BLUE ANGEL

The German Ecolabel

Remanufactured toner cartridges and ink cartridges for printers, copiers and multifunction devices

DE-UZ 177

Basic Award Criteria

Edition July 2021

Version 3

The Environmental Label is supported by the following four institutions:

Federal Ministry
for the Environment, Nature Conservation
and Nuclear Safety

The Federal Ministry for the Environment, Nature Conservation and Nuclear Safety is the owner of the label. It regularly provides information on the decisions taken by the Environmental Label Jury.

Umwelt Bundesamt

The German Environmental Agency with its specialist department for "Ecodesign, Eco-Labelling and Environmentally friendly Procurement" acts as office of the Environmental Label Jury and develops the technical criteria of the Basic Criteria for Award of the Blue Angel.

Jury Umweltzeichen

The Environmental Label Jury is the independent, decision-making body for the Blue Angel and includes representatives from environmental and consumer associations, trade unions, industry, the trade, crafts, local authorities, academia, the media, churches, young people and the German federal states.

RAL gGmbH

The RAL gGmbH is the awarding body for the Environmental Label. It organises the process for developing the relevant award criteria in independent expert hearings – which involve all relevant interest groups.

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Version 1 (07/2021): New Edition, Expiry date: December 31, 2026
Version 2 (11/2021): Changes in chapter 3.1.2, 3.2.1 and 3.2.2.
Version 3 (01/2026): Prolongation without changes, Expir date: December 31, 2028

Table of contents

This document is a translation of a German original. In case of dispute, the original document should be taken as authoritative.

1 Introduction

1.1 Preface

In cooperation with the Federal Ministry for the Environment, Nature Conservation and Nuclear Safety, the German Environmental Agency and considering the results of the expert hearings conducted by RAL gGmbH, the Environmental Label Jury has set up these Basic Criteria for the Award of the Environmental Label. RAL gGmbH has been tasked with awarding the Environmental Label.
Upon application to RAL gGmbH and on the basis of a Contract on the Use of the Environmental Label to be concluded with RAL gGmbH, the permission to use the Environmental Label may be granted to all products, provided that they comply with the requirements as specified hereinafter.
The product must comply with all the legal requirements in the country in which it is to be marketed. The applicant shall declare that the product meets this requirement.

1.2 Background

Ink cartridges and toner cartridges for office equipment with printing function (such as printers, copiers and multifunction devices) are replaced once the ink or toner in them has been used up. Due to the high utilisation of these types of devices, it can be assumed that a significant amount of waste comprising several million empty modules and cartridges will be generated every year, unless the empty cartridges are remanufactured and reused.
The objective of awarding the environmental label for remanufactured ink cartridges and toner cartridges is to reduce the amount of waste and thus make a contribution to the preservation of resources. In addition, the environmental label places requirements on the materials used, the colour former (toner or ink) and the performance characteristics of the ink cartridges and toner cartridges.

Particle emissions from electrophotographic office equipment have been known to be an issue for some time and have been taken into account as particulate matter in the criteria for the Blue Angel for Office Equipment with Printing Function (RAL-UZ 122) and the Blue Angel for Remanufactured Printing Modules with Toner (RAL-UZ 55). Electrophotographic office equipment – especially LED or laser printers – have become the subject of some public debate due to their emission of ultrafine particles during printing operation. The Blue Angel has responded to this public debate on the issue of emissions from electrophotographic printers and the potential health risks associated with fine and ultrafine particles by revising the Basic Award Criteria for the Blue Angel for Office Equipment with Printing Function and the Blue Angel for Remanufactured Toner Cartridges.

Electrophotographic office equipment with print function that have been awarded the Blue Angel RAL-UZ 171, DE-UZ 205 or DE-UZ 219 fulfil the strictest requirements with respect to the release of fine and ultrafine particles during the printing process. In the revision of the Basic Award Criteria for Remanufactured Toner Cartridges, the requirements for the restriction of emissions in the environmental label for electrophotographic office equipment are now being transferred to the environmental label for toner cartridges. The aim is to make remanufactured toner cartridges with the Blue Angel available to interested suppliers and users so that, in combination with low emission office equipment according to RAL-UZ 171, DE-UZ 205 or DE-UZ 219, they

comply with the strict requirements for the release of fine and ultrafine particles during the printing process.

Inkjet devices also have to fulfil strict emission requirements and other requirements for the substances (azo dyes and biocides) added to the inks. As is the case with toner cartridges, the aim of these Basic Award Criteria is to make remanufactured ink cartridges available that meet the requirements for low emission office equipment certified in accordance with RAL-UZ 171, DE-UZ 205 or DE-UZ 219.

Therefore, the following benefits for the environment and health are stated in the explanatory box:

1.3 Definitions[1]

AMES test (mutagenicity test): Bacterial testing method for mutagenic properties of substances.
Note on this term: This test was developed in the 1970's by Professor Bruce N. Ames (University of California, Berkeley) and is considered the most well-known bacterial test for the mutagenic effect of substances.

Remanufactured (rebuilt): Used, repaired by replacing wear parts and filled with new toner
Note on this term: Remanufacturing does not necessarily use original spare parts. Requirements for the remanufacturing process are laid down, for example, in the standards DIN 33870 and DIN 33871.

Remanufacturing: Repair by replacing wear parts and filling with new toner or new ink.

Yield: The number of flawless prints that can be produced under defined conditions with an unused printer cartridge until the abort criterion is reached.

Efficiency rate (ratio): Ratio between the efficiency of a remanufactured printer cartridge (A) and the efficiency of a comparison product (V), determined under identical test conditions (efficiency rate = EZ, ratio = VZ):
EZ = A/V
VZ = EZ

[1] Mostly based on DIN 33867:2018-10 and DIN 33871-1:2013-12

Colour former: Material that is applied to the printing medium to achieve a change in colour. Note 1 on the term: In the sense of these Basic Award Criteria, colour former are toners and/or inks.

Manufacturer: Any natural or legal person who manufactures a product or commissions the development or manufacturing of a product and places the product on the market using its own name or brand.

Distributor: The company that places a product on the market for the first time under its own name or brand.

Cartridge families: Cartridges that use the same colour former and have the same functional properties.

Ink cartridge families: Ink cartridges that use the same colour former and have the same functional properties.

User: User of the device, including network administrators. Product or service technicians of the company that distributes the device or the company responsible for its maintenance are not considered users.

Residual toner: Toner that is still present in the toner cartridge before remanufacturing.
Note 1 on this term: Residual toner is not only the non-used fresh toner but also the toner that accumulates after the printing process which has not been transferred onto the paper from the OPC drum.

Toner: Powder to be applied to the printing medium during the electrophotographic printing process
Note 1 on the term: Toner is also used to describe so-called liquid toner.

Toner cartridge (toner module): Toner container with or without a photo-semiconductor drum, charging unit, developing unit, cleaning unit and residual toner container.

Ink: A liquid in which dyes, pigments and other additives are dissolved or finely dispersed and which dries in contact with air and/or by absorption.

Ink cartridge: Container for the ink (with or without a print head).

2 Scope

These Basic Award Criteria apply to remanufactured ink cartridges and toner cartridges with toner or ink for use in office equipment with an electrophotographic printing function or in inkjet devices. The ink cartridges and toner cartridges may also contain additional parts required for the printing process that can be used on office equipment with printing function.

The test methods described in DIN Technical Report 155 or standard DIN 33870 for determining the performance/quality characteristics or, alternatively, the requirements stated in standard

DIN 33870-1 are valid for remanufactured toner cartridges that are exclusively designed for use in monochrome office equipment with printing function and which were placed onto the market for the first time before 31/12/2012.

The test methods described in DIN Technical Report 155 for determining the performance/quality characteristics or, alternatively, the requirements stated in standard DIN 33870-2 are valid for remanufactured toner cartridges that are exclusively designed for use in 4-colour office equipment with printing function and which were placed onto the market for the first time before 31/12/2013.

The test methods described in standard DIN 33871-1:2003-10 are still valid for remanufactured ink cartridges that are exclusively designed for use in inkjet printers and which were placed onto the market for the first time before 31/12/2011.

With respect to the requirements for the remanufacturing process, labelling and health and safety, the standards DIN 33870-1:2020-08 and 33870-2:2020-08 are valid for toner cartridges and standard DIN 33871-1:2013-12 for ink cartridges.

Remanufactured ink cartridges and toner cartridges designed for use in office equipment that were placed onto the market for the first time after the dates listed above must comply with the standards DIN 33870-1:2020-08[2], 33870-2:2020-08[3] and DIN 33871-1:2013-12[4].

3 Requirements

3.1 Requirements for the ink cartridges and toner cartridges and the remanufacturing process

3.1.1 Collection and disposal

The applicant must be able to provide proof of a suitable collection system. Empty and used ink cartridges and toner cartridges (including their components) supplied by the applicant must be recovered for the purpose of remanufacturing as part of this system. If the applicant is not certified in accordance with DIN EN ISO 14001, the operator of the collection system must be certified in accordance with DIN EN ISO 14001 or must submit an equivalent process description.

If it is not possible to remanufacture the cartridges again while complying with the process steps described in DIN 33870-1, DIN 33870-2 or DIN 33871-1 for technical reasons, the applicant must still ensure that the cartridges can be returned and recycled or disposed of properly.

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[2] DIN 33870-1 Requirements and tests for the preparation of refilled toner modules for electrophotographical printers, copiers and facsimile machines - Part 1: Monochrome printers (black/white);

[3] DIN 33870-2 Requirements and tests for the preparation of refilled toner modules for electrophotographical printers, copiers and facsimile machines - Part 2: 4-colour printers

[4] DIN 33871-1 Office machines, inkjet print heads and inkjet tanks for inkjet printers - Part 1: Preparation of refilled inkjet print heads and inkjet tanks for inkjet printers

The applicant must ensure that any residual toner is collected in dust-proof, enclosed containers and passed on for material or thermal recycling.

Compliance verification

The applicant shall declare compliance with the requirements in Annex 1 to the contract pursuant to DE-UZ 177 and submit information on the take-back system (Annex 4).

3.1.2 Remanufacturing of toner cartridges

The toner cartridges must be remanufactured in accordance with remanufacturing instructions that describe the remanufacturing process. Tests to verify the functionality of the toner cartridges according to DIN 33870-1 or DIN 33870-2 must be carried out and documented. The remanufacturing process must include the following steps in accordance with DIN 33870-1 or DIN 33870-2 and must be documented:

- Incoming goods inspection and marking of quality-relevant components, such as purchased parts and raw materials.
- Inspection of empty and used toner cartridges. The applicant must ensure the use of empty cartridges that had been marketed by the original equipment manufacturers (OEMs) or remanufactured in accordance with DIN 33870-1 and DIN 33870-2.

The following steps can be carried out during the remanufacturing process:

- Disassembly of the toner cartridge, if this is required to maintain its quality;
- Removal of the residual toner;
- Cleaning of the components intended for reuse;
- Removal or permanent concealing of the OEM part number and OEM logo;[5]
- Filling of the toner container with the specified amount and type of toner as shown in the parts list;
- Assembly of the specified components according to the parts list;
- Testing the functionality of each toner module on a printer;
- Visual inspection of the finished toner cartridge;
- Labelling of the toner cartridge with a serial number or batch number to ensure the traceability of the remanufacturing process.

Before the cartridges are filled with toner, the remanufactured toner cartridges must consist of at least 75% (percent by mass) remanufactured parts. The following parts that have a direct impact on the print quality are excluded:

- OPC (organic photo conductor);
- Chip;
- Wiper blade;
- Doctor/DO blade.

In the case of remanufactured toner cartridges with a yield that is at least 50% greater than that of the original toner cartridge (efficiency rate EZ ≥ 1.5 according to DIN 33870-1 or DIN

[5] As an exception to the requirements in standards DIN 33870-1 or DIN 33870-2, it is not necessary to remove the OEM part number and/or the logo. Clear labelling of the product as a refilled cartridge in accordance with Paragraph 3.1.6 is obligatory.

33870-2, see Section 2.24 of DIN 33867), the weight of the replaced toner containers can be ignored when calculating the proportion of remanufactured parts.

Compliance verification

The applicant shall declare compliance with the requirement in Annex 1 to the contract pursuant to DE-UZ 177 and state the proportion of recycled parts in percent by mass (+/- 5%) for every type of module in Annex 2.

3.1.3 Remanufacturing of ink cartridges

The ink cartridges must be remanufactured in accordance with remanufacturing instructions that describe the remanufacturing process. Tests to verify the functionality of the ink cartridges according to DIN 33871-1 (Section 7) must be carried out and documented. The remanufacturing process must include the steps described in DIN 33871-1 (Section 4) and must be documented.[6]

Before the cartridges are filled with ink, the remanufactured ink cartridges must consist of at least 75% (percent by mass) remanufactured parts. The following parts that have a direct impact on the print quality are excluded:

- Chip.

In the case of remanufactured ink cartridges with a yield that is at least 50% greater than that of the original ink cartridge (efficiency rate EZ ≥ 1.5 according to DIN 33871-1, see Section 3.6), the weight of the replaced ink containers can be ignored when calculating the proportion of remanufactured parts.

Compliance verification

The applicant shall declare compliance with the requirement in Annex 1 to the contract pursuant to DE-UZ 177 and state the proportion of recycled parts in percent by mass (+/- 5%) for every type of ink cartridge in Annex 2.

3.1.4 Requirements for housing parts

New parts added to the ink cartridges or toner cartridges by the applicant by way of addition or replacement are not permitted to contain any halogenated polymers.
The plastic parts added to the cartridges must not contain PBDEs (polybrominated diphenyl ethers) or PBBs (polybrominated biphenyls) as flame retardants.
If the plastic parts added to the cartridges weigh more than 25 grams, they must be marked in accordance with ISO 11469:2017-01, while taking ISO 1043, Parts 1 to 4, into consideration.

Compliance verification

The applicant shall declare compliance with the requirements in Annex 1 to the contract pursuant to DE-UZ 177.

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[6] As an exception to the requirements in standard DIN 33871-1, it is not necessary to remove the OEM part number and/or the logo. Clear labelling of the product as a refilled ink cartridge in accordance with Paragraph 3.1.6 is obligatory.

3.1.5 Documentation

The origin of the empty ink cartridges and toner cartridges collected for remanufacturing and the remanufacturing process must be documented in accordance with the requirements of DIN 33870-1 or DIN 33870-2 (this also applies to ink cartridges):

- Parts lists must exist for every ink cartridge and toner cartridge to be remanufactured that indicate which original components or alternative components are used. The components used must be documented for each production batch. New or reused parts must be marked in the parts list.
- For each production batch of the remanufactured ink cartridges and toner cartridges, the applicant must state which new and reused parts have been used and document the proportion of reused parts according to Paragraphs 3.1.2 and 3.1.3 (in percent by mass) and the amount of ink or toner used to refill the cartridges.

The records and results must be checked, evaluated for their plausibility and confirmed in the form of a test report in accordance with Annex 5 and a signed copy of Annex 2 to the contract pursuant to DE-UZ 177 by an independent specialist body at the production site where the used ink cartridges or toner cartridges are remanufactured.
Independent specialist bodies are:

- An independent environmental verifier in accordance with Article 9 of the German Environmental Audit Act[7] (Umweltauditgesetz) for approval area 38 (recycling, waste disposal), or
- Publicly certified experts in accordance with Article 36 of the German Industrial Code[8] for the Specialist Areas of Waste Recycling, Waste Disposal Technology, Plastic Recycling, Plastic Technology and the Disposal of Packaging (Gewerbeordnung für die Sachgebiete Abfallverwertung, Abfalltechnik, Kunststoffrecycling, Kunststofftechnik bzw. Verpackungsentsorgung), or
- Environmental verifiers in accordance with Directive (EG) No. 1221/2009 Article 2, Definition no. 20. If the verification checks are carried out by environmental verification organisations (i.e. not by natural persons), the person responsible for the completion of the tests must be specifically named by the organisation, or
- Accredited certification bodies for environmental management systems according to DIN EN ISO 14001.

With regards to the obligation to provide information, the dealer (distributor) is free to choose in the case of remanufactured toner cartridges whether to provide the information required according to Section 7.5 of DIN 33870-1 or DIN 33870-2 on its own website or to provide a link to the relevant information on the manufacturer's website. If the dealer provides this information on its own website, the applicant is responsible for ensuring that he/she complies with the requirements according to DIN 33870-1 or DIN 33870-2.
In the case of refilled ink cartridges, the dealer (distributor) is free to choose whether to provide the information from the test report (Section 8 of DIN 33871-1) on its own website or to provide a link to the relevant information on the manufacturer's website.

[7] German Environmental Audit Act (Umweltauditgesetz – UAG) from 6 December 2011, BGBl. I p. 2509
[8] German Industrial Code (Gewerbeordnung – GewO), new version from 22 February 1999 BGBL I

Compliance verification

The applicant shall submit a confirmation according to Annex 5 and a signed copy of Annex 2 every two years after the award of the contract. In the case of refilled toner cartridges, the applicant shall submit the information sheet according to Section 4.2 of DIN 33870-1 or DIN 33870-2 and state the website where this information is published in accordance with Section 7.5 of DIN 33870-1 or DIN 33870-2 in Annex 2.
In the case of refilled ink cartridges, the applicant shall submit the test report according to Section 8 of DIN 33871-1 and state the website where this information is published in Annex 2. To verify the specialist information provided, the approval certificate for the environmental verifier or the accreditation certificate for the publicly certified expert shall be included with the confirmation. In the case of accredited certification bodies for environmental management systems according to DIN EN ISO 14001, their accreditation certificate must be enclosed as an annex (Annex 6).

3.1.6 Labelling

3.1.6.1 Ink cartridges/toner cartridges

Remanufactured ink cartridges or toner cartridges must be clearly labelled as such in accordance with Section 7 of standards DIN 33870-1 or DIN 33870-2 or Section 9 of standard DIN 33871-1. It is recommended that the Blue Angel logo (DE-UZ 177) is also depicted on the toner cartridge or ink cartridge.

The applicant must ensure that products labelled with the environmental label do not have the same name as other cartridges produced by the same manufacturer.

Compliance verification

The applicant shall declare compliance with the requirements in Annex 1 to the contract pursuant to DE-UZ 177 and submit supporting information with the application (Annex 15).

3.1.6.2 Packaging

The information on the packaging must comply with the requirements in Section 7.3 of standards DIN 33870-1 or DIN 33870-2 and Section 9.3 of DIN 33871-1. The Blue Angel logo (DE-UZ 177) must also be depicted on the packaging.
The plastics used for the packaging of the toner cartridges or ink cartridges are not permitted to contain any halogenated polymers.
The plastics used must be marked in accordance with the currently valid version of Annex 5 of the German Packaging Act (Verpackungsgesetz).
Paper and cardboard in the packaging must contain at least the following proportions of recycled fibres for the following packaging materials:

- Paperboard: 80%
- Corrugated cardboard: 25%
- Solid fibreboard: 40%
- Wound tubes: 90%

Alternatively: The packaging design must be as simple as possible and must take into account easy reusability and the environmental impact related to disposal of the packaging.

The distributor must provide detailed information, including the exact proportion of recycled materials used in the packaging.

Compliance verification

The applicant shall declare compliance with the requirements in Annex 1 to the contract pursuant to DE-UZ 177 and state the packaging material.
For paper and cardboard, the distributor shall either declare that the packaging materials used for the products contain at least the stated proportions of recovered fibres (Annex 1) or provide detailed information on the packaging in Annex 3.
The applicant shall enclose the layout for the packaging with the application (Annex 16).

3.1.6.3 User information and instructions for handling the toner cartridges and ink cartridges

The user information must comply with the requirements in Section 7.4 of standards DIN 33870-1 or DIN 33870-2. In addition, the user information must provide the user with clear instructions on the proper handling of the ink cartridges and toner cartridges. The user information must state that it is not permitted to open the ink cartridges or toner cartridges by force and that users should take precautions to avoid breathing in the dust or allowing it to come into contact with the skin if toner dust does leak from the toner cartridge due to improper handling. Furthermore, information on what to do in case of skin contact must be included.
The user information should emphasise that the toner cartridges and ink cartridges must be stored out of the reach of children.

Compliance verification

The applicant shall declare compliance with the requirements in Annex 1 to the contract pursuant to DE-UZ 177 and submit the user information (Annex 7).

3.2 Requirements for the toners and inks used

3.2.1 Heavy metals

The toners and inks must not contain any substances which contain mercury, cadmium, lead, nickel or chromium VI compounds as constituent components.
Production-related contamination by heavy metals such as cobalt and nickel must be kept as low as technically possible and economically reasonable (ALARA principle = as low as reasonably achievable). The heavy metal contents of the toner powder must by determined in accordance with the criteria catalogue of TÜVRheinland[9] or IFA[10]. The contents must be less than or equal to the stated test values in the following table.

[9] TÜV Rheinland Prüfgrundlage 2 PfG S 0136/07.2021 "Druckmodule mit Toner" VOC- und Formaldehyd-Emissionsprüfung von Konsumgütern | DE | TÜV Rheinland (tuv.com)
[10] Institut für Arbeitsschutz der DGUV: GS-IFA-G03, Ausgabe 12/2018: https://www.dguv.de/medien/dguv-test-medien/_pdf_zip_doc_ppt/pruefgrundsaetze/ifa/gs_ifa_g03_2018_12.pdf

Table 1: Permissible test values for heavy metals and metalorganic compounds

Test parameter	Determination method	Test values [mg/kg]
Cadmium	ICP/MS or ICP-OES	5.0
Cobalt	ICP/MS or ICP-OES	25
Nickel	ICP/MS or ICP-OES	70
Lead	ICP-MS or ICP/OES	25
Mercury	AFS or ICP/MS	2.0
Chromium VI (as Chromium)	ICP/MS or ICP/OES	1.0
Total tributyltin (TBT) and dibutyltin (DBT))	Method A[9]: GC/MS[11] Method B[9]: GC/MS IFA [10]: ICP-MS (total organotin compounds)	0,5 0,05 1 (determination limit)
Total other organotin compounds[12]	Method A[9]: GC/MS IFA [10]: ICP-MS	5 5

Compliance verification

The applicant shall verify compliance with the requirements by submitting a declaration from the manufacturers or suppliers of the ink or toner as Annex 8 to the contract pursuant to DE-UZ 177 confirming that no mercury, cadmium, lead, nickel, or chromium VI compounds have been added as constituent components and that production-related contaminations (by heavy metals such as cobalt, nickel or organotin compounds) have been minimized. The applicant shall submit a test report to verify compliance with the test values in Table 1 (Annex 9). The testing laboratory must be accredited according to ISO/IEC 17025. The testing institution shall enclose a copy of the valid accreditation certificate (Annex 10).

3.2.2 Azo colourants

Colour toners and inks are not permitted to contain dyes or pigments that can release carcinogenic aromatic amines included in the list of aromatic amines in Regulation (EG) 1907/2006 (REACH Regulation), Annex XVII, Appendix 8[13] (also see TRGS 614).

In the case of inks, the content of the primary amines in the azo colourant must not exceed 0.05%. Compliance with this requirement must be verified by submitting an analysis carried out in accordance with DIN 55610:1986 or ETAD Method 212 (2016).

Compliance verification

The applicant shall submit a declaration from the manufacturers or suppliers of the ink or toner as Annex 8 to the contract pursuant to DE-UZ 177 to verify that dyes, colourants or pigments that can release carcinogenic aromatic amines included in the list of aromatic amines in Regulation (EG) 1907/2006 (REACH Regulation), Annex XVII, Appendix 8[14] (also see TRGS 614) have

[11] Method A applies to extraction with methanol. If the guideline value set by method A is exceeded, method B (extraction with artificial sweat solution) is applied.
[12] Sum of butyltin, tetrabutyltin, octyltin, dioctyltin, tricyclohexyltin and triphenyltin
[13] See Amending Regulation (EC) No 552/2009 of 22 June 2009
[14] Established determination method, see Appendix B

not been added as constituent components. In the case of inks the applicant shall submit a test report to verify compliance (Annex 9). The testing laboratory must be accredited according to ISO/IEC 17025. The testing institution shall enclose a copy of the valid accreditation certificate (Annex 10).

3.2.3 Biocides in inks

Only those substances (active substances or biocides) may be used for which an active substance dossier for preservatives for products during storage (product type 6) according to the Biocidal Product Regulation (BPR, Regulation (EU) 528/2012) has been submitted. If inclusion on the list of approved substances for product type 6 is rejected after an evaluation has been completed, the use of this substance is no longer permitted.

Compliance verification

The applicant shall verify compliance with the requirement by submitting a declaration from the manufacturer of the toner or ink (Annex 8) and enclosing a valid safety data sheet (Annex 11).

3.2.4 Other ingredients

The toners and inks must not contain any substances as constituent components that fulfil the following conditions according to Table 2.

Table 2: Conditions for the exclusion of substances as intentionally added constituent components in toners and inks (1)

Hazard class	**Hazard category**	**CLP Regulation (EC) No. 1272/2008**
Carcinogenicity	Carc. 1A, 1B	H350 May cause cancer.
Carcinogenicity	Carc. 1A, 1B	H350i May cause cancer if inhaled.
Carcinogenicity	Carc. 2	H351[15] Suspected of causing cancer
Germ cell mutagenicity	Muta. 1A, 1B	H340 May cause genetic defects.
Germ cell mutagenicity	Muta. 2	H341 Suspected of causing genetic defects.
Reproductive toxicity	Repr. 1A, 1B	H360 May damage fertility or the unborn child.
Reproductive toxicity	Repr. 2	H361 Suspected of damaging fertility or the unborn child.
Substances included in the so-called "list of candidates" in accordance with Article 59 of the REACH Regulation. The version of the list of candidates at the time of application is valid.[16]		

In addition, the inks and toners must not contain any substances as constituent components which require labelling of the mixture according to Annex 1 of Regulation (EC) No. 1272/2008 with H phrases or which meet the criteria for such classification (Table 3).

Table 3: Conditions for the exclusion of substances as intentionally added constituent components in toners and inks (2)

[15] An exemption is made for titanium dioxide that is required in toners for technical reasons. See Paragraph 3.2.4

[16] http://echa.europa.eu/de/candidate-list-table. For substances on the list of candidates, a general limit value of 0.1% (m/m) or a stricter value – calculated based on a classification in accordance with the hazard classes in the CLP Regulation – must be observed.

Hazard class	Hazard category	CLP Regulation (EC) No. 1272/2008
Specific target organ toxicity single exposure	STOT SE1	H370 Causes damage to organs.
Specific target organ toxicity single exposure	STOT SE2	H371 May cause damage to organs.
Specific target organ toxicity repeated exposure	STOT RE1	H372 Causes damage to organs through prolonged or repeated exposure.
Specific target organ toxicity repeated exposure	STOT RE2	H373 May cause damage to organs through prolonged or repeated exposure.

Compliance verification

The applicant shall verify compliance with the requirements by submitting a declaration from the manufacturers or suppliers of the inks or toners as Annex 8 to the contract pursuant to DE-UZ 177. Safety data sheets for all of the inks and toners must be enclosed with the application (Annex 11a). Provided that the safety data sheet for the ink or toner does not show a negative AMES text, the test result for this test must be given separately (Annex 12).

3.2.5 Restriction to the use of titanium dioxide (TiO_2)

The use of TiO_2 in powder form in the toner (mixture) must be limited. From 1 October 2021, the amount of actively added TiO_2 with an aerodynamic diameter less than 10 µm must be lower than 1%. The use of TiO_2 < 1 % is still permitted because respirable emissions above the limit value for particle emissions are minimised in accordance with Paragraph 3.3.2.

Compliance verification

The applicant shall verify compliance by submitting a declaration from the manufacturer of the ink or toner powder (Annex 8).

3.3 Substance emissions

3.3.1 Testing guidelines

The substance emissions from office equipment with print function that have been certified with the Blue Angel environmental label must not exceed the defined limits in Basic Award Criteria DE-UZ 219 when using the original ink cartridges and toner cartridges. The relevant testing guidelines are published as Appendix S-M to Basic Award Criteria DE-UZ 219, this method for evaluating the emission tests should also be used for remanufactured toner cartridges. An exception is made for the determination of ozone emissions.

3.3.2 Emission tests for electrophotographic devices

The emission rates in the pre-operating and print phases must be determined and recorded in accordance with the test methods described in Appendix S-M to Basic Award Criteria DE-UZ 219. They must not exceed the following values (Table 4):

Table 4: Permissible test values for emission rates as determined according to Appendix S-M for electrophotographic devices

(All values in mg/h, except for particle emissions)		**Monochrome printing**	**Colour printing**
Pre-operating phase	TVOC*[1]	1 (Desktop devices) 2 (Floor-mounted devices, device volume > 250 l)	1 (Desktop devices) 2 (Floor-mounted devices, device volume > 250 l)
Print phase (= pre-operating + print phase)	TVOC*[1]	10	18
	Benzene	< 0.05	< 0.05
	Styrene	1.0	1.8
	Unidentified single substances VOC	0.9	0.9
	Dust	4.0	4.0
Print phase	$PER_{10\ PW}$ [particles/10min]*[2]	2,5* 10^{11}	2,5* 10^{11}

*[1] Please see the list of volatile organic compounds which must be considered when measuring emissions from office equipment with printing function (see Appendix S-M, Paragraph 4.5 VOCs).
PER10 = n,m * 10x [particles/10 min]
*[2] The test value will be gradually introduced and will only come into force fully from 2025. See explanations below

TVOC, benzene, styrene, dust (gravimetric):
Provided that the determined emission rate also meets the test values for monochrome printing when printing out the colour test pattern, no additional testing of colour printing devices is required for monochrome printing. For colour printing devices, the dust emission rate is determined in colour mode, while it is determined in monochrome mode for monochrome devices. If the page throughput SF is more than 20% below the page throughput SM, a test in monochrome printing mode is also required and the test values for monochrome printing must also be fulfilled.

Particle emissions in the fine and ultrafine particle size range:
In the case of remanufactured toner cartridges that can be used in at least one desktop device (devices with a volume ≤ 250l) that has been certified in accordance with RAL-UZ 171, DE-UZ 205 or DE-UZ 219 or which were placed onto the market for the first time after 01/01/2013, the particle emissions must be determined and the test values must be observed.
In the case of remanufactured toner cartridges that are exclusively designed for use in floor-mounted devices (devices with a volume > 250l) that have been certified in accordance with DE-UZ 205 or DE-UZ 219 or which were placed onto the market for the first time[17] after 01/01/2017, the particle emissions must be determined and the test values must be observed.

[17] Date of the EU declaration of conformity for the office equipment with print function

The following conditions apply:
For colour printing devices, particle emissions are determined in colour mode. If the page throughput SF is more than 20% below the page throughput SM, a test in monochrome printing mode is required and the test values must be fulfilled. For monochrome devices, particle emissions are determined in monochrome mode.
The particle emissions can be tested on all configurations of the device with an identical construction. The size of the test chamber must in each case comply with the criterion for the loading factor according to Appendix S-M, Paragraph 4.2.
If the particle emissions are "not quantifiable" according to Appendix S-M, Paragraph 4.9.3, Step 9, the test value is considered to have been fulfilled.
For remanufactured toner cartridges that are inserted into devices certified in accordance with DE-UZ 219, the following test values apply:
From 01/01/2021, the test value for $PER_{10\ PW}$ [particles/10min] of ≤ $3.5*10^{11}$ is valid.
From 01/01/2023, the test value for $PER_{10\ PW}$ [particles/10min] of ≤ $3.0*10^{11}$ is valid.
From 01/01/2025, the test value for $PER_{10\ PW}$ [particles/10min] of ≤ $2.5*10^{11}$ is valid.

If the same type of module (identical design) is used for cartridge families for printers, copiers or multifunction devices, the tests must be carried out on the device with the highest printing speed.
The type of toner must be stated in the test report. RAL must be informed about any change to the type of toner (type designation, change of recipe) and this will require the submission of a new test report.

Compliance verification

The applicant shall verify compliance with the requirements by submitting a test report according to the test methods for determining the emission rates described in the testing guidelines (Appendix S-M) for Basic Award Criteria DE-UZ 219 that was issued by a testing institution suitable for this test. The test report must state the exact device designation of the test device. (Test results: Annex 13a, Test report: Annex 13b). The applicant shall name the devices in which the tested toner cartridge can be used in Annex 2.
The qualification of the testing institution for the emission measurements is, for the time being, to be established to the satisfaction of the German Federal Institute for Materials Research and Testing (Bundesanstalt für Materialforschung und– prüfung) Working Specialist department 4.2 and documented in an annex to the test report, insofar as this document has not already been submitted to RAL.

3.3.3 Emission measurements for inkjet devices

The emission rates in the pre-operating and print phases must be determined and recorded in accordance with the test methods described in Appendix S-M to the Basic Award Criteria DE-UZ 219. They must not exceed the following values (Table 5):

Table 5: Permissible test values for emission rates determined according to Appendix S-M for inkjet devices

(All values in mg/h, except for particle emissions)		**Monochrome printing**	**Colour printing**
Pre-operating phase	TVOC*[1]	1 (Desktop devices) 2 (Floor-mounted devices, device volume > 250 l)	1 (Desktop devices) 2 (Floor-mounted devices, device volume > 250 l)
Print phase (= pre-operating + print phase)	TVOC*[1]	10	18
	Benzene	< 0.05	< 0.05
	Styrene	1.0	1.8
	Unidentified single substances VOC	0.9	0.9

*[1] Please see the list of volatile organic compounds which must be considered when measuring emissions from office equipment with printing function (see Appendix S-M, Paragraph 4.5 VOCs).

Provided that the determined emission rate also meets the test values for monochrome printing when printing out the colour test pattern, no additional testing of colour printing devices is required for monochrome printing. If the page throughput SF is more than 50% below the page throughput SM, a test in monochrome printing mode is also required and the test values for monochrome printing must also be fulfilled.

If the same type of module or colour former (identical design) is used for ink cartridge families for printers, copiers or multifunction devices, the tests must be carried out on the device with the highest printing speed.

The test report must list the types of ink used for testing. RAL gGmbH must be informed about any change to the type of ink and this will require the submission of a new test report.

Compliance verification

The applicant shall verify compliance with the requirements by submitting a test report according to the test methods for determining the emission rates described in the testing guidelines (Appendix S-M) for Basic Award Criteria DE-UZ 219 that was issued by a testing institution suitable for this test. The test report must state the exact device designation of the test device. (Test results: Annex 13a, Test report: Annex 13b). The applicant shall name the devices in which the tested ink cartridge can be used in Annex 2.
The qualification of the testing institution for the emission measurements is, for the time being, to be established to the satisfaction of the German Federal Institute for Materials Research and Testing (Bundesanstalt für Materialforschung und– prüfung) Working Specialist department 4.2 "Materials and Air Pollutants" and documented in an annex to the test report, insofar as this document has not already been submitted to RAL.

3.3.4 Fitness for use

Ink cartridges, printing modules or toner containers must be sealed to prevent any toner dust or other colour former from escaping during storage and transport.
Remanufactured modules or cartridges that have been refilled with monochrome or colour toner or ink must comply with the requirements in standards DIN 33870-1 (for monochrome printing equipment), DIN 33870-2 (for 4-colour printing equipment) or DIN 33871-1 (ink cartridges).

The test results must be documented for every type of ink module/toner cartridge in accordance with Appendix C of the above-named standards.
For each type of remanufactured ink/toner cartridge and for each product range in the case of combined orders, the distributor must produce a safety data sheet (according to Article 6 of the German Ordinance on Hazardous Substances and Regulation (EG) 1907/2006 (REACH)[18]) for the ink/toner used in the cartridges in German or, where relevant, English that specifies the item numbers.

Compliance verification

The applicant shall declare compliance with the requirements in Annex 1 to the contract pursuant to DE-UZ 177 and submit test reports according to Annex 14 to the contract pursuant to DE-UZ 177 and state the link to the corresponding website in Annex 2. Any change to the type of ink/toner will require the submission of a new test report / a declaration and a safety data sheet, as well as a test report according to DIN 33870-1, DIN 33870-2 or DIN 33871-1 and a test report of the emissions test according to Paragraph 3.3.2.

4 Applicants and Parties Involved

Manufacturers of final products according to Paragraph 2 shall be eligible for application.

Parties involved in the award process are:
- RAL gGmbH to award the Blue Angel Environmental Label,
- the federal state being home to the applicant's production site,
- Umweltbundesamt (German Environmental Agency) which after the signing of the contract receives all data and documents submitted in applications for the Blue Angel in order to be able to further develop the Basic Award Criteria.

5 Use of the Environmental Label

The use of the Environmental Label by the applicant is governed by a contract on the use of the Environmental Label concluded with RAL gGmbH.

Within the scope of such contract, the applicant undertakes to comply with the requirements under Paragraph 3 while using the Environmental Label.

Contracts on the Use of the Environmental Label are concluded to fix the terms for the certification of products under Paragraph 2. Such contracts shall run until December 31, 2028.
They shall be extended by periods of one year each, unless terminated in writing by March 31, 2028 or March 31 of the respective year of extension.
After the expiry of the contract, the Environmental Label may neither be used for labelling nor for advertising purposes. This regulation shall not affect products being still in the market.

[18] Regulation (EG) 1907/2006 (REACH), especially Articles 31-36 and Annex II https://eur-lex.europa.eu/legal-content/DE/TXT/?uri=CELEX%3A02006R1907-20140410

The applicant (manufacturer) shall be entitled to apply to RAL gGmbH for an extension of the right to use the ecolabel on the product entitled to the label if it is to be marketed under another brand/trade name and/or other marketing organisations.

The Contract on the Use of the Environmental Label shall specify:

- Applicant (manufacturer)
- Brand/trade name, product description
- Distributor (label user), i.e. the above-mentioned marketing organisations.

Appendix A Cited legislations and standards, literature

Observance of the legal regulations according to European and German law is a prerequisite for products labelled with the environmental label. In particular, this includes:

[1] The WEEE Directive (2012/19/EU)[19] implemented in German law in the Electrical and Electronic Equipment Act (ElektroG)[20] that regulates the disposal of products.

[2] The ROHS Directive (2011/65/EU)[21] implemented in German law in the German Material Ordinance for Electrical and Electronic Equipment (ElektroStoffV)[22] that regulates the pollutant content of products.

[3] The substance requirements defined by the EU Chemicals Regulation REACH (1907/2006/EC)[23] and the POP Regulation (850/2004/EC)[24].

[4] The EU Directive 94/62/EC on packaging and packaging waste implemented in German law in the German Packaging Law (VerpackG)[25].

[19] Directive 2012/19/EU on waste electrical and electronic equipment (new version); WEEE Directive

[20] Law for the sale, return and environmental disposal of electrical and electronic equipment, Electrical and Electronic Appliance Act from 20 October 2015 (BGBl. I P. 1739); ElektroG

[21] Directive 2011/65/EU on the restriction of the use of certain hazardous substances in electrical and electronic equipment (new version); ROHS Directive

[22] Ordinance to limit the use of hazardous substances in electrical and electronic equipment (Material Ordinance for Electrical and Electronic Equipment); ElektroStoffV

[23] Regulation (EC) No. 1907/2006 concerning the Registration, Evaluation, Authorization, and Restriction of Chemicals; REACH Regulation

[24] Regulation (EC) No. 850/2004 on persistent organic pollutants; POP Regulation

[25] Law for the sale, return and high-quality recycling of packaging (VerpackG) from 1 January 2019 (BGBl. I P. 1328)

Appendix B Method for determining organotin compounds in toners

(according to the criteria catalogue from TÜV Rheinland LGA Products GmbH: Criteria catalogue "Printing Modules with Toner" / "TÜVRheinland Certified", product group: Printing modules with toner, status 08/ 2013)

Weigh 0.3 to 0.5 g of toner powder into an extraction vessel. Mix the toner powder with 30 ml of extractant, an acetic acid, methanol buffer solution and internal standards [tributyltin (d 27), tetrapropyltin (d 7), butyltin (d 9)]. The extraction must be performed at room temperature in an ultrasonic bath for 1 hour. Decant the extract into a 100 ml volumetric flask. For the purpose of derivatisation, stir 5 ml of n-hexane and 100 µl of sodium tetraethylborate solution (2 g sodium tetraethylborate in 10 ml tetrahydrofuran) into the filtrate and stir for 1 hour.
Mix the remaining toner powder for a second time with 30 ml of acetic acid, methanol buffer solution and extract it for 1 hour in an ultrasonic bath at room temperature. Decant the extract into a second 100 ml volumetric flask. For the purpose of derivatisation, stir 5 ml of n-hexane and 100 µl of sodium tetraethylborate solution into the filtrate and stir for 1 hour.
Fill both volumetric flasks with distilled water, isolate the n-hexane phases and combine them. Then evaporate the n-hexane solution and fill the volumetric flask up to 1 ml.
Determine the organotin compounds in the n-hexane extract using gas chromatography with mass selective detection in SIM mode.