[2] (minutes)
0 < ppm ≤ 10	≤ 10	≤ 5
10 < ppm ≤ 20	≤ 20	≤ 15
20 < ppm ≤ 30	≤ 30	≤ 30
30 < ppm ≤ 44	≤ 40	≤ 60
ppm > 44	≤75	≤ 60

Table 1b: Energy Consumption Requirements for Colour Printers*

**for laser, ink-jet and thermal transfer printers*

Product Speed[1] (pages per minute)	Average Power Consumption Stand-by or "Sleep" Mode (watts)	Default Time to "Sleep" Mode[2] (minutes)
0 < ppm ≤ 10	≤ 35	≤ 30
10 < ppm ≤ 20	≤ 45	≤ 60
ppm > 20	≤ 70	≤ 60

Table 1c: Energy Consumption Requirements for Large/Wide-Format Printers*

** for laser, ink-jet and thermal transfer printers*

Product Speed[1] (pages per minute)	Average Power Consumption Stand-by or "Sleep" Mode (watts)	Default Time to "Sleep" Mode[2] (minutes)
0 < ppm ≤ 10	≤ 35	≤ 30
10 < ppm ≤ 40	≤ 65	≤ 30
ppm > 40	≤ 100	≤ 90

[1] Product speed to be measured by the printing time of the standard CCITT 6% Coverage Test Chart.

[2] Default times may be changed by the user.

[3] For printers that utilize a functionally integrated computer, whether contained within or outside of the printer cabinet, the power consumption of the computer does not have to be included when determining the sleep mode value of the printer unit. However, the integration of the computer must not interfere with the ability of the printer to enter or exit its Sleep Mode state. This provision is conditioned upon the manufacturer agreeing to provide potential customers with product literature that clearly states that the power consumed by the integrated computer is in addition to the power consumed by the printer unit, especially when the printer unit is in Sleep Mode.

A one-time 5-Watt allowance is permitted for those products that are shipped "network ready" (i.e., inclusive of network functionality "out of the box"). For those products shipped as not "network ready", the additional one-time 5-Watt allowance does not apply.