

GUIDE

Guide  
on green public procurement

# Electric Bicycles

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**Guide**  
**on green public procurement**

# **Electric Bicycles**

**This guide is based on the June 2015 edition of the Blue Angel eco-label criteria for electric cycles (DE-UZ 197).**

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# 1. Introduction

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Electric bicycles are an important environmentally and socially sustainable alternative to cars for covering distances of up to around 20 kilometres. Compared to cars, electric bicycles are more economical and at the same time healthier and more eco-friendly, and are often quicker – and indisputably space-saving. Some 1.6 million electrically power assisted bicycles (pedelecs) and e-bikes are in operation on the streets of Germany today.<sup>1</sup> Although electric bicycles are less eco-friendly than conventional, non-motorized bicycles, their relatively minor negative impact on the environment is substantially offset when they are used as a means of transportation in lieu of cars.

Thanks to the availability of a host of products ranging from folding bikes to cargo bikes, electric bicycles are highly useful for commuting, as well as for use by municipal agencies. According to a representative survey by Forsa Gesellschaft für Sozialforschung und statistische Analysen mbH, around 23 per cent of the German workforce is open to the idea of sometimes commuting to work on a pedelec instead of by car. In addition, electrically power assisted cargo bikes open up new possibilities in the field of urban logistics. A study by the EU-funded Cyclelogistics project found that 51 per cent of all motorized transport in European cities could be shifted to cargo bikes – which are

often quicker, cheaper and more practical than cars for transporting loads weighing up to 250 kilos.<sup>2</sup>

However, while electric bicycles do have a positive impact on mobility patterns, their manufacture, use and end-of-life disposal also engender environmental pollution. This holds true in particular for electric bicycle rechargeable batteries, whose manufacture entails a considerable amount of energy and resource use – not to mention the current absence of a uniform standard for the quality of rechargeable batteries. At the same time, the lifetime and availability of replacement batteries is a crucial factor for the service lives of pedelecs. Furthermore, electric bicycles have often been criticized in the past due to their safety defects.

Electric bicycles that satisfy the criteria set forth in this guide exhibit the following environment attributes:

- ▶ Long battery life and availability of batteries
- ▶ Mechanical and electrical safety
- ▶ Durable, easy to repair and recyclable design

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1 See Umweltbundesamt, available from: <https://www.umweltbundesamt.de/themen/pedelecs-sind-umweltfreundliche-alternativen-im> (as per 28 March 2018)

2 See <https://nationaler-radverkehrsplan.de/de/aktuell/nachrichten/foerderung-von-pedelecs-und-lastenfahraedern> (as per 28 March 2018).

## 2. How to use this guide

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This guide contains key information and recommendations for contracting authorities concerning the incorporation of environmental considerations into tender and contractual documents. The tenderer questionnaire concerning green procurement of electric bicycles (annexed hereto and available as a Microsoft Word document from [www.beschaffung-info.de](http://www.beschaffung-info.de)) is intended for use as an annex to the specifications. To this end, in terms of the environmental requirements for the deliverables in question, you need only include the relevant reference in the specifications in order to meet the legal requirement that the deliverables be described clearly and completely. The tenderer questionnaire is also intended to serve as proof of compliance. The tender wording in this regard could go as follows:

*In order to be taken into consideration for the contract award decision in question, electric bicycles must meet the minimum criteria pursuant to the attached tenderer questionnaire on green public procurement of electric bicycles. By way of proof, you are to submit a completed questionnaire for each tendered product along with the mandated elements of proof. You may forego such proof if the product in question bears the Blue Angel DE-UZ 197 eco-label. Such proof can likewise be foregone if the product in question bears an equivalent eco-label that meets all minimum criteria listed in the tenderer questionnaire. The evaluation criteria referred to in the questionnaire will be applied to the tender evaluation process.*

## 3. Scope

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This guide applies to electric bicycles that are equipped with up to 0.25 kW auxiliary electric motors (see pedelecs 25, section 4) and that do not require motor vehicle registration according to the German Road Vehicle Registration Regulation (StVZO) (this includes single-track cargo bikes).

This guide does not apply to the following:

- ▶ Bicycles without power assistance
- ▶ Electric bicycles that require motor vehicle registration under German law (StVZO) such as pedelec 45 e-bikes (see section 4).

## 4. Definitions of terms

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- ▶ **Electric bicycle:** Umbrella term for bicycles that are equipped with electric auxiliary motors, including pedelecs 25, pedelecs 45 and e-bikes. Electric bicycles are defined in EN 15194 as electrically power assisted cycles (EPAC), i.e. as a cycle that is outfitted with pedals and an electric auxiliary motor and that can be operated with or without such motor.
- ▶ **Pedelec 25:** According to the scope defined in EN 15194, a pedelec 25 is an electrically power assisted cycle with a maximum continuous rated power of up to 0.25 kW, and whose output is incrementally reduced and ultimately shut down once the bike reaches a speed of 25 kilometres per hour – or earlier, if the cyclist activates pedalling mode. The fact that pedelecs 25 have the same legal status as regular bicycles means that users can carry the cycles on public transport.
- ▶ **Pedelec 45/S-Pedelec:** This type of pedelec falls into EU vehicle category L1e pursuant to Directive 2002/24/EC and is thus classified as a motor vehicle. Pedelecs 45/S are defined as two-wheel mopeds with a maximum design speed of 45 kilometres per hour and maximum continuous rated power of 4 kW, in the case of electric motors.
- ▶ **E-bike:** E-bikes require no pedalling and can instead be operated with the assistance of an electric drive using a rotary handle or control knob. Their motors support speeds of up to 20 kilometres per hour. In Germany, they are regarded as small mopeds requiring vehicle registration and are classified as light mopeds according to the German Light Moped Exemption Regulation.
- ▶ **Single-track electric cargo bike:** In accordance with DIN 79010-1:2014-11, this type of electric bike (a) is intended for use for the transport of goods and persons; and (b) has wheels that are arranged directly behind each other. Their maximum allowable total weight is 250 kilos. They are assisted by an electric motor with a maximum continuous rated power of 250 W, up to a speed of 25 kilometres per hour.
- ▶ **Rechargeable battery:** Lithium-ion-(rechargeable) batteries are normally used in electric bicycles.
- ▶ **Charging cycle:** A charging cycle is defined as the process of discharging the entirety of a battery's stored capacity, with subsequent complete charging of the battery. Thus an actual charging cycle can consist of multiple partial cycles.

# 5. Proof of compliance

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When tendering, contracting authorities have the option to state that tenderers can demonstrate compliance with the relevant performance requirements by submitting certificates from a conformity assessment body pursuant to Article 33 Procurement Regulation (VgV 2016) or via labels pursuant to Article 34 VgV and Article 24 UVgO 2017).

## 5.1 Proving compliance via certification from a conformity assessment body

Pursuant to Article 33 Procurement Regulation (VgV), compliance with technical requirements can be substantiated by a conformity assessment body such as TÜV, VDE, or a certified test lab, or by a certificate of compliance issued by such a body. In cases where a contracting authority stipulates that certification must be issued by a specific conformity assessment body, such authority must also recognize certificates of compliance issued by equivalent conformity assessment bodies (Article 33(1)(sentence 2)). Contracting authorities are also required to allow other forms of proof such as manufacturers' technical documentation pursuant to Article 34(2) Procurement Regulation (VgV) 2016. This presupposes the following:

- ▶ That the tenderer does not have access to the required certifications or to proof supplied by an equivalent body; or
- ▶ That the tenderer's inability to obtain proof from a conformity assessment body by the relevant bid submission

deadline was due to circumstances beyond the tenderer's control.

In both such scenarios, the burden of proof rests on the tenderer – which means that if he is unable to prove that the deliverables being offered do not meet the mandated technical requirements, the tenderer's bid will be excluded from the contract award procedure.

## 5.2 Proof via labels

Under the Procurement Regulation (VgV 2016), contracting authorities have the option to require compliance with the technical specifications of a specific label such as the Blue Angel eco-label (VgV 2016, UVgO 2017). In such cases, contracting authorities are also required to accept labels that mandate equivalent requirements for the deliverables in question (Article 34(4) VgV 2016, Article 24(4) UVgO 2017). This holds true in particular for labels from other EU member states. In cases where the deliverables in question do not need to meet the totality of the requirements mandated by a given label, then the contracting authority in question must specify which label requirements are to be met (Article 34 VgV 2016; Article 24(3) UVgO 2017).

In cases where a tenderer is unable to provide, by a reasonable deadline and for reasons beyond the tenderer's control, either the mandated label or an equivalent thereof, the contracting authority must accept other suitable forms of proof such as technical documentation or test reports from a recog-

nized body (Article 34(5) VgV 2016; Article 24(3) 5 UVgO 2017). In such cases it falls to the tenderer to prove that the alternative form of proof in question meets the requirements of the relevant label.

### 5.3 Recommended evidential requirements

Exclusive verification of compliance with the performance specifications by a label, such as the Blue Angel environmental label, can only be recommended if there is a sufficient number of products from different manufacturers that bear the label. Only then, a competition amongst the tenderers can be guaranteed.

Hence when it comes to electric bicycles, contracting authorities should

first check on the Blue Angel website ([www.blauer-engel.de](http://www.blauer-engel.de)) whether a sufficient number of products (e.g. four or more) bear the Blue Angel eco-label and are commercially available. If this proves not to be the case, then in addition to the Blue Angel eco-label or equivalent eco-labels, individual substantiations should be accepted as proof of compliance with the performance specifications. Such proof can take the form of, for example, certificates from conformity assessment bodies (e.g. test-lab test results) or manufacturers' technical documentation.

The tenderer questionnaire that is annexed to this guide takes all three of these substantiation options into account, i.e. Blue Angel eco-label, equivalent label, and individual substantiations.

## 6. Environmental requirements

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In the following, a distinction is made between environmental requirements for contractual deliverables in the form of minimum or evaluation criteria (see section 6.1) and environmental requirements pertaining to contract performance (see section 6.2).

### 6.1 Environmental requirements pertaining to contractual deliverables

#### 6.1.1 Rechargeable batteries

##### 6.1.1.1 Battery capacity

###### **Criterion: Minimum**

**Proof of compliance: Blue Angel eco-label for electric bicycles (DE-UZ 197), equivalent label, or test report**

Battery capacity must demonstrably amount to 100 per cent of the rated capacity indicated by the manufacturer. Such capacity is to be rated using the DIN EN 61960 test procedure.<sup>3</sup>

Battery capacity (Ah) and energy content (Wh) are to be indicated.

#### 6.1.1.2 Labelling the capacity of rechargeable batteries

**Criterion: Minimum**

**Proof of compliance: Blue Angel eco-label for electric bicycles (DE-UZ 197), equivalent label, or manufacturer's/tenderer's declaration**

The rated capacity in ampere hours (Ah) and energy content in watt hours (Wh) is to be clearly, legibly and permanently labelled on the rechargeable battery.

#### 6.1.1.3 Low level of self-discharge (charge retention)

**Criterion: Minimum**

**Proof of compliance: Blue Angel eco-label for electric bicycles (DE-UZ 197), equivalent label, or test report**

Rechargeable batteries may have a self discharge rate of up to 20 per cent and are to exhibit residual capacity of at least 80 per cent of rated capacity after 800 conditioning

cycles. Such capacity is to be rated using the DIN EN 61960 test procedure.<sup>4</sup>

Residual capacity after 800 conditioning cycles is to be indicated, in per cent.

**Note:** This requirement need not be met provided that the tenderer meets the *extended-warranty requirements* set forth in section 6.1.1.4.

#### 6.1.1.4 Extended warranty cover

**Criterion: Minimum**

**Proof of compliance: Blue Angel eco-label for electric bicycles (DE-UZ 197), equivalent label, or manufacturer's/tenderer's declaration**

Here, the tenderer grants an extended battery warranty cover for a period of 48 months as from the purchase date, subject to proper use of the battery. After this 48 month period or 500 charging cycles, the battery's residual capacity must be 60 per cent of rated capacity.

Residual capacity after 48 months or 500 charging cycles is to be indicated, in per cent.

**Note:** This requirement need not be met provided that the tenderer meets the *low-level self-discharge requirements (charge retention)* set forth in section 6.1.1.3.

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- 3 Battery capacity is to be measured in accordance with Article 7.3.1 (Discharge performance at 20 °C (rated capacity)) of the current version of DIN EN 61960, following the first charging and discharging cycle. The test is to be conducted on three rechargeable batteries, and can be repeated up to four times for each battery. At least one of the four measurements for each battery must be fully consistent with the rated capacity indicated by the manufacturer.
  - 4 Self-discharge is to be measured in accordance with the test conditions set forth in the current version of Article 7.3 DIN EN 61960. All three batteries must meet the requirements of the test procedure described therein. The residual capacity measured during the final charging cycle of the test is to equate to 80 percent of rated capacity.

### 6.1.1.5 Heavy-metal content

#### Criterion: Minimum

**Proof of compliance: Blue Angel eco-label for electric bicycles (DE-UZ 197), equivalent label, or test report**

The heavy-metal content of rechargeable batteries is not to exceed the limits set forth in the table below (Table 1).<sup>5</sup>

Table 1:

#### Limits for heavy-metal concentrations in rechargeable batteries

Type of metal	Concentration
Mercury	0.1 PPM or less
Cadmium	1.0 PPM or less
Lead	5 PPM or less
Arsenic	10 PPM or less

## 6.1.2 Safety requirements

### 6.1.2.1 General safety requirements

#### Criterion: Minimum

**Proof of compliance: Blue Angel eco-label for electric bicycles (DE-UZ 197), equivalent label, or test report**

Rechargeable batteries and battery cells must comply with all applicable verification requirements in accordance with the latest

version of DIN EN 62133 or alternatively with the requirements by the draft standard CEN PrEN 50604-1 developed by the Technical Committee (CLC/TC 21x), and with the attendant DIN EN 50604-1 standard.

### 6.1.2.2 Mechanical safety

#### Criterion: Minimum

**Proof of compliance: Blue Angel eco-label for electric bicycles (DE-UZ 197), equivalent label, or test report**

The mechanical robustness and functions of electric bicycles are to meet the requirements of the draft European standard for pedelecs (25 PrEN 15194, 2015 version) and the resulting DIN EN 15194.

Electric bicycles that are also cargo bikes are subject to the following requirements:

- ▶ Dynamic test of the complete electric bicycle on a roller drum test rig, with at least the permissible total weight and the pedal drive.
- ▶ The electric bicycle must have a parking brake if the permissible total weight exceeds 250 kilograms
- ▶ The following must be tested on the roller drum test rig:
  - a) Seatpost: maximum 75 kilograms
  - b) Handlebars: 2 x 10 kilograms

5 Heavy-metal concentrations are to be determined in accordance with the methods set forth 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 (Bundesanstalt für Materialforschung und -prüfung (BAM), November 2011), available from: <https://www.umweltbundesamt.de/publikationen/ueberpruefung-quecksilber-cadmium-blei-gehalte-in> (as per 27 March 2018); or Battery Industry Standard Analytical Method for the determination of Mercury, Cadmium and Lead in Alkaline Manganese Cells Using AAS, ICP-AES and “Cold Vapour” (The European Portable Battery Association (EPBA), the Battery Association of Japan (BAJ), the National Electrical Manufacturers Association (NEMA; USA), April 1998); available from: <https://www.epbaeurope.net/wp-content/uploads/2016/09/standard-analytical-method-april-1998.pdf> (as per 27 March 2018), or via equivalent methods.

- c) Pedals: 2 x 20 kilograms
- d) Cargo area: (permissible overall weight) – (a + b + c)

### 6.1.2.3 Electrical safety

#### Criterion: Minimum

#### Proof of compliance: Blue Angel eco-label for electric bicycles (DE-UZ 197), equivalent label, or test report

In terms of its electrical safety (including its battery and charging device), the electric bicycle must meet the requirements of the draft European standard for pedelecs (25 PrEN 15194:2015) and the attendant DIN EN 15194 standard.

The following requirements must also be met:

- ▶ Additional testing of electrical safety in accordance with DIN EN 60335-1 (where applicable), based on the assumption that the bicycle's battery need not be monitored while it is being charged.
- ▶ Additional testing of any external or integrated charger in accordance with DIN EN 60335-2-29.

### 6.1.3 Charging electronics

#### 6.1.3.1 No-load power consumption

#### Criterion: Minimum

#### Proof of compliance: Blue Angel eco-label for electric bicycles (DE-UZ 197), equivalent label, or test report

No-load<sup>6</sup> charger power consumption is to meet the following requirements:

- ▶ Charging device without a status indicator:  $\leq 1$  watt
- ▶ Charging device with a status indicator:  $\leq 2$  watts

The charger's power consumption (watts/Wh) is to be indicated.

#### 6.1.3.2 Protection against over- and deep discharging of rechargeable batteries

#### Criterion: Minimum

#### Proof of compliance: Blue Angel eco-label for electric bicycles (DE-UZ 197), equivalent label, or test report

The chargers or the charging electronics integrated into electric bicycles are to protect the rechargeable battery against over- and deep discharge.

Testing in this regard is to be performed, in accordance with DIN EN 60335-2-29, using the charger in conjunction with the rechargeable battery.

#### 6.1.3.3 Charging status indicator

#### Criterion: Minimum

#### Proof of compliance: Blue Angel eco-label for electric bicycles (DE-UZ 197), equivalent label, manufacturer's declaration, tenderer's declaration, or product documentation

<sup>6</sup> Regulation (EC) No 278/2009 ([http://www.sinpro.com/file/Technical\\_Knowledge/278-2009%20external%20power%20supply.pdf](http://www.sinpro.com/file/Technical_Knowledge/278-2009%20external%20power%20supply.pdf); as per 27 March 2018), defines no load as a state in which the input interface of an external power supply is plugged into an electrical outlet, whereas the output interface is not connected to a primary consumer.

While a battery is charging, a status indicator is to show the battery's charging status. The user must be able to readily see such status on the charger or rechargeable battery.

### 6.1.4 Durability

#### 6.1.4.1 Rechargeable-battery replacement

**Criterion: Minimum**

**Proof of compliance: Blue Angel eco-label for electric bicycles (DE-UZ 197), equivalent label, or manufacturer's/tenderer's declaration**

Rechargeable batteries must be removable using standard tools.

#### 6.1.4.2 Replacement batteries

**Criterion: Minimum**

**Proof of compliance: Blue Angel eco-label for electric bicycles (DE-UZ 197), equivalent label, or manufacturer's/tenderer's declaration**

Replacement batteries must be available for at least five years after production ceases.

#### 6.1.4.3 Electrical drive system (motor, electronics)

**Criterion: Minimum**

**Proof of compliance: Blue Angel eco-label for electric bicycles (DE-UZ 197), equivalent label, or manufacturer's/tenderer's declaration**

The components of electrical drive systems must be available for at least five years after production ceases.

### 6.1.4.4 Repairability

**Criterion: Minimum**

**Proof of compliance: Blue Angel eco-label for electric bicycles (DE-UZ 197), equivalent label, or manufacturer's/tenderer's declaration**

The tenderer must ensure that the spare parts necessary to repair the bicycle will be available for at least five years after production ceases.

“Spare parts” means parts that typically fail in connection with usual product use. Parts whose lifetime exceeds that of the product itself do not qualify as spare parts.

Spare parts also include compatible parts that display at least the same product characteristics and thus the same or a greater range of functions relative to the original parts.

#### 6.1.4.5 Design for recycling

**Criterion: Evaluation**

**Proof of compliance: Blue Angel eco-label for electric bicycles (DE-UZ 197), equivalent label, or manufacturer's/tenderer's declaration**

All assemblies containing electronic components (e.g. batteries, battery cells, battery holders containing charging electronics, displays, lights and motors) are to be designed and built in such a way that they can be removed as a single unit, in just a few manual steps.

### 6.1.5 Material properties; substance related requirements

#### Criterion: Minimum

**Proof of compliance: Blue Angel eco-label for electric bicycles (DE-UZ 197), equivalent label, manufacturer's declaration, or test report**

#### *Polycyclic aromatic hydrocarbons (PAHs)*

The following limits are not to be exceeded for handlebars, gear levers, and saddles:<sup>7</sup>

- ▶ 0.5 mg/kg benz(a)pyrene
- ▶ 10 mg/kg total 18 PAH (EPA)10

#### *Phthalates*

Handlebars, gear levers and saddles are to be free of phthalates that are on the REACH<sup>8</sup> candidate list.

#### *Dimethyl fumarate (DMF)*

In cases where leather is used in handlebar grips or saddles, it must be demonstrated that dimethyl fumarate content does not exceed 0.1 mg/kg.

#### *Chromium VI*

In cases where leather is used in handlebar grips or saddles, it must be demonstrated that chromium VI content does not exceed 0.2 mg/kg.

## 6.2 Contractual environmental requirements

The conditions referred to below should be incorporated into tender documents as contractual conditions.<sup>9</sup>

The tenderer's offer is to state that the tenderer will meet the following requirements in performing the contract.

### 6.2.1 Minimum warranty

The tenderer is to grant a battery warranty for the battery for a period of 24 months as from the purchase date, subject to its proper use. After this 24 month period or 500 charging cycles, the battery's residual capacity must be 70 per cent of its rated capacity.

### 6.2.2 Ensuring take-back waste batteries

The tenderer is to take back waste batteries, pursuant to Articles 4 and 5 German Battery Act (BattG).<sup>10</sup>

7 Pursuant to AfPS GS 2014:01 PAK and the findings of the United States Environmental Protection Agency (EPA) (as per the list in CEC document 04-11), the sum total of the 18 PAHs (extended substance list issued by the AtAV (predecessor committee of the AfPS) only take into account those PAH components whose concentration exceeds 0.2 mg/kg.

8 See <https://echa.europa.eu/de/candidate-list-table> (as per 27 March 2018).

9 "Contracting authorities shall furthermore be entitled to promulgate contract performance terms and conditions that are specific to a given contract/order, provided that such terms and conditions are related to the contractual deliverables (pursuant to Article 127(3)), and result from the relevant tender or contract award documentation. Specifically, such conditions can relate to the following: innovation; environmental, social and/or employment policy considerations; or the protection of confidential information."

10 See the German law entitled *Gesetz über das Inverkehrbringen, die Rücknahme und die umweltverträgliche Entsorgung von Batterien und Akkumulatoren (BattG)*

### 6.2.3 Consumer information

The documentation supplied with electric bicycles must contain (a) descriptive technical information; and (b) environmentally-relevant user information.

Such information must be provided as printed documentation, with the electric bicycle. Such documentation is to contain the following essential user information:

1. Advisories concerning the proper use of the battery so as to maximize battery life and battery capacity:
  - ▶ Batteries are to be charged under adequate conditions, including the following: in a dry place; at an optimal temperature; partial charging (which extends battery life); using the charger that is provided with the bicycle.
  - ▶ Batteries are to be stored under adequate conditions, i.e. in a dry place and at an optimal temperature; the optimal charging status for storage is also to be indicated.
  - ▶ Optimal operating temperature, which means the following: operation at high ambient temperatures should be avoided; capacity loss owing to low temperatures should be avoided during the winter; bicycles should be parked in the shade whenever possible.
2. Information on the disposal of waste batteries:
  - ▶ Safety instructions for minimizing risks such as short circuits (apply masking tape or the like to battery terminals during storage and disposal, e.g. risk of fire or explosion)
  - ▶ Information concerning battery capacity (in Ah) and energy content (in watt hours), as well as a guaranteed number of charging cycles.
  - ▶ Never put waste batteries in the household trash
  - ▶ Return such batteries to the retailer or to a recycling centre
3. Information on proper upkeep practices such as not cleaning electric bicycles with high-pressure cleaners
4. The weight of each electric bicycle is to be indicated (in kilograms), as is the permissible total weight of the bicycle.

## 7. Tender evaluation

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Tender evaluations may take into account criteria justified by the subject of the contract, such as environmental characteristics and life cycle costs.<sup>11</sup>

When it comes to electric bicycles, it is recommended to use the requirements set forth in section 6.1.4.5 (Design for recycling) of this guide as evaluation criteria, via a point system or the like.

For procurement of energy related products, energy consumption should be adequately taken into account as a procurement criterion.<sup>12</sup> This can be done by factoring in life cycle costs<sup>13</sup> or by evaluating actual power consumption data. Given the fact that there are as yet no standardized testing methods or test data for drive system motor efficiency, this factor cannot be taken into account for tender evaluation.

In cases where life cycle costs are taken into account for electric bicycles, apart from the purchase price it is important that energy costs during the bike's lifetime and the cost of replacement batteries also be taken into account. In such cases, it is recommended to define a specific usage pattern in the tender documents such as 50 full battery charges per year, and to use this figure as a basis for requesting information concerning power consumption and the extent to which batteries need to be replaced.

Life cycle costs can be calculated using one of the calculation tools that is available here:

<http://www.umweltbundesamt.de/berechnung-lebenszykluskosten-0>

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11 See Article 127 German Act on Unfair Competition (GWB 2016) in conjunction with Article 58(2) VgV 2016; Article 43(3) 2 UVgO 2017).

12 See Article 67 Procurement Regulation (VgV 2016).

13 For a practical guide to life cycle costing and a list of suitable life cycle costing tools, see the series of *training documents* titled *Umweltfreundliche Beschaffung* and therein Schulungsskript 5 - Einführung in die Berechnung von Lebenszykluskosten und deren Nutzung im Beschaffungsprozess.

## Annex: Tenderer questionnaire concerning green public procurement of Electric Bicycles

### General information

Product name	
Manufacturer	
Tenderer	
Tenderer's address	

### Information on verification

<b>Does the product have a Blue Angel eco-label?</b>	
<p>The product in question is certified by the June 2015 edition of the Blue Angel eco-label for electric bicycles (DE-UZ 197). Hence the minimum and evaluation criteria set forth in the “Requirements” section below are met. The statistics provided in response to the request for them in sections 1.1., 1.3., 1.4., and 3.1 are truthful and accurate. The required proof (see the “Requirements” column) is being submitted with this offer, for purposes of confirmation.</p> <p>Label use contract no.: ___</p>	<input type="checkbox"/> Yes
<b>Does the product have an equivalent label?</b>	
<p>The product in question bears an equivalent label, which is hereby submitted with this offer for the product in question as an alternative to the Blue Angel eco-label.</p> <p>Label name and label use contract no.:</p> <p>The statistics requested in the table in the “Requirements” section below (items 1.1., 1.3., 1.4., and 3.1) are truthful and accurate. In the table contained in the “Requirements” section below, the tenderer furthermore states, by checking the boxes in the right-hand column of the table, that the label being submitted meets the requirements entailed by the minimum criteria set forth in this document – and that therefore such label is equivalent to the Blue Angel eco-label.</p> <p>Insofar as the evaluation criterion set forth in section 4.5 is met, separate proof thereof is to be submitted (in the “Comments” column), in the event such criterion is not a constituent of the equivalent label.</p>	<input type="checkbox"/> Yes

**Does the product not have an equivalent label?**

The product in question is certified neither by the June 2015 edition of the Blue Angel eco-label for electric bicycles (DE-UZ 197) nor by an equivalent label.

In the “Requirements” section of the table below, check the box in the right-hand column of the table to confirm that the product meets the following minimum criteria and, if applicable, the attendant evaluation criteria. The required proof (see the “Comments” column) is being submitted with this offer, for purposes of confirmation.

Moreover, the statistics requested in the table in the “Requirements” section below (items 1.1., 1.3., 1.4., and 3.1) are truthful and accurate. The required proof (see the “Requirements” column) is being submitted with this offer, for purposes of confirmation.

Yes

## Requirements

No.	Criterion	Comments	Criterion met, proof of compliance submitted <sup>14</sup> (to be completed by the tenderer)
1	<b>Rechargeable battery</b>		
1.1	<p><b>Battery capacity</b></p> <p>Battery capacity must demonstrably amount to 100 per cent of the rated capacity indicated by the manufacturer. Such capacity must be rated using the DIN EN 61960 test procedure.<sup>15</sup> The battery capacity is to be indicated, and amounts to: Battery capacity = ____ ampere hours (Ah) The battery's energy content is to be indicated, and amounts to: Energy content = ____ watts (Wh)</p>	<p><b>Minimum criterion</b> <b>Proof of compliance: test report</b></p>	<p><input type="checkbox"/></p>
1.2	<p><b>Battery capacity labelling</b></p> <p>The capacity in ampere hours (Ah) and energy content in watt hours (Wh) are to be clearly, legibly and permanently labelled on all batteries.</p>	<p><b>Minimum criterion</b> <b>Proof of compliance: Tenderer/ manufacturer declaration</b></p>	<p><input type="checkbox"/></p>

<sup>14</sup> Proof must be submitted in the form of the questionnaires in the documents listed under “Comments.”

<sup>15</sup> Battery capacity must be measured in accordance with the current version of Article 7.3.1 (Discharge performance at 20 °C (rated capacity)) of the current version of DIN EN 61960, following the first charging and discharging cycle. The test must be conducted on three batteries, and can be repeated up to four times for each battery. At least one of the four measurements for each battery must be fully consistent with the rated capacity indicated by the manufacturer.

No.	Criterion	Comments	Criterion met, proof of compliance submitted <sup>14</sup> (to be completed by the tenderer)
1.3	<p>Low level of self-discharge (charge retention)</p> <p>Batteries may have a self discharge rate of up to 20 per cent and are to exhibit residual capacity of at least 80 per cent of rated capacity after 800 conditioning cycles. Such capacity is to be rated using the DIN EN 61960 test procedure.<sup>16</sup> Residual capacity after 800 conditioning cycles is to be indicated, in per cent. Residual capacity = ____ per cent</p> <p>This requirement need not be met provided that the tenderer meets the extended-warranty requirements set forth in section 1.4.</p>	<p>Minimum criterion Proof of compliance: test report</p>	<input type="checkbox"/>
1.4	<p>Extended warranty cover</p> <p>Here, the tenderer grants an extended battery warranty cover for the battery for a period of 48 months as from the purchase date, subject to proper use of the battery. After this 48 month period or 500 charging cycles, the battery's residual capacity must be 60 per cent of rated capacity. Residual capacity after 48 months or 500 charging cycles is to be indicated, in per cent. It amounts to the following: Residual capacity = ____ per cent</p> <p>This requirement need not be met provided that the tenderer meets the low level of self-discharge (charge retention) requirements set forth in section 1.3.</p>	<p>Minimum criterion Proof of compliance: Tenderer/ manufacturer declaration</p>	<input type="checkbox"/>

<sup>16</sup> Self-discharge is to be measured in accordance with the test conditions set forth in the latest version of Article 7.3 DIN EN 61960. All three batteries must meet the requirements of the test procedure described therein. The residual capacity measured during the final charging cycle of the test must equate to 80 percent of rated capacity.

No.	Criterion	Comments	Criterion met, proof of compliance submitted <sup>14</sup> (to be completed by the tenderer)
1.5	Heavy-metal content		
	<p>The heavy-metal concentrations of batteries are not to exceed the following limits:</p> <p>Mercury ≤ 0.1 PPM  Cadmium ≤ 1.0 PPM  Lead ≤ 5 PPM  Arsenic ≤ 10 PPM</p>	<p><b>Minimum criterion</b>  <b>Proof of compliance:</b> test report</p>	<input type="checkbox"/>
2	<b>Safety requirements</b>		
2.1	General safety requirements		
	<p>Batteries and battery cells must comply with all applicable requirements in accordance with the latest version of DIN EN 62133, or alternatively with the requirements of the draft standard CEN PrEN 50604-1 issued by the technical committee (CLC/TC 21x), as well as with the resulting DIN EN 50604-1 standard.</p>	<p><b>Minimum criterion</b>  <b>Proof of compliance:</b> test report</p>	<input type="checkbox"/>
2.2	Mechanical safety		
	<p>The mechanical robustness and functions of electric bicycles must meet the requirements of the draft European standard for pedelecs (25 PrEN 15194, 2015 version) and the resulting DIN EN 15194 standard.</p> <p>Electrical bicycles that are also cargo bikes are subject to the following requirements:  Dynamic test of the complete electric bicycle on a roller drum test rig, with at least the permissible total weight and the pedal drive.</p>	<p><b>Minimum criterion</b>  <b>Proof of compliance:</b> test report</p>	<input type="checkbox"/>

No.	Criterion	Comments	Criterion met, proof of compliance submitted <sup>14</sup> (to be completed by the tenderer)
	<p>Electric cargo bikes whose permissible total weight exceeds 250 kilograms must be equipped with parking brakes.</p> <p>The following elements are to be tested on the roller drum test rig:</p> <ul style="list-style-type: none"> <li>a) Seatpost: maximum 75 kilograms</li> <li>b) Handlebar: 2 x 10 kilograms</li> <li>c) Pedal: 2 x 20 kilograms</li> <li>d) Cargo area: (permissible total weight) – (a + b + c)</li> </ul>		
2.3	Electrical safety		
	<p>In terms of electrical safety (including its battery and charging device), electric bicycles must meet the requirements of the draft European standard for pedelecs (25 PrEN 15194:2015) and the resulting DIN EN 15194 standard.</p> <p>Such bicycles are subject to the following additional requirements:</p> <ul style="list-style-type: none"> <li>▶ Additional testing of electrical safety in accordance with DIN EN 60335-1 (where applicable), assuming that the charging process is carried out unattended.</li> <li>▶ Additional testing of any external or integrated charger in accordance with DIN EN 60335-2-29.</li> </ul>	<p><b>Minimum criterion</b>  <b>Proof of compliance:</b> test report</p>	<input type="checkbox"/>

No.	Criterion	Comments	Criterion met, proof of compliance submitted <sup>14</sup> (to be completed by the tenderer)
<b>3</b>	<b>Charging electronics</b>		
3.1	No-load power consumption		
	<p>No-load<sup>17</sup> charger power consumption must meet the following requirements:</p> <ul style="list-style-type: none"> <li>▶ For chargers without a status indicator: ≤ 1 watt</li> <li>▶ For chargers with a status indicator: ≤ 2 watts</li> </ul> <p>Power consumption is to be indicated, and amounts to: Power consumption = _____ watts (Wh)</p>	<p><b>Minimum criterion</b> <b>Proof of compliance: test report</b></p>	<input type="checkbox"/>
3.2	Protection against over-charging and deep discharging of the rechargeable battery		
	<p>The chargers or the charging electronics integrated into electric bicycles must protect the battery against over-charging and deep discharge.</p> <p>Testing in this regard is to be effected, in accordance with DIN EN 60335-2-29, using the charger in conjunction with the rechargeable battery.</p>	<p><b>Minimum criterion</b> <b>Proof of compliance: test report</b></p>	<input type="checkbox"/>

<sup>17</sup> Regulation (EU) No 278/2009 defines no load as a state in which the input interface of an external power supply is plugged into an electrical outlet, whereas the output interface is not connected to a primary consumer.

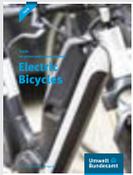
No.	Criterion	Comments	Criterion met, proof of compliance submitted <sup>14</sup> (to be completed by the tenderer)
3.3	Charging status indicator		
	While a battery is charging, a status indicator must show the battery's charging status. The user must be able to readily see such status on the charger or battery.	<b>Minimum criterion</b> <b>Proof of compliance:</b> Tenderer/ manufacturer declaration or product documentation	<input type="checkbox"/>
<b>4</b>	<b>Durability</b>		
4.1	Battery replacement		
	Batteries must be removable using standard tools.	<b>Minimum criterion</b> <b>Proof of compliance:</b> Tenderer/ manufacturer declaration	<input type="checkbox"/>
4.2	Replacement batteries		
	Replacement batteries must be available for at least five years after production ceases.	<b>Minimum criterion</b> <b>Proof of compliance:</b> Tenderer/ manufacturer declaration	<input type="checkbox"/>

No.	Criterion	Comments	Criterion met, proof of compliance submitted <sup>14</sup> (to be completed by the tenderer)
4.3	<p>Electrical drive systems (motor, electronics)</p> <p>The components of electrical drive systems must be available for at least five years after production ceases.</p>	<p><b>Minimum criterion</b>  <b>Proof of compliance:</b> Tenderer/manufacturer declaration</p>	<input type="checkbox"/>
4.4	<p>Repairability</p> <p>The tenderer must ensure that the spare parts necessary to repair the bicycle will be available for at least <u>five</u> years after production ceases.  “Spare parts” means parts that typically fail in connection with usual product use. Parts whose lifetime exceeds that of the product itself do not qualify as spare parts.  Spare parts also include compatible parts that display at least the same product characteristics and thus the same or greater range of functions relative to the original parts.</p>	<p><b>Minimum criterion</b>  <b>Proof of compliance:</b> Tenderer/manufacturer declaration</p>	<input type="checkbox"/>
4.5	<p>Design for recycling</p> <p>All assemblies containing electronic components (e.g. batteries, battery cells, battery holders containing charging electronics, displays, lights and motors) are to be designed and built in such a way that they can be removed as a single unit, in just a few manual steps.</p>	<p><b>Evaluation criterion</b>  <b>Proof of compliance:</b> Tenderer/manufacturer declaration</p>	<input type="checkbox"/>

No.	Criterion	Comments	Criterion met, proof of compliance submitted <sup>14</sup> (to be completed by the tenderer)
5	<p><b>Material properties; substance related requirements</b></p>		
	<p><b>Polycyclic aromatic hydrocarbons (PAHs)</b>  The following limits must not be exceeded for handlebars, gear levers, and saddles:<sup>18</sup>  0.5 mg/kg benz(a)pyrene  10 mg/kg total 18 PAH (EPA)<sup>10</sup></p> <p><b>Phthalates</b>  Handlebars, gear levers and saddles must be free of phthalates that are on the REACH<sup>19</sup> candidate list.</p> <p><b>Dimethyl fumarate (DMF)</b>  In cases where leather is used in handlebar grips or saddles, it must be demonstrated that dimethyl fumarate content does not exceed 0.1 mg/kg.</p> <p><b>Chromium VI</b>  In cases where leather is used in handlebar grips or saddles, it must be demonstrated that chromium VI content does not exceed 0.2 mg/kg.</p>	<p><b>Minimum criterion</b></p> <p><b>Proof of compliance:</b> Tenderer/ manufacturer declaration or test report</p>	<p><input type="checkbox"/></p>

18 Pursuant to AfPS GS 2014:01 PAK and the findings of the United States Environmental Protection Agency (EPA) (as per the list in CEC document 04-11), the sum total of the 18 PAHs (extended substance list issued by the AtAV (predecessor committee of the AfPS) only take into account those PAH components whose concentration exceeds 0.2 mg/kg.

19 See <https://echa.europa.eu/de/candidate-list-table> (as per 27 March 2018).



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