2 PfG E 0055/10.24

Criteria for the award of Green Product Mark for Printer

Version: 1.0 dated Oct 11, 2024

Contents

1 Foreword

The work of selecting and developing criteria for the award of Green Product Mark is carried out through Global 2 PfG-E Technical Committees (PTC) convened by TÜV Rheinland. Interested parties participate in the selection and development of criteria for the award of Green Product Mark through either PTC membership or stakeholder consultation mechanism.

Criteria for the award of Green Product Mark are drafted in accordance with the rules given in following standards and guides:

- ISO/IEC Directives, Part 1 and Part 2

- ISO/IEC Guide 21, Part 1 and Part 2

- ISO Guide 64

- ISO Guide 82

- ISO 14024

- US EPA Guidelines for Environmental Performance Standards and Ecolabels for Use in Federal Procurement

- ISEAL Code of Good Practice for Setting Social and Environmental Standards

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. TÜV Rheinland shall not be held responsible for identifying any or all such patent rights.

This document was developed using a multi-stakeholder approach involving experts from multiple stakeholder groups including but not limited to consumers, government, industry, labour, nongovernmental organizations (NGOs), and service, support, research, academics. Although efforts were made to ensure balanced participation of all the stakeholder groups, a full and equitable balance of stakeholders was constrained by various factors, including the availability of resources and the need for English language skills.

2 Objectives

The TUV Rheinland Green Mark for Printer may be awarded to appliances offering the following environmental properties:

- Social responsible manufacturing
- Avoidance of materials hazardous to the environment,
- Transparent carbon footprint,
- Save of natural resources (post-consumer recycled content),
- Low energy consumption,
- Low noise emissions.
- Reparability and durability,
- Recyclable design

Therefore, following benefits for the environment and health are stated in the TUV Rheinland Certipedia:

- Low energy consumption
- Durable
- Recycle design
- Carbon Footprint Calculated / Carbon Neutral

3 Introduction

Product environmental labels are claims which indicate the environmental aspects of a product and provide information about a product in terms of its overall environmental character, a specified environmental aspect, or any number of aspects. Green Product Mark is a voluntary environmental labelling scheme operating in accordance with ISO 14020 Environmental labels and declarations – General principles and ISO 14024 Environmental labels and declarations – Type I environmental labelling – Principles and procedures. Green Product Mark has been developed in accordance with ISO/IEC 17067 Conformity assessment – Fundamentals of product certification and guidelines for product certification schemes. Certification activities under Green Product Mark scheme shall be performed in accordance with ISO/IEC 17065 Conformity assessment – Requirements for bodies certifying products, processes and services.

Through the communication of verifiable and accurate information on environmental aspects of products, Green Product Mark aims to encourage the demand for and supply of those products that cause less stress on the environment, thereby stimulating the potential for market-driven continuous environmental improvement.

Green Product Mark certification scheme is owned by TÜV Rheinland, a leading international technical service provider who have been developing solutions to ensure the safety, quality and economic efficiency of the interaction between human, technology and the environment.

This document is intended to convey clear and unambiguous requirements to be fulfilled for products to get awarded with Green Product Mark.

4 Scope

This document lays out prerequisites, product environmental criteria and product function characteristics for the Printer.

Types of printers: inkjet printers, thermal printers, multifunction printers, laser printers.

3D printer is under consideration and will not be included in this requirement currently.

All products which demonstrate compliance with relevant prerequisites, product environmental criteria and product function characteristics set forth in this document are entitled to be awarded Green Product Mark.

5 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

- SA 8000, Social Accountability

- ISO 14040, Environmental management - Life cycle assessment - Principles and framework

- ISO 14044, Environmental management - Life cycle assessment - Requirements and guidelines

- Product Environmental Footprint (PEF) Guide

- 2001/95/EC General Product Safety Directive

- RED Directive 2014/53/EU

- EMC Directive 2014/30/EU

- LVD Directive 2014/35/EU

- ISO/TS 14067, Greenhouse gases - Carbon footprint of products - Requirements and guidelines for quantification

- ISO 14021, Environmental labels and declarations - Self-declared environmental claims (Type II environmental labelling)

- ISO 14024, Environmental labels and declarations - Type I environmental labelling - Principles and procedures

- Directive 2012/19/EU (WEEE Directive) and its amendments

- RoHS Regulation 2011/65/EU with amendments

- REACH Regulation (EU) No 1907/2006 and its amendments

- Regulation (EU) No 2019/1021 on persistent organic pollutants (POP Regulation) and its amendments

- Regulation (EC) 1278/2012 (CLP)

- Regulation (EU) No 1275/2008 and its amendments (Ecodesign requirements for standby and off mode electric power consumption of electrical and electronic household and office equipment)

- Directive 2005/20/EC and amendments on Packaging and Packaging waste

- Chemicals Prohibition Ordinance (ChemVerbotsV - Chemikalienverbotsverordnung)
- AfPS GS 2019-01 on polycyclic aromatic hydrocarbons
- Packaging and packaging waste Directive 94/62/EC
- 2 PfG S 0147, TÜV Rheinland PROOF Kriterienkatalog für Schadstoffgeprüfte Konsumgüter
- ENERGY STAR® Program Requirements for Imaging equipment Version 3.0

6 Terms and definitions

For the purpose of this document, the following terms and definitions apply.

Green Product Mark

A voluntary environmental labelling program owned by TÜV Rheinland to indicate the overall environmental preferability of a product within a particular product category based on life cycle considerations and aim to communicate verifiable and accurate information on environmental aspects of products.

Printer

A printer is a peripheral device that converts digital documents and images into physical copies on paper or other printable media. Printers are widely used in homes, offices, and various industries for producing hard copies of documents, photos, and other materials.

1) Inkjet printers: Use liquid ink sprayed through tiny nozzles onto the paper, can use at home and small office environments for printing documents and photos, good for high-quality color prints and photos, but Ink can be expensive and print heads may clog if not used regularly.
2) Thermal printers: Use heat to transfer an image onto thermal paper, can use for receipts, labels, and barcodes, fast and quiet printing, but thermal paper can fade over time.
3) Multifunction printers: known as all-in-one printers, are devices that combine multiple functionalities into a single unit. These functionalities typically include printing, scanning, copying, and sometimes faxing. MFPs are designed to save space, reduce costs, and increase efficiency by consolidating several office tasks into one machine.
4) Laser printers: Use a laser beam to produce an image on a drum, which is then transferred to paper using toner (powdered ink), normally use at office environments for high-volume printing, fast printing speeds, high-quality text prints, and cost-effective for large volumes, but higher initial cost compared to inkjet printers.
5) 3D printers: Create three-dimensional objects by layering material (such as plastic, resin, or metal) based on a digital model, common use for Prototyping, manufacturing, and hobbyist projects. Can produce complex shapes and custom objects, but slower and more expensive than traditional manufacturing methods.

Product function characteristics

Attribute or characteristic in the performance and use of a product. In the context of environmental labelling, fitness for purpose implies that a product satisfies health, safety and consumer performance needs. [SOURCE: ISO 14024:1999, definition 3.5]

7 Prerequisites

7.1 Social compliance

The social compliance of brand owner, manufacturer and production site shall be maintained with all statutory and regulatory requirements for the jurisdiction in which the manufacturing operations are located.

Methodology for assessing and demonstrating compliance:

The brand owner, manufacturer and the factory/third-party producer must submit audit reports and corrective action plans(CAPs).

Independent audits must be conducted by organizations accredited to ISO 17021 and carried out by SA8000, RBA or BSCI certified lead auditors.

Types of accepted audits are:

a. SA8000,

b. RBA VAP ,

c. amfori BSCI,

d. SMETA, or

e. Report developed according to the GRI Sustainability Reporting Guidelines or GRI Sustainability Reporting Standards.

The documented proof/report shall be maximum of 12 months old at the time of application for Green Product Mark certification.

The CAPs for each priority/major non-conformity shall be provided together with audit report, and all priority/major non-conformity shall be closed with 24 months.

7.2 Legal requirements

Compliance shall be maintained with legal - safety requirements (generally accepted rules of engineering), essential usability requirements, and other requirements set forth in statutory regulations for the jurisdiction in which Green Product Mark certified products will be sold.

Methodology for assessing and demonstrating compliance:

The applicant shall provide the certificate of national safety approval relevant to the jurisdiction in which Green Product Mark certified products will be sold. The certificate shall not be older than 1 year.

7.3 Environmental compliance

All production facilities must assure compliance with the applicable national and local legal environmental law e.g. referring to air emissions requirements applicable to their processing/manufacturing stage.

Methodology for assessing and demonstrating compliance:

The applicant shall provide the valid certificate or related documents to proof the compliance to the applicable national and local legal environmental law. A valid ISO 14001 certificate is acceptable.

It is allowed that an extended time period of 12 months maximum on factory that is not yet certified, by presenting a time plan for achieving the ISO 14001 certification and signing an declaration.

TÜV Rheinland has the right to abolish issued certificate if the factory will not be able to achieve ISO 14001 certification within the extended time period.

8 Product environmental criteria

8.1 Protection of human health and environment

Products need to fulfil basic safety and quality requirements, verified by TÜV Rheinland either through testing or by accepting test reports. The selections of tests is depending on the type of product and material.

8.1.1 Restriction of hazardous substances

8.1.1.1 Hazardous substances control

The final product (include product body, packaging and accessory) shall not contain hazardous substances listed in the Restricted Substance List of 2 PfG S 0147 at or above the specified concentration limits or according to the specified restrictions.

Requirement	Regulation	Limit
Odour	Environment scheme: reference to Blue Angel UZ 219 DE-UZ 219-202101-en Criteria-V3-2022-06-03.pdf (blauer-engel.de) Evaluation scheme: refer to SNV 195651 (rating scale 1~5 only) 1 = odourless 2 = weak	Grade 2 (in operation) Test method: refer to Appendix S-M / DIN ISO 16000-11/28/30 Sensory test* simulating the odour perception of consumers within 24 hours of opening the product package; standard model chamber is used for VOC emission with product in operation,

	3 = bearable 4 = intense/annoying 5 = unbearable	to evaluate the acceptance level, level 1 is the best, and more than level 3 is unacceptable
RoHS	Directive 2011/65/EU and amendments	E&E Product Hazardous Substance Restriction Regulations, controlling heavy metals, flame retardants and plasticizers in all homogeneous materials. All exemptions to the substances restrictions as defined by the Directive are applicable. *Also, a RoHS Declaration of Conformity to Directive 2011/65/EC shall be provided by the applicant.
Substances of Very High Concern (REACH SVHC)	Regulation (EU) No 1907/2006	Refers to 0.1% in each article and each packaging material.
Phthalates: DEHP, DBP, BBP, DINP, DIDP, DNOP + SVHC-Phthalates	With reference to Regulation (EC) No 1907/2006 Annex XIV, Annex XVII and Directive 2011/65/EU	Refers to 0.1% of each finished material of the article.
NP/ OP + NPEO/ NPEO (Nonylphenol/ Octylphenol + Ethoxylates)	With reference to Regulation (EU) No 1907/2006	100 mg/kg each (AP) / 100 mg/kg each (APEO) (skin-contactable parts only)
Organotin Compounds	With reference to Regulation (EU) No 1907/2006	0.1 mg/kg :TBT; 1 mg/kg: MBT, DBT, DOT (skin-contactable parts only)
Flame retardants (TRIS, TEPA)	With reference to Regulation (EU) No 1907/2006	Not detected Conduct all materials except metals, glass, ceramic and wood.
PAH (Polycyclic Aromatic Hydrocarbons)	AfPS GS 2019:01 PAK & (EU) No 1907/2006 (REACH)	Requirements set by AfPS and REACH annex XVII
Halogen	NEMI Position Statement on "Low Halogen" Electronics	Cl, Br: 1000 mg/kg (in each material) All Printed circuit board (PCB) and substrate laminates shall meet Br and Cl requirements.

		The maximum total halogens contained in the plastic parts exceeding 25 g, resin plus reinforcement matrix should be less than 1500 ppm with maximum chlorine of 900 ppm and maximum bromine being 900 ppm. *For plastic parts exceeding 25 g manufacturer shall provide a declaration which declares the materials used in the production meet the above seen requirement
Packaging testing	Directive 94/62/EC and amendments	Pb + Hg + Cd + Cr (VI) < 100 mg/kg The manufacturer shall state in its packaging requirement(s) that elemental chlorine shall not be used in product packaging. A manufacturer's requirement for product packaging to be either elemental chlorine free (ECF), totally chlorine free (TCF) or processed chlorine free meets the requirements.
Mercury	DIN EN 1483	Mercury is not allowed for a backlight unit.
Beryllium	DIN EN ISO 11885	Refers to 0.1% in each finished part of the article (all sub-products which can be separated without tools) and each packaging separately.
Antimony	DIN EN ISO 11885	Refers to 0.1% in each finished part of the article (all sub-products which can be separated without tools) and each packaging separately.
Short chain Chlorinated Paraffins C10-C13 (SCCP)	Regulation (EU) No 2019/1021 on persistent organic pollutants (POP) Annex I	Refers to 0.1% of each finished material of the article and each packaging (made of PVC, soft plastic and leather material)
Hexabromo-cyclododecane (HBCDD)	Regulation (EU) No 2019/1021 on persistent organic pollutants (POP) Annex I	Refers to 75 mg/kg of each finished material of the article and each packaging (made of EPS and PS foams)
Packaging material (MOSH and MOAH)	French Arrêté du 13 avril 2022	Ban on the use of mineral oils in printing ink: · 1 % Aromatic mineral oil hydrocarbons (MOAH) with 1 to 7 aromatic rings;

		From January 1, 2025, the ban applies to the use of mineral oils: · For MOAH, if the printing ink contains more than 0.1 % or the mass concentration of compounds with 3 to 7 aromatic rings in the printing ink is more than 1 ppm (mg/kg); For MOSH, the limit value in the printing ink is 0.1 %.
Per- and polyfluoroalkyl substances (PFAS)	With reference to proposed EU and US ban on the use of PFAS	All plastic, rubber materials and substrate laminates shall meet requirements for PFAS. From Nov.1, 2024 all certified products shall meet the requirement. 1, 25 ppb for any PFAS as measured with targeted PFAS analysis (polymeric PFASs excluded from quantification) 2, 250 ppb for the sum of PFASs measured as sum of targeted PFAS analysis, optionally with prior degradation of precursors (polymeric PFASs excluded from quantification) 3, 50 ppm for PFASs (polymeric PFASs included). If total fluorine exceeds 50 mg F/kg the manufacturer, importer or downstream user shall upon request provide to the enforcement authorities a proof for the fluorine measured as content of either PFASs or non-PFASs. For plastic parts exceeding 25 g manufacturer shall provide a declaration which declares the materials used in the production meet the above-seen requirement.

Requirements for toner according to 2 PfG E 0011 and 2 PfG S 0136 shall be also evaluated, eg. VOC, PAHs, Organotin, Flame retardants, Preservatives, AZO/Aniline, Extractable heavy metals, Disperse and carcinogenic dyes and CMR substances screening.

Controlling and monitoring the chemical usage in production is covered by auditing process and the testing of the producer's Chemical Management System.

Methodology for assessing and demonstrating compliance:

- The applicant shall provide test reports issued by TÜV Rheinland, or by a laboratory accredited by one of ILAC MRA signatories according to ISO/IEC 17025 and holding accreditation scope that cover the standards relevant to substances.
- Report must identify the product and/or materials.
- Test reports should not be older than 12 month from the date of certification
- Testing reports are deemed valid for a period of 12 month* from date of test sample submission up to the date of review.
  ** Valid period could be extended to 5 years in maximum if applicant could guarantee through appropriate means that the materials are not changed since the initial testing.*

8.2 Sustainable use of resources

8.2.1 Energy Efficiency

8.2.1.1 Power consumption

The product shall comply with the maximum power consumption requirements for On Mode and Standby Mode according to Energy Star Requirements for Imaging equipment Version 3.0 or Regulation (EU) No 1275/2008 and its amendments (Ecodesign requirements for standby and off mode electric power consumption of electrical and electronic household and office equipment)

Methodology for assessing and demonstrating compliance:

The applicant shall provide test reports issued by TÜV Rheinland, or by a laboratory accredited by one of ILAC MRA signatories according to ISO/IEC. At least three samples have to be tested. Testing reports are deemed valid for a period of 18 month from date of test sample submission up to the date of review. Reports shall be issued for the complete finished product. Additional spot checks may be carried out by TÜV Rheinland in a risk based approach.

8.3 Product recycled material content

8.3.1 Recycled material content for product

Recycled material content of final product shall be evaluated according to ISO 14021.

Calculation of the percentages of more sustainable material based on the article weight.

The percent of recycled material content of plastic parts (excluding PCB, cable, label and electronic components) of the product should be recorded.

Methodology for assessing and demonstrating compliance:

Certification attesting that the average minimum content of the plastic parts is made from post-consumer recycled or pre-consumer recycled plastics as defined in this criterion and in accordance with either ISO14021:1999, National Green Schemes (Eco Label, IEEE 1680.3, etc.), GRS, RCS, or equivalent standard. Certification shall be obtained from a certification body for which the specific standard is in the scope of their accreditation.

8.4 Evaluation of product climate resilience

The producer shall quantify/assess the life cycle carbon emissions of products using life cycle assessment techniques, i.e. by describing the inputs and their associated emissions attributed to the delivery of a specified amount of the product functional unit.

Methodology for assessing and demonstrating compliance:

Option 1: The applicant shall provide a report of Product Carbon Footprint (PCF) based on ISO 14067 and relevant Product Category Rules (PCR). The report shall be issued by or verified/critical reviewed by TÜV Rheinland. The results of the PCF shall base on the product model.

PCF information disclosure:

1. The results of the PCF shall be publicly available and can be download free of charge from brand owner's website.
2. The results of the PCF shall base on the product model.

Note: For models have not yet on sale, the link of PCF result can be temporary, but the result announcement must be finished when the model is on sale.

Option 2: The applicant shall provide a report of Life Cycle Assessment (LCA) using ISO 14040 and ISO 14044. The report shall at least include the environmental impact category Global Warming Potential. The report shall be issued by or verified/critical reviewed by TÜV Rheinland. The critical review process shall ensure that (source: ISO 14044):

- the methods used to carry out the PCF or LCA are consistent with this international standard,
- the methods used to carry out the PCF or LCA are scientifically and technically valid,
- the data used are appropriate and reasonable in relation to the goal of the study,
- the interpretations reflect the limitations identified and the goal of the study, and
- the study report is transparent and consistent.

8.5 Recycle Design

8.5.1 WEEE

The final product shall compliance with following requirements:

- 85 % shall be recovered, and
- 80 % shall be prepared for re-use and recycled

Methodology for assessing and demonstrating compliance:

The applicant shall provide an evaluation report and TÜV Rheinland carries out a verification of the reports accoring to WEEE Directive 2012/19/EU and amendments.

8.5.2 Recycling strategy

The applicant has to provide a detailed recycling strategy and disassemble document. The product shall be designed so as to allow a low-effort separation of significant material fractions, such as plastics, ferrous metal, copper and aluminum.

Plastics shall be separable from each other based on their marked resin identification code.

Packaging components > 25 g shall be separable from other packaging components made of dissimilar materials without the use of tools once the product is removed.
A minimum of 90 percent of the mass of plastics and metals of housing parts/chassis must be recyclable by material (this does not mean the recovery of thermal energy by incineration).

Methodology for assessing and demonstrating compliance:

The applicant shall provide information according their recycling strategy concerning the tested product. Additionally the applicant shall provide a declaration concerning recyclability of housing parts/chassis.

8.5.3 Design for Recycling

The product shall be designed so as to allow specialist companies to dismantle the device into its main parts by the use of commonly available tools for the purpose of recycling.

All discrete plastic parts > 25 g shall be:

- Comprised of a single resin, or a combination of resins (e.g., a blend) that are compatible for recycling, and
- Separable by hand or with commonly available tools from other plastic parts that are > 25 g and not compatible together for recycling
- Printed circuit boards, wires and cables, connectors, electronic components, optical components, acoustic components, ESD components, and EMI components are excluded from this requirement.

Methodology for assessing and demonstrating compliance:

The applicant shall provide a description of disassembly (e.g. as part of the recycling strategy).

8.5.4 Material Selection

The following shall apply to plastic parts (except for cables) with a mass greater than 25 grams as well as to key caps.

8.5.4.1 Marking:

- Plastic parts with a mass greater than 25 grams each and an even surface area of more than 200 mm² shall be permanently marked in accordance with ISO 11469 with due regard to ISO 1043, Parts 1 to 4. Transparent plastic parts the function of which requires transparency (e.g. visible plastic films in displays) shall be exempt from marking according to ISO 11469.

8.5.4.2 Coatings:

- Galvanic coatings and other metallic coatings of plastic housing parts shall not be permitted.

Methodology for assessing and demonstrating compliance:

The applicant shall provide a declaration according the above mentioned requirements. Marking will be tested at the product.

8.5.5 Take Back

The applicant shall meet the following requirements concerning product take back:

- The applicant undertakes to take back eco-labelled and own-manufactured products after use in order to channel them with preference to reuse or to material recycling.
- Non-recyclable device parts shall be disposed of in an environmentally sound manner.
- The devices shall be taken back free of charge - either personally or by shipment - at applicant's facility or at a return facility named by the applicant.
- The product documentation of the device shall provide detailed information on the return options.

Methodology for assessing and demonstrating compliance:

The applicant shall declare compliance with the requirements and provides information concerning product take back (e.g. as part of the recycling strategy).

9 Product function characteristics

9.1 Durability, Repair and Reuse

9.1.1 Service support

Manufacturer shall inform the purchaser about how to obtain repair and replacement services for the product from the date of sale. The information shall be accessible to the purchaser without restriction of access.

9.1.2 Service Standardization

9.1.2.1 Warranty

The applicant undertakes to offer 2 years warranty on the product, at no extra cost.

9.1.2.2 Software Updates

- The applicant undertakes to make functional and security-related software updates for at least four years from the time that production ceases.
- The device shall come with a free function to allow the user to update the operating system.
- The product documents shall provide information on how to implement software updates.

9.1.2.3 Repair and Spare Parts Availability

- The applicant undertakes to perform repairs or provide infrastructures for repair services for at least four years from the time that production ceases and to make sure that the availability of spare parts for device repair is guaranteed for at least four years from the time that production ceases. Spare parts shall be offered at reasonable prices by the manufacturer itself or by a third party. Spare parts are those parts which, typically, may fail or break down within the scope of the ordinary use of a product, as for example power supplies or rechargeable batteries (if any).
- The product documents shall provide information on the assembly of components, spare parts supply and repair services.

Methodology for assessing and demonstrating compliance:

The applicant shall declare compliance with the requirements.

9.2 User guide information

The product shall provide a user manual and safety warning together with product when sold.

The use manual shall contain information that operating guide of product:

a. guidelines concerning the placing or installation of the appliance.

b. Information that ignoring the issues mentioned above will lead to higher energy consumption and therefore higher running costs.

c. Information that the appliance is made of parts and materials, including fluids, which are reusable and/or recyclable.

d. Advice on how the consumer can make use of the manufacturer's take-back offer.

e. Product functions, dimensions and weight to be recorded.

The applicant shall declare compliance of the appliance with these requirements. The applicant shall provide the Competent Body assessing the application with a copy of the instruction manual.

Methodology for assessing and demonstrating compliance:

The applicant shall provide the operating instructions and short guide demonstrating that the information listed above are available.

10 Revision History

Version	Changes on Document	Established by	Date
Ver. 1.0	Draft	Sunny Sun / Ryan Chen / Chole Chen / Jarree Jiang / Xinyue Zhao/ Yonggang Li / Stanley Liu	Oct.11, 2024