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**Size series and safety requirement of
battery box for electric bicycle**

电动自行车用电池盒尺寸系列及安全要求

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Size series and safety requirement of battery box for electric bicycle

1 Scope

This standard specifies the terms and definitions, size and structure, requirements, test methods and inspection rules of battery boxes for electric bicycles.

This standard applies to the size series and safety requirements of battery boxes for electric bicycles. Other types of battery boxes may refer to this standard.

2 Normative references

The following documents are essential for the application of this document. For dated references, only the dated version applies to this document. For undated references, the latest version (including all amendments) applies to this document.

GB/T 1633-2000 Plastics - Thermoplastic materials--Determination of Vicat softening temperature (VST)

GB/T 2828.1-2012 Sampling procedures for inspection by attributes - Part 1: Sampling schemes indexed by acceptance quality limit (AQL) for lot-by-lot inspection

GB/T 2829-2002 Sampling procedures and tables for periodic inspection by attributes (Apply to inspection of process stability)

GB/T 5169.11-2006 Fire hazard testing for electric and electronic products - Part 11: Glowing/hot-wire based test methods - Glow-wire flammability test method for end-products

GB/T 7141-2008 Plastics - Methods of heat aging

GB/T 14152-2001 Pipes - Determination of resistance to external blows - Round - The clock method

QB/T 4428 Specification and dimension of lithium-ion batteries for electric bicycle

- 3 - Charging base;
- 4 - Keyhole;
- 5 - Fuse;
- 6 - Hander;
- 7 - Wiring slot.

Figure 5 -- Basic structure of battery box

5 Requirements

5.1 General

The battery box for electric bicycles shall meet the relevant requirements for physical, mechanical, environmental, fire protection.

5.2 Size requirements

5.2.1 Sizes

The size series of lead-acid battery box shall comply with the provisions of 4.1; the size series of lithium ion battery box shall meet the requirements of QB/T 4428. If there are special requirements, it shall be agreed between the supplier and the purchaser.

5.2.2 Wall thickness

The wall thickness of the metal battery box shall be not less than 1.3 mm; the wall thickness of the non-metal battery box shall be not less than 2.5 mm.

5.3 Physical properties of non-metal battery box

5.3.1 Softening temperature

Determine the softening temperature according to the method specified in 6.3.1. The softening temperature of the thermoplastic battery box shall not be lower than 100 °C.

5.3.2 Size change rate

The size change rate of the thermoplastic battery box shall not be greater than $\pm 5\%$.

6.4 Compressive strength

Use a rigid cylindrical end face with a diameter of 30 mm to apply a force of 250 N to the weakest positions at the top, bottom, side of the battery box; maintain this force for 60 s. Check the surface change of the battery box.

6.5 Drop

Place the battery box (lowest point) at a height of 1000 mm from the ground. Drop it freely from the three directions of X, Y, Z to the concrete floor each time, to check the surface change of the battery box.

6.6 Freezing shock

The impact tester and impact hammer shall meet the requirements of GB/T 14152-2001. The weight of the hammer is 1 kg.

Put the battery box in a freezer which has a temperature of $-20\text{ }^{\circ}\text{C} \pm 2\text{ }^{\circ}\text{C}$ for 2 hours. Take it out and place it on an impact test bench. Let the weakest side of the battery box face up. At a vertical height of 700 mm from the impact point, drop the hammer freely, to check the change in the surface of the battery box.

The operation from removing the battery box from the freezer to the end of the impact test shall be completed within 1 min.

6.7 Tensile strength

6.7.1 Overview

There are two methods of tensile strength test: tensile force at room temperature and hot air aging tensile force. The test may be performed by either method.

When the test results are in dispute, the arbitration test is carried out using the tensile force at room temperature.

6.7.2 Tensile force at room temperature

Fix the battery box in a special clamp. At the position of 50 mm width at the middle of the hander, along the stressed direction of the hander, uniformly apply the tensile force F (as shown in Figure 7). For a battery box with a single hander, the tensile force F value is 3 times the gravity of the battery pack as allowed to be loaded in the battery box. For a battery box with double handers, the tensile force F value of each hander is 1.5 times the gravity of the battery pack as allowed to be loaded in the battery box. The duration of the tensile test is 10 min. Check the surface change of the battery box after the test.

Note: When calculated pull force F value as a decimal, optimize the F value upwards

Product inspection is divided into exit-factory inspection, periodic inspection, type inspection.

7.2 Exit-factory inspection

7.2.1 Inspection basis

Exit-factory inspection is based on GB/T 2828.1-2012. Take samples from the finished products of the exit-factory continuous series batches to carry out inspection batch by batch.

7.2.2 Unit products

Unit product in batch: set.

7.2.3 Lot quality

The quality level of the inspection lot as submitted is expressed as the percentage of nonconforming product.

7.2.4 Sampling plan

Use a one-time sampling plan. Normal inspection shall be used at the beginning of the inspection. The inspection items, inspection level (IL), non-conformity classification, acceptance quality limit (AQL) are as shown in Table 1.

Table 1 -- Inspection items, inspection level (IL), non-conformity classification, acceptance quality limit (AQL)

Inspection item	Requirements	Test methods	Inspection level	Non-conformity classification	AQL
Size	5.2.1	6.2.1	S-3	B	1.5
Wall thickness	5.2.2	6.2.2			

7.2.5 Others

When the inspection lot is used for the delivery and acceptance of both the supplier and the buyer, the requirements specified in 7.2 may be separately agreed in the contract.

7.3 Periodic inspection

7.3.1 Inspection basis

Periodic inspection is based on GB/T 2829-2002. Take samples from a certain batch or several batches which passed the batch-by-batch inspection to carry out inspection.

7.3.2 Inspection period

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