

BLUE ANGEL

The German Ecolabel



**Computers
and Keyboards**

DE-UZ 78

Basic Award Criteria

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Version 5

The Environmental Label is supported by the following four institutions:



Federal Ministry
for the Environment, Nature Conservation
and Nuclear Safety

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



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



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



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

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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

In 2015, 86 percent of all German households owned a computer (desktop PC, notebook computer or tablet PC) and 83 percent of the population make regular use of these devices (Federal Statistical Office, 2016)¹. Often there are more than one computers in Germany's private households. 92 percent of Germany's companies use computers at the workplace (Federal Statistical Office, 2015)².

The manufacture of computers requires not only plenty of energy but also plenty of resources whose production is accompanied by quite some environmental impact. The resources are usually scarce resources, such as rare earth elements, gold, indium, cobalt or tantalum. They are extremely important for modern technologies but their availability is not guaranteed. With a view to a resource-efficient economy the aim is to allow long-time use of computers in order to derive the greatest possible benefit from the resources used once when manufacturing the product.

Blue Angel eco-labelled computers meet this requirement because they are repairable and upgradable.

Also, Blue Angel eco-labelled computers meet stringent requirements for recyclable design and material selection, thereby creating favourable framework conditions for an efficient recovery of the materials used and helping to save natural resources.

Moreover, low-emission materials are used in the plastic parts of the devices, thus reducing possible risks to environment and human health.

¹ Statistisches Bundesamt (Federal Statistical Office), Fachserie 15, Reihe 4, Wirtschaftsrechnungen, Private Haushalte in der Informationsgesellschaft – Nutzung von Informations- und Kommunikationstechnologien, (Household budget surveys - Private households in information society - Use of information and communication technologies) Wiesbaden 2016,
https://www.destatis.de/DE/Publikationen/Thematisch/EinkommenKonsumLebensbedingungen/PrivateHaushalte/PrivateHaushalteIKT2150400157004.pdf?__blob=publicationFile

² Statistisches Bundesamt, Unternehmen und Arbeitsstätten, Nutzung von Informations- und Kommunikationstechnologien in Unternehmen, (Enterprises and Workplaces - Use of information and communication technologies) Wiesbaden 2015
https://www.destatis.de/DE/Publikationen/Thematisch/UnternehmenHandwerk/Unternehmen/InformationstechnologieUnternehmen5529102157004.pdf?__blob=publicationFile

1.3 Objectives of the Environmental Label

Climate protection, reduction of energy consumption, greater resource efficiency and the avoidance of pollutants and waste are key objectives of environmental protection.

The Blue Angel eco-label for computers may be awarded to appliances offering the following environmental properties:

- low energy consumption,
- durability,
- recyclable design,
- avoidance of materials hazardous to the environment,
- low noise emissions.

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



1.4 Basic Legal Provisions

It shall be a matter of course for Blue Angel eco-labelled products to comply with current laws and regulations, especially the following ones, as amended:

- Ecodesign Regulation for computers and computer servers (617/2013/EU)³,
- WEEE Directive (2012/19/EU)⁴, transposed into German law by the German Elektro- und Elektronikgesetz (ElektroG)⁵ (Electrical and Electronic Equipment Act) governing the disposal of electronic devices,
- RoHS Directive (2011/65/EU)⁶ governing the contents of hazardous substances in the products transposed into German law by the German Elektro- und Elektronikgeräte-Stoff-Verordnung (ElektroStoffV) (Ordinance on the Restriction of the Use of Hazardous Substances in Electrical and Electronic Equipment)⁷,
- Substance requirements defined by the EU Chemicals Regulation REACH (EC/1907/2006)⁸ and the POP Regulation (EC/850/2004)⁹,

³ Commission Regulation (EU) No 617/2013 implementing Directive 2009/125/EC with regard to ecodesign requirements for computers and computer servers; Ecodesign Regulation

⁴ Directive 2012/19/EU on waste electrical and electronic equipment (WEEE) (revised version); WEEE-Directive

⁵ Gesetz über das Inverkehrbringen, die Rücknahme und die umweltverträgliche Entsorgung von Elektro- und Elektronikgeräten, Elektro- und Elektronikgerätegesetz (Act on the placing on the market, return and environmentally sound disposal of waste electrical and electronic equipment) of 20 October 2015, (Federal Law Gazette I, page 1739); ElektroG

⁶ Directive 2011/65/EU of the European Parliament and of the Council of 8 June 2011 on the restriction of the use of certain hazardous substances in electrical and electronic equipment (revised version); ROHS Directive

⁷ Verordnung zur Beschränkung der Verwendung gefährlicher Stoffe in Elektro- und Elektronikgeräten (Elektro- und Elektronikgeräte-Stoff-Verordnung); ElektroStoffV (Ordinance on the Restriction of the Use of Hazardous Substances in Electrical and Electronic Equipment)

⁸ Regulation (EC) No 1907/2006 concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH)

⁹ Regulation (EC) No 850/2004 on Persistent Organic Pollutants; POP Regulation

- External Power Supply Regulation (278/2009/EC)¹⁰ fixing the energy efficiency requirements for external power supplies,
- Battery Directive (2006/66/EC)¹¹ transposed into German law by the German Batteriegelgesetz (BattG) (Battery Act)¹².

1.5 Definitions

The following definitions are based on the definitions laid down in Article 2 of the EU Eco-design Regulation for computers and computer servers (617/2013/EU) as well as on ENERGY STAR for Computers Version 6.1.

1.5.1 Computers

Computer: means a device which performs logical operations and processes data, is capable of using input devices and outputting information to a display, and normally includes a central processing unit (CPU) to perform operations.

The term "computer" includes both personal computers (i.e. desktop computers, integrated desktop computers, small-scale servers, thin clients, and workstations) as well as notebook computers and mobile workstations.

Desktop computer: means a computer where the main unit is intended to be located in a permanent location. It is not designed for portability. It is used with an external computer display and external peripherals, such as keyboard and mouse.

Integrated desktop computer: means a computer in which the computer and the display function as a single unit which receives its ac power through a single cable. Integrated desktop computers come in one of two possible forms:

- a) a product where computer and computer display are physically combined into a single unit, or
 - b) a product where the display is separate but connected to the main chassis by a power cord.
- An integrated desktop computer is intended to be located in a permanent location and is not designed for portability. An integrated desktop computer is not primarily designed for the display and reception of audiovisual signals.

Desktop thin client: means a computer that relies on a connection to remote computing resources (e.g. computer server, remote workstation) to obtain primary functionality. Its storage medium primarily serves the operating system. The main unit of a desktop thin client must be intended for use in a permanent location (e.g. on a desk) and not for portability. Desktop thin clients can output information to either an external or, where included with the product, an internal display.

Notebook computer: means a computer designed specifically for portability and to be operated for extended periods of time either with or without a direct connection to an ac power source. Notebooks include an integrated display, an integrated mechanical keyboard (with

¹⁰ Regulation (EC) No 278/2009 implementing Directive 2009/125/EC (formerly: 2005/32/EC) with regard to ecodesign requirements for no-load condition electric power consumption and average active efficiency of external power supplies; External Power Supply Regulation

¹¹ Directive 2006/66/EC on batteries and accumulators and waste batteries and accumulators and repealing Directive 91/157/EEC; Battery Directive

¹² Gesetz zur Neuregelung der abfallrechtlichen Produktverantwortung für Batterien und Akkumulatoren; (Act revising the law of Waste-Related Product Responsibility for Batteries and Accumulator) Battery Act of 25 June 2009, Federal Law Gazette I, page 1582; BattG

physical movable keys) and a pointing device. Note: Notebook computers are typically designed to provide similar functionality to desktop computers, including operation of software similar in functionality as that used in desktops. For the purpose of this specification notebook computers also include models with touch-sensitive screens. Notebook computers are also called portable computer or laptop.

Small-scale server: means a type of computer that typically uses personal computer components in a desktop format, but is designed primarily to be a storage host for other computers and to perform functions such as providing network infrastructure services and hosting data/media, and which has the following characteristics:

- a) designed in a pedestal, tower, or other form factor similar to those of desktop computers such that all data processing, storage, and network interfacing is contained within one box;
- b) designed to be operational 24 hours per day and 7 days per week;
- c) primarily designed to operate in a simultaneous multi-user environment serving several users through networked client units;
- d) where placed on the market with an operating system, the operating system is designed for home servers or server applications;
- e) not placed on the market with a discrete graphics card (dGfx) meeting any classification other than G1.

Workstation: means a high-performance, single-user computer primarily used for graphics, Computer Aided Design, software development, financial and scientific applications among other compute intensive tasks, and

- f) has a mean time between failures (MTBF) of at least 15 000 hours,
- g) meets at least three of following six characteristics:
 - ♦ has error-correcting code (ECC) and/or buffered memory;
 - ♦ has supplemental power support for high-end graphics (i.e. peripheral component interconnect (PCI)-E 6-pin 12 V supplemental power feed);
 - ♦ its system is wired for greater than x4 PCI-E on the motherboard in addition to the graphics slot(s) and/or PCI-X support;
 - ♦ does not support uniform memory access (UMA) graphics;
 - ♦ includes five or more PCI, PCI-E or PCI-X slots;
 - ♦ is capable of multi-processor support for two or more CPU (must support physically separate CPU packages/sockets, i.e. not met with support for a single multi core CPU).

Mobile workstation: means a high-performance, single-user computer primarily used for graphics, Computer Aided Design, software development, financial and scientific applications among other compute intensive tasks, excluding game play, and which is designed specifically for portability and to be operated for extended periods of time either with or without a direct connection to an AC power source. Mobile workstations utilise an integrated display and are capable of operation on an integrated battery/accumulator or other portable power source. Most mobile workstations use an external power supply and most have an integrated keyboard and pointing device.

A mobile workstation

- a) has a mean time between failures (MTBF) of at least 13 000 hours;
- b) has at least one discrete graphics card (dGfx) meeting the G3 (with FB Data Width > 128-bit), G4, G5, G6 or G7 classification;

- c) supports the inclusion of three or more internal storage devices;
- d) supports at least 32 GB of system memory.

1.5.2 Battery and Accumulator

Battery and Accumulator: (hereinafter called battery/accumulator) means a secondary battery designed to repeatedly restore its charge state using a special purpose power supply (charging electronics) i.e. it can be recharged. The battery/accumulator includes one or more battery cells coupled together by a housing, plastic film or in other suitable form. It may comprise electronic control units and is equipped with connecting terminals or a connecting cable. Batteries/accumulators are also called accumulator packs, energy storage systems or rechargeable batteries.

Other definitions of battery/accumulator characteristics can be seen from Appendix A: Determination of Battery/Accumulation Durability.

2 Scope

- a) These Basic Criteria apply to computers as defined in paragraph 1.5.1.
- b) These Basic Criteria also apply to keyboards placed on the market as a separate unit or together with a computer.
- c) Devices that perform computer-like functions but fall within the scope of other Basic Criteria for Award of the Blue Angel Eco-label shall not fall within of these Basic Criteria. These are:
 - ♦ Mobile phones / smart phones (DE-UZ 106),
 - ♦ E-book readers (DE-UZ 158),
 - ♦ Television sets (DE-UZ 145),
 - ♦ Computer monitors (DE-UZ 78c)

3 General Requirements

The following requirements shall be met by all devices (computers and keyboards) within the scope of these Basic Criteria.

3.1 Energy and Power Consumption of Computers

Computers, as defined in para. 1.5.1 shall meet ENERGY STAR Program Requirements for Computers applicable to the specific type of computer, as amended at the time of application (current version: 6.1).

Compliance Verification

The applicant shall declare in Annex 1 to the Contract that the product meets all applicable ENERGY STAR requirements for computers as well as those laid down in the Ecodesign Regulation for Computers and Computer Servers ((EU) No 617/2013). Also, the applicant shall specify the admissible maximum value (E_{TEC}_MAX or P_{TEC}_MAX) as well as the typical annual energy consumption (E_{TEC} or P_{TEC}) of the device determined in accordance with the ENERGY STAR specifications as well as the power consumption in the various operating modes in Watts. The measurements shall be made in compliance with the current ENERGY STAR requirements for

computers (current version: 6.1)¹³ . The applicant shall present test reports prepared by an independent testing laboratory accredited for these measurements according to DIN EN ISO/EC 17025 as Annex 2 to the Contract. Test reports prepared by the applicant will be accepted as equivalent if the latter uses a testing laboratory that has been accredited for these measurements by an independent body as Supervised Manufacturer's Testing (SMT) Laboratory.

3.2 Durability

3.2.1 Spare Parts Availability

The applicant undertakes to make sure that the availability of spare parts for appliance repair is guaranteed for at least 5 years from the time that production ceases. Especially batteries/accumulators, (if any) must be available for at least 5 years following the end of production. The spare parts must be offered at reasonable cost by the manufacturer itself or a by third party.

Spare parts are functionally identical or compatible and functionally improved components or modules that may be exchanged during repair in the course of the life-cycle of a computer or keyboard to replace defect parts. Other parts which normally exceed the life of the product are not to be considered as spare parts.

The product documents shall include detailed information on the provision of spare parts.

Compliance Verification

The applicant shall declare compliance with the requirements in Annex 1 to the Contract, highlight the relevant passages in the product documents that make reference to spare parts provision and present the relevant pages of the product documents in Annex 3 to the Contract.

3.2.2 Capacity Expansion

Computers to be Blue Angel eco-labelled must be so designed as to ensure easy accessibility to the replaceable components and expansion interfaces (e.g. IC sockets plug-in connectors). For this purpose, it must be possible to open housing parts, chassis and battery covers easily and without expert knowledge.

The computers must provide the following expansion options:

- Replacement or expansion of Random Access Memory (RAM) (if any),
- Replacement or expansion of the mass storage (if any).

In addition, the computers must provide the following interfaces:

- Existence of two or more USB 3.0 or later ports (small-scale servers may have a different type of serial port),
- Connectivity to external monitors (does not apply to integrated desktop computers and small-scale servers).

¹³ ENERGY STAR® Program Requirements, Product Specification for Computers, Eligibility Criteria, Version 6.1, <https://www.energystar.gov/sites/default/files/specs//Version%206%201%20Computers%20Final%20Program%20Requirements.pdf>

Compliance Verification

The applicant shall declare compliance with the requirements in Annex 1 to the Contract, highlight the relevant passages in the product documents that make reference to capacity expansion options and present the relevant pages of the product documents in Annex 3 to the Contract.

3.3 Recyclable Design

3.3.1 Structure and Connection Technology

The following applies to computers and keyboards:

- The devices to be Blue Angel eco-labelled must be so designed as to allow easy disassembly for recycling purposes to make sure that housing parts, Chassis, batteries (if any), display units (if any) and printed circuit boards can be separated as fractions from materials of other functional units and, if possible, recycled by the type of material. They shall be so designed as to allow manual disassembly by a waste disposal company by the use of universal tools¹⁴ and it shall be possible for a single person to disassemble the device.
- Batteries/accumulators (if any) must be easy to remove without the use of any tools or with the use of universal tools.
- Electrical/electronic components must be easy to remove from the housing.

Compliance Verification

The applicant shall declare compliance with the requirements in Annex 1 to the Contract and present instructions showing/explaining the professional disassembly of the computer or keyboard (Annex 4 to the Contract). These instructions shall focus in particular on the professional separation of housing parts, chassis, batteries (if any), display units (if any) and printed circuit boards. These free-of-charge instructions shall be presented either in writing, by photo documentation, drawings or in video format. Moreover, the applicant shall undertake in Annex 1 to the Contract to provide, as required, the applicant-hired recycling companies with information on efficient disassembly, the assemblies as well as on the substances and components requiring selective treatment.

3.3.2 Material Selection

- The following applies to plastic parts with a mass greater than 25 grams as well as to key caps, provided that their total mass is greater than 25 grams: A maximum of 4 types of plastic may be used for these parts. The plastic housings may consist of two separable polymers or polymer blends at the most.
- Plastic parts with an mass greater than 25 grams each and an even surface area of more than 200 sq.mm. must be permanently marked in accordance with ISO 11469 with due regard to ISO 1043, Parts 1 to 4. Transparent plastic parts the function of which requires transparency (e.g. visible plastic films in displays) shall be exempt from marking according to ISO 11469.
- It shall not be permitted to apply metallic coatings to plastic housing parts. Exception: plastic housing parts of notebook computers may have a metallic coating provided that such coating

¹⁴ The term "universal tools" stands for ordinary commercial tools

is technically required. However, galvanic coatings of plastic housing parts shall not be permitted.

- (Post-consumer) recycle material may be used in housing parts and chassis. It may be used on a percentage basis.
- 90% of the mass of plastics and of the metals of housing parts and chassis must be recyclable by material (this does not mean the recovery of thermal energy by incineration).

Compliance Verification

The applicant shall declare compliance with the requirements in Annex 1 to the Contract, specify the plastics used for plastic parts greater than > 25 grams in mass as well as the respective percentage of recycled plastics related to the mass of the plastic part in Annex P-L 25 to the Contract (see form).

3.4 Material Requirements

3.4.1 Plastics used in Housings and Housing Parts

The plastics used in housings and housing parts must not contain, as constituent components, any substances with the following characteristics¹⁵:

- a) Substances that have been identified as substances of very high concern according to Regulation (EC) No 1906/2006 (REACH) 8 and have been included in the list (so-called Candidate List) set up in accordance with REACH, Article 59(1).¹⁶
- b) Substances that have been classified according to the CLP Regulation¹⁷ in the following hazard categories or meet the criteria for such classification¹⁸:
 - ♦ carcinogenic of category Carc. 1A or Carc. 1B
 - ♦ mutagenic of category Muta. 1A or Muta. 1
 - ♦ reprotoxic of category Repr. 1A or Repr. 1B.

Halogenated polymers shall not be permitted in housings and housing parts. Nor may halogenated organic compounds be added as flame retardants. Nor shall any flame retardants be permitted which are classified under the CLP Regulation as carcinogenic of Category Carc. 2 or as hazardous to waters of Category Aquatic Chronic 1.

¹⁵ Constituent components are substances which are added to the product as such or as an ingredient of mixtures and continue to be there unchanged in order to achieve or influence certain product properties. They do not include, for example, minimized residual monomers.

¹⁶ The Candidate List, as amended at the time of application, shall be applicable. For the current version, please go to: [REACH-Kandidatenliste](#).

¹⁷ Regulation (EC) No 1272/2008 on classification, labelling and packaging of substances and mixtures (short: CLP), replacing the old Directives 67/548/EEC (dangerous substance directive) and 1999/45/EC (dangerous preparations directive).

¹⁸ The list of harmonised classification and labelling of hazardous substances is included in Part 3 of Annex VI to the CLP Regulation. Moreover, a comprehensive classification and labelling inventory is publicly accessible via the website of the European Chemicals Agency ECHA which also includes all manufacturer-provided self-classifications of hazardous substances: [ECHA Einstufungs- und Kennzeichnungsverzeichnis](#).

The hazard statements (H-phrases) assigned to the hazard categories can be seen from **Fehler! Verweisquelle konnte nicht gefunden werden.**

The following shall be exempt from this requirement:

- fluoroorganic additives (as, for example, anti-dripping agents) used to improve the physical properties of plastics, provided that they do not exceed 0.5 weight percent;
- plastic parts weighing 25 grams or less, where - with regard to keyboards - the total weight of all key caps shall be the decisive factor in determining the mass.

Compliance Verification:

The applicant shall declare compliance with the requirements in Annex 1 to the Contract and submit a written declaration from the plastic manufacturers or ensure the submission of such declaration to RAL gGmbH. Such declaration shall confirm that the banned substances have not been added to the plastics and give the chemical designation of the flame retardants used, including CAS No. and classifications (H statements) (Annex P-M to the Contract). When first applying for the Blue Angel eco-label the declaration submitted must not be older than 6 months. If one applicant files additional applications for the eco-labelling of products containing the same plastics the declarations submitted may be presented unchanged during the term of the Basic Criteria. Notwithstanding this, RAL shall be entitled to ask for an updated version of the declarations if the Umweltbundesamt (Federal Environmental Agency) finds that product-relevant substances have been added to the Candidate List.

3.4.2 Use of Biocidal Silver

The use of biocidal silver on touchable surfaces shall not be permitted.

Compliance Verification

The applicant shall declare compliance with the requirements in Annex 1 to the Contract.

3.5 Noise Emissions

Compliance with the following requirements needs to be verified only if mechanical fans (e.g. CPU/GPU fan, power pack fan, system fan, RAM fan, hard disk fan), mechanical hard disk drives and/or optical drives are integrated into the computer. If none of these components are integrated into the computer the requirements shall be considered met. The requirements for keyboards shall apply independently of a computer.

The evaluation of noise emissions is based on the specification of the declared A-weighted sound power levels $L_{WA(d)}$ in decibel (dB) to the first decimal place. In doing so, it must be made sure that, in the case of configuration variants of structurally identical devices, the measurements are performed on the loudest individual components.

Determination of the declared A-weighted sound power levels

The A-weighted sound power levels $L_{WA(1..4)}$ shall be determined in accordance with ISO 7779 in the operating modes as described in the Annex to ECMA-74.

- a) $L_{WA(1)}$ shall be determined in the C.15.3.2 mode - "idle mode".
- b) $L_{WA(2)}$ shall be determined in the C.15.3.3 g) mode - "active mode".

- c) $L_{WA(3)}$ shall be determined in the C.19.3.2 mode „optical drive“.
- d) $L_{WA(4)}$ shall be determined in the C.5.3.1 „keyboard“.

Declared A-weighted sound power level

Tests shall be performed on a minimum of three devices of one model in each operating mode. The declared A-weighted sound power levels $L_{WA(1..4)}$ shall be determined in accordance with ISO 9296:1988 and given in decibel (dB) rounded to the next decimal place.

Alternatively, if the noise measurements can only be performed on one device the declared A-weighted sound power level L_{WAd} may, alternatively, be determined using the following formula:

$$L_{WAd} = L_{WA1} + 3.0 \text{ dB.}$$

(L_{WA1} = A-weighted sound power level of a single device in dB to the first decimal place)

Test Values

The declared A-weighted sound power levels $L_{WAd(1..3)}$ must not exceed the following test values:

Operating Mode	Test Value for		
	Desktop computers, small-scale servers, thin clients	Notebook computers	Workstations, small-scale servers with more than 2 mass storage drives
(1) „Idle mode“	35.0 dB	32.0 dB	38.0 dB
(2) „Active mode“	39.0 dB	37.0 dB	42.0 dB
(3) „Optical drive“	50.0 dB	48.0 dB	50.0 dB

There is no test value for the "keyboard" operating mode.

Compliance Verification

The applicant shall declare compliance with the requirements in Annex 1 to the Contract, highlight the relevant passages in the product documents that specify the declared A-weighted sound power levels $L_{WAd(1..4)}$ in dB, rounded to the next decimal place in the relevant operating modes for computers and keyboards and present the relevant pages of the products documents in Annex 3 to the Contract.

The applicant shall verify compliance with the requirements by attaching to the application for computers the completed form of Annex 5a to the Contract or, for keyboards, a test report as Annex 5b to the Contract. Annex 5a to the Contract shall be completed and confirmed by the testing laboratory on the basis of the test report.

The testing laboratory must be accredited according to ISO/IEC 17025 and according to ISO 7779 for the acoustic tests required. When performing the tests for the first time for application for the Blue Angel eco-label the testing laboratory shall attach a copy of the accreditation certificate.

3.6 Product Documents

The product documents included with the computer shall include both the technical specifications and the environment and health-related user information. These documents shall either be installed on the computer, supplied as a CD-ROM or in printed form, preferably on recycled paper, together with the device or made available on the Internet from the time of delivery for a period of at least 5 years after the end of production.

The product documents for keyboards need only include the relevant keyboard-related information (Nos. 2., 4., 5. und 6.).

The product documents shall at least provide the following user information:

- a) Energy consumption (ETEC) in kilowatt hours per year (kWh/a) as well the power consumption in different operating modes according to para. **Fehler! Verweisquelle konnte nicht gefunden werden.** Also included shall be instructions for setting the devices into energy-saving operating modes as well as information on further energy-saving options (e.g. reduction of screen brightness, complete disconnection from the mains). If a maximum power value is set for computers in accordance with ENERGY STAR - instead of energy consumption (ETEC) - the product documents shall give the measured power values (in watts): PTEC for workstations and PLONG_IDLE as well as POFF for small-scale servers.
- b) Information on the provision of spare parts according to **Fehler! Verweisquelle konnte nicht gefunden werden.** (Spare Parts Availability**Fehler! Verweisquelle konnte nicht gefunden werden.**),
- c) Options for expanding the capacity according to para. 3.2.2 (Capacity Expansion),
- d) Sound power level in all operating modes (provided that the requirements are applicable) according to para. 3.5 (Noise Emissions),
- e) Instructions for environmentally sound disposal at the end of the life cycle in accordance with the German Elektroggesetz (Electrical and Electronic Equipment Act),
- f) Information on manufacturer-operated product take-back programs to allow reuse (if any),
- g) If the computer is a notebook computer the product documents shall additionally include information according to para. 4 (Special Requirements for Notebook Computers):
 - ◆ Instructions on how to remove and replace the battery/accumulator or battery/accumulator pack according to para. 4.2 (Replaceability),
 - ◆ Indication of nominal capacity, nominal voltage and type designation according to para. 4.4 (Battery/Accumulator Marking) as well as instructions for decoding if the battery/accumulator displays a coded date of manufacture,
 - ◆ Indication of the minimum achievable full charge cycles according to para. 4.5 (Battery/Accumulator Durability),
 - ◆ Information on the software tools for battery/accumulator status reading and for battery/accumulator protection according to para. 4.6 (Battery/Accumulator Status and Battery/Accumulator Protection Software),
 - ◆ A note advising the user that batteries/accumulators must not be disposed of with the normal household waste but instead should be taken to a waste collection facility.

Compliance Verification

The applicant shall declare compliance with the requirements in Annex 1 to the Contract and present the product documents in Annex 3 to the Contract.

4 Special Requirements for Notebook Computers

The requirements set out in para. 4 shall apply in addition to the general requirements in para. **Fehler! Verweisquelle konnte nicht gefunden werden.** to notebook computers (including mobile workstations), as defined in para. 1.5.1.

4.1 Rechargeability

Notebook computers must be equipped with batteries/accumulators meeting the definition in para. 1.5.2.

The requirements shall not apply to battery cells which are only used, for example, to buffer CMOS memories or to run timers.

Compliance Verification

The applicant shall declare compliance with the requirements in Annex 1 to the Contract.

4.2 Replaceability

The computers shall be designed to allow the easy replacement of the batteries/accumulators without the need for expert knowledge.

Compliance Verification

The applicant shall declare compliance with the requirements in Annex 1 to the Contract, highlight the relevant passages in the product documents that describe the battery replacement process and present the relevant pages of the product documents in Annex 3 to the Contract.

4.3 Battery/Accumulator Capacity

The battery/accumulator capacity shall be measured in accordance with standard EN 61960, as amended (current version: DIN EN 61960:2012-04), in accordance with standard paragraph 7.3.1 „Discharge performance at 20 °C (rated capacity)“. The rated capacity (C), thus determined, must at least be equal to the nominal capacity (N) indicated on the battery/accumulator and in the product documents.

Compliance Verification

The applicant shall specify the rated capacity (C) measured in Annex 1 to the Contract and present a test report in Annex 6 to the Contract stating that at least three batteries/accumulators have been analysed and that all three meet the requirement. The test report shall be prepared by a testing laboratory that meets the general requirements for the competence of testing and calibration laboratories under DIN EN ISO/IEC 17025. Test reports prepared by the applicant will be accepted as equivalent if the latter uses a testing laboratory that has been accredited for these measurements by an independent body as Supervised Manufacturer's Testing (SMT) Laboratory. Test reports prepared by manufacturer-owned testing laboratories of the battery manufacturers will also be accepted.

4.4 Battery/Accumulator Marking

The battery/accumulator (or battery/accumulator pack) must be marked in accordance with standard EN 61960 providing at least the following information:

- nominal capacity (N),
- nominal voltage,
- type designation,
- date of manufacture (may be coded).

These specifications (except for the date of manufacture) shall also be given in the product documents. In case the date of manufacture has been given in coded form the product documents shall include instructions for decoding.

In addition, the battery/accumulator (or battery/accumulator pack) shall provide the following information to help improve the recycling process:

- indication of the metal with the greatest mass percentage (e.g. cobalt, manganese, nickel, iron),
- indication of substances contained in the battery/accumulator that hinder the recycling process (e.g. tin, phosphorous).
- This information may also be provided in coded form, for example, in accordance with the marking system proposed by the Battery Association of Japan (BAJ)¹⁹.

Compliance Verification

The applicant shall declare compliance with the requirements, specify nominal capacity (in mAh or Ah), nominal voltage and type designation, provide details on the recycling process in Annex 1 to the Contract, highlight the relevant passages in the product documents that include these data and present the relevant pages of the product documents in Annex 3 to the Contract. In addition, the applicant shall present in Annex 7 to the Contract a photo of the battery/accumulator that shows all of the data mentioned above.

4.5 Battery/Accumulator Durability

The battery/accumulator must achieve a minimum of 500 full charge cycles:

$$\text{full charge cycles} \geq 500$$

A full charge cycle is to be understood as the drain of a quantity of electricity (in ampere hours) from the battery/accumulator in the amount of its nominal capacity (N) that has been stored in the battery/accumulator by one or more charging processes.

The minimum number of full charge cycles achievable shall be specified in the product documents.

After 500 full-charge cycles the battery/accumulator must, in addition, have in a fully charged state, a remaining capacity (Q_{Rem}) of at least 80% of the nominal capacity (N).

$$Q_{\text{Rem}} \geq 80\% * N$$

¹⁹ Revised Guideline for Recycle Marking on Li-ion Batteries for the Japanese Market; <http://www.baj.or.jp/e/recycle/recycle11.html>

Full charge cycles shall be calculated and remaining capacity shall be measured in accordance with the requirements set out in Appendix A: Determination of Battery/Accumulator Durability.

Compliance Verification

The applicant shall, in Annex 1 to the Contract, specify the minimum number of full charge cycles achievable, highlight the relevant passages where this figure is noted in the product documents and present the relevant pages of the product documents in Annex 3 to the Contract.

In addition, the applicant shall - in Annex 8 to the Contract - present the report on the durability test for a minimum of three batteries/accumulators tested according to "Appendix A: Determination of Battery/Accumulator Durability" which documents the resulting numbers of achieved full charge cycles of the batteries/accumulators as well as the remaining capacities recorded at the end of the tests.

4.6 Battery/Accumulator Status and Protection Software

The applicant shall make the following software tools available for the computer:

- **Software for Determining the Battery/Accumulator Status:**

The software must allow the reading of the battery's/accumulator's "state of health" (defined as the ratio of „full charge capacity" to „design capacity" according to Smart Battery System Specifications²⁰), „state of charge" (according to Smart Battery System Specifications) as well as the number of full charge cycles already performed from the battery/accumulator and to display these data for the user. Provided that the battery/accumulator (or battery/accumulator pack) does not have integrated electronics to record these data the computer itself must be equipped with corresponding electronics. The software must access the corresponding electronics and be capable of reading the battery/accumulator status data. The electronics must, if applicable, detect a battery/accumulator replacement and take it into account when giving the number of full charge cycles.

- **Battery/Accumulator Protection Software:**

The software shall be able to limit the battery's/accumulator's charge to a value smaller than the maximum amount of usable electricity (e.g. 80% of the full charge capacity). Doing so will extend the battery's/accumulator's life.

The applicant shall - from the date of placing the computer on the market or, at least, from the date of filing the application until, at least, 6 years after production ceases - make these software tools available for free-of-charge download on its website as well as inform about these tools in the computer product documents. Provided that the computer is placed on the market with a pre-installed operating system the software tools described above-described must also be pre-installed on the computer.

Compliance Verification

The applicant shall declare compliance with the requirements in Annex 1 to the Contract, highlight the relevant passages in the product documents that make reference to these software tools and present the relevant pages of the product documents in Annex 3 to the Contract.

²⁰ Smart Battery System Specifications, Smart Battery Data Specification, Revision 1.1, <http://smartbattery.org/specs/sbdat110.pdf>

5 Special Requirements for Separate Keyboards

The requirements set out in para. 5 apply to keyboards placed on the market as a separate unit or together with a computer. Integrated notebook keyboards shall not be required to meet these requirements.

5.1 Ergonomics

Separate keyboards used as user input devices for computers shall be tested for the ergonomic properties of keyboards for personal computers in accordance with standards DIN EN ISO 9241-400 and DIN EN ISO 9241-410, as amended, and meet the parameters for full-size keyboards and compact keyboards set out therein.

Compliance Verification

The applicant shall declare compliance with the requirements in Annex 1 to the Contract and name therein the laboratory that has performed the test.

6 Outlook on Possible Future Requirements

The next revision of these Basic Criteria is expected to consider the following aspects:

- Extension of the scope to include pointing devices (especially mice),
- Requirements for the reparability of devices,
- Inclusion of plastic parts already with a mass of over 10 grams per part into the list of requirements for material selection and material properties,
- Requirements for entrepreneurial diligence regarding the origin of raw materials used and the manufacture of devices.

7 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.

8 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, 2024.

They shall be extended by periods of one year each, unless terminated in writing by March 31, 2024 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 Determination of Battery/Accumulator Durability

1 Definitions

For the determination of the durability of a battery the following definitions are used:

Rated capacity (C): Quantity of electricity (in ampere-hours) declared by the manufacturer which a single cell or battery can deliver during a 5-h period, when charged, stored and discharged under the condition specified in the standard EN 61960 Paragraph 7.3.1.

Nominal capacity (N): Electric charge (in ampere-hours) specified by the manufacturer of the battery or rechargeable battery pack declared on the battery and in the product documents. The nominal capacity can be drained by a discharge current specified by the manufacturer. The nominal capacity is generally equal to the rated capacity, but can also be specified by the manufacturer with a smaller value than the rated capacity.

Remaining capacity (Q_{rem}): Battery capacity ("Full Charge Capacity" according to Smart Battery System Specifications²¹) that is available after performing the charge cycle test to determine the achievable full charge cycles (see below). The remaining capacity decreases by age and use of the battery.

Charge cycle: The term charge cycle referring to EN 61960 is defined as the cycle of charging a battery according to the specification of the manufacturer and the subsequent discharging until the cut-off voltage.

Full charge cycle: A full charge cycle is defined as the charging of a battery and the drain of an electric charge from the battery in the amount of its nominal capacity (N). The main difference between the full charge cycle and the charge cycle according to EN 61960 is that a charging cycle is not determined by achieving the cut-off voltage, but by the drained quantity of energy, which is specified by the nominal capacity (N). A full charge cycle can require more (or less) than one charge cycle.

2 Preparation of the tests

- a) Determination of the rated capacity (C) according to the standard EN 61960 paragraph 7.3.1 "Discharge performance at 20 °C (rated capacity)",
- b) Determination or definition of the nominal capacity (N),
- c) Complete discharge of the battery up to the cut-off voltage.

²¹ Smart Battery System Specifications, Smart Battery Data Specification, Revision 1.1, <http://smartbattery.org/specs/sbdat110.pdf>

3 Performance of the tests

The tests must be carried out with at least three batteries, according to the sample size determined in the standard EN 61960. All three batteries have to achieve the mentioned requirements.

The charge and discharge currents, the ambient temperature as well as the respective test periods have to be chosen according to standard EN 61960, section 7.6.2 "Endurance in cycles at a rate of 0,2 I_t A".

3.1 Charge cycle test:

- a) Charging of the battery,
- b) Rest period in a charged condition,
- c) Discharging of the battery,
- d) During the discharge process: measuring the quantity of the drained electricity (Q_i).
- e) Rest period in a discharged condition.

The charging and discharging process must be repeated (at step 1.) until the sum of the drained electricity (Q_i) achieves at least the 500-fold value of the nominal capacity (N).

$$\sum_{i=1}^n Q_i \geq 500 * N [Ah]$$

3.2 Determination of the remaining capacity

After performing the above charge cycle test, the remaining capacity (Q_{rem}) of the battery must be determined:

- a) Maximum charging of the batteries according to manufacturer's specifications,
- b) Rest period in a charged condition,
- c) Discharge of the battery until the cut-off voltage is reached,
- d) During the discharge process: measuring the quantity of the drained electricity. The recovered charge quantity in step 4 is defined as remaining capacity (Q_{rem}).

To meet the requirements of the eco-label, the so-called remaining capacity (Q_{rem}) must be at least 80% of the nominal capacity (N):

$$Q_{rem} \geq 80\% * N$$

Meeting this requirement is furthermore a prerequisite for the determination of the number of full charge cycles set out in the following.

3.3 Determination of the number of full charge cycles

In order to be able to calculate the full charge cycles, the remaining capacity (Q_{rem}) must be at least 80% of the nominal capacity (N) in accordance with the above described cycle test (see preceding condition). The number of full charge cycles is calculated as the ratio of the sum of the sum of the drained electricity (Q_i) delivered during the cycle test and the nominal capacity:

$$Full\ charge\ cycles = \frac{\sum_{i=1}^n Q_i}{N}$$

3.4 Simplified calculation rule

If the accessible charge cycles of the battery have been carried out through a cycle test in accordance with standard EN 61960 (section 7.6 Endurance in cycles) or a comparable method providing for a cyclic maximum loading of the battery and a discharge of the battery down to the cut-off voltage, a simplified calculation of the number of full charge cycles can be carried out. Here as well, the prerequisite for applicability is that, after having performed the cycle test, the remaining capacity (Q_{rem}) has to be at least 80% of the nominal capacity (N).

The number of full charge cycles can be determined by a simplified method of calculation by multiplying it by the ratio of the average amount of drained electricity ($Q_{i_average}$) and the nominal capacity (N):

$$\text{Full charge cycles} = \text{charge cycles} * \frac{Q_{i_average}}{N}$$

3.5 Documentation of the tests

The test protocol must contain at least the following details:

- Nomination of the testing laboratory
- Attestation of the testing laboratories' competence
- Nomination of the test procedure (e.g. EN 61960)
- For all three batteries that have been tested:
 - ♦ Nominal capacity (N),
 - ♦ Remaining capacity (Q_{rem}) after completion of the test,
 - ♦ Number of full charge cycles achieved,
 - ♦ In the case of simplified calculation: average amount of drained electricity ($Q_{i_average}$).

Appendix B Assignment of Hazard Categories and Hazard Statements

The following table assigns the respective hazard statements (H statements) to the hazard categories of the substances generally excluded.

CLP Regulation (EC) No 1272/2008		
Hazard Category	Hazard Statements	
	H Code	Wording
Carcinogenic Substances		
Carc. 1A Carc. 1B	H350	May cause cancer.
Carc. 1A Carc. 1B	H350i	May cause cancer by inhalation.
Carc. 2	H351	Suspected of causing cancer.
Mutagenic Substances		
Muta. 1A Muta. 1B	H340	May cause genetic defects.
Reprotoxic Substances		
Repr. 1A Repr. 1B	H360D	May damage the unborn child.
Repr. 1A Repr. 1B	H360F	May damage fertility.
Repr. 1A Repr. 1B	H360FD	May damage fertility. May damage the unborn child.
Repr. 1A Repr. 1B	H360Df	May damage the unborn child. Suspected of damaging fertility.
Repr. 1A Repr. 1B	H360Fd	May damage fertility. Suspected of damaging the unborn child.
Environmentally Hazardous Substances		
Aquatic Chronic 1	H410	Very toxic to aquatic life with long lasting effects.