BLUE ANGEL

The German Ecolabel

Office Equipment with Printing Function (Printers and Multifunction Devices)

DE-UZ 205

Basic Award Criteria

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Version 4

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.

If you require further information please contact:
RAL gGmbH
RAL UMWELT
Fränkische Straße 7
53229 Bonn
Tel: +49 (0) 228 / 6 88 95 - 0
E-Mail: umweltzeichen@ral.de
www.blauer-engel.de

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

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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

ICT equipment has become indispensable to companies and private households. In households, computers, office equipment with printing function and telephones make up the biggest share of the total ICT-related electric power consumption – with almost 44% or 21 TWh in 2015, respectively. In contrast, these devices only account for around 17% of the total ICT-related electric power consumption in companies, which corresponds to about 8 TWh in 2015.

Blue Angel eco-labelled office equipment with printing function (printers and multifunction devices) consume considerably less electric power compared to market average. Using devices with a relatively low power consumption and low so-called no-load losses (losses in, e.g., idle and off-mode) contributes considerably to climate protection.

Nowadays, electrophotographic devices (LED and laser) and Inkjet printers dominate the market. For some time, it has been known that electrophotographic devices release fine and ultrafine particles into the indoor air just like other household appliances or everyday activities, e.g. vacuum cleaning. The emissions of electrophotographic devices as well as potential health risks which might be posed by such ultrafine particles (UFPs) have been subject of public discussions. Among other things, this also applies to electrophotographic desktop devices which are frequently found in private households and home offices as well as at companies' and public authorities' workplaces.

For such devices, the Indoor Air Hygiene Commission (IRK) of the German Federal Environmental Agency (UBA) recommends a test value for measurements in emission test chambers of 3.5×10^{11} particles per 10 minutes of printing. This test value was defined by the Indoor Air Hygiene Commission (IRK) based on general hygienic considerations. Therefore, and given the different chemical composition of particles emitted from electrophotographic printing devices, the IRK abandoned toxicological single case considerations and, instead, places the test value in a general hygienic context of exposure at the workplace and in private households. This means, that when defining this value, observed amounts of particles released

from current electrophotographic printing devices and during operation processes, the typical substances contained in these particles, and their size ranges were taken into account.

Moreover, Blue Angel eco-labelled office equipment with printing function meets requirements for recyclable design, material selection, and longevity. They thus provide good framework conditions for efficient recovery of materials used and help to save natural resources.

Last but not least, low-pollutant materials are used in plastic parts of Blue Angel eco-labelled devices, thus, reducing possible harm to the environment and risks for human health.

1.3 Objectives of the Blue Angel Eco-Label

An increased resource efficiency, the avoidance of pollutants and waste, climate protection, and the reduction of energy consumption are key objectives of environmental protection.

Office equipment with printing function can be awarded the Blue Angel eco-label when featuring the following environmental properties:

- Long-life and recyclable design;
- Avoidance of materials harmful for the environment;
- Low consumption of electric power;
- Low indoor air pollution and noise emissions at the workplace and in the home environment.

1.4 Compliance with legal requirements

Compliance with German and European legal requirements is expected for products labelled with the Environmental Label. This includes in particular the following laws and regulations:

- The WEEE Directive (2012/19/EU)[1], transposed into German law by the Electrical and Electronic Equipment Act (Elektro- and Elektronikgesetz, ElektroG[2]), which regulates the disposal of the products.
- The RoHS Directive 2011/65/EU[3], transposed into German law by the ElektroStoffV[4], which regulates the content of hazardous substances in the products.
- EU Directive 2006/66/EG[5], transposed into German law by the Batteries Act (Batteriegesetz; BattG)[6].
- The EU Chemicals Regulation REACH (1907/2006/EC)[7] and the POP regulation (850/2004/EC)[8], which define requirements regarding substances.

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1 Directive 2012/19/EU on Waste Electrical and Electronic Equipment (WEEE).
2 Act on Governing the Sale, Return and Environmentally Sound Disposal of Electrical and Electronic Equipment (Electrical and Electronic Equipment Act - ElektroG) of 20 October 2015 (BGBl. I p. 1739).
3 Directive 2011/65/EU on the Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment (RoHS).
4 Ordinance on the Restriction of the Use of Hazardous Substances in Electrical and Electronic Equipment (Elektro- und Elektronikgeräte-Stoff-Verordnung; ElektroStoffV) of 19 April 2013 (BGBl. I p. 1111).
5 Directive 2006/66/EC on Batteries and Accumulators and Waste Batteries and Accumulators.
6 Act on the Distribution, Take-back, and Environmentally Sound Disposal of Batteries and Accumulators (Batteriegesetz - BattG) of 25 June 2009 (BGBl. I p. 1582).
7 Regulation (EC) No 1907/2006 Concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH).
8 Regulation (EC) No 850/2004 on Persistent Organic Pollutants (POP).

- The Regulation on external power supplies (278/2009/EC)[9], which defines the minimum energy efficiency of power supplies.

1.5 Definitions

When using these Basic Award Criteria, the following definitions are to be applied.

1.5.1 User, manufacturer, supplier

1.5.1.1 User

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

1.5.1.2 Manufacturer

Manufacturer is a natural or legal person who manufactures a product or has commissioned the development or manufacturing of a product, respectively, and who places the product on the market using his own name or brand.

1.5.1.3 Distributor

Distributor is a natural or legal person who makes a product available for the first time within the European Economic Area with a view to its distribution or use within the European Economic Area, whether for reward or free of charge and irrespective of the selling technique.

1.5.2 Device Designs

1.5.2.1 Base Unit

This is the most basic version of a device which is sold as a fully operational model. The base unit can be designed and shipped as a single piece or as a combination of functionally integrated components.

1.5.2.2 Inkjet Device

This is a device which transfers data onto paper or similar materials by using inks, gels or solid inks (waxes).

1.5.2.3 Monochrome Printing Device

This is a device which can transfer data onto paper or similar materials by monochrome printing only.

1.5.2.4 Colour Printing Device

This is a device which can transfer data onto paper or similar materials by colour printing.

[9] Regulation (EC) No 278/2009 with regard to Ecodesign Requirements for No-load Condition Electric Power Consumption and Average Active Efficiency of External Power Supplies.

1.5.2.5 Multifunction Device

A device that performs two or more primary functions including printing. A multifunction device (MFD) may have a physically integrated form factor or it may consist of a combination of functionally integrated components.

1.5.2.6 Delivery Status

The condition in which the manufacturer ships the device and in which the manufacturer has set the delay times of the different operating modes. In addition, appendix E-M shall be considered.

1.5.3 Primary Functions

1.5.3.1 Primary Functions

Primary functions are printing, copying, digitising and transmission of data as well as sending and receiving of electronic messages and faxes.

1.5.3.2 Copying

Data input via a scanning unit and data output by printing on paper or similar materials. The number of printouts of a document must be selectable.

1.5.3.3 Printing

Output of data received by the device via interface on paper or similar materials.

1.5.3.4 Digitising and Transmission of Data

Digitising of data via a scanning unit and transmission of data via interface.

1.5.3.5 Sending and Receiving of Electronic Messages and Faxes

Sending and receiving of electronic messages and faxes via internal modem.

1.5.4 Printing and Printing Technologies

1.5.4.1 Page Throughput S_M

The page throughput S_M specifies the number of DIN A4 size pages a device can print per minute in monochrome printing mode by transfer of data onto paper or similar materials. The page throughput S_M has to be determined according to ISO/IEC 24734 and specified as an average ESAT value resulting from simplex printing. The S_M value is an integer; the ESAT value[10] is to be rounded down.

When determining this for electrophotographic devices, also the printing test pattern according to ISO/IEC 10561 (Dr. Grauert Letter) or the so-called continuous printing can be used.

[10] 1 Set + 30 Second Test; $ESAT_{30\ sec}$

1.5.4.2 Page Throughput S_F

In accordance with the page throughput S_M, the page throughput S_F specifies the number of DIN A4 size pages a device can print in colour by transfer of data onto paper or similar materials. As with the page throughput S_M, the page throughput S_F has to be determined according to ISO/IEC 24734. The S_F value is an integer; the ESAT value[10] is to be rounded down.

When determining this for electrophotographic devices, also the printing test pattern according to ISO/IEC 10561 (Dr. Grauert Letter) or the so-called continuous printing can be used.

1.5.4.3 Printing Unit

Unit of the device used to print on paper and similar data carriers – be it in the primary function copying, printing or printing of faxes.

1.5.4.4 Monochrome Printing

This is a printing process in which data are transferred onto paper or similar materials making them appear monochrome. This can be done by using monochrome colourants or by mixing different colourants.

1.5.4.5 Colour Printing

This is a printing process in which data are transferred onto paper or similar materials exclusively using coloured colourants or by using a combination of coloured and black colourants.

1.5.4.6 Black colourant printing

This is a type of monochrome printing in which black colourant is used only. There is no mixing of different colourants (mixed black printing).

1.5.5 Device Parts

1.5.5.1 Scanning Unit

Unit of the device used to convert paper originals (or similar) into electronic images that can be stored, edited, converted, or transmitted, primarily for data processing in a multifunction device or computer.

1.5.5.2 Accessory

An optional supplemental component that is not necessary for standard operation of the base unit, but that may be added before or after shipment in order to add new functionality or alter functions of the device. An accessory may be sold separately under its own model number, or sold with a base unit as part of a multifunction device package or configuration.

Note:

a) Examples of accessories include sorters, high-capacity paper feeders, paper-finishing equipment, large paper supply equipment, multiple output paper trays as well as chips and counters.

b) The power consumption of accessories is not included in the power consumption of the device which the distributor must state in Annex 8a/8b.

1.5.5.3 Wireless network access point

Wireless network access point means a device whose primary function is to provide IEEE 802.11 (Wi-Fi) connectivity to multiple clients.

1.5.5.4 Controller

This accessory expands the functionalities of the image creating device, e.g. by processing data sent to the office equipment with printing function in order to deliver particularly high printing quality. The controller is supplied with electric power by the office equipment with printing function or by a separate power supply.

1.5.5.5 Module for Colourant

A complex module (of a printer, copier or a fax) which in addition to a container for colourants can include other components for transferring the colourant onto the media such as, for example, a photo semiconductor, a charging unit, a cleaning unit, an excess toner reservoir or an inkjet print head with nozzles and one or more integrated ink tanks.

1.5.5.6 Container for Colourant

Containers for colourants such as toners (e.g. toner bottles), inks (e.g. ink tanks) etc.

1.5.5.7 Assemblies

Assemblies consist of at least two components that are joined together in a force- or form-fit manner.

1.5.5.8 Casing and casing parts

Casing and casing parts protect the fixtures from environmental impacts, and the user from contact with moving and/or radiating components as well as with components under voltage. The casing consists of casing parts.

1.5.5.9 Chassis

The chassis is the supporting component of the device.

1.5.5.10 Electric/ electronic assemblies

Electric/ electronic assemblies include at least one electronic or electric component.

1.5.5.11 Mechanical parts

Mechanical parts are not included in electric/electronic assemblies and perform mechanical or optical functions (except for the casing and chassis).

1.5.5.12 Exchange parts

Exchange parts are parts that are expected to need replacement during the supposed service life under typical conditions of use (e.g. ink absorber, excess toner reservoir, paper feed).

Exempted are parts that shall not be exchanged by the user because of security or legal concerns.

1.5.5.13 Spare parts

Spare parts are components or assemblies that can potentially fail within the service life of the products. This includes e.g. hinges of casing parts, paper trays etc. as well as cable connections and electronic components which might be damaged by overheating.

1.5.6 Materials and operating materials

1.5.6.1 Constituent substances

The term "constituent substances" encompasses all substances added to the product or to parts of mixtures to achieve or influence desired product functionalities, i.e. substances added for a particular purpose. Impurities from primary production are not constituent substances.

1.5.6.2 Colourant

Mixture in which dyes, pigments and further additives are dissolved or dispersed in a carrier material such as a polymer matrix (e.g. toners), liquids (e.g. inks), gels or waxes (e.g. solid inks).

1.5.6.3 Substance[11]

A chemical element and its compounds in the natural state or obtained by any manufacturing process, including any additive necessary to preserve its stability and any impurity deriving from the process used, but excluding any solvent which may be separated without affecting the stability of the substance or changing its composition.

1.5.6.4 Mixture

Mixture or solution composed of two or more substances.

1.5.6.5 Post-consumer recycling material

Recycle from materials for disposal from households, commercial and industrial organisations or institutions which are final consumers of products. It may contain material returned from the supply chain.

1.5.7 Operation Modes

1.5.7.1 Standard Operation Mode

In standard operation mode the product is connected to the mains and actively performs a primary function.

1.5.7.2 Print Mode

In print mode the device produces output by printing on paper and similar materials – be it in the primary function copying, printing or when faxing.

[11] Cf. REACH, article 3 and CLP Regulation, article 2.

1.5.7.3 Idle Mode

The state that the product enters after the end of the printing process – immediately or upon expiry of a delay time (t_{iA}, t_{iA}, ...). In an idle mode, the power consumption (P_a, P_b, ... P_S) of the device is usually lower than in the print mode. In idle modes the device is more or less ready for operation i.e. it can more or less fast return to print mode. Ready mode and electric power saving modes are examples for idle modes. With respect to the Blue Angel requirements the idle modes are to be categorised according to Appendix E-M, i.e. they must be delimited from each other.

1.5.7.4 Ready Mode

This is the mode Z_a in which the product is not producing output, has reached operating conditions, has not yet entered any electric power saving mode and is ready to enter print mode with minimum delay. All device functions can be activated in this mode and the device is capable of returning to print mode by responding to any potential inputs including external electrical impulses (e.g., data network impulses, fax call or remote control) and direct physical interventions (e.g., activating a switch or button).

Note: ready mode is the state that the device enters immediately after the end of the printing process.

1.5.7.5 Electric Power Saving Mode

This is a mode (Z_b, Z_c, ...) which the device enters after expiry of a delay time (t_{bA}, t_{cA}, ...) and in which its power consumption (P_b, P_c, ...) is usually lower than in ready mode.

Note: after the end of the printing process devices usually enter ready mode first before they enter an electric power saving mode. Some devices have just one electric power saving mode while others have multiple electric power saving modes of different power consumption levels. And again others have no electric power saving mode at all. These devices stay in ready mode, in which the power consumption is mostly very low so that this ready mode fulfils the function of an electric power saving mode. The operation modes sleep mode and off-mode (standby) are electric power saving modes (if activated automatically).

1.5.7.6 Sleep Mode

An electric power saving mode that a device enters either automatically or after expiry of a delay time. For devices with sleep modes which can be activated by different means, the mode which can be entered automatically is relevant regarding these Basic Award Criteria. If the device has several subsequent sleep modes, the manufacturer shall decide which sleep mode shall be considered. The reported delay time has to match the selected sleep mode.

In addition to the automatic activation, devices can enter sleep modes by different means:

[1] At a user-set time of day,

[2] in response to a user activation of physical switch or button or in response to external electrical stimulus

or

[3] by other automatic processes depending on the user behaviour.

All product features can be activated in this mode. Also, the device must be able to switch to a primary function by responding to **any** given input option which the device features; this, however, can go along with a certain recovery time. These input options include external electrical impulses (e.g. network impulses, fax calls or remote control) and direct physical interventions (e.g. using a switch or button).

1.5.7.7 Off-Mode (Standby)

This is the power state that the product enters when is has been manually or automatically switched off but is still connected to the mains.

The ENERGY STAR 2.0 definition of standby mode ("the lowest power consumption state which cannot be switched off (influenced) by the user and that may persist for an indefinite time when the product is connected to the main electricity supply and used in accordance with the manufacturer's instructions […]") generally falls within this definition. If this mode is manually activated by the user, it is often referred to as "manual off", and if it is activated by an automatic or predetermined signal (e.g. delay time or timer), it is often referred to as "auto off".

1.5.7.8 Remote Management by a Network Administrator

The ability to be remotely managed by a network administrator, which includes remote management functions such as user access controls, job accounting, device configuration, and firmware updates via network access.

1.5.8 Time-related Definitions

1.5.8.1 End of the Printing Process

The point in time when the last printed sheet of paper (or of similar material) of the print job has left the printing unit of the device and is available to the user. This is the case, for example, when the sheet has reached the output tray of the device. If there are different points in time which could be used for determination of the end of the printing process for a certain device – for example, if the device has various output trays – the earliest of these points in time is to be considered as the end of the printing process in terms of these Basic Award Criteria.

1.5.8.2 Delay Times (=Activation time) (t_{iA}, t_{iA}, etc.)

The delay time is the time that elapses after the end of the printing process until the device enters an electric power saving mode.

1.5.8.3 Recovery Time (= Return Time) (t_{iR})

This is the time it takes to return from an electric power saving mode to ready mode. The recovery time is to be determined as difference between

a) the time required to complete a certain print job from electric power saving mode Z_i (i.e. Z_b, or Z_c, or ...) and
b) the time it takes to complete the same job from ready mode Z_a.

1.5.9 Power Consumption

1.5.9.1 Power Consumption of the Device (P_a, P_b, …)

The total effective power consumption of the device measured at the power supply of the device is the basis for evaluating the device's power consumption in ready mode (P_a), in the electric power saving modes (P_b, P_c, …) as well as in off-mode (P_S). The power consumption of accessories does not have to be included into the power consumption declaration required by the distributor in Annex 8a/8b. The respective information in Appendix E-M has to be followed.

1.5.9.2 Typical Energy Consumption for Monochrome Printing (TEC_M)

This is the power consumption for an assumed typical usage cycle of a device in kilowatt-hours per week (kWh/week). The method for determining the TEC_M is based on the ENERGY STAR 2.0 method. Modifications and further details are set out in Appendix E-M.[12]

2 Scope

These Basic Award Criteria apply to office devices (usually referred to as printers and/or multifunction devices) which at least

- offer printing as their primary function,
- are capable of producing monochrome or colour printouts (4-colour-printing) on standard paper with a grammage of 60 to 80 g/m^2,
- are capable of processing media or a minimum format of DIN A4 and up to a maximum format of DIN A3+, and
- work as electrophotographic devices (LED or laser technology) by using toners or as inkjet devices by using inks (or gels, or waxes).

The requirements of the Basic Award Criteria for the modules and containers for colourants as well as for the colourants themselves apply to the unmodified original equipment of the products marked with the environmental label of the respective distributor, including the materials recommended in the product documents by the distributor.

3D-printers are not in the scope of these Basic Award Criteria.

3 Requirements and Compliance Verifications

3.1 Resource conservation

With a view to resource conservation, it is to be distinguished between devices that are are destined for use in a professional environment and devices that are destined for use by private final consumers.

[12] When new versions of the ENERGY STAR are published, a possible alignment of the measuring procedure may be required.

To allow for assigning the requirements to the respective products against this background, the application for the Blue Angel must comprise a categorisation of the device and the customer must be informed about this.

Compliance Verification:

The distributor indicates in the application whether the device is destined for use in a professional environment or for use by private final consumers. This information is also to be included in the information and data sheet.

3.1.1 Design for recycling

To reduce the consumption of natural resources, office equipment certified with the Blue Angel shall promote high-quality recycling and re-use of components by design. The following requirements support this goal.

3.1.1.1 Design for disassembly requirements

Devices shall be designed in a way that they meet the requirements of the following table:

Table 1: Requirements regarding design for disassembly

No.	Requirement	Applies to Assembly (-ies)	Must/Should Requirement
1	Are assemblies made of mutually incompatible materials separable or connected by separation aids?	Casing parts, chassis, electric/electronic assemblies, modules for colourants	Must
	Explanation: Connections between casing and chassis as well as between chassis and electric/electronic assemblies are important connections. Their separability is required for the separate reuse/recycling of the assemblies and materials and for a quick and safe separation of components containing harmful substances. Glued labels (i.e. company logos and stickers) are concerned as well. The term "separation aids" refers to predetermined breaking points, for example.		
2	Are electric/electronic assemblies easy to find and to remove?	Entire unit, including lamps	Must
	Explanation: The minimal strategy for recycling is to remove hazardous materials. Electric/electronic assemblies and components according to Appendix III of the Electrical and Electronic Equipment Act (ElektroG), such as batteries and condensers which have a risk of containing constituents bearing hazardous substances, as well as fluorescent lamps containing mercury, must be easy to find and separate.		
3	Are detachable connections easy to find?	Casing parts, chassis, modules for colourants	Should
	Explanation: Connections that have to be detached during disassembly must be easy and quick to find. If they are hidden, this should be stated on the product (e.g. by laser labelling or injection moulding).		
4	Can disassembly be done exclusively with general-purpose tools?	Casing, chassis, electric/electronic assemblies	Must
	Explanation: "General-purpose tools" refers to widely used, commercially available tools.		
5	Have the points of application and the work space required for disassembly tools been considered?	Casing parts, chassis, electric/electronic assemblies	Must
	Explanation: At points of application the force of the tool is transmitted to the connecting element. This requires there to be enough work space to complete the loosening movement. This requirement especially covers snap-on connections, which, in contrast to the assembly process, can often be loosened by using tools only.		
6	Are all connecting elements that have to be dismantled for recycling axially accessible?	Casing parts, chassis, electric/electronic assemblies	Should

No.	Requirement	Applies to Assembly (-ies)	Must/Should Requirement
	Explanation: Connections to be dismantled that can be accessed only with difficulty or indirectly make disassembly more laborious. For example, releasing screw connections with radial accessibility is time consuming.		
7	Can screw connections for fastening assemblies be tightened with no more than three tools?	Casing parts, chassis, electric/electronic assemblies	Must
	Explanation: Standardised and uniform connection elements facilitate disassembly. The fewer tools needed, the simpler assembly and disassembly are. A tool is characterised by its type of drive (e.g. Phillips-head screwdriver) and size of drive (wrench size).		
8	Are detachable connections of plastic components at least half click/snap-on connections?	Casing parts	Should
	Explanation: The proportion of click and snap-on connections is the basis for assessing whether joining techniques have been selected for ease of disassembly.		
9	Can the disassembly be performed by one person?	Entire unit	Must
	Explanation: Any number of snap-on connections of the same joining direction can be assembled simultaneously, whereas this may not hold for disassembly if the undercut angle is more than 90º. This requirement is not met if more than two snap-on connections have to be loosened at the same time.		
10	Can the supporting surface be maintained during the entire disassembly process?	Unit to be handled	Should
	Explanation: With this requirement, the unit is indirectly checked for a hierarchical design.		
11	Are casing parts free of electronic assemblies?	Casing parts	Must
	Explanation: To facilitate the clean and fast removal of hazardous materials and the separation of electronic fractions, all electric/electronic assemblies must be fastened to the chassis. The casing must not contain any electric/electronic assemblies. A control element fastened to the casing and casing parts at the same time fulfilling the function of the chassis are not considered as casing parts here.		
12	Has the manufacturer carried out a trial disassembly (e.g. in accordance with no.1-11) and recorded it with focus on weak spots?	Entire unit	Must

3.1.1.2 Requirements concerning a material selection for recyclability

Regarding a selection of materials promoting high-quality recycling, devices shall be designed in a way that they meet the requirements of the following table:

Table 2: Requirements concerning a material selection for recyclability

No.	Requirement	Applies to Assembly (-ies)	Must/Should Requirement
1	Is the variety of materials used for plastic components of similar function limited to one material?	Casing parts, chassis Mechanical parts (≥ 25g)	Must
	The smaller the variety of materials, the more efficient the separation and recycling processes are. This requirement does not apply to parts that are demonstrably reused according to para. 3.1.1.4.		
2	Are components that are made of the same plastic dyed uniformly or compatibly?	Casing parts, modules for colourants	Should
	Explanation: Uniform dyeing of parts consisting of the same plastic improves possibilities to introduce material cycles for recycling. Compatible dyeings are different degrees of brightness of a colour (e.g. grey and anthracite). If in addition different types of plastics have different colours, this "colour code" facilitates reliable type-specific separation of plastics. Control elements on the equipment are exempt from this requirement.		

No.	Requirement	Applies to Assembly (-ies)	Must/Should Requirement
3	Has the coating of plastic components been limited to a minimum? Have no galvanic coatings been used?	Casing parts, modules for colourants	Must
	Explanation: Large-area lacquer coatings, vapour deposition and imprints on plastic components require additional treatment for removal if the materials are to be recycled subsequently. Reasons must be given for coatings of special parts. Laser inscriptions are not considered as imprints. Demonstrably reused parts according to para. 3.1.1.4 are not affected by this requirement.		
4	Are recyclable materials and material composites used?	Casing parts, chassis, modules for colourants	Must
	Explanation: This means that it is possible to produce recycled material identical to the original material (original recycling).		
5	Is the partial use of post-consumer recycled plastics permitted?	Casing parts, chassis, modules for colourants	Must
	Explanation: To have a "closed cycle" it is necessary for the manufacturer to already be using recycled materials, or to announce this intention in the product specifications.		
6	Does the share of post-consumer recycled plastics amount to at least 5% of the complete plastic material?	Casing parts, casings of modules for colourants	Should
	Explanation: Using appropriate recycled materials contributes considerably to saving resources and is explicitly desired within the scope of availability.		
7	Are assemblies and materials easy to dismantle according to Appendix 4 of the Electrical and Electronic Equipment Act (ElektroG)?	Entire unit	Must
	Explanation: Appendix 4 ElektroG defines a number of parts that must be removed from separately collected waste electronic equipment.		
8	Have materials been selected in accordance with no.1-5 and has this been documented in writing?	Casing parts, chassis, modules for colourants	Must
9	Are plastic parts >25 g with a flat surface of at least 200 mm^2 marked in accordance with EN/ISO 11469 considering ISO 1043?	Entire unit (exempted are plastic parts contained in reused complex assemblies)	Must
	Explanation: The marking of plastics enables all recycling companies to separate plastics by type.		
10	Is the share of post-consumer recycled plastics stated in the information and data sheet, calculated as percentage of total plastic (by weight) and indicated in intervals of 0-1%, 1-5%, 5-10%, 10-15%, 15-20%, and so on (in 5% intervals)?	All assemblies	Must
	Explanation: The following parts may be excluded from the calculation of the recyclate share: printed circuit boards, cables, connectors, electronic components, optical components, electrostatic discharge (ESD) components, electromagnetic interference (EMI) components, and biobased plastic material.		

3.1.1.3 Reusability of components and assemblies

To increase the reusability of components and assemblies, devices shall be designed in a way that they meet the requirements of the following table:

Table 3: Requirements concerning the reusability of components and assemblies

No.	Requirement	Applies to Assembly (-ies)	Must/Should Requirement
1	Are at least 50% of the components of the device, excluding standard parts, identical in construction to those of other devices of the same manufacturer, and the same performance category and generation?	Entire unit	Must
2	Have provisions been made to use refurbished assemblies or components and is this permitted?	Entire unit	Must
	Explanation: The manufacturer should be willing to use assemblies and components refurbished under his supervision as spare parts or ETN (Equivalent To New) parts in the device.		
3	Can modules or containers for colourants for single colours be replaced separately?	Modules and containers for colourants	Must
	Explanation: The separate replacement contributes to economical handling of materials.		
4	Is the use of refurbished toner modules and refurbished ink modules and containers according to DIN 33870-1 and 33870-2 not prevented by constructive, software-based or other measures?	Entire unit	Must
5	Can modules for colourants be refurbished?	Modules for colourants (exempted are containers for colourants)	Must
	Explanation: Reuse shall not be precluded by constructive measures.		

Compliance Verification:

The manufacturer confirms in written form that the requirements of sections 3.1.1.1, 0, and 0 are met and provides the completed Annex 3a. The requirements are met if in the category M the answer is always "yes".

The manufacturer must name the casing plastics used for parts with a mass greater than 25 grams and submit a list of plastics (according to Annex 4). This must include information on the share of post-consumer recyclate in plastics. The distributor provides this information in the information and data sheet.

3.1.1.4 Take-back of devices for re-use

The take-back of devices for re-use is desirable. Re-use with regard to these Basic Award Criteria means the re-use of devices or components for the same purpose after a refurbishment. The refurbishment may include the replacement of damaged parts or components.
If the manufacturer verifies that through his re-use activities more than 50% of devices (number or tonnage) are refurbished and re-used/recycled, the exemptions mentioned in section 0 can be used.
In any case, information regarding take-back and disposal of devices shall be contained in the product documents and in the information and data sheet.

Compliance Verification:

The distributor describes the take-back and re-use activities and documents their effectiveness (Annex 11). The distributor provides this information in the information and data sheet.

3.1.1.5 Photoconductor Drums

- Photoconductor drums shall not contain selenium, lead, mercury or cadmium or any of their compounds as constituent substances.
- Spent photoconductor drums shall be taken back by the distributor (free of charge return to the return facility) and either be recovered for reuse or subjected to material recycling.
- The information and data sheet must include details regarding the take-back and return facility. The facility shall be located in Germany or, respectively, in the country where the product is offered with reference to the Blue Angel.

Compliance Verification:

The manufacturer declares in Annex 1 that the aforementioned substances are not contained in the photoconductor drums and the distributor declares in Annex 2 that replaced drums will be taken back and recycled. The distributor must indicate the recycling method (Annex 11) and refer to take-back options in the information and data sheet (Annex 12; see also para. 4).

3.1.2 Take-back of modules and containers for colourants

The distributor commits to take back modules and containers for colourants which he supplied or recommended for use in the product documents in order to preferably channel such modules and containers to reuse or material recycling.

This also applies to excess toner reservoirs. A third party (dealers or service agencies or companies engaged in the module reuse/recycling business) may be commissioned to perform this task. The formers are to be provided with instructions for proper handling of excess toners. Non-recyclable product parts must be properly disposed of.

Modules and containers are to be taken back free of charge by the return facility named by the distributor to which products can be returned personally or by shipment (return facilities abroad are only permissible if the products can be sent there free of charge). The product documents and the information and data sheet must include detailed information on the return options.

Compliance Verification:

The distributor declares compliance in Annex 2 and provides instructions to the recycling contractor regarding handling of excess toners (e.g. by means of the EC Material Safety Data Sheet) and by means of the note: "Prevent toner dust from being released into the air." (Annex 6b).

3.1.3 Yield of inks and toner

For devices for use by private final consumers, the ink/toner yield of modules/containers provided with the device shall be indicated (if technically possible) according to ISO/IEC 19752, ISO/IEC 19798, and ISO/IEC 24711, respectively, or according to page coverage, and indicated in the information and data sheet. The information and data sheet (if applicable) shall contain information that the yield (of inks or toner) may be reduced for the installation or by rinsing or calibration processes, respectively.

If the ink modules provided in the condition supplied to the customer have a clearly reduced yield compared to the standard configuration, this has to be indicated in the information and data sheet.

Compliance Verification:

If the device is destined for use by private final consumers, the distributor informs in the information and data sheet about the yield of provided toner and ink modules (Annex 12; see also para. 4).

3.1.4 Paper handling

The consumption of printing paper contributes significantly to the device's total resource consumption. Against this background, the following requirements regarding a resource-conserving paper handling have to be met.

3.1.4.1 Usability of recycled paper

The devices must be capable of using recycled paper made of 100% post-consumer recycled paper that meets the requirements of EN 12281. The distributor is free to recommend certain types of recycled paper.

The information and data sheet must include the following note: "This equipment is suitable for using recycled paper". A reference to EN 12281 can be included.

3.1.4.2 Duplex Printing and Copying

Devices must offer an option for duplex printing on DIN A4 paper according to the requirements in Table 4. In the condition supplied to the customer, the devices must be configured in a way that paper is printed in duplex mode under consideration of the requirements of Table 4.

Table 4: Requirements for Automatic Duplex Printing and Copying

Page Throughput S_M [DIN A4 Pages per Minute]		Minimum requirements for duplex printing and Copying	Default settings in the condition supplied to the customer with regard to duplex printing
Colour Printing Devices	Monochrome Printing Devices		
≤ 19	≤ 24	The devices must offer an additional software-supported option for duplex printing and copying.	None
$19 < S_M < 35$	$24 < S_M < 37$	The devices must by default be equipped with a component for duplex printing and copying or such a component must be offered as supplementary equipment.	For devices that are by default equipped with a component for duplex printing and copying and which are placed on the market for the first time after 1.1.2018: duplex printing must be set as default

Page Throughput S_M [DIN A4 Pages per Minute]		Minimum requirements for duplex printing and Copying	Default settings in the condition supplied to the customer with
≥ 35	≥ 37	The devices must by default be equipped with a component for duplex printing and copying.	For electrophotographic devices, which are placed on the market for the first time after 1.1.2017, and for inkjet devices, which are placed on the market for the first time after 1.1.2018: duplex printing must be set as default

The information and data sheet to be provided by the distributor must include information on options for duplex printing, the existence of a duplex unit or its availability as an upgrade.

3.1.4.3 Availability of N-up printing

Devices shall offer as a standard feature the capability to print several pages of a document on one sheet of paper. The required information on the availability of N-up printing and software settings shall be contained in the information and data sheet.

Compliance Verification:

The manufacturer declares compliance with the requirements regarding resource saving paper handling (Annex 1) and the distributor submits the information and data sheet (Annex 12; see also para. 4).

3.1.5 Longevity

A long service life of the devices contributes significantly to resource conservation. Against this background the following requirements applying to devices destined for use by private final consumers are included in these Basic Award Criteria:

3.1.5.1 Information regarding supposed service life

The distributor informs in the information and data sheet about the typical service life span or use intensity (e.g. in printed pages), which the device is designed for in its default configuration assuming typical user behaviour. The manufacturer shall define the assumed typical use conditions in the information and data sheet.

3.1.5.2 Exchange parts

The devices shall be designed in a way that all necessary exchange parts can be exchanged by the user him-/herself. The respective exchange parts have to be available for the user.

3.1.5.3 Repair options

The distributor commits to ensure that the spare parts and exchange parts needed for repair of the devices and the according infrastructure are available for at least 5 years after ceasing production and that the user is informed about this availability of spare parts. Other parts the life span of which usually exceeds the typical life span of the product do not have to be held available as spare parts.

The distributor commits to provide easily accessible repair options for the device to the users. Such repair options may consist in a delivery to the service centre of the manufacturer by means of licensed dealers or logistical solutions (package services) offered to the customer, or that dealers and repair centres independent from the manufacturer have access to spare parts and repair information.

3.1.5.4 Cleaning and maintenance

Cleaning and maintenance can contribute to preserving the functional and environmental properties of the device. The user information must include instructions for equipment cleaning and maintenance by users as well as cleaning and maintenance intervals.

Compliance Verification:

For devices destined for use by private final consumers, the distributor confirms that all requirements regarding longevity are met and provides the required product and service information and the information and data sheet (Annex 12; see also para. 4).

3.1.6 Packaging

Plastics used for product packaging must not contain halogen-containing polymers. The plastics used must be marked in accordance with the German Packaging Ordinance (Verpackungsverordnung), as amended.
Paper and cardboard packaging shall, for the packaging materials mentioned below, have at least the mentioned a recovered fibre content.

- wound tubes: 90% Paperboard: 80%
- Corrugated fiberboard: 25%
- Solid fiberboard: 40%
- Spiral

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 provides according information in detail, including the exact recycling contents of the packaging.

Compliance Verification:

The distributor declares compliance with the requirements regarding plastics (Annex 2). For paper and cardboard the distributor either declares that the used packaging materials have at least the mentioned recovered fibre contents (Annex 2) or provides detailed information on the packaging in Annex 2a.

3.2 Use of hazardous substances

In order to protect the natural environment as well as for health and safety reasons, the use of hazardous substances for production and use of the devices shall be reduced as far as possible.

3.2.1 Hazardous substances in casings and casing parts

Halogenated polymers and halogenated organic compounds for their use as flame retardants are not permitted.

Exempted from this requirement are:

- Fluorinated organic additives (as, for example, anti-dripping agents) used to improve the physical properties of plastics, provided that they do not exceed 0.5% w/w.
- Fluorinated polymers as, for example, PTFE.
- Plastic parts with a mass equal to or less than 25 grams. However, these must not contain PBBs (polybrominated biphenyls), PBDEs (polybrominated diphenyl ethers) or chlorinated paraffins. (This exemption does not apply to control panel keys.)
- Special plastic parts located close to heating and fuser elements. These parts must, however, not contain PBBs, PBDEs or chlorinated paraffins.

Large-sized plastic parts which are reused as can be proven and which are marked according to 0,

- Table 2, no. 9. They must not, however, contain PBBs, PBDEs or chlorinated paraffins.

Flame retardants used in plastic parts with a mass greater than 25 grams are to be confidentially reported to the RAL and identified by their CAS number.

In addition, no substances are to be intentionally added as constituents to the plastics which meet at least one of the conditions set out in Table 5:

Table 5: Conditions for the exclusion of substances from materials in casings and casing parts

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
Germ cell mutagenicity	Muta. 1A, 1B	H340 May cause genetic damage
Reproductive toxicity	Repr. 1A, 1B	H360 May damage fertility or the unborn child
Substances of the so-called candidate list according to REACH Article 59. The version of the candidate list at the point of application applies.[13]		

The requirements also apply to recycled material.

Compliance Verification:

The manufacturer declares compliance with the requirements (in Annex 1). Regarding flame retardants a written confirmation by the plastics supplier shall be submitted to RAL, confirming that no restricted substances are contained in the casing materials (Annex 5). This applies to used recycled plastics, too. The manufacturer also commits to ask the plastics supplier to report the chemical designation of the flame retardants used (CAS no.) confidentially to the RAL (Annex 5).

[13] http://echa.europa.eu/de/candidate-list-table. For substances on the candidate list at least a general threshold value of 0.1 % (m/m) applies of a more stringent value, which is based on a classification according to the hazard classes of the CLP Regulation.

If a substitution problem regarding the allowed substances in casing plastics should arise due to changes to the candidate list at short notice, a transition period can be set in agreement with the Federal Environment Agency (UBA).

3.2.2 Hazardous Substances in Printed Circuit Boards

The support material of printed circuit boards must not contain PBBs (polybrominated biphenyls), PBDEs (polybrominated diphenyl ethers) or chlorinated paraffins.

Compliance Verification:

The manufacturer must declare compliance with the requirement in Annex 1 or submit declarations by the suppliers of printed circuit boards stating that the restricted substances are not contained in the board material.

3.2.3 Hazardous substances in colourants

3.2.3.1 Restriction of the use of hazardous substances

Colourants such as toners, inks, solid inks and the like must not contain substances as intentionally added constituents which meet the conditions set out in
Table 6.

Table 6: Conditions for the exclusion of substances as intentionally added constituents in colourants

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[14] 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 of the so-called candidate list according to REACH Article 59. The version of the candidate list at the point of application applies.[15]		

In addition, colourants must not contain substances as intentionally added constituents which require labelling of the mixture according to Annex 1 of Regulation (EC) No. 1272/2008 with the H phrases or which meet the criteria of the according classification.

[14] 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. October 2021, the toner should not contain more than 1% titanium dioxide.

[15] http://echa.europa.eu/de/candidate-list-table. For substances on the candidate list at least a general threshold value of 0.1 % (m/m) applies of a more stringent value, which is based on a classification according to the hazard classes of the CLP Regulation.

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

Compliance Verification:

The manufacturer declares compliance with the requirements in Annex 1 and submits a declaration of the device manufacturer or supplier of the ink or toner (Annex 6a). In addition, material safety data sheets have to be submitted for all colourants (Annex 6b). Provided that the Material safety data sheets for toners do not show a negative AMES Test the test result of such a test must be given separately (Annex 6c).

3.2.3.2 Restriction to the use of heavy metals

No substances are to be added to toners and inks which contain mercury, cadmium, lead, nickel or chromium-VI-compounds as constituent substances. Exempted are high molecular weight complex nickel compounds as colourants.
Production-related contamination by heavy metals, such as cobalt and nickel oxides and organotin compounds is to be kept as low as technically possible and economically reasonable (ALARA principle = as low as reasonably achievable).

Compliance Verification:

The applicant must demonstrate compliance with the requirement by submitting a declaration by the device manufacturer or ink or toner manufacturer confirming that no mercury, cadmium, lead, nickel, or chromium-VI compounds are added as constituent substances and that production-related contaminations (by heavy metals such as cobalt, nickel or organotin compounds) are minimized.

3.2.3.3 Azo-dyes

Toner and inks shall not contain azo dyes (dyes or pigments) that can release carcinogenic aromatic amines listed in Regulation (EC) 1907/2006 (REACH Regulation), Annex XVII, Appendix 8[16] (see also TRGS 614)[17].

[16] According to the amending Regulation (EC) No. 552/2009 of 22 June 2009
[17] http://www.baua.de/de/Themen-von-A-Z/Gefahrstoffe/TRGS/TRGS-614_content.html;jsessionid=DE8FE0F226164F3E52F56C99F814AA6E.2_cid135

Compliance Verification:

The applicant must demonstrate compliance with the requirement by submitting a declaration by the device manufacturer or the ink or toner manufacturer (Annex 6a).

3.2.3.4 Biocides in Inks

Only 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 the inclusion to the list of approved substances for product type 6 is rejected, the use of the substance is no longer permitted.

Compliance Verification:

The applicant demonstrates compliance with the requirements by submitting a declaration of the device manufacturer or ink manufacturer (Annex 6a) and attaches a valid material safety data sheet.

3.2.3.5 Specific Instructions for Handling of Toner Modules

Toner modules and containers must be sealed in a way preventing toners from leaking during storage and transport. The information and data sheet must include explicit instructions for proper handling of toner modules. In addition, the information and data sheet must include a note warning the user that toner modules must not be opened by force and that in case toners have leaked as a result of improper handling inhaling toner dust and skin contact are to be avoided as precaution. Additionally, it must be stated what to do in case of skin contact. It has to be stressed that toner modules must be kept away from children.

Compliance Verification:

The distributor submits the information and data sheet (Annex 12; see also para. 4).

3.3 Substance Emissions

3.3.1 Comments

Electronic devices emit volatile organic substances into the indoor air. In addition, ozone can be generated during the operation of printing devices depending on the technology used. Furthermore, electrophotographic devices release fine and ultrafine particles. These emissions shall be kept as low as possible in order to maintain good indoor air quality. This is supported by both the limitation of emissions within the scope of the requirements for the Blue Angel eco-label and appropriate user behaviour.

Volatile organic compounds, VOCs, are determined as the sum parameter TVOCs (total volatile organic compounds). Benzene, styrene as well as ozone are determined as single substances. Dust is measured gravimetrically; for colour printing devices dust measuring shall be performed in colour printing mode. In addition, particle emissions are quantified during the printing process as particle number concentrations.

The emissions are measured under defined conditions and specified as emission rates.

Determination of emission rates according to Appendix S-M to the Basic Award Criteria is done in the pre-operating phase[18] of the device as well as during continuous printing.

Maximum permissible emission rates are defined under the presumption of a use factor of 0.1 for monochrome printing equipment in print mode, i.e. printing is actually only done during 10% of the time theoretically available for uninterrupted printing (this corresponds to a print volume of about 1,000 pages per working day for a device that prints approximately 17 pages/minute). For colour printing equipment, a use factor of 0.05, i.e. half of the above value, is assumed, for the time being.

The use factor for the pre-operating phase is 1. The equipment-related emission of newly produced devices will, however, decrease with the passing of time. It is lower for desktop devices – primarily because of the lower material and component volume.

The maximum permissible emission rates for pre-operating and print phase in

[18] This pre-operating phase comprises the pre-set time profile of the device's power consumption for one hour.

Table 7 consider, from a precautionary perspective, the influence of ready and print phase on indoor air quality on a proportionate basis.

3.3.2 Electrophotographic Devices

Electrophotographic devices are tested for emissions of volatile organic compounds in a pre-operating phase prior to the beginning of the printing process. During the printing process, they are tested for release of TVOCs, benzene, styrene as well as for release of ozone, dust (gravimetrically) and particles (number concentration). The particle number concentration is measured continuously in the size range between 7 and 300 nm. Extension of the measuring range to particle diameters between 5 to 1,000 nm is possible – depending on the measurement equipment used. Minimum requirements to be met by the measurement equipment as well as its appropriate particle size measuring range are defined in Appendix S-M[19]. The predominant number of particles emitted by electrophotographic devices lies within this particle size range.

The emission rates in pre-operating and in print phase are to be determined and recorded according to the test methods described in Appendix S-M to the DE-UZ 205 Basic Award Criteria. They must not exceed the values shown in

[19] As the predominant number of emitted particles has a diameter smaller than 300 nm, differences in the measuring range of the measurement equipment are negligible.

Table 7. The toner types used for the measurement are to be indicated in the measurement protocol. RAL gGbmH is to be informed immediately if the toner type is changed and a new measurement protocol using the new toner type is to be submitted.

Table 7: 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 (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*	10	18
	Benzene	< 0.05	< 0.05
	Styrene	1.0	1.8
	Unidentified Single Substances VOC	0.9	0.9
	Ozone	1.5	3.0
	Dust	4.0	4.0
Print Phase	$PER_{10\ PW}$ [Particles/10 min]	3.5×10^{11}	3.5×10^{11}

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

Provided that the determined emission rate also meets the test values for mono-chrome 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, for monochrome devices, in monochrome mode. If the page throughput S_F is more than 20% below the page throughput S_M also a testing in monochrome printing mode is required and the test values for monochrome printing must also be fulfilled.

The test report must list the types of toner used with the device for testing. Any change of type of toner must be notified to the RAL and will require a resubmission of a test report.

The test report must always contain month and year of device manufacture.

Particle emissions in the fine and ultrafine particle size range:
For colour printing devices, particle emissions are determined in colour mode. If the page throughput S_F is more than 20% below the page throughput S_M also a testing in monochrome printing mode is required and the test values for monochrome printing must also be fulfilled. For monochrome devices, particle emissions are determined in monochrome mode.

Testing of particle emissions is possible for all configurations of identical construction. The test chamber size must in each case comply with the criterion for the loading factor according to Appendix S-M, para. 4.2.

If the particle emissions of a base unit which is to be tested are "not quantifiable" according to Appendix S-M, para. 4.9.2, evaluation step 9, then it is considered as meeting the test value.

The requirements regarding particle emissions apply for floor mounted devices > 250 l and high print speed (S_M ≥ 60 ppm und S_F ≥ 40 ppm) from 01.01.2019.

Compliance Verification:

The manufacturer must submit a form completed by the test laboratory (Annex 7a) confirming compliance with the requirements of the Basic Award Criteria regarding the substance emissions for monochrome printing with monochrome printing equipment as well as for colour printing and, if the occasion arises, for monochrome printing with colour printing equipment.

A copy of the complete test report according to the test guideline (Appendix S-M) must be enclosed (Annex 7b). The qualification of the test laboratory for the emission measurements under paras. 3.3.2 and 3.3.3 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 Group IV and documented in an annex to the test report.

3.3.3 Inkjet Devices

TVOCs are to be determined for inkjet devices on the basis of the work instructions in Appendix S-M when printing out the respective printing test pattern. Testing is to be performed at the print speed referred to by the manufacturer as normal or standard mode and which is usually factory preset. The emission rates during the print phase are to be determined and recorded according to the test method described in Appendix S-M to the DE-UZ 205 Basic Award Criteria. They must not exceed the values shown in Table 8.

Table 8: Permissible Test Values for Emission Rates Determined According to Appendix S-M for Inkjet Devices

(All Values in mg/h)		Monochrome Printing	Colour Printing
Pre-operating Phase	TVOC*	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*	10	18
	Benzene	< 0.05	< 0.05
	Styrene	1.0	1.8
	Unidentified Single Substances VOC	0.9	0.9

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

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

The test report must list the types of ink used for testing. Any change of a type of ink must be notified to the RAL and will require a resubmission of a test report.

Compliance Verification:

The manufacturer must submit a form completed by the test laboratory (Annex 7a) confirming compliance with the requirements regarding substance emissions. A copy of the complete test report according to the test guideline (Appendix S-M) must be enclosed as well (Annex 7b).
The qualification of the test laboratory for the emission measurements under paras. 3.3.2 and 3.3.3 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 Group IV and documented in an annex to the test report.

3.3.4 User Information on Substance Emissions

The distributor must inform in the information and data sheet that testing was carried out according to the requirements of the Blue Angel eco-label award criteria by using the consumables (types of toners or inks) supplied and recommended by the manufacturer and that those requirements were met.
The distributor must further state that new electronic devices generally emit volatile substances into the indoor air and that, therefore, the user should ensure more frequent air exchange in rooms where new equipment is set up or directly at the workplace, especially during the first days of use.

Compliance Verification:

The distributor must submit the information and data sheet (Annex 12; see also para. 4).

3.3.5 Products of Identical Construction

If two devices of identical construction differ in their maximum print speed at monochrome printing the product printing at highest speed is to be tested.
The result is considered as transferable to those devices of identical construction whose print speed falls short of the maximum print speed by not more than 20 percent.
When filing application for three or more devices of identical construction with different print speeds the product printing at highest print speed and another one featuring a lower print speed is to be tested.
Further comments on devices of identical construction can be found in Appendix B-M to the Basic Award Criteria.

3.4 Energy

The Blue Angel is awarded to devices which are, among other aspects, particularly energy efficient. Against this background, these Basic Award Criteria comprise requirements regarding the following operation modes and device properties:

- Typical Energy Consumption (TEC_M) (→ Following the definition in section 1.5.9.2),
- Sleep Mode (→ Following the definition in section 1.5.7.6)
- Maximum delay times (→ Following the definition in section 1.5.8.2)
- Maximum recovery times (→ Following the definition in section 1.5.8.3)
- Off-Mode (standby) (→ Following the definition in section 1.5.7.7).

The measurements of the power consumption, typical energy consumption, delay times and recovery times are to be conducted according to appendix E-M. In the condition as supplied to the customer, the device must meet all requirements stated in section 3.4.

3.4.1 Typical Energy Consumption

The TEC_M values of office equipment with printing function have to comply with the respective maximum TEC_{MZul} value, i.e. $TEC_M \leq TEC_{Mzul}$. The TEC_{MZul} value is to be rounded to one decimal place (according to Energy Star).

The maximum allowed TEC value TEC_{MZul} depends on the page throughput S_M and the type of the device. The calculation of maximum values is set out for printers in Table 9 for monochrome devices and Table 10 for colour devices. For multifunction devices the calculation of maximum values is set out in Table 11 for monochrome devices and Table 12 for colour printing devices.

Table 9: TEC_{MZul} calculation for monochrome printers [kWh/week]

Page throughput	TEC_{MZul}
$S_M \leq 25$	$0{,}95 + 15/100000 \times S_M$
$S_M > 25$	$0{,}35 + 105/100000 \times S_M^2$

Table 10: $TECM_{Zul}$ calculation for colour printers [kWh/week]

Page throughput	TEC_{MZul}
$S_M \leq 25$	$1{,}05 + 665/100000 \times S_M^{1,4}$
$S_M > 25$	$0{,}85 + 145/100000 \times S_M^2$

Table 11: TEC_{MZul} calculation for monochrome multifunction devices [kWh/week]

Page throughput	TEC_{MZul}
$S_M \leq 25$	$1{,}35 + 30/100000 \times S_M^{1,8}$
$S_M > 25$	$0{,}8 + 105/100000 \times S_M^2$

Table 12: TEC_{MZul} calculation for colour multifunction devices [kWh/week]

Page throughput	TEC_{MZul}
$S_M \leq 25$	$1{,}3 + 650/100000 \times S_M^{1,3}$
$S_M > 25$	$0{,}9 + 145/100000 \times S_M^2$

Compliance Verification:

The manufacturer submits Annex 8a with the required information: Type of device (printer or multifunction device, monochrome device or colour printing device) and page throughput in monochrome printing mode, further the TEC_M value of the device in the respective form. In addition, Annex 8a is submitted as MS-Excel file to RAL gGmbH.

The manufacturer submits a measurement report (Annex 8c) which verifies the fulfilment of the criteria set out in Annex 8a. This should include at least the ENERGY STAR's "TEC Data Collection Worksheet". Testing is accepted which is done in test laboratories that are accredited for the respective tests according to ISO/IEC 17025 or in laboratories of manufacturers. If the testing was carried out by an accredited test laboratory, the manufacturer submits the valid accreditation certificate (Annex 8d).

3.4.2 Sleep Mode

3.4.2.1 Maximum Power Consumption

Office equipment with printing function must have a maximum power consumption in sleep mode of 3 Watt and 2 Watt starting 01.01.2019 with the exception of equipment with wireless network access points. Devices with wireless network access point must have a maximum power consumption in sleep mode of 4 Watt and 3 Watt starting from 01.01.2019.

Compliance Verification:

In Annex 8a, the manufacturer reports all device data which are decisive for the applicability of the requirements: with/without wireless network access point as well as the value of the energy consumption in sleep mode. The manufacturer submits a measurement report (Annex 8b) verifying the compliance with the values in Annex 8a. Testing is accepted which is done in test laboratories that are accredited for the respective tests according to ISO/IEC 17025 or in laboratories of manufacturers. If the testing was carried out by an accredited test laboratory, the manufacturer submits the valid accreditation certificate (Annex 8d).

3.4.2.2 Maximum delay times

In the condition supplied to the customer, office equipment with printing function has to be configured to automatically enter an electric power saving mode after a defined delay time. Typically, devices have multiple electric power saving modes. The following requirements concerning the delay times apply to the sleep mode (according to the definition in para. 1.5.7.6), which has a maximum power consumption of 3 Watt (2 Watt from 01.01.2019) for devices without wireless network access point, and 4 Watt (3 Watt from 01.01.2019) for devices with wireless network access point (see para. 3.4.2). If more than one mode fulfills these criteria, the manufacturer must report the mode which is referred to.
The maximum delay times which can be adjusted by the user must not exceed the values set out in the following table:

Table 13: Upper Limit for the Range of the Delay Times t_{iA} for the Sleep Mode Adjustable by the User

All Devices with a Page Throughput S_M of	Minutes
> 0-30 Pages/Minute	60
> 30 Pages/Minute	120

The maximum default ("as-shipped") delay times must not exceed the values set out in the following table.

Table 14:Upper limits for default delay times [Minutes]

Page Throughput S_M	MFDs	Printer
0 - 10	15	5
11 - 20	30	15
21 - 30	45	30
31 - 50	45	45
>51	45	45

Compliance Verification:

The manufacturer reports in the forms in Annex 8a the default and maximum adjustable delay times. The manufacturer submits a measurement report (Annex 8b) verifying the compliance with the values in Annex 8a. Testing is accepted which is done in test laboratories that are accredited for the respective tests according to ISO/IEC 17025 or in laboratories of manufacturers. If the testing was carried out by an accredited test laboratory, the manufacturer submits the valid accreditation certificate (Annex 8d).

3.4.3 Maximum Values for Recovery Times t_{2R} and t_{3R}

Office equipment with printing function must return to ready mode within the defined maximum times. The operating modes relevant for the maximum recovery times t_{2R} and t_{3R} are the modes the device has entered after times t_{2B} and t_{3B} after the end of the last printing process as defined in the following table.

Table 15: Times for determining the operating mode relevant for recover times t_{2R} and t_{3R} [Minutes]

Page throughput S_M	t_{2B}	t_{3B}
> 0 … 5 pages per minute	5	10
> 5 … 10 pages per minute	10	15
> 10 … 20 pages per minute	10	20
> 20 … 30 pages per minute	10	30
> 30 … 40 pages per minute	10	45
> 40 pages per minute	15	60

For the operating mode the device has entered after t_{2B} the maximum recovery time is t_{2R}, for the operating mode the device has entered after t_{3B} the maximum recovery time is t_{3R} as defined in the following table.

Table 16: Maximum values for recovery times

	Values in Seconds	
	t_{2R}	t_{3R}
Maximum Values for t_{2R} and t_{3R}	$t_{2R} = 0.42 * S_M + 5$ (maximum 30 sec.)	$t_{3R} = 0.51 * S_M + 15$ (maximum 60 sec.)

Measurement of the recovery time shall be performed following appendix E-M.

Compliance Verification:

The manufacturer reports in the forms in Annex 8a the maximum delay times according to appendix E-M. The manufacturer submits a measurement report (Annex 8b) verifying the compliance with the values in Annex 8a. Testing is accepted which is done in test laboratories that are accredited for the respective tests according to ISO/IEC 17025 or in laboratories of manufacturers. If the testing was carried out by an accredited test laboratory, the manufacturer submits the valid accreditation certificate (Annex 8d).

3.4.4 Off-Mode (standby)

3.4.4.1 Maximum Power Consumption

The power consumption of office equipment with printing function in off-mode (standby) must not exceed 0.4 Watt.

Compliance Verification:

The manufacturer reports in the forms in Annex 8a the power consumption in off-mode according to appendix E-M. The manufacturer submits a measurement report (Annex 8b) verifying the compliance with the values in Annex 8a. Testing is accepted which is done in test laboratories that are accredited for the respective tests according to ISO/IEC 17025 or in laboratories of manufacturers. If the testing was carried out by an accredited test laboratory, the manufacturer submits the valid accreditation certificate (Annex 8d).

3.4.4.2 Availability of switches

The device must have a switch to manually enter the off-mode (standby) or an operating mode with a lower power consumption (e.g., double-pole off with separation of power supply). The design of the symbols on switches and buttons must comply with the relevant criteria according to the standard IEEE 1621. For models first introduced to the market before 1.1.2013 (including re-introduction to the market following a refurbishment as according to section 3.1.1.4) an exemption from this requirement can be made.

The switch or button must be mounted in an easily accessible position at the device when placed in a usual setup position. Easy accessibility must also be ensured if the device is upgraded – for example, with accessories. The device must be designed in a way which allows switching it at least twice a day into off-mode (standby) or a mode of a lower power consumption within the typical life span without sustaining a damage.

Compliance Verification:

The manufacturer confirms the availability of the required switch or buttons in annex 1.

3.4.5 Information and data sheet

For the idle modes the distributor must state in the information and data sheet (Annex 12):

a) Delay times
b) Recovery times
c) Power consumption

These three points describe the device's (electric power saving) behaviour in delivery status. Details on how to define the different idle modes are given in Appendix E-M and E-I.

In any case, the device must meet the requirements for electric power saving behaviour – see the before mentioned points a) and b):

- This applies as soon as the device has completed any primary function – not only copying or printing – and does not perform any other primary function.
- This also applies if the device is connected to a data network. Signals received via the data network which do not serve the performance of a primary function[20], must neither "wake up" the device, i.e.
  - neither allow the device to enter a higher power consumption mode, e.g. ready mode,
  - nor keep it from switching according to the delay times set.

  For devices supporting remote configuration the following exemption applies: For the time required for remote configuration processes by a network administrator the device is allowed to enter a higher power consumption mode; however, it is not allowed to enter ready mode.
  - This also applies if the office equipment with printing function is connected to a controller offered or licensed by the distributor. For all controllers offered or licensed by the distributor for use with one of his devices, he has to ensure that they do not affect the electric power saving functions of the device when connected.
  - This also applies if accessories are connected.
- The statements "*must meet the requirements for electric power saving behaviour – see the before mentioned points a) and b)*" and "*do not affect the electric power saving functions of the device*" have the meaning that the values for
  - delay times

  and
  - recovery times

  must not be increased. With this, extending of times which shorten electric power saving intervals shall be excluded. For example, extension of the delay time to infinite by deactivation of the idle modes shall be excluded.

3.5 Noise Emissions while printing

The noise emissions are evaluated by the declared A-weighted sound power level, L_{WAd} in decibels (dB) with one decimal place, depending on the page throughput S_M or S_F, respectively.

Devices of identical design which differ in their maximum page throughput shall be tested in all configurations in which they are to be offered with reference to the Blue Angel.

Determination of A-weighted sound power level:
The A-weighted sound power level L_{WA} shall be determined according to ISO 7779. Devices capable of colour printing shall be tested in both monochrome mode ($L_{WA,M}$) and colour mode ($L_{WA,F}$).

- Noise measurements shall be conducted without optional peripheral devices.
- A4 size paper of grammage 60 g/m² to 80 g/m² shall be used for test operations.
- The 4-page Adobe Reader file from the Office Test Suite according to B.1 of ISO/IEC 24734 shall serve as test pattern.
- Only one-sided printing shall be measured.

[20] For example: server requests regarding the device's status.

- The noise measurement shall only be conducted during repetitive printing operation cycles. The measurement time interval shall include at least three complete outputs of the 4-page test pattern (12 pages). The interval shall begin after the printing preparation.

Declared A-weighted sound power level
At least three devices of one model have to be tested. The declared A-weighted sound power level L_{WAd} shall be determined following the procedures of ISO 9296:1988. It shall be declared in decibels (dB) with one decimal place. If the noise emission measurement can be performed with one device only the following formula may be used as a substitute to determine the declared A-weighted sound power level L_{WAd}.

$$L_{WAd} = L_{WA1} + 3{,}0\ \text{dB}$$

(L_{WA1} = A-weighted sound power level of a single device, in dB with one decimal place)

Limit
The declared A-weighted sound power level(s) of (both) monochrome mode $L_{WAd,M}$ (and full colour mode $L_{WA,F}$, if applicable) shall not exceed the limit. The limit $L_{WA,lim}$ shall be determined depending on the page throughput of (both) monochrome mode S_M and colour mode S_F if applicable, given to one decimal place and according to the following formula:

$$L_{WA,lim} = 47 + 15 * \lg (S_{M/F} + 10)\ \text{dB}$$

Information on noise emissions
The values of the declared A-weighted sound power level L_{WAd} in dB with one decimal place and page throughput $S_{M/F}$ in ipm shall be indicated in the information and data sheet under „environment and health-related statements". For devices capable of colour printing the declared A-weighted sound power levels $L_{WAd,M}$ and $L_{WAd,F}$ and corresponding page throughput S_M and S_F, both of monochrome mode and colour mode, shall be indicated.

Compliance verification:

The applicant shall demonstrate compliance with the criteria by attaching a completed Annex 9 to the application. Annex 9 shall be filled in and confirmed by the testing laboratory referring to the test report. The testing laboratory must be accredited according to both ISO/IEC 17025 and ISO 7779 for acoustical noise measurements. A copy of the valid accreditation certificates (Annex 10) shall be attached. The required user information shall additionally be provided in the information and data sheet (Annex 12). In Annex 8a, the manufacturer reports the required data.

4 Product Documents and User Information

The documentation supplied along with the equipment (user manual, product documents) must include environmental- and health-related user information in addition to the technical descriptions. This documentation must be made accessible to the user in electronic or in printed form (preferably printed on recycled paper). Regardless from this, a printed summary with brief information on the installation must be supplied along with the device.

Information on the below listed device functions as well as on the use of the office equipment with printing function must be summarised in a separate information and data sheet and include the following points:

- A declaration whether the device is destined for use by private final consumers,
- Indication of the minimum share of post-consumer recycled plastic according to 0,
- If applicable, information regarding take-back system for product re-use according to 3.1.1.4,
- Information on device take-back and environmental-friendly disposal at the end of the use phase according to 3.1.1.4,
- Instructions for proper handling of toner/ colourant modules according to 3.2.3.5,
- Instructions on the take-back of used photoconductor drums according to 3.1.1.5
- Information on the take-back of colour modules and colourant containers according to 3.1.2,
- If applicable, information on yields according to 3.1.3,
- Information on use of recycled paper and resource-saving paper handling (including information on duplex and N-up printing) according to 3.1.4,
- If applicable, information on typical service life span and typical use conditions according to 3.1.5.1, on the availability of spare parts and exchange parts according to 3.1.5.3, as well as on repair options and the maintenance and cleaning of equipment according to 3.1.5.3 and 3.1.5.4,
- Instructions for proper device placement with regard to substance emissions according to 3.3.4,
- According to 3.4 and the requirements set out in Appendix E-I to the Basic Award Criteria: information on electric power saving, on device data related to electric power consumption such as power consumption in the individual operating modes, delay times of idle modes and recovery times of the electric power saving modes as well as electric power consumption data according to appendix E-M,
- Noise emission data given as declared sound power levels and page throughputs according to 3.5,
- Information on the fact that the device is awarded the environmental label Blue Angel, and a link to the website http://www.blauer-engel.de.

The information and data sheet shall be available in printed form (preferably printed on recycled paper) or in electronic form and must at least be written in German. The information and data sheet must be enclosed with products offered and/or supplied under the Blue Angel eco-label or it must be referred to the electronic version (Annex 12). In addition, its contents have to be published by the distributor about four weeks after the device was put on the market and after completion of the Contract on the Use of the Environmental Label on the website where the respective device is presented. This can also be done by offering a link to this specific information and data sheet (e.g. "User information for {device designation} according to the requirements of the German environmental label Blue Angel DE-UZ 205"). If the device is placed on the market within the German-language area, the distributor publishes within 4 weeks after announcement of the device on the Blue Angel website the German-language information and data sheet on the respective German-language site of the website of the Blue Angel (Your product category). If the device is distributed only within the Non-German-language area, an English-language version of the information and data sheet is to be

published on the respective English product site. A publication in German and English is also possible.

Compliance Verification:

The distributor submits the information and data sheet.
The distributor states in Annex 2 that this information and data sheet will be enclosed with the products or that it will be referred to the electronic version, that its contents will be published on the Internet and on the websites of Blue Angel (Your product category) around 4 weeks after the device was placed on the market and the Contract on the Use of the Environmental Label was completed, and that the essential environmental and health-related information is contained in the detailed product documents (user manual or electronic media), and, if applicable, the distributor names the link providing access to this information.

5 Outlook on Possible Future Requirements

Within the scope of the next revision of these Basic Award Criteria the following aspects shall presumably be taken into account:

- Evaluation of possible requirements regarding the minimum share of post-consumer recyclate in plastic parts;
- Evaluation of tighter requirements regarding take-back systems for refurbishment and re-use of devices;
- Evaluation of requirements regarding recovery times;
- Evaluation of tighter requirements regarding the longevity and repairability;
- Evaluation of more comprehensive exclusions of substances with certain hazard characteristics from device materials;
- Evaluation of tighter requirements regarding the exclusion of hazardous substances from printing consumables (inks and toner).

6 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.

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