

# **BLUE ANGEL**

**The Environmental Label**



**Buses**

**DE-UZ 59b**

**Basic Award Criteria**

**Edition January 2018**

**Version 8**

## 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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## Table of contents

1	Introduction.....	4
1.1	Preface .....	4
1.2	Background .....	4
1.3	Objectives of the Environmental Label .....	5
1.4	Compliance with Legal Requirements .....	6
2	Scope .....	6
3	Requirements .....	6
3.1	Noise Emissions .....	6
3.2	Pollutant Emissions.....	7
3.3	Batteries and Accumulators .....	7
3.3.1	Accumulator Capacity Measurement (Rated Capacity).....	7
3.3.2	Accumulator Life / Warranty .....	8
3.3.3	Safety check /Protection against Accumulator Overcharging and Deep Discharging....	8
3.3.4	Fulfilment of the Take-Back and Reporting Obligation according to the German Batteriesgesetz (BattG) .....	8
3.3.5	Replacement.....	9
3.3.6	Heavy Metal Limits .....	9
3.4	Air-Conditioning Systems .....	10
3.5	Paintwork and Coating .....	10
4	Applicants and Parties Involved.....	10
5	Use of the Environmental Label .....	11

**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**

The purpose of awarding this Blue Angel Environmental Label is to reduce the serious pollutant, greenhouse gas and noise emissions caused by buses, especially in inner-city, metropolitan and special protection areas. That is why the focus of these requirements is on buses used for urban transportation. Interurban and long-distance buses can also be awarded the Blue Angel Environmental Label, provided that they meet the technical requirements set out in these Basic Criteria. No distinction is made between the various applications of buses because only the best products of a product group are expected to be promoted.

The Blue Angel Environmental Label can be awarded regardless of the propulsion system. It can also be awarded to electric buses and hybrid-propulsion buses. Thus, it is now possible for the first time for pure battery electric buses or externally rechargeable hybrid-electric buses to apply for the Blue Angel.

At present, fuel cell-driven buses are not yet included because today it is not yet possible to differentiate reliably between different fuel cells in terms of environmental properties. What is needed is specialized information on how to assess the technical properties and how to formulate appropriate criteria for these propulsion systems.

If fossil fuels are used to power the vehicle the fuel must be approved under the European Type Approval System. The requirements regarding the pollutant emissions of the vehicle propulsion system correspond to the legal exhaust emission reduction standards and presuppose the use of highly efficient exhaust gas treatment systems. The legally required emission measurement test procedure provide not only for measurements on the engine test bench for type approval but also for measurements to verify conformity in real-world on-road operation in order to verify compliance with limits under real-world conditions.

The sound level requirements follow and even undercut the legal requirements for the applicable type-approval measurement methods for determining the sound level of motor vehicles (Directive 70/157/EEC or REGULATION (EU) No 540/2014). The introduction of the noise limits of Phase 2 has been taken into account by tightening the noise requirements from July 2020.

As regards externally rechargeable battery-electric buses (purely electric vehicles) or hybrid electric vehicles, these Basic Criteria have been extended by incorporating quality and safety requirements for the rechargeable traction battery. To ensure a long life of buses the replaceability and long-term availability of the batteries and accumulators used in electric and internal combustion-engined buses must be guaranteed.

Heavy metals can have harmful effects on humans, animals and plants and, when disposed of, build up in the food chain and the environment. That is why these Basic Criteria set limits for the use of heavy metals in batteries and accumulators.

From 1.1.2020 the use of refrigeration technology with non-halogenated refrigerants is mandatory for the operation of buses. Electric buses have already been tested with air conditioning systems using the refrigerant carbon dioxide. Here, the heat pump circuit using carbon dioxide for energy-efficient heating is of particular interest.

The power units of air conditioning systems can generate noises with sound power levels of more than 100 dB(A). It is a stationary noise that causes noise exposure under certain weather conditions which is not generated by the vehicle engine. So far, however, there are no legal noise requirements or standardized measuring methods for the power units of air-conditioning systems. That is why future revisions of these Basic Criteria are expected to include noise emission criteria for motor vehicle air-conditioning systems for use on buses that are to be developed on the basis of comparable applications.

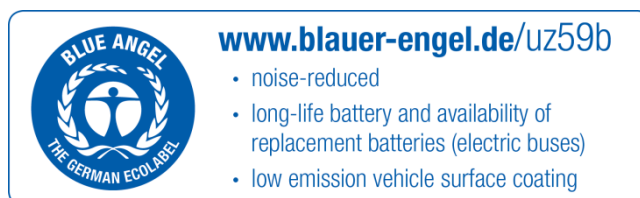
Moreover, there are heavy metal limits to be respected by the coating materials of the vehicle surfaces - with the solvent emissions during vehicle coating falling below the legal limits.

### 1.3 Objectives of the Environmental Label

The Blue Angel Environmental Label for buses may be awarded to vehicles with the following properties:

- Low noise emissions
- Long accumulator life and availability of replacement accumulators
- Low-emission vehicle surface coating

Therefore, the explanatory box contains the following benefits for the environment and health:



## **1.4 Compliance with Legal Requirements**

It is a matter of course for Blue Angel eco-labelled products to comply with current legal provisions and regulations. As regards the buses, these provisions and regulations include in particular:

- StVZO (Straßenverkehrs-Zulassungs-Ordnung - German Road Traffic Licensing Regulations)
- Directive 70/157/EEC on the permissible sound level and the exhaust system of motor vehicles
- Regulation (EU) No 540/2014 on the sound level of motor vehicles
- Regulations (EU) 595/2009 and 582/2011b) including amendment by Commission Regulation (EU) 2016/1718 - especially PEMS2 as part of the type approval procedure
- German Batteriegesetz (BattG) (Batteries Act) - „Gesetz über das Inverkehrbringen, die Rücknahme und die umweltverträgliche Entsorgung von Batterien und Akkumulatoren“ (Act Concerning the Placing on the Market, Collection and Environmentally Compatible Waste Management of Batteries and Accumulators) (transposing Directive 2006/66/EC into German law)
- Regulation (EU) 1103/2010 establishing rules as regards capacity labelling of accumulators
- 31st Bundesimmissionsschutzverordnung (BImSchV) „Verordnung zur Begrenzung der Emissionen flüchtiger organischer Verbindungen bei der Verwendung organischer Lösemittel in bestimmten Anlagen“ (Federal Immission Control Ordinance on the limitation of emissions of volatile organic compounds due to the use of organic solvents in certain installations.

## **2 Scope**

These Basic Criteria apply to motor buses for passenger transportation of vehicle category M3 under German Road Traffic Licensing Regulations (StVZO).

The Blue Angel Environmental Label can be awarded regardless of the energy carrier (fuel or electricity) and the propulsion system used (electric drive, hybrid drive or internal combustion engine). Electric vehicles using fuel cells for energy supply shall be excluded for the time being and may be added to the Scope at a later date.<sup>1</sup>

The buses may be used in urban, interurban or long-distance transportation.

## **3 Requirements**

The Blue Angel Environmental Label on page 1 may be used for the labelling of buses under paragraph 2 provided that they meet the following requirements:

### **3.1 Noise Emissions**

Measurements of noise of vehicles in motion shall be made in accordance with the type test methods for determining the sound level of motor vehicles as in force at the time of vehicle type approval.

The maximum A-weighted sound pressure level of the noise of vehicles in motion must not exceed the test values listed in table 1:

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<sup>1</sup> See the explanation above in "Background"

Rated Engine Power	Sound Level of Moving Vehicle from January 1, 2018	Sound Level of Moving Vehicle from January 1, 2020
< 150kW	75dB(A)	73dB(A)
> 150kW	77dB(A)	76dB(A)
> 250kW	79dB(A)	77dB(A)

Table 1: Noise limits for vehicles in motion, Source: UBA

As a rule, individual applications must be submitted for each bus. In the case of three or more buses of identical construction it shall also be possible to file an application for a bus type.

### **Compliance Verification**

*The test result of the sound level of individual vehicles pursuant to para. 3.1 shall be verified by submitting a copy of the registration certificate - Part I of the vehicle (field U.3) in Annex 2. In the case of type tests the relevant type test documents shall be presented.*

### **3.2 Pollutant Emissions**

Vehicles that exclusively or supplementally use internal combustion engine systems must meet the EURO VI air pollutant emission limits specified in Regulation (EU) 582/2011 b) including amendment by Commission Regulation (EU) 2016/1718 (refers only to the PEMS<sup>2</sup> part of the type approval for measuring the real emissions).

This requirement can be dropped if the vehicle has a purely electric drive system and does not use any fuels.

### **Compliance Verification**

*The applicant shall declare compliance with the requirements under para. 3.2 in Annex 1 and submit in Annex 3 a type test report prepared by a testing laboratory authorized for the measurement under Directive 715/2007 by the German Kraftfahrt-Bundesamt (KBA) (Federal Motor Transport Authority).*

### **3.3 Batteries and Accumulators**

The requirements set out in paragraphs 3.3.1, 3.3.2 and 3.3.3 shall exclusively apply to the traction accumulator (industrial battery) whereas the requirements in paras. 3.3.4, 3.3.5 and 3.3.6 shall apply to all batteries of a vehicle. Compliance with the requirements can be verified by the manufacturer of the accumulators and batteries used and is to be presented by the applicant (vehicle manufacturer).

#### **3.3.1 Accumulator Capacity Measurement (Rated Capacity)**

The accumulator's capacity shall be determined in accordance with standard DIN EN 62660-1 (Secondary lithium-ion cells for the propulsion of electric road vehicles - Part 1: Performance testing), as amended, or DIN EN 61982 (Secondary batteries (except lithium) for the propulsion of electric road vehicles), as amended.

If tested under DIN EN 62660-1 the Li-Ion traction accumulator shall, first of all, be discharged at a given constant current and a room temperature of 25 °C to the respective cut-off voltage and then be charged in compliance with the manufacturer's charging method.

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<sup>2</sup> portable emission measurement system

Subsequently, the accumulator shall be stabilised and discharged in accordance with the specifications (discharge current depending on the type of vehicle). The discharge time shall be measured until the specified cut-off voltage is reached. Afterwards, the capacity (expressed in Ah) shall be calculated to three significant figures (see DIN EN 62660-1, para. 7.2).

### **Compliance Verification**

*The applicant shall declare compliance with the requirements for accumulator capacity measurement in Annex 1 and submit in Annex 4 a test report documenting that the capacity has been determined in accordance with the specifications. The test report must be prepared by a testing laboratory that meets the general requirements for competence of testing and calibration laboratories set out in 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 SMT (Supervised Manufacturer's Testing) laboratory.*

### **3.3.2 Accumulator Life / Warranty**

The applicant undertakes to offer a minimum five-year warranty on the life of the accumulator, or a 200 000 kilometer mileage warranty or an 8000 operating hour warranty when used as intended, whichever comes first. The remaining capacity of the secondary battery shall, in the above-mentioned scenarios, be at least 70 percent of the rated capacity. The product documents shall provide all relevant details of these warranties.

### **Compliance Verification**

*The applicant shall declare compliance with the requirements in Annex 1 and present the relevant product documents in Annex 5.*

### **3.3.3 Safety check /Protection against Accumulator Overcharging and Deep Discharging**

The safety of the lithium-ion cells for the propulsion of electric road vehicles shall be verified by compliance with the tests according to DIN EN/IEC 62660-3, Chapter 6. The test includes, amongst other things, the operating behaviour of the accumulator regarding overcharging and deep discharging.

### **Compliance Verification**

*The applicant shall declare compliance with the requirements in Annex 1 and present a corresponding test protocol in Annex 6. The testing laboratory must be accredited 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 SMT (Supervised Manufacturer's Testing) laboratory.*

### **3.3.4 Fulfilment of the Take-Back and Reporting Obligation according to the German Batteriegesez (BattG)**

The applicant shall verify the battery manufacturer's fulfilment of the take-back and reporting obligations according to Sections 4 and 5 of the German Batteries Act (BattG) (deposit of the manufacturer's specifications, above all those concerning the organization of the waste battery take-back, in the Batteries Act register of the German Environment Agency (UBA)).



### **Compliance Verification**

The applicant shall declare compliance with the requirements in Annex 1 and present the relevant documents („Herstelleranzeige.pdf“ of the UBA) (Manufacturer's notification). Explanation: Following the successful deposit of the manufacturer's specifications with the BattG-Melderegister (Batteries Act register) of the German Environment Agency each battery manufacturer will receive a pdf document containing the stored data for confirmation.

#### **3.3.5 Replacement**

It must be possible for specialised companies or the final user to replace the built-in accumulators/batteries or cells without the risk of damage.

Compatible replacement accumulators/batteries or cells shall be available for reorder for at least 10 years from the time that production ceases.

### **Compliance Verification**

The applicant shall declare compliance with the requirements in Annex 1 and present the relevant pages of the of the product documentation in Annex 5.

#### **3.3.6 Heavy Metal Limits**

Batteries (appliance, vehicle and industrial batteries) with a mercury content exceeding 0.0005 percent by weight shall be legally prohibited under the German Batteries Act. In addition, there is a ban on cadmium in appliance batteries: The cadmium content of these batteries must not exceed 0.002 weight percent.

<b>Heavy Metal Limits</b>	<b>Industrial Battery</b> (traction battery)	<b>Vehicle Battery</b> (starter battery)	<b>Appliance Battery</b> (battery of the hand-held transmitter etc.)
Prohibited are: accumulators and batteries with a mercury (Hg) level exceeding 5 ppm	X	X	X
Prohibited are: accumulators and batteries with a cadmium (Cd) level exceeding 20 ppm			X

Table 2: Heavy Metal Limits for Accumulators and Batteries according to Section 3, German Batteries Act.

### **Compliance Verification**

The applicant shall declare compliance with the requirements for the vehicle's traction and/or starter battery in accordance with Annex 1. Appliance batteries shall be exempt from the verification requirement.

The applicant shall submit a test report (Annex 8) documenting that a minimum of four batteries or four cells\* (of the respective type) have been analysed and that all four meet the requirement. The metal contents shall be determined in accordance with the methods of the Bundesanstalt für Materialforschung und -prüfung (BAM) (Federal Institute for Materials Research and Testing), September 2013, presented in: „Überprüfung der Quecksilber-, Cadmium- und Blei-Gehalte in Batterien. Analyse von Proben handelsüblicher Batterien und in Geräten verkaufter Batterien. Erstellung eines Probenahmeplans, Probenbeschaffung und Analytik“ (Survey of mercury, cadmium and lead content of batteries – Analysis of samples of commercially available batteries and batteries sold in appliances. Preparation of a Sampling Plan, Purchase of Samples and Analysis) or in accordance with Battery Industry Standard Analytical Method - for the

*determination of Mercury, Cadmium and Lead in Alkaline Manganese Cells Using AAS, ICP-AES and "Cold Vapour" Publishers: The European Portable Battery Association (EPBA), the Battery Association of Japan (BAJ), the National Electrical Manufacturers Association (NEMA; USA), April 1998, or equivalent methods.*

*The test report must be prepared by a testing laboratory that meets the general requirements for competence of testing and calibration laboratories under DIN EN ISO/IEC 17025 or has been accredited for these measurements by an independent body as SMT (Supervised Manufacturer's Testing) laboratory. The testing laboratory shall declare compliance with the requirement.*

*\* If the test report exclusively covers an analysis of cells the applicant shall present IMDS data sheets (International Material Data System) to verify compliance with regard to the other battery components ( housings etc.).*

### **3.4 Air-Conditioning Systems**

Only natural, non-halogenated refrigerants may be used in environmentally friendly air-conditioning systems of passenger compartments of buses, regardless of the field of use (urban, interurban or long-distance transportation) and regardless of the propulsion concept (electric drive, hybrid drive or internal combustion engine).

#### **Compliance Verification**

The applicant shall declare compliance with the requirement and present in Annex 9 adequate technical documents to provide evidence of the refrigerant used for the air conditioning of the passenger compartment.

### **3.5 Paintwork and Coating**

Primer and paint coat of the buses must be made from coating materials that do not contain - apart from impurities - any varnish raw materials (fillers, pigments, drying agents) that contain lead, chromium VI and cadmium compounds.

Solvent emissions during coating must not exceed a total emission limit of 130 (g/m<sup>2</sup>)<sup>3</sup>.

#### **Compliance Verification**

*The applicant shall declare compliance with the requirement under 3.5.*

## **4 Applicants and Parties Involved**

Manufacturers or operators of buses 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.

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<sup>3</sup> The emission limits are based on the 31st Ordinance on the Implementation of the Federal Immission Control Act (31st BImSchV) (Ordinance on the limitation of emissions of volatile organic compounds due to the use of organic solvents in certain installations)

## **5 Use of the Environmental Label**

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

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

Contracts on the Use of the Environmental Label are concluded to fix the terms for the certification of products under Paragraph 2. Such contracts shall run until December 31, 2025. They shall be extended by periods of one year each, unless terminated in writing by March 31, 2025 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 Environmental Label 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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