

**BLUE ANGEL**

**The German Ecolabel**



**Remanufactured Toner Modules**

**DE-UZ 177**

**Basic Award Criteria**

**Edition January 2017**

**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.



The German Environmental Agency with its specialist department for "Ecodesign, Eco-Labeling 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.



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.



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.

If you require further information please contact:

RAL gGmbH

**RAL UMWELT**

Fränkische Straße 7

53229 Bonn

Tel: +49 (0) 228 / 6 88 95 - 190

E-Mail: [umweltzeichen@ral.de](mailto:umweltzeichen@ral.de)

[www.blauer-engel.de](http://www.blauer-engel.de)

Version 1 (01/2017): First Edition, Expiry date: December 31, 2021  
Version 2 (04/2020): Changes in chapter 3.2.3  
Version 3 (02/2021): Editorial amendments

## Table of contents

1	Introduction .....	4
1.1	Preface .....	4
1.2	Environmental Objectives .....	4
1.3	Definitions.....	5
2	Scope.....	6
3	Requirements .....	7
3.1	Requirements for the Toner Modules and the Remanufacturing Process .....	7
3.1.1	Collection and Disposal .....	7
3.1.2	Remanufacturing.....	7
3.1.3	Requirements for Housing Parts .....	8
3.1.4	Documentation .....	8
3.1.5	Labelling .....	9
3.1.5.1	Toner Modules.....	9
3.1.5.2	Packaging.....	10
3.1.5.3	User Information and Instructions for Toner Module Handling.....	10
3.2	Requirements for the Toners Used .....	10
3.2.1	Heavy Metals.....	10
3.2.2	Azo Colorants .....	11
3.2.3	Other Ingredients.....	12
3.3	Substance Emissions .....	13
3.3.1	Test Guideline .....	13
3.3.2	Emission Tests.....	13
3.3.3	Fitness for Use.....	15
4	Applicants and Parties Involved .....	15
5	Use of the Environmental Label .....	15
Appendix A	Method for Determining Organotin Compounds in Toners .....	17

**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 Environmental Objectives**

Toner modules for office equipment for electrophotographic printing, such as laser printers, copiers and multifunction devices, are replaced once the monochrome or colour toner powder therein is used up. The large volume of use of these devices results in a huge waste of several million empty modules per year, unless the empty modules are remanufactured and reused.

The aim of awarding the Blue Angel to remanufactured toner modules is to reduce the amount of waste and, thus, help to protect resources. Also, requirements are made for the materials used, the monochrome or colour toners as well as the for serviceability properties of toner modules.

Particle emissions from electrophotographic office equipment have been a known issue for some time and, so far, these emissions have been dealt with as particulate matter under the Blue Angel award criteria for Office Equipment with Printing Function (DE-UZ 122) as well as under those for Remanufactured Printing Modules Refilled with Toner (DE-UZ 55). Electrophotographic office equipment – especially LED or laser printers - have entered the public discourse because of the emissions of ultrafine particles during printing. The revised award criteria for the Blue Angel for Office Equipment with Printing Function as well as those for Remanufactured Toner Modules respond to this public discourse on the emissions from electrophotographic printers and potential health risks associated with fine and ultrafine particles.

Electrophotographic office equipment with printing function carrying the DE-UZ 171 or the DE-UZ 205 Blue Angel eco-label meets stringent requirements for the release of fine and ultrafine particles during printing. Following the revision of the Basic Criteria for remanufactured toner modules the emission-limiting requirements for the Blue Angel eco-label for electrophotographic office equipment also apply to toner modules. The aim is to make Blue Angel eco-labelled remanufactured toner modules available to interested suppliers and users that, in combination with low-emission office equipment according to DE-UZ 171 or DE-UZ 205, meet the stringent requirements for the release of fine and ultrafine particles during printing.

### 1.3 Definitions<sup>1</sup>

- **Ames Test** (Mutagenicity test)  
bacterial testing for mutagenic properties of substances  
Information on the term: This assay was developed in the seventies by Professor Bruce N. Ames (University of California, Berkeley). It is considered to be the most common bacterial test for mutagenic activities of substances.
- **Remanufactured**  
used, repaired by replacing wear parts and filled with new toner.  
Information on the term: Remanufacturing does not necessarily use original spare parts. Requirements for remanufacturing are laid down, for example, in German standards DIN 33870 or DIN 33871.
- **Remanufacturing**  
Repair by replacing wear parts and filling with new toner or new ink
- **Efficiency**  
Number of faultless prints that can be produced under defined conditions by means of 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:
  - ♦  $EZ = A/V$
  - ♦  $VZ = EZ$
- **Colour Former**  
Material, that is applied to the printing medium to achieve a change in colour.  
Information 1 on the term: Colour formers within the meaning of these Basic Criteria are toners.
- **Manufacturer**  
means any natural or legal person that manufactures a product or has a product developed or manufactured and places this product on the market under its own name or trademark
- **Distributor**  
means the one who, for the first time, places a product on the market under its own name or trademark
- **Family of Cartridges**  
Cartridges that use the same colour former and have the same functional properties

---

<sup>1</sup> mostly on the basis of DIN 33867- Draft (German version)

- **User**  
Users of the device. The term also refers to network administrators. Not included are maintenance and service technicians of the distributor of the device or of the company that distributes or maintains the device.
- **Residual Toner**  
Toner that is still present in the toner module before remanufacturing.  
Information 1 on the term: Residual toner is not only the non-used fresh toner but also the toner accumulating after the printing process that has not been transferred from the OPC drum onto the paper.
- **Toner**  
Powder to be applied to the printing medium during electrophotographic printing.  
Information 1 on the term: Toner also stands for so-called liquid toner.
- **Toner Cartridge** (toner cartridge, toner module)  
Toner container with or without photo-semiconductor drum, charging unit, developing unit, cleaning unit and residual toner container

## 2 Scope

These Basic Criteria apply to remanufactured toner modules filled with monochrome or colour toner for use in office equipment with electrophotographic printing function. The toner modules may contain additional parts required for printing that can be used on office equipment with printing function.

Remanufactured toner modules for exclusive use in monochrome office equipment with printing function that were first placed on the market before December 31, 2012 shall meet the requirements of the test methods described in DIN Technical Report 155 or German standard DIN 33870 for determining the performance/quality features or, alternatively, the requirements of DIN 33870-1.

Remanufactured toner modules for exclusive use in 4-colour office equipment with printing function that were first placed on the market before December 31, 2013 shall meet the requirements of the test methods described in DIN Technical Report 155 for determining the performance/quality features or, alternatively, the requirements of DIN 33870-2.

As regards the requirements for the remanufacturing process, labelling, health and safety, the products shall meet the requirements of German standards DIN 33870-1 and 33870-2.

Remanufactured toner modules for use in office equipment that was first placed on the market after the above effective dates shall unconditionally meet the requirements of German standards DIN 33870-1 and DIN 33870-2.

### **3 Requirements**

#### **3.1 Requirements for the Toner Modules and the Remanufacturing Process**

##### **3.1.1 Collection and Disposal**

The applicant shall be able to provide proof of an efficient collection service system. Within the scope of such system empty and used toner modules (including their components) supplied by the applicant shall be recovered for the purpose of remanufacturing. If the applicant is not certified under DIN EN ISO 14001 the operator of a collection service system shall be certified under DIN EN ISO 14001 or present an equivalent process description.

Where, for technical reasons, the toner modules cannot be remanufactured again in compliance with the process steps described in DIN 33870-1<sup>2</sup> or DIN 33870-2<sup>3</sup> the applicant shall, nevertheless, ensure the return as well as a proper utilization and disposal of the used products.

The applicant shall make sure that residual toner is packed in dust-proof containers and delivered to material or thermal utilization facilities.

##### **Compliance Verification**

*The applicant shall declare compliance with the requirements in Annex 1 to the Contract pursuant to DE-UZ 177 and give details of its take-back scheme (Annex 2).*

##### **3.1.2 Remanufacturing**

The toner modules shall be remanufactured in accordance with remanufacturing instructions detailing the remanufacturing process. The functionality of the toner modules shall be ensured by tests and documented in accordance with DIN 33870-1 or DIN 33870-2. Remanufacturing shall include and document the following process steps:

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

Remanufacturing may include the following process steps:

- Disassembly of the toner module to the extent required for compliance with quality requirements;
- Removal of the residual toner;
- Cleaning of the components intended for reuse;
- Removal or permanent rendering unrecognizable of the OEM part number and the OEM logo;
- Filling of the toner containers with the specified amount and type of toner as shown in the parts list;
- Assembly of the specified components according to the parts list;

---

<sup>2</sup> DIN 33870-1 Office machines - Requirements and tests for the preparation of refilled toner modules for electrophotographical printers, copiers and facsimile machines - Part 1: Monochrome

<sup>3</sup> DIN 33870-2 Office machines - Requirements and tests for the preparation of refilled toner modules for electrophotographical printers, copiers and facsimile machines- Part 2: 4-Colour-printers

- Testing of the functionality of each toner module on a printer;
- Optical test of the finished toner module;
- Marking of the toner modules with a serial or lot number to ensure the traceability of the remanufacturing process.

The remanufactured toner modules shall contain a minimum of 75% (weight percent) recycled material, not counting the amount of toner filled in. Excluded are parts with a direct impact on the print quality (e.g. photoconductor drum).

In the case of remanufactured toner modules the efficiency of which is at least 50 percent greater than that of the original toner module (efficiency rate > 1.5 according to DIN 33870-1 or DIN 33870-2, cf. para. 3.1.3) the weight of the replaced toner containers shall be left out of account when calculating the percentage of remanufactured parts.

### **Compliance Verification**

*The applicant shall declare compliance with the requirements in Annex 1 to the Contract pursuant to DE-UZ 177 and indicate the percentage of reused parts in weight percent ( $\pm 5\%$ ) for each type of module.*

### **3.1.3 Requirements for Housing Parts**

New parts added to the toner modules by the applicant by way of addition or replacement must not contain halogenated polymers.

The plastic parts added must not contain PBDEs (polybrominated diphenyl ethers) or PBBs (polybrominated biphenyls) as flame retardants.

Added plastic parts over 25 grams in weight shall be marked in accordance with ISO 11469:2000 taking ISO 1043, Parts 1 to 4, into account.

### **Compliance Verification**

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

### **3.1.4 Documentation**

The origin of the collected empty toner modules to be remanufactured as well as the remanufacturing process shall be documented in accordance with the requirements of DIN 33870-1 or DIN 33870-2:

- Parts lists shall exist for each toner module to be remanufactured showing which original components or alternative components are used. The components used shall be documented for each production lot. New or reused parts shall be marked in the parts list.
- The applicant shall name - for each production lot of remanufactured toner modules - the new or reused parts and document the percentage of the reused parts according to para. 3.1.2 (in weight percent) as well as the toner refill amounts.

The records and results shall be reviewed, verified and confirmed as a test report according to Annex 3 to the Contract pursuant to DE-UZ 177 by an independent expert body at the remanufacturing site for post-consumer toner modules.

Independent expert bodies are:

- Independent environmental verifiers according to Section 9 of the German Umweltauditgesetz<sup>4</sup> (Environmental Audit Act) for sector 38 (recycling, waste disposal), or
- Publicly appointed experts according to Section 36 of the German Gewerbeordnung<sup>5</sup> (Industrial Code) for the fields of waste recycling, waste technology, plastic waste recycling, plastics technology or packaging disposal, or
- environmental verifiers according to Regulation (EC) No 1221/2009, Article 2, Definition No. 20. If the environmental verifier is an organisation of environmental verifiers (i.e. not a natural person) the organisation shall separately list the names of the persons responsible for conducting the test, or
- accredited certification bodies for environmental management systems according to DIN EN ISO 14001.

As regards the duty to inform a dealer (distributor) shall be free to either make the information required under para. 10.5 of DIN 33870-1 or DIN 33870-2 available on his own website or to make reference to the manufacturer's website. If the dealer makes the information available on his own website the applicant shall be responsible for ensuring that the specifications under DIN 33870-1 or DIN 33870-2 are complied with.

### **Compliance Verification**

*The applicant shall, once a year, submit a confirmation pursuant to Annex 3. Such confirmation shall be submitted to RAL gGmbH by the end of the first quarter of the following year.*

*The applicant shall submit the information sheet pursuant to para. 4.2 of DIN 33870-1 or DIN 33870-2 and give the web address where the information sheet is published in accordance with para. 10.5 of DIN 33870-1 or DIN 33870-2.*

*To provide evidence of technical knowledge the confirmation shall be accompanied by either the license of the environmental verifier or the certificate of appointment of the publicly appointed expert. If the independent expert body is an accredited certification body for environmental management systems according to DIN EN ISO 14001 such confirmation shall be accompanied by its accreditation certificate along with the attachment (Annex 4).*

### **3.1.5 Labelling**

#### **3.1.5.1 Toner Modules**

Remanufactured toner modules shall be clearly labelled as such in accordance with paragraph 10.2 of German standards DIN 33870-1 or -2. It is recommended to additionally attach the Blue Angel logo (DE-UZ 177) to the toner module.

### **Compliance Verification**

*The applicant shall declare compliance with the requirements in Annex 1 to the Contract pursuant to DE-UZ 177 and attach supporting documents to the application.*

---

<sup>4</sup> Umweltauditgesetz (UAG) – German Environmental Audit Act of 6 December 2011, Federal Law Gazette I p. 2509

<sup>5</sup> Gewerbeordnung – GewO (German Industrial Code), Revised version of 22 Februar 1999, Federal Law Gazette I

### **3.1.5.2 Packaging**

The information on the packaging shall meet the requirements of para. 10.3 of German standards DIN 33870-1 or 33870-2. The Blue Angel logo (DE-UZ 177) shall be additionally attached to the packaging.

Board packaging should preferably be made of recycled materials. Plastics used for the packaging must not contain halogenated polymers. The plastics used shall be marked in accordance with the German Verpackungsverordnung (Packaging Ordinance), as amended. Recycled plastics should be preferentially used.

#### **Compliance Verification**

*The applicant shall declare compliance with the requirements in Annex 1 to the Contract pursuant to DE-UZ 177 and specify the packaging material.*

### **3.1.5.3 User Information and Instructions for Toner Module Handling**

The user information shall meet the requirements of para. 10.4 of German standards DIN 33870-1 or 33870-2. Moreover, the user information shall provide the user with detailed instructions on the proper handling of toner modules. The user information shall advise the user not to open the toner module by force and to take precautions to avoid inhaling the dust and direct skin contact in the case of accidental toner spillage due to improper handling. Also, the user information shall include instructions on what to do if, nevertheless, there is skin contact.

The user information shall underline that toner modules must be kept out of the reach of children.

#### **Compliance Verification**

*The manufacturer shall declare compliance with the requirements in Annex 1 to the Contract pursuant to DE-UZ 177 and present the user information (Annex 5).*

## **3.2 Requirements for the Toners Used**

### **3.2.1 Heavy Metals**

The toner must not contain any materials that contain mercury, cadmium, lead, nickel or chromium VI compounds as constituents. Manufacture-related contamination with heavy metals, e.g. cobalt and nickel, shall be kept as low as technically possible and economically reasonable (ALARA principle).

The heavy metal contents of the toner powders shall be determined in accordance with the criteria catalogue „Printing Modules with Toner“<sup>6</sup> and/or the toner test guidelines of BG- PRÜFZERT<sup>7</sup>. The contents shall be less than or equal to the test values listed in the following table.

---

<sup>6</sup> TÜV Rheinland LGA Products GmbH: Criteria Catalogue "Printing Modules with Toner":

[http://www.tuv.com/media/germany/30\\_products/infos\\_zur\\_chemie/Kriterienkatalog\\_Toner\\_KEYWORD\\_SCHADSTOFFGEPRUEFT\\_2Pfg\\_S\\_0136\\_04\\_14\\_25\\_03\\_2014\\_Englisch.pdf](http://www.tuv.com/media/germany/30_products/infos_zur_chemie/Kriterienkatalog_Toner_KEYWORD_SCHADSTOFFGEPRUEFT_2Pfg_S_0136_04_14_25_03_2014_Englisch.pdf)

<sup>7</sup> Prüfgrundsätze Toner (Toner Test Guidelines) (BG-VW-SG2 04), Fachausschuss Verwaltung Prüf- und Zertifizierungsstelle im BG-PRÜFZERT (Expert committee - administration - test and certification body within BG-PRÜFZERT)

[http://www.dguv.de/medien/dguv-test-medien/\\_pdf\\_zip\\_doc\\_ppt/pruefgrundsaeetze/vw/bg-vw-sg2-04.pdf](http://www.dguv.de/medien/dguv-test-medien/_pdf_zip_doc_ppt/pruefgrundsaeetze/vw/bg-vw-sg2-04.pdf)

**Table 1: Maximum Allowable 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)	UV-VIS or ICP/MS or ICP/OES	1.0
Total tributyltin (TBT) and dibutyltin (DBT) <sup>8</sup>	GC/MS	0.5
Total of other organotin compounds <sup>7</sup>	ICP/MS or GC/MS	5

**Compliance Verification**

The applicant shall present a declaration from the toner manufacturer or supplier in Annex 6 to the Contract pursuant to DE-UZ 177 to prove that the product does not contain mercury, cadmium, lead, nickel or chromium VI compounds as constituents and that manufacture-related contamination with heavy metals, such as cobalt, nickel and organotin compounds have been minimised. To verify compliance with the test values in Table 1 the applicant shall present a test protocol (Annex 7). The testing laboratory shall be accredited under ISO/IEC 17025. It shall attach the valid accreditation documents (Annex 8).

**3.2.2 Azo Colorants**

The colour toners must not contain any colorants or colour pigments that can release carcinogenic aromatic amines included in the list of aromatic amines in Regulation (EC) No. 1907/2006 (REACH Regulation), Annex XVII, Appendix 8<sup>9</sup> (see also TRGS 614).

The material samples shall be analysed in accordance with DIN EN 14362 and the content of primary aromatic amines listed in the above-mentioned regulation shall be determined.

The content of primary amines must be lower than the test value of:

$$m = 15 \text{ mg/kg colour toner powder}^5.$$

**Compliance Verification**

The applicant shall present a declaration from the toner manufacturer or supplier in Annex 6 to the Contract pursuant to DE-UZ 177 to prove that the colour toner does not contain as constituents colorants or colour pigments that can release carcinogenic aromatic amines appearing on the list of aromatic amines in Regulation (EC) No. 1907/2006 (REACH Regulation), Annex XVII, Appendix 88 (see also TRGS 614). To verify compliance, the applicant shall present a test protocol (Annex 7). The testing laboratory shall be accredited according to ISO/IEC 17025. The laboratory shall attach the valid accreditation documents (Annex 8).

<sup>8</sup> Established determination method, see Appendix A to the Basic Criteria

<sup>9</sup> Cf. COMMISSION REGULATION (EC) No 552/2009 of 22 June 2009 amending Regulation (EC) No 1907/2006 (REACH)

### 3.2.3 Other Ingredients

No substances may be added to the toners as constituents which meet the following conditions under Table 2.

**Table 2: Conditions for the exclusion of substances as constituents in toners**

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 <sup>10</sup> Suspected of causing cancer
Germ cell mutagenicity	Muta. 1A, 1B	H340 May cause genetic damage
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 placed on the so-called Candidate List pursuant to Article 59 of the REACH Regulation. The Candidate List, as amended at the time of application, shall apply. <sup>11</sup>		

Moreover, the toners must not contain as constituents any substances that require the mixture to be marked with the H phrases in accordance with Annex 1 to Regulation (EC) No 1272/2008 or meet the criteria for such classification.

Hazard class	Hazard category	CLP-regulation (EC) No. 1272/2008
Specific target organ toxicity Single exposure	STOT SE 1	H370 Causes damage to organs
Specific target organ toxicity Single exposure	STOT SE 2	H371 May cause damage to organs
Specific target organ toxicity Repeated exposure	STOT RE 1	H372 Causes damage to organs through prolonged or repeated exposure
Specific target organ toxicity Repeated exposure	STOT RE 2	H373 May cause damage to organs through prolonged or repeated exposure

<sup>10</sup> Except technically necessary titanium dioxide in the toner. All inhalable emissions are minimized by the limitation of the particle emission according to chapter 3.3.2. From the 1. September 2021, the toner should not contain more than 1% titanium dioxide.

<sup>11</sup> <http://echa.europa.eu/de/candidate-list-table>. The substances of the Candidate List shall meet at least a general threshold value of 0.1 % (m/m) or a more stringent value based on the classification according to the hazard classes of the CLP Regulation.

## Compliance Verification

The applicant shall declare compliance with the requirements in Annex 1 and attach to the application a declaration from the toner manufacturer or supplier (Annex 6) Upon filing the application, the applicant shall submit Safety Data Sheets for all types of toner (Annex 9). Unless the Safety Data Sheets show negative AMES test for the toners, the applicant shall provide separate evidence of the test result (Annex 10).

### 3.3 Substance Emissions

#### 3.3.1 Test Guideline

If original modules and original toners are used the substance emissions from Blue Angel eco-labelled office equipment with electrophotographic printing function shall not exceed the maximum values specified in the Basic Criteria DE-UZ 205. The applicable test guideline has been published as Appendix S-M to the Basic Criteria DE-UZ 205. The evaluation of the emission tests shall be equally applicable to remanufactured toner modules. The determination of ozone emissions shall be exempt from this requirement.

#### 3.3.2 Emission Tests

The emission rates during the ready phase and the printing phase shall be determined and recorded in accordance with the test methods set out in Appendix S-M to the Basic Criteria DE-UZ 205. They shall not exceed the following values (Table 3):

Table 3: Maximum allowable test values of the emission rates for electrophotographic equipment determined in accordance with Appendix S-M

(All values in mg/h, except for particle emissions)		Monochrome Printing	Colour Printing
Ready mode	TVOC*	1 (Desktop devices) 2 (Floor-standing devices, Volume > 250 l)	1 (Desktop devices) 2 (Floor-standing devices, Volume > 250 l)
Print mode (Total ready + print mode)	TVOC*	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 mode	PER <sub>10</sub> PW** [particles/10min]	3.5 x 10 <sup>11</sup>	3.5 x 10 <sup>11</sup>

\* Cf. List of volatile organic compounds to be taken into account when measuring the emissions of office equipment with printing function (cf. Appendix S-M, para. 4.5 VOC).

\*\* PER<sub>10</sub> = n,m \* 10<sup>x</sup> [particles/10 min]

**TVOC, Benzene, Styrene, Dust (gravimetric):**

If the emission rate determined during the printing of the colour test page also meets the emission test values for monochrome printing no additional testing of colour printing equipment during monochrome printing will be required. The dust emissions of colour printing equipment shall be determined during colour printing, those of monochrome printing equipment during monochrome printing. If the output speed  $S_F$  falls short of the output speed  $S_M$  by more than 20 percent the equipment shall also be tested in monochrome print mode and the specified test values for monochrome printing shall also be met.

**Emissions of Fine and Ultrafine Particles:**

Remanufactured toner modules for use at least in desktop devices (devices with a volume  $\leq 250l$ ) which have been Blue Angel eco-labelled under DE-UZ 171 or DE-UZ 205 or which have been first placed on the market after January 1, 2013<sup>12</sup> shall be tested for their particle emissions and meet the specified test value.

Remanufactured toner modules for exclusive use in floor-standing devices (devices with a volume  $> 250l$ ) which have been Blue Angel eco-labelled under DE-UZ 205 or which have been first placed on the market after January 1, 2017<sup>12</sup> shall be tested for their particle emissions and meet the specified test value.

Here, the conditions are as follows:

The particle emissions of colour printing equipment shall be determined during colour printing. If the output speed  $S_F$  falls short of the output speed  $S_M$  by more than 20 percent the equipment shall also be tested in monochrome print mode and the test values shall be met. The particle emissions of monochrome printing equipment shall be determined during monochrome printing. Testing of particle emissions shall be po

ssible for all configurations of identical construction. The size of the test chamber shall in each case meet the load factor criterion specified in Appendix S-M, para. 4.2.

If the particle emissions cannot be quantified in accordance with Appendix S-M, para. 4.9.3, step 9, the test value shall be considered met.

In the case of identical types of modules (identical construction) emission tests shall be performed for families of cartridges for printers, copiers or multifunction devices on the device with the highest maximum print speed.

The test report shall give the type of toner. Should the type of toner be changed (type designation, change of formula) the applicant shall inform RAL about such change and submit a new test report.

**Compliance Verification**

*The applicant shall submit a test report according to the test guideline for determination of emission rates on the basis of the test guideline (Appendix S-M) of the DE-UZ 205 Basic Criteria prepared by a testing laboratory qualified for this test which confirms compliance with the requirements. The test report shall give the exact device designation of test device. (Test results: Annex 11a) (Test report: Annex 11b). The applicant shall list in Annex 1 the devices on which the toner modules tested can be used.*

---

<sup>12</sup> Date of the EU Declaration of Conformity for office equipment with printing function

*Evidence of the testing laboratory's qualification to do the emission testing shall be furnished, for the time being, to Bundesanstalt für Materialforschung und -prüfung (Federal Institute for Materials Research and Testing), Division 4, and documented in an attachment to the test protocol, unless such document has already been made available to RAL.*

### **3.3.3 Fitness for Use**

Printing modules or toner containers must be sealed so as to prevent toner dust from escaping during storage and transport.

The remanufactured modules refilled with monochrome or colour toner shall meet the requirements of German standards DIN 33870-1 for monochrome printing equipment or DIN 33870-2 for 4-colour printing equipment. The test results shall be documented for each type of toner module in accordance with Annex C to the above-mentioned standards.

The distributor shall make available for each type of remanufactured toner module or - in the case of group orders - for each product line: an item-number-related Material Safety Data Sheet in German or, if applicable, in German (according to Section 6 of the German Gefahrstoffverordnung (Ordinance on Hazardous Substances) and Regulation (EC) No 1907/2006 (REACH)<sup>13</sup> for the toner materials used therein.

#### **Compliance Verification**

*The applicant shall declare compliance with the requirements in Annex 1 to the Contract pursuant to DE-UZ 177 and present test reports according to Annex 12 to the Contract pursuant to DE-UZ 177. Should the toner type be changed the applicant shall submit a new test report/declaration and a Materials Safety Data Sheet as well as a test report according to DIN 33870-1 or DIN 33870-2 and a report on the emission testing 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.

---

<sup>13</sup> Regulation (EC) 1907/2006 (REACH), above all Articles 31-36 and Annex II ([http://www.baua.de/nn\\_47698/de/Chemikaliengesetz-Biozidverfahren/Neue-Chemikalienpolitik/pdf/REACH-Verordnung-1907-2006.pdf](http://www.baua.de/nn_47698/de/Chemikaliengesetz-Biozidverfahren/Neue-Chemikalienpolitik/pdf/REACH-Verordnung-1907-2006.pdf))

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, 2021. They shall be extended by periods of one year each, unless terminated in writing by March 31, 2021 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.

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.

© 2021 RAL gGmbH, Bonn

## **Appendix A Method for Determining Organotin Compounds in Toners**

(according to the criteria catalogue TÜV Rheinland LGA Products GmbH: Kriterienkatalog "LGA-schadstoffgeprüft" / "TÜVRheinland Zertifiziert", Produktgruppe: Tonermodule (Criteria catalogue „LGA tested“/TÜV Rheinland Certified“, product group: toner modules), as of August 2013)

Weigh 0.3 to 0.5 grams of toner powder into an extraction vessel. Mix the toner powder with 30 ml of extractant, an acetic acid, methanol buffer solution as well as internal standards [tributyltin (d 27), tetrapropyltin (d 7), butyltin (d 9)]. The extraction shall 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 derivatization, add 5ml of n-hexane and 100 µl of sodium tetraethylborate solution (2 g sodium tetraethylborate in 10 ml tetrahydrofuran) with stirring to 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 another 100 ml volumetric flask. For the purpose of derivatization, add 5ml of n-hexane and 100 µl of sodium tetraethylborate solution with stirring to the filtrate and stir for 1 hour.

Fill both volumetric flasks with distilled water, isolate the n-hexane phases and put them together. Then, evaporate the n-hexane solution and fill it up to 1ml in the volumetric flask.

The organotin compounds in the n-hexane extract shall be determined by gas chromatography with mass selective detection in SIM mode.