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**NATIONAL STANDARD OF THE
PEOPLE'S REPUBLIC OF CHINA**

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**Generic technical specification of solar photovoltaic (PV)
lighting device**

太阳能光伏照明装置总技术规范

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1 Scope

This document specifies the composition and classification, general requirements, and technical requirements of off-grid, independent solar photovoltaic (PV) lighting devices (hereinafter referred to as "devices"), and describes the corresponding test methods.

This document applies to the design and manufacture of solar photovoltaic (PV) lighting devices for various lighting applications.

2 Normative references

GB/T 2423.3

GB/T 2423.17

GB/T 2423.22

GB/T 4208

GB/T 6495.9

GB/T 7000.1-2023

GB 7000.203

GB/T 9468

GB/T 9535

GB/T 15144

GB/T 18595

GB/T 19064

GB/T 19638.1

GB/T 19639.1

GB/T 22473.1

GB/T 26849

GB/T 39394

GB 40165

GB 43472

GB 43473

3 Terms and definitions

The terms and definitions defined in GB/T 9468 and GB/T 39394, as well as the following terms and definitions, apply to this document.

3.1 Solar cell module

A minimal, indivisible solar cell assembly with encapsulation and internal connections, capable of individually providing DC power output.

3.2 Solar photovoltaic (PV) lighting device

A lighting device that combines solar cell modules, energy storage components, lighting components, control components, and structural components, using solar energy as its power source, and consists of one or more luminaires or modules.

3.3 Separated type solar photovoltaic (PV) lighting device

A photovoltaic lighting device that does not integrate solar cell modules, energy storage components, lighting components, control components, and structural components into a single unit.

3.4 Monolithic type solar photovoltaic (PV) lighting device

A photovoltaic lighting device that integrates all components, including solar cell modules, energy storage components, lighting components, control components, and structural components, into a single unit.

3.5 Inverter

A converter that converts direct current into single-phase alternating current with a sine wave or quasi-sine wave.

NOTE. This inverter converts direct current (DC) into single-phase alternating current (AC) with a sine or quasi-sine wave when the battery supplies power to the lighting device, typically 220 V, 50 Hz.

3.6 Semi- cut-off luminaire

For luminaires whose maximum luminous intensity direction forms an angle between 0° and 75° with the downward vertical axis of the luminaire, the maximum permissible luminous intensity values at 90° and 80° angles are 50 cd/1000 lm and 100 cd/1000 lm, respectively.

3.7 Charge and discharge controllers

A control device that enables solar cell modules to charge a storage battery and the storage battery to discharge to lighting components.

4.1 Device composition

The device consists of the following components.

- a) solar cell modules;
- b) energy storage components (batteries and other electrical energy storage devices);
- c) control components (charge and discharge controller, inverter, and other control elements);
- d) lighting components (electric light source, control device, luminaire, etc.);
- e) structural components (lamp poles, solar cell module mounting brackets, battery room, and controller room, etc.);
- f) Charging and discharging circuit.

4.2 Device classification

The devices can be classified into the following types.

- a) monolithic type solar photovoltaic (PV) lighting device;
- b) separated type solar photovoltaic (PV) lighting device.

5 General requirements

The device shall be able to operate normally within the ambient temperature range claimed by the manufacturer. If no claim is made, the device shall be able to operate normally within an ambient temperature range of -20 °C~50 °C.

The device shall be able to provide the claimed normal lighting for 2~n (not less than

2) consecutive cloudy, rainy, or snowy days (the manufacturer may adjust the upper limit n according to the conditions of the application area).

The device should not be installed in places where tall buildings or trees block the sunlight from reaching the solar cell modules.

The electric light source shall be turned on and off automatically based on the ground illumination value or at a set time (as provided by the manufacturer according to the needs of the application area).

The controller room and battery room should have good waterproofing and battery contamination prevention measures.

The components of the assembly must be disassembled and opened using special tools.

6.1 Marking

The following information shall be clearly and permanently marked on the device.

- nominal power of photovoltaic modules;
- rated power of lighting components;
- operating ambient temperature range, unless otherwise specified, is -20 °C~50 °C;
- source marking (which may take the form of a trademark, manufacturer's identification mark, or the name of the responsible distributor); -- product model number;
- luminous efficacy [in lumens per watt (lm/W)];
- IP numerical markings indicating degrees of protection against dust, solid foreign objects, and water (where applicable);
- rated capacity of the battery.

The following information shall be included in the label or product instruction manual.

- maximum installation height;
- rated voltage or rated current of lighting components; -- rated battery voltage;
- duration of no-light operation [in hours (h)], for example. 168 h.

6.2 Safety requirements

6.2.1 The device shall have sufficient strength, and its installation height of 2.5 m or above shall be able to withstand a wind load of 32.7 m/s at least (the manufacturer shall adjust the wind load rating according to the conditions of the application area);

The wind load requirements for road and street photovoltaic lighting devices are as follows.

- Height not exceeding 8 m. it shall be able to withstand a wind load of 45 m/s at least.