

BLUE ANGEL

The German Ecolabel



Digital Projectors

DE-UZ 127

Basic Award Criteria

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Version 5

The Environmental Label is supported by the following four institutions:



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 - 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.

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

Digital projectors (also known as "beamers" in Germany) are used for a variety of different applications.

These applications range from the private projection of still images ("slideshows"), moving images ("films") and games ("home entertainment") through to the presentation of business graphics as part of congresses and conferences, as well as the projection of large-format advertising messages on trade fair stands or film screenings.

This is a product group that has experienced rapid technological developments in recent years and is being sold on the market in high quantities.

1.3 Objective of the environmental label

The "Blue Angel" eco-label for digital projectors should inform customers purchasing these types of devices that products issued with this label - in contrast to other products - provide greater environmental and consumer protection. Therefore, the eco-label can act as a decision-making aid for purchasing new devices.

It is a label that is designed to motivate manufacturers to develop efficient devices that function with the lowest possible energy consumption and low noise emissions. Furthermore, it allows them to easily inform customers about these product characteristics in a targeted way.

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



2 Scope

These Basic Award Criteria are valid for digital home cinema projectors and office projectors (also commonly known in Germany as "beamers") based on liquid crystal technology (such as LCD or "Liquid Crystal Display"), DLP technology ("Digital Light Processing") or LCoS technology ("Liquid Crystal on Silicon").

3 Requirements

3.1 Areas of application

Some of the environmentally-relevant characteristics of digital projectors are influenced by the specific area of application for which the devices are designed and optimised.

The relevant area of application is to be determined in accordance with the following criteria and documented in the technical product information:

- An **office projector** is a digital projector that achieves a contrast ratio of 5:1 for a defined image size ($A_{\max/\text{office}}$) and an ambient illuminance of 100 lux, while not exceeding the specified maximum luminous flux of black ($\Phi_{\max \text{ black office}}$).
- A **home cinema projector** is a digital projector that achieves a contrast ratio of 10:1 for a defined image size ($A_{\max/\text{cinema}}$) and an ambient illuminance of 20 lux, while not exceeding the specified maximum luminous flux of black ($\Phi_{\max \text{ black cinema}}$).

Explanations and definitions of the specific values required for differentiating between office projectors and home cinema projectors can be found in Supplement 1¹.

- **Ultra-short and short throw projectors** are digital projectors with a maximum throw ratio of 0.6:1. A maximum throw ratio of 0.6:1 means that the distance between the projector and the screen must be a maximum of 0.6 m in order to achieve an image width of 1 m.
- **High-resolution projectors** are those projectors that have a native resolution of 1280 x 800 pixels or higher.

The classification of a device as either an office or home cinema projector can also be carried out with the help of a "TCO Certified Projectors 1.2" certificate.

Compliance verification

The applicant shall declare the relevant area of application in Annex 1. Compliance with the relevant criteria (Paragraph 3.1) shall be verified with suitable technical product specifications. As part of the process for classifying the device as either an office or home cinema projector, the relevantly defined key values defined in Annex 1 of these Basic Award Criteria shall be verified with corresponding test reports. The measurement of the luminous flux emitted by the device shall be carried out in accordance with IEC 61947-1. The test results for the luminous flux measurements are to be entered in Annex 2 and signed by the testing institution. The testing institution must be accredited according to DIN EN ISO/IEC 17025 for the required test. The testing institution shall enclose a copy of the valid accreditation certificate. Testing

¹ They are based on the criteria set for projectors by the TCO (http://www.tcodevelopment.com/tcodevelopmentnew/Tillverkare_Projektorer/TCO_Certified_Projectors_1_2_110915.pdf) and specifically on Chapters A.2.1.1, A.2.1.2, B.2.1.1 and B.2.1.2.

laboratories operated by manufacturers are also permitted as long as they are accredited as SMT laboratories (supervised manufacturer testing laboratory).

Alternatively, the applicant shall provide verification (Annex 3) that the device has been labelled in accordance with "TCO Certified Projectors 1.2".

3.2 Power consumption

3.2.1 Normal operating mode

In the context of these Basic Award Criteria, the permissible power consumption for digital projectors is calculated based on the measured luminous flux in accordance with the following formula:

Power consumption with a 100% full white image and a maximum lamp output ("normal operating mode") = 0.065 x luminous flux + 98 (in watts)

Correction factors

In order to adjust the formula to match the technical requirements of the different application conditions, the maximum permissible power consumption can be corrected using the following factors.

No.	Area of application	Correction factor
i	Ultra-short and short throw projectors	+ 30%
ii	High-resolution projectors	+ 10%
iii	Home cinema projectors	+ 40%
iv	Office projectors with a luminous flux > 5000 lm (with one lamp)	+ 10%
v	Office projectors with a luminous flux > 5000 lm (with two lamps)	+ 50%

The correction factors (i) and/or (ii) and/or (iii) can also be added together if multiple areas of applications apply in some cases.

If the additional factors (i), (ii) and (iii) are added together, there is a maximum power consumption level in this special case of + 80%.

3.2.2 Energy-saving mode

The digital projectors must have an energy-saving mode that achieves at least a 15% reduction in power consumption compared to the normal operating mode with a 100% full white image.

3.2.3 Power consumption in standby mode and off mode

The power consumption in standby mode and off mode must not exceed 0.5 W.

Standby mode and off mode are defined in accordance with Article 2 of Regulation (EC) No. 1275/2008 from the European Commission with regard to ecodesign requirements for the electric power consumption of electrical and electronic household and office equipment.

Compliance verification

The measurement of the luminous flux emitted by the device shall be carried out in accordance with IEC 61947-1. The test results for the luminous flux measurements and the power consumption measurement are to be entered in Annex 2 and signed by the testing institution. The testing institution must be accredited according to DIN EN ISO/IEC 17025 for the required tests. The testing institution shall enclose a copy of the valid accreditation certificate. Testing laboratories operated by manufacturers are also permitted as long as they are accredited as SMT laboratories (supervised manufacturer testing laboratory).

3.3 Noise emissions

The evaluation of the noise emissions is based on the provision of the guaranteed A-weighted sound power level in decibels (dB) in accordance with the luminous flux. The A-weighted sound power level L_{WA} shall be determined to one decimal place in accordance with ISO 7779. The noise emission measurements shall be carried out with the lamp turned on and at the highest light output setting for the device. In order for the sound power level to be classified as guaranteed, the test must be carried out on at least three different models of the device. The guaranteed sound power level L_{WAd} shall be calculated in accordance with ISO 9296 and stated in decibels (dB), rounded up to the next whole number. If it is only possible to carry out the noise emission measurements on one device, the following formula can be used as an alternative to find the guaranteed A-weighted sound power level L_{WAd} .

$$L_{WAd} = L_{WAE} + 3 \text{ dB}$$

(L_{WAE} = calculated sound power level from the measurement of one individual device in dB)

In order to provide information on the noise emissions to consumers, the L_{WAd} that has been measured and calculated in accordance with the method described above shall be stated in the user manual (product documentation).

The guaranteed A-weighted sound power level L_{WAd} for devices issued with the Blue Angel eco-label must not be greater than 50 dB and, furthermore, must not exceed the test value $L_{WAd,lim}$. The test value $L_{WAd,lim}$ is to be calculated in accordance with the luminous flux ϕ in the highest light output setting based on the following formula:

$$L_{WAd,lim} = [14 * \log (\phi + 500)] \text{dB}$$

Compliance verification:

The applicant shall state the guaranteed sound power level in Annex 1 and submit the relevant consumer information in Annex 7. The completed Annex 4 shall be enclosed with the application to verify compliance with the material requirements. Annex 4 shall be completed and confirmed by the testing institution based on the test report. The testing institution must be accredited according to ISO/IEC 17025 and also accredited for the required acoustic test in accordance with ISO 7779. The testing institution shall enclose a copy of the valid accreditation certificate (Annex 5). Testing laboratories operated by manufacturers are also permitted as long as they are accredited as an SMT laboratory (supervised manufacturer testing laboratory).

3.4 Material requirements for plastics used in the housing and housing parts

3.4.1 General requirements for plastics used in the housing and housing parts

The plastics may not contain as constituent parts any substances classified as:

- a) carcinogenic in categories 1 or 2 according to Table 3.2 of Annex VI to EC Regulation 1272/2008²
- b) mutagenic in categories 1 or 2 according to Table 3.2 of Annex VI to EC Regulation 1272/2008
- c) reprotoxic in categories 1 and 2 according to Table 3.2 of Annex VI to EC Regulation 1272/2008
- d) particularly alarming for other reasons and included in the List (so-called "list of candidates")³ set up in accordance with REACH, Article 59, Paragraph 1.
- e) acutely toxic to aquatic organisms with long-term effects (hazard statement code H410 or risk phrase R50/53)

Halogenated polymers shall not be permitted. Neither may halogenated organic compounds be added as flame retardants.

The following shall be exempt from this rule:

- process-related, technically unavoidable impurities
- fluoroorganic additives (e.g. anti-dripping agents) used to improve the physical properties of plastics, provided that they do not exceed a proportion of 0.5 percent by mass
- plastics with a mass < 25 grams

The flame-retardant materials used in plastic parts with a mass greater than 25 grams must be named and identified using their CAS numbers.

Compliance verification:

The applicant shall declare compliance with the requirement in Annex 1 and submit a written declaration from the suppliers in accordance with Annex P-M. This declaration confirms that the excluded substances have not been added to the plastics used in the device and provides a chemical description of the flame-retardant materials used including their CAS number (Annex P-M). This also applies to any recycled plastic materials used in the device.

3.4.2 Labelling of plastic parts

Plastic parts with a mass > 25 grams that have a flat surface of at least 200 square millimetres must be permanently labelled in accordance with ISO 11469.

² Regulation (EC) No. 1272/2008 of the European Parliament and of the Council of 16 December 2008 on classification, labelling and packaging of substances and mixtures, amending and repealing Directives 67/548/EEC and 1999/45/EC, as well as amending Regulation (EC) No 1907/2006, Annex VI on harmonized classification and labelling of hazardous substances, Part 3: Harmonized classification and labelling, Tables, short: GHS Regulation, each as amended, see http://www.reach-info.de/ghs_verordnung.htm.

³ Link to the list of candidates of Regulation (EC) No. 1907/2006 concerning the Registration, Evaluation, Authorization, and Restriction of Chemicals (REACH): http://echa.europa.eu/consultations/authorisation/svhc/svhc_cons_en.asp.

Compliance verification:

The applicant shall declare compliance with the requirements in Annex P-L 25.

3.5 Recyclable design

In terms of the recyclable design of those devices issued with the environmental label, the following is valid:

- The device shall be designed in such a way that it can be easily dismantled for recycling purposes. This should ensure that housing plastics and metals can be separated as fractions from materials of other functional units and, if possible, made available for high-grade recycling.
- The device shall be designed in such a way that it can be dismantled by specialist companies using standard tools or this process is simplified by intelligently designed connections.
- Specialist companies commissioned by the manufacturer for recycling the devices shall receive information on how to dismantle the devices.
- The recycling strategy developed for the device in accordance with the above-mentioned points shall be published on the Internet.

Compliance verification

The applicant shall declare compliance with the requirements in Annex 1. The applicant shall submit their recycling strategy based on the above-mentioned points to RAL (Annex 6) and state the link under which the recycling strategy is published on the Internet.

3.6 Service life of the lamps

The manufacturer must declare compliance with the minimum service lives of the lamps listed in the following table.

Class	Luminous flux [Lumen]	Declared service life of the lamps [operating hours]
I	<5000 lm	≥ 3,000 h
II	≥5000 lm	≥ 2,000 h

This declaration shall be based on a minimum residual luminous flux of the lamp of ≥ 50% of the nominal luminous flux.

Compliance verification

The applicant shall declare compliance with the requirements for the service life of the lamps in Annex 1.

3.7 Consumer information

In order to support the objectives of the environmental label, the following information, in particular, shall be provided for consumers in the product information:

- The maximum power consumption (in watts) in normal operating mode, energy-saving mode, standby mode and off mode shall be stated, as far as possible, in the same general section.

- In this same section, the electricity savings that can be achieved using the energy-saving mode shall be explained and quantified.
- In the event that device-specific descriptions are used for the different operating modes, the product information will clearly indicate which modes correspond to the "normal operating mode" and "energy-saving mode" for meeting the requirements set by the Blue Angel eco-label.
- Furthermore, the consumer shall be informed that in order to avoid standby losses the device should be disconnected from the mains power using suitable technical installations (e.g. a switchable power socket) and/or corresponding action (e.g. disconnecting the mains plug) when it is not being used. This information can be excluded if the type of mains switch used on the device ensures that it does not consume any electricity in its off state.
- The consumer shall be provided with information on the guaranteed sound power level L_{WAd} of the device.
- Consumers will be provided with an explanation of how the declared "minimum service life" of the lamps is to be understood. This means describing which minimum residual luminous flux and which statistical probabilities for the failure of the lamps are linked to the stated number of hours.
- The extension of the service life of the lamps that can be achieved through the use of the energy-saving mode shall be explained and quantified for consumers.
- The user shall also be informed in a separate section about which area of application (according to Paragraph 3.1) the device has been classified under to meet the environmental requirements of the Blue Angel eco-label.

Compliance verification

The applicant shall declare compliance with the requirements in Annex 1 and submit the relevant excerpts from the product documentation in paper form with the application (Annex 7).

3.8 Overview of possible future requirements

In the event of a revision of the Basic Award Criteria, the following requirements in those areas indicated below are likely to be addressed in particular:

- Additional requirements regarding energy consumption (power consumption) in standby mode – complex network standby (in the sense of activation options via a LAN or similar).
- Noise requirements in energy-saving mode.
- Further requirements placed on the image quality (colour quality, acutance) e.g. based on the relevant TCO standard or other international standards⁴.
- Minimum service life of the lamps to achieve a level at least 25% above the legally stipulated minimum value at the corresponding period in time.
- Minimum service lives for the complete light generating units.
- Requirements for device recycling.

⁴ Such as those from e.g. the INTERNATIONAL COMMITTEE FOR DISPLAY METROLOGY - Definitions and Standards Committee: INFORMATION DISPLAY MEASUREMENTS STANDARD VERSION 1.03 that was published after the expert hearing for the Blue Angel eco-label on 1 June 2012.

4 Applicants and Parties Involved

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

Parties involved in the award process are:

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

5 Use of the Environmental Label

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

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

Contracts on the Use of the Environmental Label are concluded to fix the terms for the certification of products under Paragraph 2. Such contracts shall run until December 31, 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.

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Appendix A Definitions and measurements for determining the specific values required for differentiating between office projectors and home cinema projectors in accordance with Paragraph 3.1 of these Basic Award Criteria

Declared image size A_{max} [in m^2]:

$$A_{max} \leq \frac{\text{measured luminous flux (white)}}{L_{white} \cdot \pi + E_{amb}}$$

The measured luminous flux (white) (Φ_{white}) is the luminous flux of the projected image on a white screen. It is assumed for the calculations that the screen has a lambertian surface with a luminance factor (gain) of one.

L_{white} is the minimum luminance required for the white image in cd/m^2 .

E_{amb} is the ambient illuminance falling on the white screen measured in lux.

While taking into account the application conditions for office projectors and home cinema projectors, the following specific values for the ambient illuminance and the minimum luminance required are given for the relevant ambient lighting conditions:

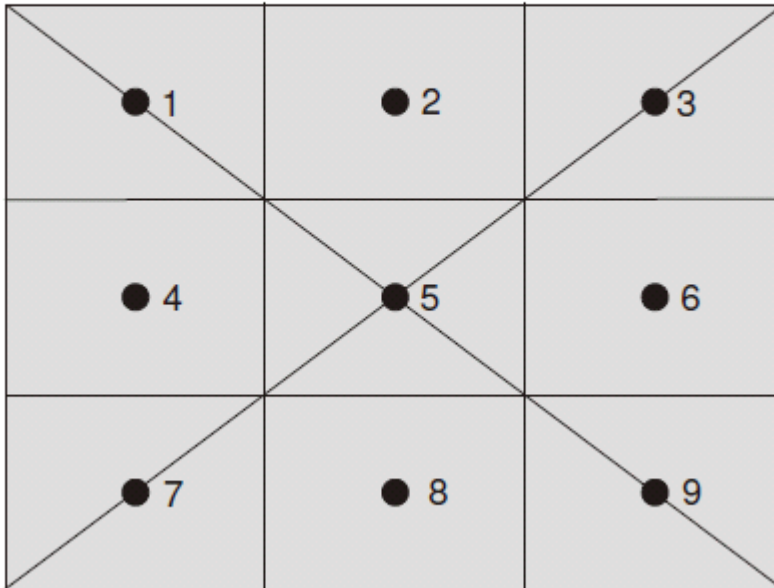
Ambient lighting	Office projectors	Home cinema projectors
Minimum luminance of a white screen in a dark room	$L_{white/office} = 170 \text{ cd/m}^2$	$L_{white/cinema} = 85 \text{ cd/m}^2$
Ambient illuminance falling on the screen	$E_{amb/office} = 100 \text{ lux}$	$E_{amb/cinema} = 20 \text{ lux}$

Test method:

The illuminance is measured at points 1 to 9 in the following diagram. In the case of wider image formats such as 16:10 or 16:9, the measurement points should be evenly distributed according to the same principle.

2011-09-15

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The luminous flux is calculated as follows:

$$\text{measured luminous flux (white)} = \frac{A_{\text{test}}}{9} \cdot E_{\text{white / measured}} = \frac{A_{\text{test}} \cdot \sum_{n=1}^9 E_{\text{white / measured}_n}}{9}$$

A_{test} is the selected test area in m² in a dark room.

$E_{\text{white/measured}}$ is the illuminance of white (RGB 255, 255, 255) measured in lux at the points 1 to 9.

The measured luminous flux (white) is the luminous flux in lumen (according to IEC 61947-1).

The level of uncertainty in the measurement of the illuminance must be $\leq 10\%$ and this value should be stated in the relevant test reports.

Specific black levels

The maximum permissible luminous flux of black for office projectors ($\Phi_{\text{max black office}}$) is:

$$\Phi_{\text{max black office}} \leq \frac{\text{measured luminous flux (white)} - 400 \cdot A_{\text{max/ office}}}{5}$$

The maximum permissible luminous flux of black for home cinema projectors ($\Phi_{\text{max black cinema}}$) is:

$$\Phi_{max\ black\ cinema} \leq \frac{\text{measured luminous flux (white)} - 180 \cdot A_{max/cinema}}{40}$$

The real luminous flux calculated from a measurement of the black illuminance ($E_{black/measured}$) at the different test points (1-9) must be smaller in each case than the previously specified maximum permissible luminous flux.

Test method:

The real luminous flux is determined based on the following conversion formula for the measured values:

$$\Phi_{luminous\ flux_{black}} \leq \frac{A_{test} \cdot \sum_{n=1}^9 E_{black / measured}}{9}$$

$E_{black/measured}$ is the black illuminance (RGB 0, 0, 0) measured in lux at the points 1 to 9.

A_{test} is the selected test area in m² in a dark room.

The level of uncertainty in the measurement of the illuminance must be $\leq 10\%$ and this value should be stated in the relevant test reports.