Green Label Product
Printer
(TGL-37-R2-15)

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Table of Contents

TGL-37-R2-15
Printer

1. Background

Printers are devices that reproduce images by printing on papers. It is a popular device and the demand for this product continues to increase in the market, which further consumes natural resources and energy for manufacturing printers. Printers may generate various kinds of emissions including styrene, ozone and particulate matters that can affect the human health. Furthermore, printers' components and their consumable parts such as toner cartridges also consist of heavy metals including mercury, lead, cadmium, and chromium (+6), which could possibly contaminate the environment and become hazardous wastes due to their improper disposal.

Green Label criteria for printers is an alternative standard that raise the bar on safety for consumers, energy efficiency, emission control (total volatile organic compounds, ozone, benzene, and other particles), and plastic type labeling to encourage use of recycled plastic and lessen the burden for disposal.

2. Scope

The criteria for printers covers products that creates pictures, texts and graphics on paper, which receives information from a single user or networked computer or other equipments (such as digital camera). The printer is dependent on electrical energy sources. The criteria also include multifunction printer with printing function as the main function[1].

3. Definitions

3.1 Printer is a device that display images, texts, and graphics through printing.

3.2 Printing speed refers to the number of A4 pages that can printed per minute (pages per minute or ppm) at the starting resolution of the printer, or the speed can be measured by the numbers of dots per second (DPS).

Remarks: For printers printing on large sized paper, measurement of printing speed should be compared to A4 paper by using the conversion factor below multiply by the time it takes to print.

Paper size	A2	A1	A0
Conversion factor	4 times	8 times	16 times

3.3 Double-sided printing refers to printing on both side of 1 paper per one paper feeding.

[1] Nordic Ecolabelling of Imaging equipment Version 6.2

3.4 Multifunctional device (MFD) refers to devices with printing as the main function and additional functions including scan or fax[2].

3.5 Total volatile organic compounds (TVOC) refers to organic compounds and total volatile organic compounds dissolved during gas chromatographic separation on non-polar column of n-hexane and n-hexadecane[3]

3.6 Dust refers to total suspended particulate matter, solid particle, and liquids that may be dispersed through the air. Some of these particles are large sized and black in color, which can be observed as smog or smoke. Some of these particles are small sized and cannot be detected by human eyes[4].

3.7 High molecular weight nickel refers to organometallic compounds or organic metal compounds with a molecular weight over 1,000 a.u. These nickel compounds are used as catalyst in steel and alloy industries as well as in ceramic and jewelry industries.

4. General requirements

4.1 The product shall be certified or passed the electrical safety standard test under Thailand Industrial Standard TIS 1561[5] for Information Technology Equipment – Safety: General Requirements or international standard IEC 60950[6] or EN 60950-1[7] or other equivalent standards.

Verification method
The applicant shall declare a certificate or submit electrical safety standard test results under TIS 1561 or IEC 60950 part 1 or EN 60950-1 or other equivalent standards.

4.2 The product shall be certified or passed the test of Electromagnetic Compatibility: EMC in accordance with TIS 1956[8] or CISPR 22[9] or EN 55022[10] or other equivalent standards.

Verification method
The applicant shall submit test results of EMC in accordance with TIS 1956 or CISPR 22 or EN 55022 or other results under equivalent standard test.
Note: If the model code on the application does not match the code specified on the EMC test, the applicant shall submit documents and evidence to show how the model codes are related or show how the model code from the manufacturer and the commercial model name are related.

4.3 Manufacturing, transportation and post-industrial waste disposal shall comply with national laws and regulations or the manufacturer shall be accredited by ISO14001.

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[2] Eco Mark No.155 “Imaging Equipment Such As Copiers, Printers, etc. Version 1.

[3] EcoLogo Program Certification Criteria CCD-035 Office Machines , North America (Environmental Choice(Ecologo)

[4] สำนักจัดการคุณภาพอากาศและเสียง กรมควบคุมมลพิษ http://aqnis.pcd.go.th/basic/pollution_pm.htm

[5] มอก.1561: มาตรฐานผลิตภัณฑ์อุตสาหกรรม บริภัณฑ์เทคโนโลยีสารสนเทศเฉพาะด้านความปลอดภัย

[6] IEC 60950 part 1: Information technology equipment -Safety - P.1: General requirements

[7] EN 60950-1 : Information technology equipment - Safety - P.1: General requirements

[8] มอก. 1956: มาตรฐานผลิตภัณฑ์อุตสาหกรรมบริภัณฑ์เทคโนโลยีสารสนเทศ: ขีดจำกัดสัญญาณรบกวนวิทยุ

[9] CISPR 22: Information technology equipment-Radio disturbance characteristics-Limits and methods of measurement

[10] EN 55022 : Information technology equipment - Radio disturbance characteristics - Limits and methods of measurement

Verification method
The applicant shall submit one of the following documents:

1. License or evidences to prove that manufacturing, transportation, and post-industrial waste disposal complies with national laws and regulations.
2. Certification of ISO14001 from the manufacturer.

5. Product environmental requirements

5.1 Energy consumption shall be in accordance with the latest version of the International Energy Star Program Requirements for Imaging Equipment.

Verification method
The applicant shall submit one of the following documents:

1. The test results for energy consumption level of the printer in different conditions according to the test method defined by the latest version of International Energy Star Program Requirements for Imaging Equipment.
2. Energy Star certification.
3. Other documents to confirm that the applicable products conforms to International Energy Star Program Requirements for Imaging Equipment.

5.2 Noise emissions of the printer during use phase shall be within limits of 75 decibel (dB). Noise emissions shall be calculated using the below formula. For Wire dot or Dot matrix printers, the applicant shall test the noise emissions at full speed mode without calculating L_{WAd} value.

Table 1Noise level of the printer during use phase

Noise level L_{WAd} (Unit: Decibel)	
Monochrome printing	Color printing
$\leq 0.35*S_{bw}+59$ and ≤ 75	Parallel equipment : $\leq 0.3*S_{co}+61$ and ≤ 75

Remarks: S_{bw} = Operating speed for monochrome printing in pages per minute
S_{co} = Operating speed for color printing in pages per minute

Calculation method is in accordance with that of Germany Eco-Label RAL-UZ-171

Verification method
The applicant shall submit the test results for noise emissions in accordance with methods defined by ISO 7779: Acoustics-Measurement of airborne noise emitted by computer and business equipment by declaring the value for A-weighted sound power level (L_{wad}) under ISO 9296: Acoustics-Declared noise emission value of computer and business equipment. The unit, page per minute (PPM), for printing speed shall be used for calculation.

5.3 Emission rate of dust, ozone, TVOC, styrene, and benzene during use phase shall not exceed the limit as shown in Table 2[11].

Exception: Ink jet, thermal paper printing, and wire dot printing needs only TVOC test.

Table 2 Emission rate of dust, ozone, TVOC, styrene, and benzene during use phase

Type of pollutant			Concentration (unit: milligram per hour)	
			Monochrome	Color
Dust			≤4.0	≤4.0
Ozone			≤1.5	≤3.0
TVOC	Print phase		≤10	≤18
	Ready phase	Floor-mounted	≤2.0	≤2.0
		Table top	≤1.0	≤1.0
Styrene			≤1.0	≤1.8
Benzene			≤0.05	≤0.05

Note: 1. Color printers shall be tested both under monochrome mode and color mode. If test results under color mode passes the criteria for monochrome mode, then test results for monochrome mode is not necessary.
2. Test methods based on Appendix 2 of Germany Eco-Label RAL-UZ-171

Verification method
The applicant shall submit test results for emission rate of dust, ozone, TVOC, styrene, and benzene during use phase according to Table 2, which is based on Appendix 2 of Germany Eco-Label criteria RAL-UZ-171.

5.4 Plastic parts

5.4.1 Flame retardants used in casting external plastic parts structure weighing more than 25 g shall declare flame retardants used and CAS number in accordance with ISO 1043-4[12]. This requirement does not include reused external plastic parts structure that weights more than 25 g.

Verification method
The applicant shall submit a declaration letter for list of flame retardants used with CAS number for external plastic parts heavier than 25 g, or the code number in accordance with ISO 1043-4. Except is made for reused external plastic parts structure that is heavier than 25 g.

[11] Eco Mark No.155 "Imaging Equipment Such As Copiers, Printers, etc. Version 1.
[12] ISO 11469-4: Plastics - symbols and abbreviated terms - part 4: flame retardants

5.4.2 Plastic parts weighing more than 25 g shall not contain heavy metals, heavy metal compounds, and flame retardants. Heavy metals (lead, mercury, and chromium hexavalent) due to impurities or traces deriving from raw materials in plastic parts shall not exceed 0.1 % (1000 mg/kg) by weight, for cadmium 0.01% (100 mg/kg) by weight, and for flame retardants (PBB and PBDE) 0.1 % (1000 mg/kg) by weight.

Note: If total chromium (Cr) content is less than or equal to 1,000 mg/kg, the criteria for chromium hexavalent (Cr^{6+}) content shall be considered.

Verification method

Applicant shall submit one of the following documents:

1.If the product manufacturer has established the Hazardous Substance Process Management system, the applicant shall submit the following documents:

1.1 Certification from product manufacturer to declare compliance with the requirement including the manual or evidence to confirm the existence of Hazardous Substance Process Management.

1.2 Declaration letter and/or test results from part manufacturer confirming heavy metal and flame retardants in plastic parts are in accordance with IEC 62321[13] or other equivalent standard.

2. If manufacturer doesn't have the Hazardous Substance Process Management system in place, the applicant shall submit test results for heavy metal and flame retardants in plastic parts weighing more than or equal to 25 g in accordance with IEC 62321 or other equivalent standard.

5.4.3 Plastic parts weighing more than or equal to 25 g or has a plane surface of at least 200 square millimeters shall be labeled properly for plastic identification and the symbol used shall be in accordance with TIS 1310 or in accordance with ISO 1043 or ISO 11469.

Verification method

The applicant shall submit a declaration letter for plastic parts weighing more than or equal to 25 g and with a plane surface of at least 200 square millimeters has been labeled properly for plastic identification in accordance with TIS 1310 for recyclable plastic or in accordance with ISO 1043 or ISO 11469. The applicant shall submit sample plastic part or picture of plastic part that shows the existence of plastic identification for inspection.

5.4.4 Plastic part weighing more than or equal to 25 g shall not contain substances in different categories specified in Table 3.2, which is from the Appendix VI of Regulation (EC) No.1272/2008[14] as follows:

[13] IEC 62321: Electro technical products - Determination of levels of six regulated substances (lead, mercury, cadmium, hexavalent chromium, polybrominated biphenyls, polybrominateddiphenyl ethers).

[14] (EC) No. 1272/2008 of the European Parliament and of the council of 16 December 2008 on classification, labelling and packaging of substances and mixtures, amending and repealing Directives 67/548/EEC and 1999/45/EC, and amending Regulation (EC) No 1907/2006, annex VI harmonised classification and labeling – tables, table 3.2 : The list of harmonised classification and labelling of hazardous substances from Annex I to Directive 67/548/EEC (P. L 353/923)

- Carcinogenic Category 1 (Carc. 1)
- Carcinogenic Category 2 (Carc. 2)
- Carcinogenic Category 3 (Carc. 3)
- Mutagenic Category 1 (Mut. 1)
- Mutagenic Category 2 (Mut. 2)
- Mutagenic Category 3 (Mut. 3)
- Toxic to Reproduction Category 1 (Repr. 1)
- Toxic to Reproduction Category 2 (Repr. 2)
- Toxic to Reproduction Category 3 (Repr. 3)

Verification method
The applicant shall submit declaration letter that plastic parts weighing more than 25 g are free from substances in listed categories from Table 3.2, which is from the Appendix VI of Regulation (EC) No.1272/2008.

5.5 Product design shall conform to 3R design checklist (Annex I).

Verification method
The applicant shall submit declaration letter ensuring that printer design is in accordance with 3R design checklist (Annex I).

5.6 Photo sensitive drum in the printer shall not contain cadmium, lead, mercury, and selenium.

Verification method
The applicant shall submit letter of declaration for compliance ensuring photosensitive drum is free from cadmium, lead, mercury, and selenium.

5.7 Back up battery for printers

5.7.1 Shall not contain lead and lead compounds

5.7.2 Hg and Cd contents shall be in accordance with the latest version of EU directive for battery.

5.7.3 Battery installed in printer shall be replaced without removing printed circuit board.

Verification method
The applicant shall submit letter of declaration ensuring back up battery of the printer meets 5.7 requirement as well as letter of declaration from battery manufacturer.

5.8 Paper saving

5.8.1 Electro photographic printer shall be able to print double-sided on office paper under criteria listed in Table 3. If the printer passed the test for double-sided printing on office paper under color printing condition, then it is not necessary to test in monochrome printing condition.

Table 3 The minimum criteria in printing paper for electro photographic printer [15]

A4 Paper Printing Speed (Pages Per Minute; PPM)		Minimum criteria for double-sided printing
Color	Monochrome	
≤19	≤24	Device software shall make double-sided printing option available (for printer and multi-function device)
>19-39	>24-44	Double-sided printing equipment shall be installed and set as default, or made available as additional equipment of photocopier.
>39	>44	Double-sided printing equipment shall be installed and set as default.

Verification method
The applicant shall submit a declaration letter ensuring the electro photographic printer is capable of double-sided printing according to criteria in Table 3. This information shall be disclosed in product document.

5.8.2 All type of printers shall be capable of printing on recycled paper with recycled content of more than 50%.

Verification method
The applicant shall submit a declaration letter ensuring that all types of printers are capable of printing on recycled paper with recycled content of more than 50%. This information shall be disclosed in product document.

5.9 Substances listed in Table 4 shall not be used during production process; during end production stage of the printer machine and printed circuit board; or for cleansing the machine parts for reuse.

[15] The blue angel RAL-UZ 171 Office Equipment with Printing Function (Printers, Copiers, Multifunction Devices) edition July 2012.

Table 4 Groups of synthetic chemical compounds composed of chlorine.

CFC5s	Trichlorofluoromethane Dichlorodifluoromethane Trichlorotrifluoroethane Dichlorotetrafluoroethane	HCFCs	Pentachlorofluoropropane Tetrachlorodifluoropropane Trichlorotrifluoropropane Dichlorotetrafluoropropane Chloropentafluoropropane Tetrachlorofluoropropane Trichlorodifluoropropane Dichlorotrifluoropropane Chlorotetrafluoropropane Trichlorofluoropropane Dichlorodifluoropropane Chlorotrifluoropropane Dichlorofluoropropane Chlorodifluoropropane Chlorofluoropropane
	Chloropentafluoroethane		
Other CFCs	Chlorotrifluoromethane Pentachlorofluoromethane Tetrachlorodifluoroethane Heptachlorofluoropropane Hexachlorodifluorpropane Pentachlorotrifluoropropane Tetrachlorotetrafluoropropane Trichloropentafluoropropane Dichlorohexafluoropropane Chloroheptafluoropropane Carbon Tetrachloride		
	1,1,1-Trichloroethane		
HCFCs	Dichlorofluoromethane Chlorodifluoromethane Chlorofluoroethane Tetrachlorofluoroethane Trichlorodifluoroethane Dichlorotrifluoroethane Chlorotetrafluoroethane Trichlorofluoroethane Dichlorodifluoroethane Chlorotrifluoroethane Dichlorofluoroethane Chlorodifluoroethane Chlorofluroethane Hexachlorofluoropropane Pentachlorodifluoropropane Tetrachlorotrifluoropropane Trichlorotetrafluoropropane Dichloropentafluoropropane		
	Chlorohexafluoropropane		

<u>Verification method</u>
The applicant shall submit a declaration letter ensuring no prohibited substances listed in Table 4 was used during end production of the printer core machine and printed circuit board; or for cleansing of printer parts for reuse.

5.10 Toners, ink and ribbon

5.10.1 Solid or liquid ink and ribbon used in toners and ink ribbon shall not contain the following substances:

1) Lead, cadmium, nickel, and chromium (6^+)

<u>Except</u> high molecular weight nickel in ink and ink cartridges

Verification method
The applicant shall submit a declaration letter for compliance with requirement 5.10.1 (1) and a declaration letter from toners manufacturer.

2) Substances listed in categories in Table 3.1 from Appendix VI of Regulation (EC)No.1272/2008:
- Carcinogenic according to categories 1A, 1B or 2
- Mutagenic according to categories 1A, 1B or 2
- toxic to reproduction according to categories 1A, 1B or 2

Verification method
The applicant shall submit a declaration letter for compliance with requirement 5.10.1 (2) and declaration letter from toners manufacturer.

5.10.2 The following azo colorants (dyes or pigments) in the ink that degenerates into amines through decomposition of one or more of the azo compounds[16] (in accordance with official test method from Article 35 of the German law on foods and sundries) shall not be used.

[16] REACH Regulations: Annex XVII Appendix 8 Entry 43 – Azocolurants

Table 5 Compounds of aromatic amine from decomposition of Azo groups

No.	Substances	CAS no.
1	Biphenyl-4-ylamine, 4-aminobiphenyl xenylamine	92-67-1
2	Benzidine	92-87-5
3	4-chloro-*o*-toluidine	95-69-2
4	2-naphthylamine	91-59-8
5	*o*-aminoazotoluene, 4-amino-2',3-dimethylazobenzene, 4-*o*-tolylazo-*o*-toluidine	97-56-3
6	5-nitro-*o*-toluidine	99-55-8
7	4-chloroaniline	106-47-8
8	4-methoxy-*m*-phenylenediamine	615-05-4
9	4,4'-methylenedianiline 4,4'-diaminodiphenylmethane	101-77-9
10	3,3'-dichlorobenzidine 3,3'-dichlorobiphenyl-4,4'-ylenediamine	91-94-1
11	3,3'-dimethoxybenzidine *o*-dianisidine	119-90-4
12	3,3'-dimethylbenzidine 4,4'-bi-*o*-toluidine	119-93-7
13	4,4'-methylenedi-*o*-toluidine	838-88-0
14	6-methoxy-*m*-toluidine (*p*-cresidine)	120-71-8
15	4,4'-methylene-bis-(2-chloro-aniline) 2,2'-dichloro-4,4'-methylenedianiline	101-14-4
16	4,4'-oxydianiline	101-80-4
17	4,4'-thiodianiline	139-65-1
18	*o*-toluidine, 2-aminotoluene	95-53-4
19	4-methyl-*m*-phenylenediamine	95-80-7
20	2,4,5-trimethylaniline	137-17-7
21	*o*-Anisidine	90-04-0
22	4-Aminoazobenzene	60-09-3

Verification method
The applicant shall submit a declaration letter ensuring that azo colorants (dyes or pigments) are not in the liquid ink and a declaration letter from toners manufacturer or submit test results that uses test methods from Article 35 of the German law on foods and sundries).

5.10.3 Plastic parts of cartridges

(1) Plastic parts weighing more than 25 g shall not contain heavy metals, heavy metal compounds, and flame retardants.

Note: 1. Impurities containing flame retardants, i.e., Pb, Cd, Hg, Cr^{6+}, Polybrominated Biphenyl (PBB) and Polybrominated Diphenyl Ether (PBDE) shall be in accordance with the criteria in Table 6.

2. If total chromium (Cr)) content is less than 1,000 mg/kg, then criteria for chromium hexavalent (Cr^{6+}) shall be considered.

Table 6 Heavy metals or heavy metal compounds in plastic parts of cartridge[17]

Substances	Heavy metals or heavy metal compounds				Flame retardants	
	Pb	Cd	Hg	Cr^{6+}	PBB	PBDE
Amount (mg/kg)	≤1,000	≤100	≤1,000	≤1,000	≤1,000	≤1,000

Verification method
The applicant shall submit one of the following documents:
1. If the product manufacturer has established the Hazardous Substance Process Management system, the applicant shall submit the following documents:
1.1 Certification from product manufacturer to declare compliance with the requirement including the manual or evidence to confirm the existence of Hazardous Substance Process Management.
1.2 Declaration letter and/or test results from part manufacturer confirming heavy metals and flame retardants in plastic parts are in accordance with IEC 62321[13] or other international standard or other equivalent national standard.
2. If manufacturer doesn't have the Hazardous Substance Process Management system in place, the applicant shall submit test results for heavy metals and flame retardants in plastic parts weighing more than or equal to 25 g in accordance with IEC 62321 or other international standard or other equivalent national standard.

(2) External plastic layer and structure for cartridges shall be recyclable of no less than 95% by weight.
(3) Each plastic casing part of cartridge weighing more than 25 g shall be made of one single polymer or polymer blends. In addition, all plastic casing parts weighing more than 25g shall be made of four or fewer types of mutually separable polymers or polymer blends.

Verification method
The applicant shall submit a declaration letter that meets the requirement 5.10.3 (2) and (3)

5.10.4 Existence of return policy of used cartridges and information dissemination of this policy to consumers through user manual, websites, or other printed materials.

Verification method
The applicant shall declare evidence that the applicant has the capacity to take back used cartridges from customers with information dissemination through user manual, websites, or other printed materials.

[17] RoHS Directive (2011/65/EU)

5.11 Packaging

5.11.1 Plastic packaging

(1) Plastic packaging shall not contain substances listed in Table 7.

Table 7 Groups of synthetic chemical compounds composed of chlorine.

CFC5s	Trichlorofluoromethane Dichlorodifluoromethane	Dichlorotetrafluoroethane Chloropentafluoroethane
	Trichlorotrifluoroethane	
Other CFCs	Chlorotrifluoromethane Pentachlorofluoromethane Tetrachlorodifluoroethane Heptachlorofluoropropane	Pentachlorotrifluoropropane Tetrachlorotetrafluoropropane Trichloropentafluoropropane Dichlorohexafluoropropane
	Hexachlorodifluoropropane	Chloroheptafluoropropane
	Carbon Tetrachloride	
	1,1,1-Trichloroethane	
HCFC	Dichlorofluoromethane Chlorodifluoromethane Chlorofluoroethane Tetrachlorofluoroethane Trichlorodifluoroethane Dichlorotrifluoroethane Chlorotetrafluoroethane Trichlorofluoroethane Dichlorodifluoroethane Chlorotrifluoroethane Dichlorofluoroethane Chlorodifluoroethane Chlorofluroethane Hexachlorofluoropropane Pentachlorodifluoropropane Tetrachlorotrifluoropropane	Dichloropentafluoropropane Chlorohexafluoropropane Pentachlorofluoropropane Tetrachlorodifluoropropane Trichlorotrifluoropropane Dichlorotetrafluoropropane Chloropentafluoropropane Tetrachlorofluoropropane Trichlorodifluoropropane Dichlorotrifluoropropane Chlorotetrafluoropropane Trichlorofluoropropane Dichlorodifluoropropane Chlorotrifluoropropane Dichlorofluoropropane Chlorodifluoropropane
	Trichlorotetrafluoropropane	Chlorofluoropropane

(2) Plastic packaging shall be free of halogens and organic halogenides.

Verification method

1. The applicant shall submit a declaration letter ensuring that plastic packaging does not contain substances listed in Table 7

2. The applicant shall submit a declaration letter ensuring that plastic packaging is free of halogens and organic halogenides.

5.12 Reporting (in Thai language) of the following information in user manual or attached document for customers:

(1) Instruction on the proper positioning of the machine

(2) Instruction on how to return used products, packaging and consumables through the manufacturer's take-back service, (if available)

(3) Instruction for replacing used ozone filter in the appropriate time of the day for laser printers (if used)

(4) Information on the warranty of product
(5) Information on the compatibility of printer to recycled paper
(6) After sale services for customers and contact numbers
(7) Instruction for safety handling of cartridges
(8) Instruction for setting up products with noise emission value of ≥ 63 dB(A) in a designated area instead of setting up around employees'work space.

Verification method
The applicant shall submit evidence of user manual/product safety data sheet/attached document for customer with information listed in requirement 5.12.

6. Testing and certification

6.1 Testing

6.1.1 The laboratory shall be operated by the government or under governmental control as defined by clause 5 of the Industrial Standard Act B.E. 2511 (and its addenda) or certified by TIS. 17025 or ISO/IEC 17025.

6.1.2 Test results
6.1.2.1 Test results shall comply with testing methods defined in this document.
6.1.2.2 If "comparable test methods" are submitted, the following documents shall be submitted with the test results:
1) Declaration letter from the laboratory verifying that the test methods are comparable to the methods defined in this document.
2) Method validation documents which enable unequivocal scientific verification that the testing methods and requirements defined in this document have been met.
6.1.2.3 Test results shall have been issued no more than 3 years following the application date.

6.2 Declaration letter to verify compliance with Green Label requirements
6.2.1 Shall have been issued no more than 3 years following the Green Label application date.
6.2.2 Shall be signed by the authorized directors and have the company seal affixed (if relevant).

Annex 1. Checklist for 3R design of equipment/consumables

- Group **A** Ink jet, dot impact and thermo sensitive equipment

"M" requirements, which must be met

Requirement group	No	Requirement	Applies to subassembly(cies)	Compliance?	Remarks	Purpose
Structure and joining technique	1	Componets made of materials incompatible with each other are connected separably or via separation aids.	Case parts, chassis, electric modules	Yes / No		Promoting reuse and recycling
	2	Electronic modules are easily traceable and removal.	Entire unit, including lumps	Yes / No		Facilitating parts search
	3	Disassembly for recycling can be done with universal tools exclusively	Case, chassis, electric modules	Yes / No	"Universal tools" refers to widely used, commercially available tools. This requirement dose not apply to connections where legal regulations have influenced the choice of joining technique.	Facilitating disconnection
	4	Necessary points of application and working space for disassembly tools have been taken into consideration?	Case parts, chassis, electric modules	Yes / No	The points of engagement" refers to the places to transmit forces to connection elements by tools.	Facilitating disconnection
	5	Screwed connections between modules can be separated with no more than three tools.	Case parts, chassis, electric modules	Yes / No	Tools can be distinguished by drive type (for example, cross-head slots) and drive size (for example, tool size).	Facilitating disconnection
	6	Disassembly can be done by a single person.	Entire unit	Yes / No	For example, if an undercut angle is 90 degrees or greater, any number of snap-fit joints that snap-fit in the same direction can be fit together simultaneously, but disconnecting them is not always possible. This requirement is considered not satisfied if three or more snap-fit joints cannot be simultaneously disconnected.	Facilitating dismantling
	7	Case parts are free from electronic modules. Control element attached to the case and case parts which simultaneously perform the functions of the chassis are not considered as case parts.	Case parts	Yes / No		Promoting reuse and recycling
	8	The manufacturer did a trial disassembly(e.g. according to 1-7 and prepared a test report focusing on the weak points	Entire unit	Yes / No		
Selection and marking of materials	9	The variety of materials forming plastic components performing comparable functions are limited to one material. This requirement shall not apply to parts that have been reused as can be proved.	Case parts, chassis, > 25 g	Yes / No	For instance, "similar functions" refer to impact resistance and abrasion resistance.	Promoting reuse and recycling
	10	(a) The coating of plastic components has been limited to the minimum necessary. Laser-produced labelings shall not be considered as printings. This requirement shall not apply to parts that have been reused as can be proved.	Case parts, ink modules	Yes / No	Coating includes layers of paint, vacuum-deposited layers and print. "Considerations for reducing environmental burden" includes the measures to control VOC emission into the air, such as the removal equipment, the devices in coating process, or replacement by low-VOC paint.	Promoting reuse and recycling
		(b) The paints which shall not prevent recycling has been used. Coating works have been conducted with considerations for occupational safety and health and reducing environmental burden.	Case parts, ink modules	Yes / No		
		If "Yes" in (a) or (b), it is considered to conform this requirement.				
	11	Materials can be reused as materials, and materials are assembled such that they can be separated.	Case parts, chassis	Yes / No	"Can be reused as materials" means that recycled material identical to the starting material can be manufactured. (It can be used as if it were the original material.) This item asks the intention and purpose upon designg and does not ask wheter recycling is actually conducted.	Promoting reuse and recycling
	12	Components and materials under Annex 1 can be easily exchanged	Entire unit			Promoting reuse and recycling
	13	Plastic parts > 25g and > 200mm2 (flat area) are marked in accordance with ISO11469:2000(corresponding standard JIS K6999:2004).	Entire unit	Yes / No		Promoting reuse and recycling
	14	Material selection according to 9-13 has been done and recorded in writing	Case parts, chassis	Yes / No		
Longevity	15	At least 50% of the components* of the device except for standard parts, are identical in design to those in other devices of the same manufacturer and the same performance category and generation.	Entire unit	Yes / No		Promoting commonization of parts
	16	Ink modules can be reproduced	Ink modules	Yes / No	Reuse should not be prevented by constructive measures.	Promoting reuse and recycling

- **Group B** Electrophotographic equipment

"M"-requirements, which must be met						
Requirement group	No	Requirement	Applies to subassembly (ies)	Compliance?	Remarks	Purpose
Structure and joining technique	1	Are subassemblies made of mutually incompatible materials separable, or connected by separation aids?	Case parts, chassis, electric modules,toner modules	Yes / No		Promoting reuse and recycling
	2	Are electric/electronic subassemblies and components easy to find and separate? See annex 1	Entire unit, including lumps	Yes / No		Facilitating parts search
	3	Can dismantling for recycling purposes be done exclusively with universal tools?	Case, chassis, electric modules	Yes / No	"Universal tools" refers to widely used, commercially available tools. This requirement dose not apply to connections where legal regulations have influenced the choice of joining technique.	Facilitating disconnection
	4	Have the points of engagement and the work space required for dismantling tools been considered?	Case parts, chassis, electric modules	Yes / No		Facilitating disconnection
	5	Can screw connections for fastening subassemblies be tightened with no more than three tools?	Case parts, chassis, electric modules	Yes / No	Tools can be distinguished by drive type (for example, cross-head slot) and drive size (for example, tool size).	Facilitating disconnection
	6	Can the dismantling be performed by one person?	Entire unit	Yes / No	For example, if an undercut angle is 90 degrees or greater, any number of snap fit joints that snap fit in the same direction can be fit together simultaneously, but disconnecting them is not always possible. This requirement is considered not satisfied if three or more snap fit joints cannot be simultaneously disconnected.	Facilitating dismantling
	7	Are case parts free of electronic subassemblies? Control panels attached to the casing and case parts serving as a chassis, are not considered here as a casing part.	Case parts	Yes / No		Promoting reuse and recycling
	8	Has the manufacturer carried out a trial disassembly (for example, in accordance with 1-7)?	Entire unit	Yes / No		
Selection and marking of materials	9	Is the variety of materials used for plastic components of similar functions limited to one material? However, this requirement does not apply to parts that demonstrably reused.	Case parts, chassis, > 25 g	Yes / No	For instance, "similar functions" refer to impact resistance and abrasion resistance.	Promoting reuse and recycling
	10	(a)Has the coating of plastic components been limited to a minimum (for example, manufacturer identification)? However, laser marking is not included in this requirement as coating. And also demonstrably reused parts are not affected by this requirement.	Case parts, toner modules	Yes / No	Coating includes layers of paint, vacuum-deposited layers and print.	Promoting reuse and recycling
		(b) The paints which shall not prevent recycling has been used. Coating works have been conducted with considerations for occupational safety and health and reducing environmental burden.	Case parts, toner modules	Yes / No	"Paints not to prevent recycling" refers to the paints that have the following characteristics: it possesses compatibility with materials of coated parts, and does not prevent high level material recycling (horizontal recycling for in-house products). "Considerations for occupational safety and health" includes ventilation/air emission and worker wearing protective equipment. "Considerations for reducing environmental burden" includes the measures to control VOC emissions into the air such as the removal equipment, the devices in coating process, or replacement by low-VOC paint.	Promoting reuse and recycling
	If "Yes" in (a) or (b), it is considered to conform this requirement.					
	11	Materials can be reused as materials, and materials are assembled such that they can be separated.	Case parts, chassis, case parts of toner modules	Yes / No	"Can be reused as materials" means that recycled material identical to the starting material can be manufactured. (It can be used as if it were the original material.) This item asks the intention and purpose upon designing and does not ask whether recycling is actually conducted.	Promoting reuse and recycling
	12	Is the partial use of recyclate material permitted?	Case parts, chassis, toner modules	Yes / No	"Permitted" means the use of recyclable material is permitted as long as such material meets the requirements provided in the specifications and is available. "Partial" means some available plastic components are appropriate. (This does not require all available components.)	Promoting reuse and recycling
	13	Components and materials under Annex 1 can be easily exchanged	Entire unit	Yes / No		Promoting reuse and recycling
	14	Plastic parts > 25g and > 200mm2 (flat area) are marked in accordance with ISO 11469:2000(corresponding standard JIS K6999:2004).	Entire unit	Yes / No		Promoting reuse and recycling
	15	Material selection according to 10-14 has been done and recorded in writing.	Case parts, chassis, toner modules	Yes / No		
Longevity	16	At least 50% of the components* of the device except for standard parts, are identical in design to those in other devices of the same manufacturer and the same performance category and generation.	Entire unit	Yes / No		Promoting commonization of parts
	17	The use of reprocessed modules or components is possible and permissable.	Entire unit	Yes / No	Referring to that spare/ETN(Equivalent to new) parts must be prepared for reuse under manufacturer's responsibility	Promoting reuse and recycling
	18	Tonermodules can be reproduced	Toner modules, except containers	Yes / No	Reuse should not be prevented by constructive measures.	Promoting reuse and recycling