

# **BLUE ANGEL**

## **The German Ecolabel**



### **Routers**

**DE-UZ 160**

**Basic Award Criteria**  
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**Version 1**

**The environmental label is supported by the following institutions:**



Bundesministerium  
für Umwelt, Naturschutz, nukleare Sicherheit  
und Verbraucherschutz

The Federal Ministry for the Environment, Nature Conservation, Nuclear Safety and Consumer Protection (Bundesministerium für Umwelt, Naturschutz, nukleare Sicherheit und Verbraucherschutz) is the owner of the label. It regularly provides information on the decisions taken by the Environmental Label Jury.



The German Environment 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.



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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# **1 Introduction**

## **1.1 Preface**

In cooperation with the Federal Ministry for the Environment, Nature Conservation, Nuclear Safety and Consumer Protection, the German Environment 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 these conditions.

## **1.2 Background**

Routers enable a computer network to access the Internet. A router primarily connects the local area network (LAN) to the wide area network (WAN) and thus provides the end customer with Internet, TV, telephony and smart home services – either separately or as a bundle of services.

According to the Federal Statistical Office, there were 37.9 million Internet connections in German households in 2023. Assuming that these routers are operated continuously with an average power consumption of 8.5 watts, this results in a total annual energy demand of 3.2 terawatt hours (TWh). This figure does not include the many routers that are also used in the commercial sector. The electric energy demand of routers during their useful life is basically determined by technical and use-related parameters, such as the range of functions, number of enabled and connected interfaces and their frequency and intensity of use. Alongside their energy-related environmental impact during the useful life of the product, these devices also have environmental impacts during the manufacturing phase.

The choice of materials and design of the router – which is primarily influenced by the electrical, thermal and mechanical requirements placed on the device – can help improve the durability, reparability and recyclability of these devices.

### 1.3 Objectives of the environmental label

The aim of the Blue Angel ecolabel for routers is to signal to purchasers of such devices that products certified with the Blue Angel provide greater preventative protection for the environment, human health and consumer protection compared to other products. The ecolabel can thus act as a decision-making aid for purchasing new devices. Therefore, the ecolabel should be awarded to routers that have the following environmental properties:

- **Low energy consumption during use:** This goal is achieved by selecting the latest, high-quality and adequately dimensioned electronic components, as well as through consistent, automatic and reliable power management. The functionality of the router must be provided based on defined availability (operating modes) and with the lowest possible electric power consumption.
- **High reliability and durability:** This goal is achieved through adequate dimensioning of the components for the desired functionality, a reliable thermal and mechanical design and a repair guarantee and software updatability.
- **Conservation of resources during the entire product life cycle:** This goal is achieved by using materials with a low environmental impact and selecting the materials and designing the device in a recycling-friendly way.
- **Post-consumer materials (PCR material):** Material generated by households or by commercial, industrial and institutional facilities in their role as end-users of the goods or service which can no longer be used for its intended purpose. This includes returns of material from the distribution chain.

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

- low energy consumption
- durable
- (for plastic housings) housing with at least 80% recycled materials



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- low energy consumption
- durable
- housing with at least 80% recycled materials

## 1.4 Definitions

### 1.4.1 Manufacturer, distributor, user

- A **manufacturer** is any natural or legal person who manufactures a product or has a product designed or manufactured, and markets that product under his name or trademark.
- A **distributor** is any natural or legal person who makes a product available for distribution or use whether in return for payment or free of charge and irrespective of the marketing method.

A **user** of the device is the end user who uses and/or sets the functionalities of the device. This includes administrators, although device or service engineers of the distributor or of the company that distributes or maintains the device are not regarded as users.

### 1.4.2 Types of router

- **Routers configured using central software** are devices generally used in the commercial sector that are configured via a server. These devices are usually inserted into a rack. In general, these devices connect several company sites with one another.
- **Routers configured using local software** are devices where the software is already at least partially configured in its delivered state. They are normally used in private households and small commercial businesses.

### 1.4.3 Operating modes

- **On-state** means an operating state where the device processes a payload, i.e. it receives, processes, stores or forwards data. The definitions of the on-states of individual components and network ports are explained in the Code of Conduct on Energy Consumption of Broadband Equipment 9.0, Tables 7 to 9.<sup>1</sup>
- **Off-state** means an operating state where the device does not provide any functionality and would have to be started to work (booting).
- **Ready-state** (since 2024, previously idle state) means an operating state where the device does not transfer data via a network connection but can resume data transfer immediately (in less than 3 seconds). The definitions of the ready-states or idle states of individual components and network ports are explained in the Code of Conduct on Energy Consumption of Broadband Equipment 9.0, Table 3.<sup>1</sup> This definition is based on the ANSI/CTA standard 2049-B.<sup>2</sup>

### 1.4.4 Other terms

- **DECT** (Digital Enhanced Cordless Telecommunications): An international standard for wireless telephone connections, mainly used by mobile telephones.
- **LAN** (Local Area Network) also called Ethernet, means a wired network for broadband data transmission on the basis of the IEEE 802.3 standard series.
- **Modem** means a component whose main function is to transmit and receive digitally modulated signals via a wired network.

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<sup>1</sup> Lejeune, A., Bertoldi, P.: Code of Conduct on Energy Consumption of Broadband Equipment, Version 9, Joint Research Centre, European Commission, Ispra (IT), 2024  
<https://data.europa.eu/doi/10.2760/985625> (30/10/2024)

<sup>2</sup> Determination of Small Network Equipment Energy Consumption, ANSI/CTA-2049-B, Consumer Technology Association (CTA), 2024

- **Network port** or interface means a wired or wireless physical interface or port to the external network connection on the device.
- **Payload** means the data to be transmitted and processed by the device.
- **Transition time** means the maximum allowable time to switch from a higher operating state to a lower one.
- **WLAN** (Wireless Local Area Network), also called WiFi, means a wired network for broadband data transmission on the basis of the IEEE 802.11 standard series.
- **Central function** means the main processor unit providing the primary routing functionality.
- **Constituent components** are substances added to the product as such or as part of a mixture in order to achieve or influence certain product properties and those required as chemical cleavage products for achieving the product properties.
- **Warranty:** A legal obligation for the seller to ensure that the goods supplied to the buyer are free from defects. Warranty rights in civil law/purchasing law are rights that the buyer has when the seller has supplied defective goods. The seller must procure the goods for the buyer free from material defects and defects of title. (§ 433 (1) sentence 1 BGB: Bürgerliches Gesetzbuch/German Civil Code). In the case of new goods, the seller is liable for any defects for 2 years (§ 438 (1) No. 3 BGB). The warranty period for used goods is generally 1 year. Warranty rights are standardised by law, i.e. suppliers are obligated to provide a warranty by legal regulations (§§ 437 ff. BGB). Special rules apply to consumable materials.
- **Guarantee:** A voluntary service provided by a manufacturer that is subject to its own defined conditions. It runs in parallel to the warranty and, in contrast to the warranty, also protects the buyer against defects that arise after the goods are purchased.

## 2 Scope

**Router** means a network component to forward data packets on the basis of information of the network layer (L3) from one network to another and within the network.

These Basic Award Criteria apply to routers that:

- are used to connect to the Internet and are supplied with electric power via an integrated or external power supply unit, a battery<sup>3</sup> or a network connection,
- have wired and/or radio-based network interfaces
- and (in the case of routers configured using local software) modems.

The Basic Award Criteria do not apply to modems that are externally connected to a router.

## 3 Requirements

### 3.1 Energy efficiency

#### 3.1.1 Electric power consumption

##### 1.) Limits

The router must not exceed the electric power consumption limits stated in the Broadband Equipment Code of Conduct (2024) for ready-state (idle state) and also on-state using the defined

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<sup>3</sup> Battery-operated devices are referenced here because this may influence the measurement of the electric power consumption and hence must be taken into account in the verification processes for the requirements.



measurement conditions in each case. The latest version of the Code of Conduct (current version: 9/2024) and the "Tier" for the year in which the application is submitted are valid. The applicant must confirm compliance with these limits for the individual device configuration (each network port) and submit corresponding measurement reports when submitting the application.

## **2.) Example scenarios**

The applicant must also disclose the average electric power consumption in both on-state and ready-state for three example application scenarios in the product documentation, if the relevant connections are present:

- a) LAN scenario (+ telephony if present)
- b) WLAN scenario (+ telephony if present)
- c) Telephony scenario (if present)

The power consumption must be measured in accordance with Appendix B and always using the standard power supply unit supplied with the device.

The average power consumption in both on-state and ready-state (idle state) must be disclosed in the product documentation for the example LAN and WLAN application scenarios.

### **Compliance verification**

*The applicant shall submit the test report for the measurements performed on a minimum of three devices tested in accordance with Appendix B: "Requirements for measuring the electric power consumption" as Annex 7. In addition, the applicant shall state the average power consumption in Annex 1 to the contract, mark the corresponding sections of the product documentation where the power consumption is documented and submit the relevant pages of the product documentation in Annex 2 to the contract. The test report must be completed by a testing laboratory that fulfils the requirements for the competence of testing and calibration laboratories according to DIN EN ISO/IEC 17025. Test reports completed by the applicant are recognised as being of an equivalent standard when the testing laboratory used for the measurements is accredited by an independent body as an SMT laboratory (supervised manufacturer testing laboratory).*

### **3.1.2 Defined transition time**

The router must have a function that automatically switches it back to ready-state (idle) within a transition period of no more than 5 minutes after processing a payload in on-state.

The transition time must be measured in accordance with Appendix B: "Requirements for measuring the electric power consumption and transition time".

### **Compliance verification**

*The applicant shall declare compliance with this requirement in Annex 1 to the contract and submit the test report for the measurements performed on a minimum of three devices tested in accordance with Appendix A: "Requirements for measuring the electric power consumption and transition time" in Annex 7. The test report shall specifically highlight the time "when active data transmission ends" and the time "when ready-state is reached" at a largely stable power consumption within 5 minutes.*

### **3.1.3 Power management**

The router must be designed so that the user can individually enable or disable non-required functions or select individual energy saving settings using a software function or a switch. Moreover, the router's electric power consumption in on-state must vary based on the function and load. The router must have an automatic power management feature that minimizes the electric power consumption at all times in a timely and functionally appropriate manner.

#### **Disabling the WLAN function**

The router must be designed so that the user can manually disable the WLAN (WiFi) module via the software (in the router menu or an app); routers configured using local software must also have a switch on the housing that allows the user to manually disable the WLAN module.

The device must allow the user to program the device so that the WLAN module is enabled and disabled according to a time schedule. If the WLAN module is disabled via the menu or an app, a notification must be displayed to inform the user that disabling the WLAN function may delay security updates for devices connected via WLAN.

#### **WLAN range**

Routers configured using local software must reduce the WLAN transmission power of the WLAN module when there is no terminal device registered. In order to limit radiation exposure, the user must also be able to amend the WLAN range by reducing the transmission power of the device. If the transmission power is reduced, a notification must be displayed via the menu or app to inform the user that the range may not be sufficient to operate some connected devices.

#### **Indicator lights on the display**

The current WAN and WLAN status must be displayed on the user interface and, in the case of routers configured using local software, also indicated using lights on the device.

The user should be able to use the menu or an app for the router to switch off the indicator lights on the device.

#### **Other functions**

Routers configured using local software must be designed so that the user can disable an existing DECT function. DECT must be disabled on delivery. The electric power consumption of unused LAN ports, i.e. ports with no cable connected and ports with a non-active device connected, must be automatically reduced to a minimum.

If routers configured using local software have a mobile communications interface (e.g. LTE), they must have a signal strength indicator when this function is active to provide information on the quality of the connection to the mobile communications network and help the user find the most suitable location for operating the device via this mobile communications network.

#### **Settings in the router menu**

When accessing the configuration menu, users must be informed that they can have a decisive influence on the energy consumption of their device by adjusting the settings (e.g. using a timer function, reducing the transmission power, deactivating the device manually). The possibility of disabling individual functionalities (especially DECT and WLAN) and thus reducing the electrical

power consumption must be explained in an understandable way and highlighted in a clearly visible place.

### **Information in the product documentation**

The product documentation must inform the user that disabling unused interfaces helps reduce the power consumption of the device and it must include information on how to disable individual functionalities. In addition, the product documentation must provide information on the timer function and explain how to activate it, as well as information on how to reduce the transmission power of the WLAN module in order to reduce energy consumption and radiation exposure.

### **Compliance verification**

*The applicant shall declare compliance with this requirement in Annex 1 to the contract, mark the relevant sections of the product documentation that make reference to the functions and submit the relevant pages of the product documentation in Annex 2 to the contract. In addition, the applicant shall submit screenshots in Annex 3 showing the software function in the menu when using the device for the first time.*

### **3.1.4 Integrated DECT stations**

If the router has integrated DECT stations, these stations must comply with the additional requirements for base stations described in Paragraphs 3.2 and 3.3 of the Basic Award Criteria for DE-UZ 131 (Digital Cordless Phones), Edition January 2020, Version 3:

#### **a) User-adjustable range limitation**

Cordless phones supplied with a base station (device combination: handset + base station) or as a single handset (handset with a charging cradle, as an additional handset for a base station or for a router with a built-in base station) must have a user-adjustable range limitation function that can be used to reduce the maximum peak transmission power. It must be possible to reduce the transmission power in at least three steps, i.e. the user must be able to set a minimum of four different ranges (transmission power levels). This also applies to CAT-iq handsets. The difference in the maximum peak transmission power for the highest and the lowest level must be at least 10 dB (factor of 10). The reduction in the maximum peak transmission power must be effective on the base station and the registered handset at the same time. It must be possible for the user to easily change the settings on the handset. If the base station not only uses the "traffic bearer" transmission channel but also another channel to send a "dummy bearer" signal, the transmission power for all signals must be reduced in accordance with the setting of the user-adjustable range limitation function. This also applies if more than one handset is registered to the base station.

The peak transmission power (equivalent radiated power) must not exceed 250 mW EIRP in any setting. It must be easy for the user to adjust the range limitation function and the current setting must be shown on the display of the handset at least when no call is currently being made.

As an exception to these requirements, the following applies to CAT-iq devices:

The base station must have the option of reducing the maximum transmission power by at least one level. The transmission power of the lowest level must not exceed 18 dBm (EIRP).

### **Compliance verification**

*The applicant shall declare compliance with this requirement in Annex 1 to the contract and submit a protocol for the conformity assessment according to ETSI EN 301406 as Annex 6a,*

*listing the measured equivalent radiated power of the base station and one handset registered to the base station in all possible settings for the range limitation function. A measurement setup as shown in Appendix C must be used. The equivalent radiated power (EIRP) taking into account the antenna gain (which also needs to be measured) and the calculated reduction factor for the transmission power levels shall be entered in a table. The measurement diagrams shall be enclosed with the test report as an Annex.*

*If more than one handset can be registered to the router or if the system supports HQAudio, e.g. in CAT-iq devices, all channels (dummy bearer and traffic bearer channels) shall be measured and documented.*

*The measurements shall be carried out with the rechargeable batteries in the handset fully charged. In addition, the applicant shall provide a description of how to adjust the range and submit illustrations of the different messages appearing on the display (as Annex 6b or marking the corresponding pages, e.g. in the manual). Testing laboratories commissioned by the applicant must be connected to a notified body appointed by the Federal Network Agency in accordance with Directive 2014/53/EU (RED Directive) of the European Parliament and of the Council of 16 April 2014 on the harmonisation of the laws of the Member States relating to the making available on the market of radio equipment and repealing Directive 1999/5/EC (Text with EEA relevance).*

#### **b) Automatic adaptation of transmission power**

The DECT function must adjust its transmission power to the connection quality: If the connection is good or the components are only located a short distance from each other, the peak transmission power must be automatically reduced. The power control dynamics between maximum and minimum transmission power must have a minimum of four transmission power levels (or three transmission power steps). The difference between the highest and lowest level must be at least 10 dB (factor of 10). If the range limitation function (Paragraph 3.2) is switched on, the control dynamics may only reduce the transmission power in line with the set level. If more than one handset is registered to the base station, it is sufficient if the base station controls the transmission power of the transmission channels; the transmission power of the dummy bearer signal may be kept at the value set in accordance with Paragraph 3.2 for the duration of an active voice or data connection. The automatic adaptation of the transmission power of handsets and the base station must be activated in the factory settings and it must be impossible for the user to deactivate it.

#### **Compliance verification**

*The applicant shall declare compliance with the requirement in Annex 1 to the contact and submit a test report as Annex 6c that lists the required control behaviour for one handset and one base station at the maximum and a medium user-adjustable transmission power level according to Paragraph 3.2. The control behaviour of the base station and handset shall be determined by means of an HF probe mounted on the respective device housing and using a measuring receiver or spectrum analyser. The measurement may be performed in normal indoor living environments. The distances at which the handset or base station switches to the next transmission power level shall be listed in a table. The measurements shall be taken at increasing as well as at decreasing distances and both cases shall be documented. The respective transmission power levels shall be determined using a measurement setup as illustrated in Appendix C and shall also be listed in a table. The measurements shall be carried out with the rechargeable batteries in the handset fully charged. Testing laboratories commissioned by the applicant must be*

connected to a notified body appointed by the Federal Network Agency in accordance with Directive 2014/53/EU (RED Directive).

## **3.2 Durability, repairability and reusability**

### **3.2.1 Guarantee**

In order to comply with the expected high standards with respect to product quality and durability, the applicant undertakes to offer a five year guarantee on the product, of which two years at no extra cost, unless a longer guarantee period is required in the statutory regulations. The product documentation must contain information about the guarantee. It is important to note that the guarantee should not be confused with the statutory warranty (see definitions in Paragraph 1.4.4).

#### **Compliance verification**

*The applicant shall declare compliance with the requirements in Annex 1 to the contract, mark the corresponding sections of the product documentation in which the guarantee is indicated and submit the relevant pages of the product documentation as Annex 2 to the contract.*

### **3.2.2 Software updates**

The applicant undertakes to provide functional and, above all, security software updates until at least five years after the product has been removed from the market. The device must offer a free function that can be used to keep the operating system up to date. The aim of these updates is, above all, to close known security gaps. The product documentation must include information on how to update the software.

#### **Compliance verification**

*The applicant shall declare compliance with the requirements in Annex 1 to the contract, mark the corresponding sections of the product documentation in which the software updates are described and submit the relevant pages of the product documentation as Annex 2 to the contract.*

### **3.2.3 Repairs and availability of spare parts**

The applicant undertakes to perform repairs or provide infrastructures for repair services until at least five years after the product has been removed from the market and to guarantee that spare parts required for repairing the device are available until at least five years after the product has been removed from the market. Spare parts must be offered at reasonable prices by the manufacturer itself or by a third party.

Spare parts are those parts which, typically, may fail or break down within the scope of the ordinary use of a product, such as condensers, power supply units or rechargeable batteries (if relevant).

The router must be designed so that qualified specialist workshops can repair or replace such spare parts with reasonable effort.

The product documentation must provide information on how the components are assembled and on the availability of spare parts and repair services.

The device must comply with the requirements for a recycling-friendly and repair-friendly design in Paragraph 3.3.2.

### **Compliance verification**

*The applicant shall declare compliance with the requirements in Annex 1 to the contract, mark the corresponding sections of the product documentation in which the provision of spare parts and repairs is indicated and submit the relevant pages of the product documentation as Annex 2 to the contract.*

#### **3.2.4 Replaceability of rechargeable batteries**

If the device contains rechargeable batteries, it must be possible for them to be replaced by the user without damaging the device and without the aid of special tools. Rechargeable batteries are typical spare parts that are subject to the requirement in Paragraph 3.2.3.

In addition, the rechargeable batteries must comply with the valid regulations in DIN EN IEC 62133 and DIN EN IEC 61951-2. The product documentation must include information on replacing the batteries and on the type of batteries used, as well as on the proper disposal of the batteries.

### **Compliance verification**

*The applicant shall declare compliance with the requirements in Annex 1 to the contract. The applicant shall mark the corresponding sections of the product documentation in which the replacement of the rechargeable batteries and the type of batteries are described and submit the relevant pages of the product documentation as Annex 2 to the contract.*

#### **3.2.5 Data deletion**

To enable the reuse of the device, it must be designed so that users can completely and securely delete all personal data themselves without the need for paid software. In addition, the device must also have a function that resets the device to its factory settings (while retaining any updates).

### **Compliance verification**

*The applicant shall declare compliance with the requirements in Annex 1 to the contract, mark the corresponding sections of the product documentation in which the data deletion and reset function to restore the factory settings are described and submit the relevant pages of the product documentation as Annex 2 to the contract.*

#### **3.2.6 Product packaging**

Sales packaging may only be made out of paper or cardboard. This must be produced using recycled fibres accounting for at least 70% by mass, a tolerance limit of 5% is permitted.

### **Compliance verification**

*The applicant shall declare compliance with the requirement in Annex 1 to the contract and, if paper or cardboard are used for the packaging, verify the source of the materials and the composition of the packaging in the form of written confirmations from the suppliers and, if necessary, by providing further verification in Annex 5.*

### **3.2.7 Product take back**

The applicant undertakes to take back those devices certified with the ecolabel after use and to recondition them as a priority or to recycle them in accordance with the German Electrical and Electronic Equipment Act (ElektroG). Non-recyclable parts of the device must be disposed of in an environmentally friendly manner. The devices must be taken back free of charge – either personally or by post – at the applicant's facility or a return facility named by the applicant. The product documentation for the device must include detailed information on the return options.

#### **Compliance verification**

*The applicant shall declare compliance with the requirement in Annex 1 to the contract, mark the corresponding sections of the product documentation in which the take back of products is described and submit the relevant pages of the product documentation as Annex 2 to the contract.*

## **3.3 Recycling**

### **3.3.1 Recycling strategy**

The router must be designed so that important material fractions, such as plastics, ferrous metal, copper and aluminium, can be separated with a low amount of effort. A minimum of 90% of the mass of the plastics and metals used for the housing parts/chassis must be recyclable by the type of material (this does not include the recovery of thermal energy by incineration).

#### **Compliance verification**

*The applicant shall declare compliance with the requirement and state the link to where the recycling strategy is available in electronic form in Annex 1 and submit the published recycling strategy in Annex 8.*

### **3.3.2 Repair-friendly and recycling-friendly design**

The router must be designed so that the materials used in the manufacture of the device can be easily separated. In particular, this includes:

- Housings with plugs/connectors
- Printed circuit board assemblies (mainboard)
- Rechargeable battery
- Large-area heat-sinks and heatpipes

For this purpose, parts made of mutually incompatible materials must be separable or connected by separation aids. Electrical assemblies must be easy to remove.

In particular, a repair-friendly and recycling-friendly design means:

- a) Preference should always be given to the use of simple mechanical mountings, clamp and spring mechanisms instead of screwed or glued connections, provided that this is consistent with the requirements for the reliability and robustness of the device. Visually highlighting these connections, e.g. by colour coding, can speed up the disassembly process.
- b) The use of double-sided adhesive tape is permitted if the adhesive tape can be easily identified, grasped and removed by means of pull straps without leaving any residue.
- c) The use of thermally or electrically conductive adhesive connections in the electronic packaging of integrated circuits is permitted. However, it is not permitted to stick metal sheets to large areas of the housing plastics (e.g. for the purpose of heat dissipation).

- d) Glued connections must not be used to attach connectors or plug-in connectors and LEDs to the housing.
- e) The use of screws is permitted if the type and number are kept to a minimum. Only common types of screws may be used in the device. It must be possible to remove these screws without special tools.
- f) The number of screws used to fasten main components such as the housing, printed circuit board(s) and heatsinks should not exceed six in each case (the applicant must provide a technical justification in the event of any exceptions).
- g) Screws should be positioned so that they are not hidden and can be easily removed using standard tools. Visually highlighting the screws, e.g. with colour coding around them, can speed up the disassembly process, provided that the colour does not conflict with other colour coding (components).

### **Compliance verification**

*The applicant shall declare compliance with the requirement in Annex 1 to the contract, mark the corresponding sections of the recycling strategy in which the disassembly of the router for recycling is described and submit the recycling strategy in Annex 8. Justifications for any technical exceptions with respect to requirement f) must also be submitted in Annex 8.*

### **3.3.3 Selection of materials (types of plastic and recycled content)**

The following applies to plastic parts with a mass greater than 25 grams and key caps, insofar as they have a total mass greater than 25 grams:

Only the plastic types ABS, PC, HIPS, PE and PP are approved for the individual plastic parts. The use of plastic compounds consisting of PC and ABS is also permitted if they are sourced from post-consumer recycled materials<sup>4</sup>. This requirement does not apply to transformers and the plastic coatings on electronic components.

Plastic housings must be manufactured using at least 80% post-consumer materials. These post-consumer materials must be free of chlorine and bromine.

Galvanised coatings and other metal coatings of plastic housing parts are not permitted.

### **Compliance verification**

*The applicant shall declare compliance with the requirement in Annex 1 to the contract and state which plastics are used for plastic parts with a mass > 25 grams and the relevant proportion of recycled plastics used based on the mass of the plastic parts in Annex P-L 25 to the contract. If plastics or plastic composites made of PC and ABS are used, their origin and composition must also be verified by submitting a certificate (including the report) according to the EuCertPlast certification scheme, the RecyClass certification scheme (for "recycling purposes"), the Global Recycled Standard (GRS) or an equivalent certification scheme according to EN 15343:2007 or DIN EN 15343:20085 (with calculated and plausible verification of the percentage of post-consumer materials)<sup>5</sup>.*

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<sup>4</sup> Other types of plastic or plastic compounds may be accepted upon application to the German Environmental Agency.

<sup>5</sup> See <http://www.eucertplast.eu>, <https://controlunion-germany.com>



*The fact that the post-consumer recycled materials are free of chlorine and bromine must be verified by carrying out a screening test in accordance with DIN EN 62321. If the screening test indicates the presence of chlorine or bromine, the quantities of these substances must be determined by liquid chromatography of ion in accordance with DIN EN ISO 10304-1 after dissolving the materials. According to IEC 61249-2-21, a max. of 900 mg/kg of chlorine or bromine and a max. of 1,500 mg/kg in total for both chlorine and bromine may be present as impurities.*

### **3.3.4 Material requirements for plastics and plastic housing parts**

The plastics used in the housing and housing parts may not contain any substances with the following properties as a constituent component:

1. Substances which are identified as particularly alarming under the EU Chemicals Regulation REACH (1907/2006/EC) and which have been incorporated into the list drawn up in accordance with Article 59, Paragraph 1 of the REACH Regulation (so-called "list of candidates").
2. Substances that according to the CLP Regulation (EC) No. 1272/2008 have been classified in the following hazard categories or which meet the criteria for such classification:
  - ♦ carcinogenic in categories Carc. 1A or Carc. 1B
  - ♦ germ cell mutagenic in categories Muta. 1A or Muta. 1B
  - ♦ reprotoxic (teratogenic) in categories Repr. 1A or Repr. 1B

Halogenated polymers are not permitted in the housing and housing parts. Neither may halogenated organic compounds be added as flame retardants. In addition, no flame retardants classified according to the CLP Regulation as carcinogenic in category Carc. 2 or as hazardous to water in category Aquatic Chronic 1 may be added to the product.

The hazard statements (H Phrases) that correspond to the hazard categories can be found in Appendix D: Assignment of hazard categories and H Phrases.

The following are exempt from this rule:

- 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. If the product contains such substances, they must be named (chemical designations and CAS numbers);
- plastic parts with a mass of less than or equal to 25 grams.

### **Compliance verification**

*The applicant shall declare compliance with the requirements in Annex 1 to the contract and submit a written declaration from the plastics manufacturer or guarantee the provision of these documents to RAL gGmbH. The applicant shall also verify that the housing does not contain any halogen compounds. The declaration shall confirm that the excluded substances have not been added to the plastics and provide a chemical description of the flame retardants and fluoroorganic additives added to the plastics including the CAS number and their rating (H Phrases) (Annex P-M to the contract). When first applying for the Blue Angel ecolabel, the submitted*

*declaration must not be older than 6 months. If one applicant submits additional applications for the labelling of products that contain the same plastics, the submitted declarations may be presented unchanged during the term of the Basic Award Criteria. Notwithstanding this, RAL shall be entitled to ask for an updated version of the declarations if the German Environment Agency (Umweltbundesamt) finds that product-relevant substances have been added to the list of candidates.*

### **3.4 Electromagnetic radiation**

Devices with one or more wireless interfaces and a total transmission power of 10 mW or more must be designed so that the specific absorption rate (SAR) of the high-frequency electromagnetic radiation emitted by the device in exposed persons – locally averaged over 10 grams of tissue – is as low as possible. For this reason, data on the SAR values is currently being collected to determine the range of SAR values for various different devices. This data must be provided to the certification body (RAL) for information purposes.

The maximum SAR value must be determined in accordance with DIN EN 62209-2, DIN EN IEC 62209-3 or EN IEC/IEEE 62209-1528. The position of the test sample relative to the body phantom used for measurement purposes ("measurement phantom") must be chosen in accordance with sections 6.1.4.7 "Desktop devices" and, if applicable, 6.1.4.5 "Device with hinged or swivel antenna(s)".

The result must be based on the maximum value measured when there is no distance between device and the body phantom.

#### **Compliance verification**

*The applicant shall submit a report for the measurement carried out in accordance with DIN EN 62209-2, DIN EN 62209-3 or EN IEC/IEEE 62209-1528 in Annex 8. Testing laboratories commissioned to perform the measurements must be affiliated with a body notified according to the German law on the placing of radio equipment on the market (Radio Equipment Act - Funkanlagen-gesetz - FuAG)).*

### **3.5 Information for users**

The router must be supplied with a quick guide and operating instructions. For routers configured using local software, the quick guide must be enclosed with the device on paper. This quick guide can be provided on the Internet or on an app for routers configured using central software. The operating instructions must be made available on the Internet or via an app.

The documentation enclosed with the device must be printed on recycled paper, preferably on paper certified with the Blue Angel ecolabel. The quick guide must contain at least the following information, presented in a clear and understandable way:

- Instructions for analogously displaying the status of the operating modes of the router or individual interfaces on the device (e.g. LED displays).
- Instructions for digitally displaying the status of the operating modes of the router or individual interfaces on the user interface.
- Instructions on how to enable or disable radio modules (e.g. WLAN, DECT).
- A note that the operating instructions describe how to activate the timer function and how to reduce the transmission power of the WLAN module in order to lower the energy consumption and exposure to radiation.

- A note that the operating instructions include information on the electric power consumption (in watts) in on-state and ready-state for three example application scenarios.
- A note that the operating instructions include instructions on the energy efficient use of the router, including instructions on automatic and manual power management, as well as on the optimal positioning of the router in a room.

The operating instructions for the router must contain the following information:

- A description of how to activate the timer function and how to reduce the transmission power of the WLAN module in order to lower the energy consumption and exposure to radiation.
- Information on the electric power consumption (in watts) in on-state and ready-state for three example application scenarios.
- Instructions on the energy efficient use of the router, including instructions on automatic and manual power management, as well as on the optimal positioning of the router in a room.
- Instructions on removing batteries (if present).
- Instructions on using the mass storage modules (if present).

The operating instructions and quick guide for a router with one or more radio transmitters must also inform the user that:

- the device emits high-frequency electromagnetic fields during operation,
- exposure to these fields can be reduced by way of precaution if the device is installed in a central place where people usually do not spend much time, i.e. in the hall,
- the WLAN transmitter can be permanently turned off using a switch on the housing on routers configured using local software and can be programmed to be turned off using the timer function on all devices,
- software (menu or app) can be used to measure the quality of the wireless connection on the device and to find the optimal position to place the router from a technical perspective.

### **Compliance verification**

*The applicant shall declare compliance with the requirement in Annex 1 and submit the corresponding pages of the quick guide (Annex 4) and the operating instructions (Annex 5).*

## **3.6 Social requirements for production and supply chains**

### **3.6.1 Due diligence of companies in the sourcing of raw materials**

The manufacturer must carry out due diligence with respect to human rights for the mineral raw materials in the devices by implementing the "OECD Due Diligence Guidance for Responsible Supply Chains of Minerals from Conflict-Affected and High-Risk Areas" (in its currently valid version)<sup>6</sup>.

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<sup>6</sup> OECD (2019): OECD Due Diligence Guidance for Responsible Supply Chains of Minerals from Conflict-Affected and High-Risk Areas, <https://doi.org/10.1787/3d21faa0-de>, version: 2024.

### **Compliance verification**

*The applicant shall verify compliance by submitting a report from the manufacturer of the devices in Annex 9. The report must cover the entire process for due diligence with respect to human rights in the supply chain in accordance with the "OECD Due Diligence Guidance for Responsible Supply Chains of Minerals from Conflict-Affected and High-Risk Areas" (in its currently valid version) and be audited by an independent, third party auditing body (Annex 9/9a). The auditing body must meet the requirements for independence (Chapter VIII(A) of the Fair Labor Association (FLA) Charter), expertise and accountability (ISO 19011) of the independent, third party auditing body.*

*Reports from the following auditing bodies will be recognised<sup>7</sup>:*

- *Reports from an RBA-approved auditor based on an audit according to the RBA VAP Standard in section E3 of the currently valid version of the Responsible Business Alliance Code Of Conduct*
- *Auditing bodies accredited according to SA 8000*
- *Reports created according to the Dodd Frank Act (Section 1502) using the CMR template or the EU Conflict Minerals Regulation (2017/821) and submitted to the US Securities and Exchange Commission (SEC).*

*After successful auditing of the report by a third party auditing body, the applicant shall provide RAL gGmbH with a weblink to the published report from the manufacturer that covers all steps of the OECD due diligence process (Annex 1). The report must not be more than two years old at the time the application is submitted.*

### **3.6.2 Support for local initiatives to promote responsible mining**

The applicant shall declare compliance with the requirement in Annex 1 and confirm that the manufacturer of the devices (or also the parent company) supports at least one of the following initiatives to promote responsible mining:

- ITSCI Programme for Responsible Mineral Supply Chains<sup>8</sup>
- Fair Trade Gold<sup>9</sup>
- Fairmined Gold<sup>10</sup>
- Responsible Minerals Initiative<sup>11</sup>
- The European Partnership for Responsible Minerals (EPRM)<sup>12</sup>
- JATAM Project Indonesia (Mining Advocacy Network)<sup>13</sup>

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<sup>7</sup> Reports from other auditing bodies may be approved upon application to the German Environment Agency.

<sup>8</sup> <https://www.itsci.org/>

<sup>9</sup> <https://www.fairtrade-deutschland.de/produkte/gold>

<sup>10</sup> [https://www.fairever.gold/de/shop/category/fairmined-gold-56?gad\\_source=1&gclid=CjwKCAjwzNvBhAkEiwAYiO7oFFedvf5av-dEBPqz7MkzqCrPEcuITeIr7V3hRiBHE1hBnFMh7RR6hoCPG0QAyD\\_BwE](https://www.fairever.gold/de/shop/category/fairmined-gold-56?gad_source=1&gclid=CjwKCAjwzNvBhAkEiwAYiO7oFFedvf5av-dEBPqz7MkzqCrPEcuITeIr7V3hRiBHE1hBnFMh7RR6hoCPG0QAyD_BwE)

<sup>11</sup> <https://www.responsiblemineralsinitiative.org/>

<sup>12</sup> <https://europeanpartnership-responsibleminerals.eu/>

<sup>13</sup> <https://www.jatam.org/en/>

### **Compliance verification**

*Membership of the manufacturer of the devices in one of the above-mentioned initiatives will be accepted as verification. This membership can be verified, for example, by the presence of the manufacturer's name on the list of members on the website of the relevant initiative(s).*<sup>14</sup>

#### **3.6.3 Social sustainability in the manufacturing process**

The manufacturer must ensure compliance with the following fundamental working conditions during production of the devices:<sup>15</sup>

- Freedom of association and collective bargaining (ILO C087 and C098),
- Non-discrimination (ILO C100 and C111),
- Prohibition of forced labour (ILO C29 and C105),
- Prohibition of the worst forms of child labour and minimum age (ILO C182 and C138),
- Occupational health and safety (ILO C155),

and compliance with other ILO standards on relevant social risks:

- Safety in the use of chemical substances (ILO C170),
- Payment of the statutory minimum wage (for a standard working week) (ILO C131),
- Hours of work (ILO C001),
- Social security (ILO C102).

The obligation to comply with the requirements also extends to levels 1 and 2 of the supply chain. The individual levels of the supply chain are defined (according to BMI/Bitkom 2019)<sup>16</sup> as follows:

- Level 1: the final production site and, if only product finishing is carried out at the final production site, also their direct suppliers;
- Level 2: all direct suppliers to the production sites in level 1;

The essence of the occupational and social standards covered by these requirements must also be met even if the national law in a particular country has not ratified one or more of the ILO standards or they have not yet been implemented in national law.

### **Compliance verification**

*For level 1 of the supply chain:*

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<sup>14</sup> It is possible that other initiatives will be accepted after they have been investigated by the German Environment Agency. For this purpose, the applicant should provide information to the German Environment Agency on the type of initiative (organisational structure, goal, country, materials covered, type of support) that describe how the project helps to improve human rights and the relevant social and environmental conditions in and around the mining town(s).

<sup>15</sup> <https://normlex.ilo.org/dyn/normlex/en/f?p=NORMLEXPUB:12000:0::NO::>

<sup>16</sup> BMI/Bitkom (2019), Procurement Agency of the Federal Ministry of the Interior & the German Association for Information Technology, Telecommunications and New Media, Joint Declaration on social sustainability in IT procurement in the public sector, [https://www.nachhaltige-beschaffung.info/SharedDocs/DokumenteNB/Verpflichtungserkl%C3%A4rung\\_ILO\\_BeschA\\_Bitkom\\_2019.pdf](https://www.nachhaltige-beschaffung.info/SharedDocs/DokumenteNB/Verpflichtungserkl%C3%A4rung_ILO_BeschA_Bitkom_2019.pdf), version: 2024

*The manufacturer shall state the name and location of the production sites in level 1 in Annex 1 and declare compliance with the above-mentioned requirements for these production sites. Certification (Annex 10)<sup>17</sup> in accordance with the following standards will be accepted:*

- *the audit standard SA 8000.<sup>18</sup> It is not necessary to submit certificates to verify that any compliance issues that were identified have now been resolved for this audit standard.*
- *The audit standard RBA VAP Recognition Program<sup>19</sup> platinum/gold. It is not necessary to submit certificates to verify that any compliance issues that were identified have now been resolved for this audit standard. The audit standard RBA VAP Recognition Program silver is recognised, insofar as the final audit confirms that there were no priority findings or major findings related to the ILO standards promoted in the DE-UZ 160 Basic Award Criteria. Verification of compliance with this requirement can be provided, for example, by disclosing the detailed evaluation in the audit results with respect to the ILO standards promoted in the DE-UZ 160 Basic Award Criteria.*
- *Alternatively, the applicant can verify compliance by submitting an audit report for the manufacturer of the devices from an RBA-approved auditor or an auditor accredited in accordance with SA 8000 in Annex 10. Or the report must be created by an independent testing institution accredited according to ISO/IEC 17065 that can verify compliance with the above-mentioned requirements.*

*The audit on which the report is based must not be more than 3 years old when the application is submitted.<sup>20</sup>*

*For level 2 of the supply chain:*

*The manufacturer shall confirm in Annex 1 that contractual obligations between a company in level 1 and a company in level 2 guarantees compliance with the requirements.*

*In the case of reasonable doubt, the manufacturer must request documentation to verify that these obligations exist and provide feedback to RAL gGmbH. RAL must be provided with the names and addresses of the affected production sites to clarify the matter.<sup>21</sup>*

### **3.7 Outlook**

As part of the next revision of these Basic Award Criteria, the following aspects, amongst other things, will be taken into account:

- Definition of a limit for the specific absorption rate (SAR) in persons exposed to the electromagnetic radiation.

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<sup>17</sup> Certificates from other initiatives may be approved upon application to the German Environment Agency. The German Environment Agency bases its approval on the criteria in the declaration issued by BITKOM and the Procurement Agency of the BMI.

<sup>18</sup> SA 8000 standard: [https://sa-intl.org/wp-content/uploads/2020/01/SA80002014\\_German1.pdf](https://sa-intl.org/wp-content/uploads/2020/01/SA80002014_German1.pdf) Stand: 2024

<sup>19</sup> Responsible Business Alliance, Validated Assessment Program (VAP), <https://www.responsiblebusiness.org/vap/about-vap/> version: 2024

<sup>20</sup> The manufacturer of the devices is obligated to submit revisions of the verifications at regular intervals if the contents of his declaration have changed. The frequency at which revisions of the verifications need to be submitted is determined based on the assignment of the production sites to levels 1 and 2 according to the country-specific risk categories in the currently valid ranking for the SA 8000 Country Risk Assessments Process, which is based on the World Governance Indicators (WGI). If the relevant production sites in levels 1 and 2 are in countries in risk category 1, a revision must be submitted on an annual basis. If the relevant production sites in levels 1 and 2 are in countries in risk category 2, a revision must be submitted every 24 months. If the production sites in levels 1 and 2 are in countries in risk category 3, a revision must be submitted every 36 months. If any deficiencies are identified in the relevant revision or audit, a corrective action plan will be implemented. This includes an obligation for the applicant and relevant suppliers to provide corresponding information to RAL gGmbH and a six-month grace period for the correction of the deficiencies and the provision of supplemental verifications.

<sup>21</sup> This corresponds to the process in the "Joint Declaration on social sustainability in IT procurement in the public sector" from Bitkom in section 4 "Ordering authorisation". Accessible at: [https://www.nachhaltige-beschaffung.info/SharedDocs/DokumenteNB/Verpflichtungserk%C3%A4rung\\_ILO\\_BeschA\\_Bitkom\\_2019.pdf?\\_\\_blob=publicationFile&v=7](https://www.nachhaltige-beschaffung.info/SharedDocs/DokumenteNB/Verpflichtungserk%C3%A4rung_ILO_BeschA_Bitkom_2019.pdf?__blob=publicationFile&v=7)

- Requirements for routers used as rental devices (i.e. ways to verify the reuse rate of the main components).

#### **4 Applicants and parties involved**

Manufacturers or distributors of 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 Environment Agency) which after the signing of the contract receives all data and documents submitted in application 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 31 December 2028.

They shall be extended by periods of one year each, unless terminated in writing by 31 March 2028 or 31 March 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 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 organizations.

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

- Applicant ({manufacturer}{manufacturer/distributor})
- Brand/trade name, product description
- Distributor (Label User), i.e. the marketing organization.

## Anhang A Relevant laws and standards, literature

- ANSI/CTA 2049-B: Determination of Small Network Equipment Energy Consumption, ANSI/CTA-2049-B, Consumer Technology Association (CTA), May 2024
- Battery Directive (BattG): Law for the sale, return and environmental disposal of batteries and accumulators from 25 June 2009 (BGBl. I S. 1582), last amended by Article 1 of the Act of 3 November 2020 (BGBl. I p. 2280). <https://www.gesetze-im-internet.de/battg/BJNR158210009.html>
- BMI/bitkom (2019): Joint Declaration on social sustainability in IT procurement in the public sector. Procurement Agency of the Federal Ministry of the Interior & the German Association for Information Technology, Telecommunications and New Media (bitkom), Berlin. [https://www.nachhaltige-beschaffung.info/SharedDocs/DokumenteNB/Verpflichtungserkl%C3%A4rung\\_ILO\\_BeschA\\_Bitkom\\_2019.pdf?\\_\\_blob=publicationFile&v=7](https://www.nachhaltige-beschaffung.info/SharedDocs/DokumenteNB/Verpflichtungserkl%C3%A4rung_ILO_BeschA_Bitkom_2019.pdf?__blob=publicationFile&v=7)
- DIN EN 15343: Plastics - Recycled Plastics - Plastics recycling traceability and assessment of conformity and recycled content, Beuth Verlag.
- DIN EN IEC 62133: Secondary cells and batteries containing alkaline or other non-acid electrolytes - Safety requirements for portable sealed secondary cells, and for batteries made from them, for use in portable applications, Beuth Verlag.
- DIN EN 61951-2: Secondary cells and batteries containing alkaline or other non-acid electrolytes - Secondary sealed cells and batteries for portable applications, Beuth Verlag.
- German Material Ordinance for Electrical and Electronic Equipment (ElektroStoffV): Ordinance to limit the use of hazardous substances in electrical and electronic equipment from 19 April 2013 (BGBl. I p. 1111), last amended by Article 21 of the act from 10 August 2021 (BGBl. I p. 3436). <https://www.gesetze-im-internet.de/elektrostoffv/BJNR111100013.html>
- Electrical and Electronic Equipment Act (ElektroG): Law for the sale, return and environmental disposal of electrical and electronic equipment, Electrical and Electronic Equipment Act from 20 October 2015 (BGBl. I P. 1739), which was last amended by Paragraph 1 of the law from 8 December 2022 (BGBl. I S. 2240). [https://www.gesetze-im-internet.de/elektrog\\_2015/](https://www.gesetze-im-internet.de/elektrog_2015/)
- EU Battery Directive (2006/66/EC): Directive 2006/66/EG of the European Parliament and of the Council of 6 September 2006 on batteries and accumulators and waste batteries and accumulators, Official Journal of the European Union of 26 September 2006. <http://data.europa.eu/eli/dir/2006/66/2018-07-04>
- EU CLP Regulation (EC/1272/2008): Regulation (EC) No. 1272/2008 of the European Parliament and of the Council of 16 December 2008 concerning the classification, labelling and packaging of substances and mixtures. <http://data.europa.eu/eli/reg/2008/1272/2023-12-01>
- EU POP Regulation (2016/293/EU): Commission Regulation (EU) of 1 March 2016 amending Regulation (EC) No 850/2004 of the European Parliament and of the Council on persistent organic pollutants as regards Annex I. <http://data.europa.eu/eli/reg/2016/293/oj>
- EU Council Recommendation (1999/519/EC): Council Recommendation of 12 July 1999 on the limitation of exposure of the general public to electromagnetic fields (0 Hz to 300 GHz), Official Journal of the European Union of 30 July 1999. <http://data.europa.eu/eli/reco/1999/519/oj>



- EU REACH Regulation (EC/1907/2006): Regulation (EC) No. 1907/2006 concerning the Registration, Evaluation, Authorization, and Restriction of Chemicals (REACH Regulation), Official Journal of the European Union of 30 December 2006. <http://data.europa.eu/eli/reg/2006/1907/oj>
- EU RED Directive (2014/53/EC): Directive 2014/53/EU of the European Parliament and of the Council of 16 April 2014 on the harmonisation of the laws of the Member States relating to the making available on the market of radio equipment and repealing Directive 1999/5/EC, Official Journal of the European Union of 22 May 2014. <http://data.europa.eu/eli/dir/2014/53/oj>
- EU ROHS Directive (2011/65/EC): Directive 2011/65/EC 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, Official Journal of the European Union of 1 July 2011. <http://data.europa.eu/eli/dir/2011/65/oj>
- EU Standby Regulation (801/2013/EU): Commission Regulation (EU) No. 801/2013 of 22 August 2013 amending Regulation (EC) No. 1275/2008 with regard to ecodesign requirements for standby, off mode electric power consumption of electrical and electronic household and office equipment, and amending Regulation (EC) No. 642/2009 with regard to ecodesign requirements for televisions, Official Journal of the European Union of 18 December 2008. <http://data.europa.eu/eli/reg/2008/1275/oj>
- EU WEEE Directive (2012/19/EC): Directive 2012/19/EU of the European Parliament and of the Council of 4 July 2012 on waste electrical and electronic equipment (revised version), Official Journal of the European Union of 24 July 2012. <http://data.europa.eu/eli/dir/2012/19/2024-04-08>
- German Radio Equipment Act (FuAG 2024): German law on the placing of radio equipment on the market of 27 June 2017 (BGBl. I P. 1947), which was last amended by Paragraph 1 of the law from 6 May 2024 (BGBl. 2024 I No. 148). <https://www.gesetze-im-internet.de/fuag/>
- Lejeune, A., Bertoldi, P. (2024): Code of Conduct on Energy Consumption of Broadband Equipment, European Joint Research Centre (JRC), Ispra (IT), ISBN 978-92-68-13294-4. <https://dx.doi.org/10.2760/985625>
- Act on Corporate Due Diligence Obligations in Supply Chains (LkSG): Law on corporate due diligence obligations to avoid human rights violations in supply chains of 16 July 2021 (BGBl. I S. 2959). <https://www.gesetze-im-internet.de/lksg/>
- OECD (2019): OECD Due Diligence Guidance for Responsible Supply Chains of Minerals from Conflict-Affected and High-Risk Areas, 3rd Edition, OECD Publishing, Paris, 12 November 2019. <https://doi.org/10.1787/3d21faa0-de>
- SA 8000 (2014): Internationaler Standard on Social Responsibility, Social Accountability International, New York, June 2014. <https://sa-intl.org/wp-content/uploads/2020/02/SA8000Standard2014.pdf>

## Anhang B Requirements for measuring the electric power consumption and transition time

### General test conditions:

The basic test conditions for measuring the average electric power consumption in ready-state (idle mode) such as the calibration of test equipment and the test environment correspond to those in IEC 62301 "Household Electrical Appliances – Measurement of Standby Power", Section 4, "General Conditions for Measurements".

### Wiring of the LAN Scenario:

Connect the WAN port to the Internet via a broadband connection (if the router offers hybrid access via landline and a mobile communication network, it should be connected to both). Connect 2 of the gigabyte LAN ports to computer terminals (notebook PCs) via 10 m LAN cables. If the router has a telephone function, connect a telephone to the FXS port. All other functions can be disabled.

Place the measuring instrument between the power socket and the power supply unit.

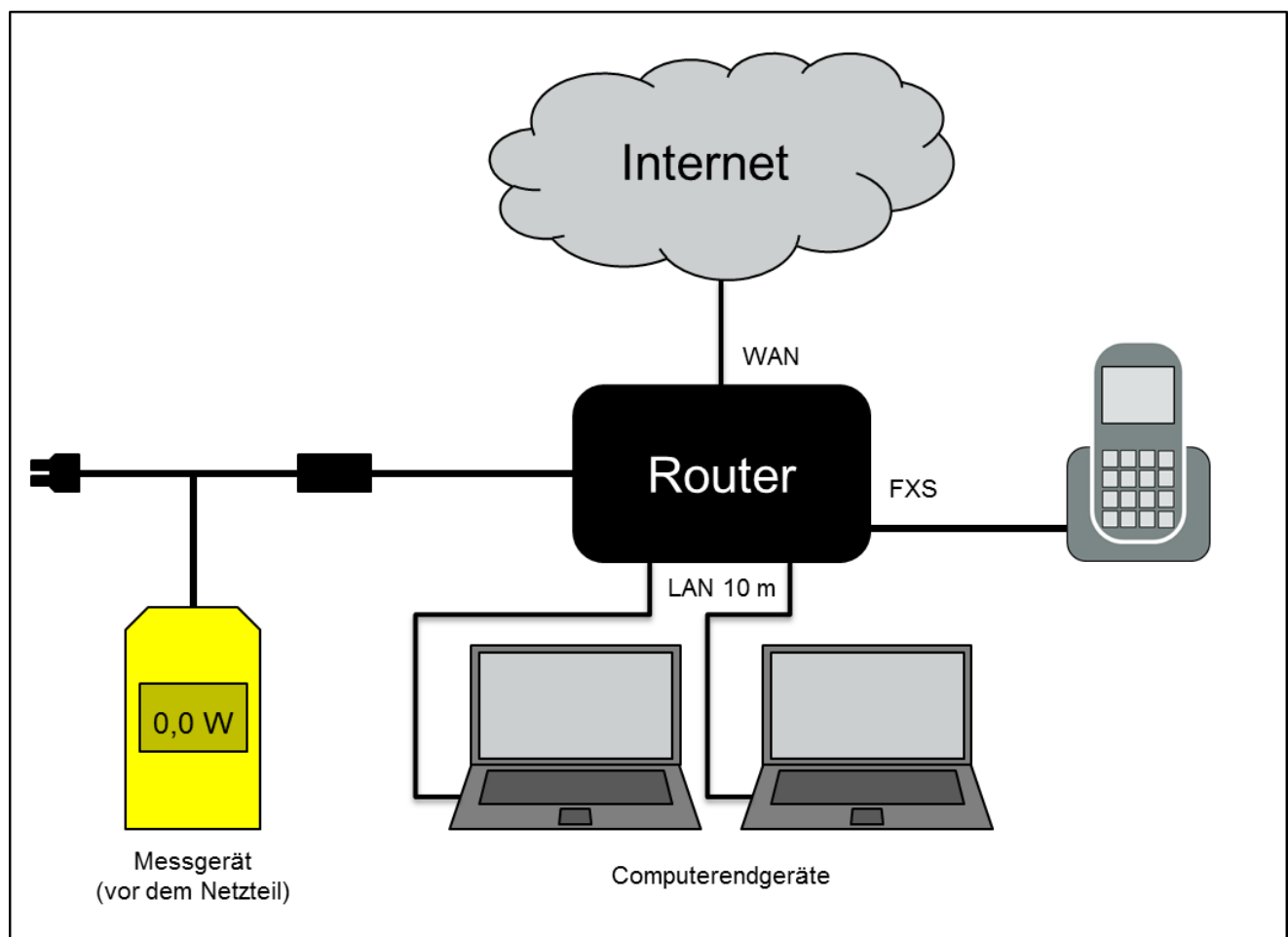


Figure 1: Measurement setup for the LAN scenario

### Wiring of the WLAN Scenario:

Connect the WAN port to the Internet via a broadband connection (if the router offers hybrid access via landline and a mobile communication network, it should be connected to both). Activate all WLAN modules and connect two computers (notebook PCs) to the router via WiFi at a distance of 5 metres. If the router has a telephone function, connect a telephone to the FXS port. All other functions can be disabled.

Place the measuring instrument between the power socket and the power supply unit.

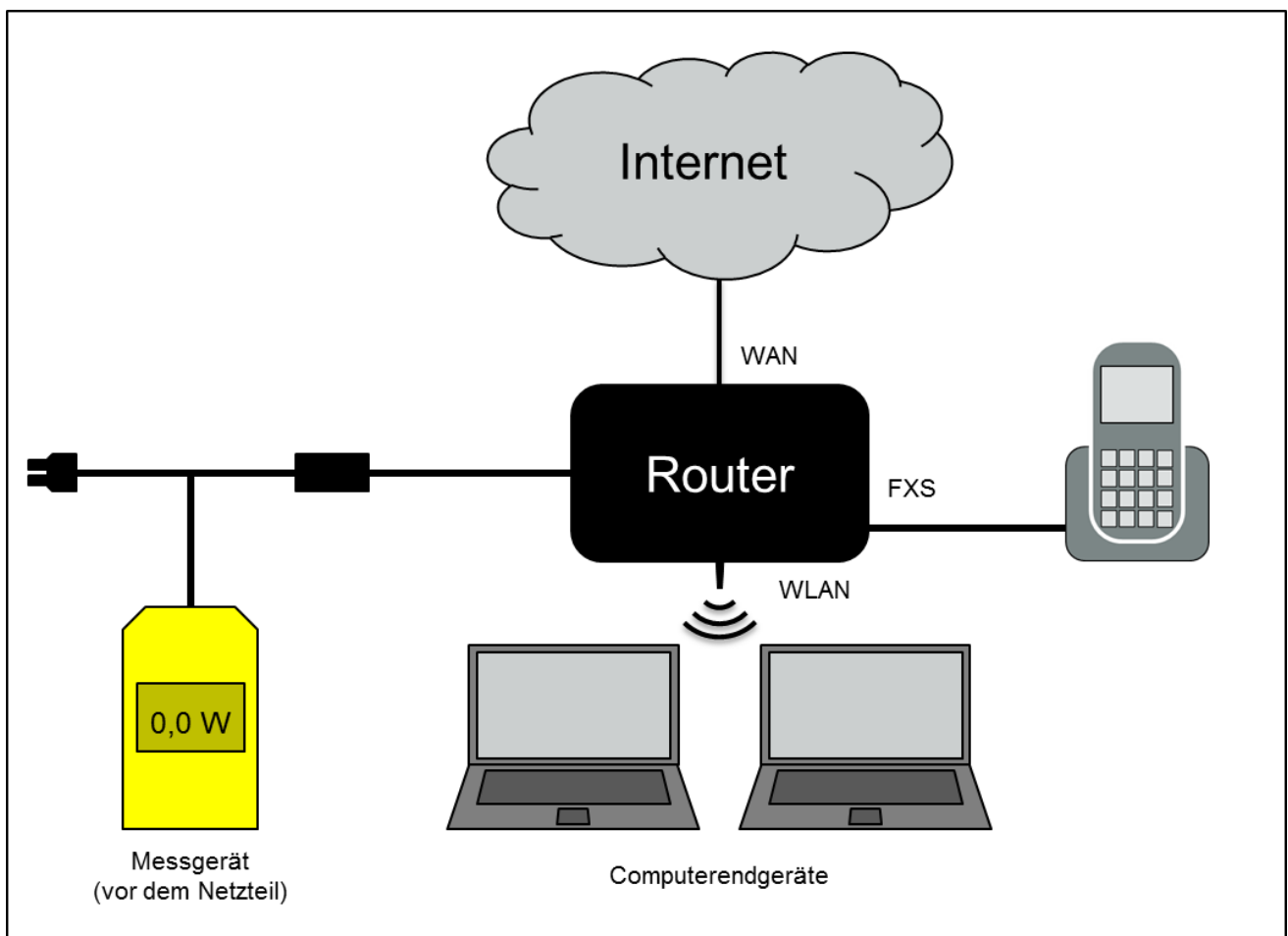


Figure 2: Measurement setup for the WLAN scenario

### Wiring of the telephone scenario:

Connect the WAN port to the Internet via a broadband connection (if the router offers hybrid access via landline and a mobile communication network, it should be connected to both). LAN and WLAN are available. If the router has a telephone function, connect a telephone to the FXS port. All other functions can be disabled.

Place the measuring instrument between the power socket and the power supply unit.

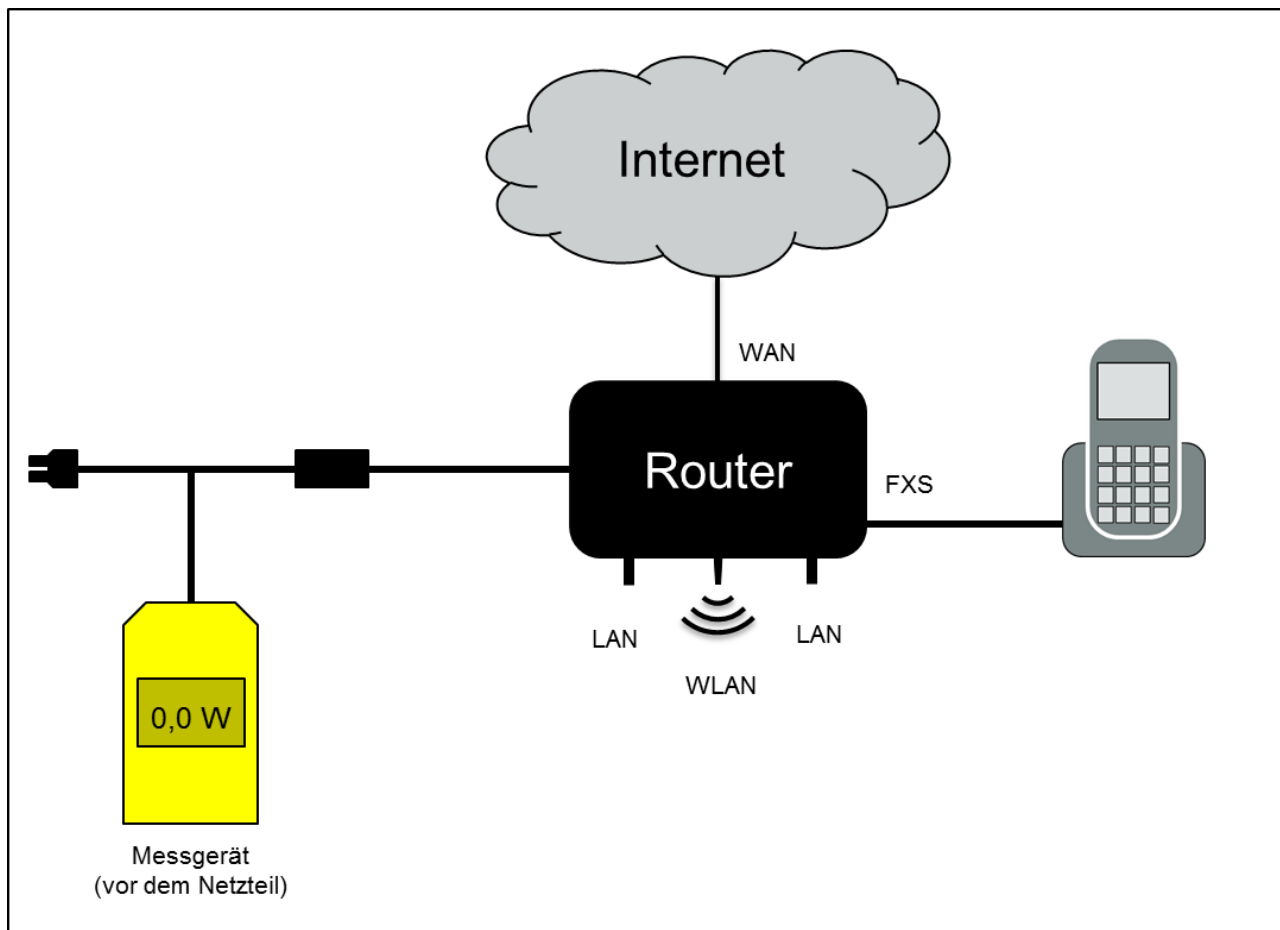


Figure 3: Measurement setup for the telephone scenario

### Measurement process (LAN and WLAN scenario):

Access a full HD video stream on a media server (such as YouTube) from each of the computer terminals. Start measuring the router's electric power consumption when connection to the server is established (by clicking on the video stream) and stop measuring after 10 minutes. The average electric power consumption over the measurement period in on-state should be determined and documented in watts, rounded to one decimal place.

Then disable the active network adapters (LAN or WLAN) on both computer terminals. After the router has reached a stable ready-state (idle state) following a transition time of 5 minutes, start the ready-state measurement and stop measuring after a further 10 minutes. The applicant must document compliance with the 5-minute transition time. Afterwards, the applicant must determine the average electric power consumption over the measurement period in ready-state and document the value in watts, rounded to one decimal place.

**Measurement process for the telephone scenario, if a telephone function is provided:**

Establish an active telephone connection using the telephone connected to the router. Start measuring the router's electric power consumption when the telephone connection is established and stop after 10 minutes. The average electric power consumption over the measurement period in on-state should be determined and documented in watts, rounded to one decimal place. Then end the telephone connection (by hanging up). After the router has reached a stable ready-state (idle state) following a transition time of 5 minutes, start the ready-state measurement and stop measuring after a further 10 minutes. The applicant must document compliance with the 5-minute transition time. Afterwards, the applicant must determine the average electric power consumption over the measurement period in ready-state and document the value in watts, rounded to one decimal place.

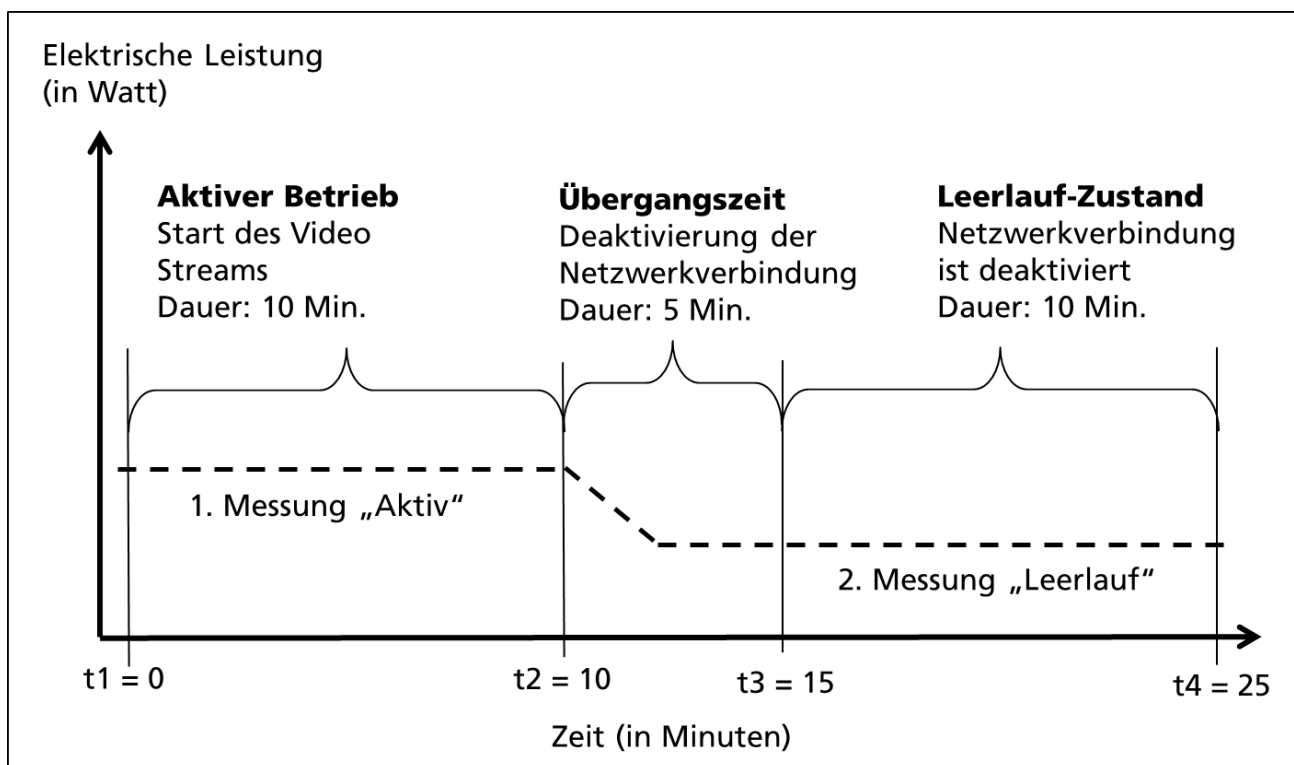
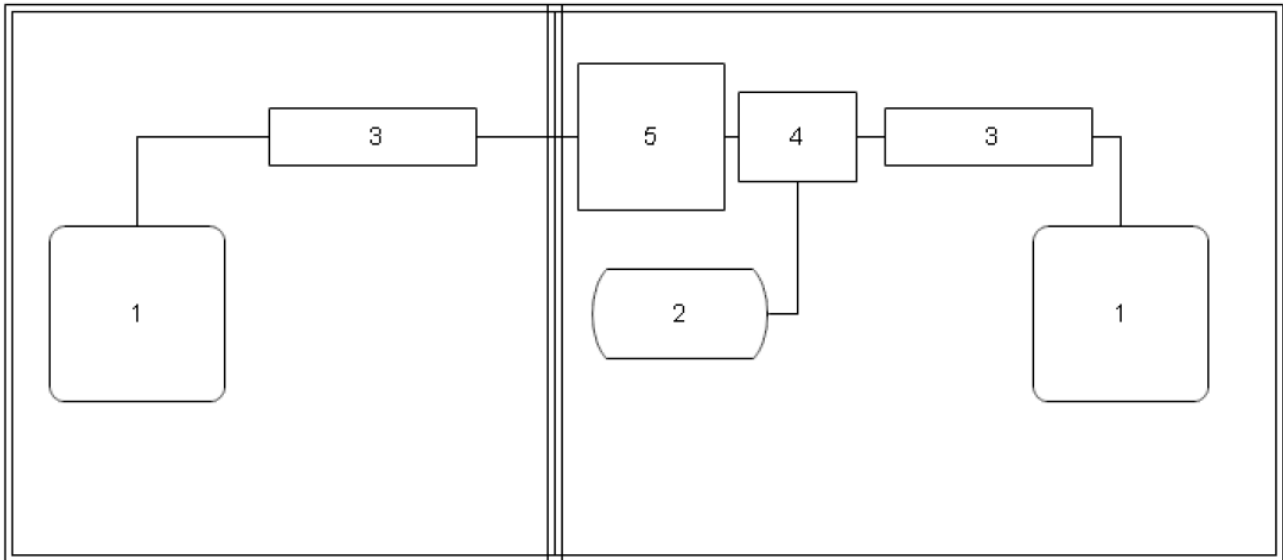


Figure 4: Basic sequence of the measurement

## Anhang C Measurement setup in shielded rooms



- 1: Router
- 2: Spectrum analyser
- 3: Attenuators 10dB
- 4: Coupling element, directional coupler
- 5: Reference circuit

## Anhang D Assignment of hazard categories and H Phrases

The following table assigns the hazard categories for the general exclusion of substances to the corresponding hazard statements (H Phrases).

### CLP Regulation (EC) No. 1272/2008

Hazard category	H Phrases	Hazard statement
<b>Carcinogenic substances</b>		
Carc. 1A Carc. 1B	H350	May cause cancer.
Carc. 1A Carc. 1B	H350i	May cause cancer if inhaled.
Carc. 2	H351	Suspected of causing cancer.
<b>Germ cell mutagenic substances</b>		
Muta. 1A Muta. 1B	H340	May cause genetic defects.
<b>Reprotoxic substances</b>		
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.
<b>Environmental hazards</b>		
Aquatic Chronic 1	H410	Very toxic to aquatic life with long-lasting effects.