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

GB/T 45021.1-2024

**Photovoltaic (PV) module performance testing and energy
rating - Part 1: Irradiance and temperature performance
measurements and power rating
(English Translation)**

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Foreword

This document is in accordance with the provisions of GB/T 1.1-2020 "Guidelines for standardization work Part 1: Structure and drafting rules for standardization documents" Drafting is required.

This document is Part 1 of GB/T 45021 "Photovoltaic Module Performance Test and Energy Assessment". GB/T 45021 has been published in Lower part.

-- Part 1: Irradiance and temperature performance measurements and power evaluation.

This document is modified to adopt IEC 61853-1:2011 "Photovoltaic module performance testing and energy assessment Part 1: Irradiance and temperature Energy Measurement and Power Assessment.

A new chapter "Terms and Definitions" has been added to this document.

The technical differences between this document and IEC 61853-1:2011 and their reasons are as follows.

-- The scope (see Chapter 1) has been revised to better reflect the applicability of the standard;

--The sampling method has been changed. GB/T 2828 (all parts) has replaced IEC 60410 (see Chapter 4). IEC 60410 has been Repealed;

-- The normative reference IEC 60891:2021 replaces IEC 60891:2008 (see 9.1 and 10.1.5). IEC 60891 has been revised.

Order updated versions;

-- The normative reference IEC 60904-7:2019 replaces IEC 60904-7 (see 9.3.6 and 9.5.6). IEC 60904-7 has been revised.

Order updated versions;

-- Delete IEC 61215:2005 and IEC 61646:2008, and add reference to IEC 61215-2:2021 (see Chapter 6, 8.1 and 9.5.8), IEC 61215:2005 and IEC 61646:2008 have been revised and merged into the IEC 61215 series.

The following editorial changes were made to this document.

--Add the informative reference IEC 61853-3 in Chapter 1 to the references;

-- Add normative references to ISO/IEC 17025 in the text to Chapter 2.

Introduction

Photovoltaic (PV) modules are usually tested under standard test conditions (STC) with a cell temperature of 25 °C, an irradiance of 1 000 W/m² and a spectrum of AM1.5.

However, PV panels in the field operate in a range of temperatures, irradiances, and spectra. In order to accurately predict the performance of the panels under different conditions, to ensure the production capacity under certain conditions, it is necessary to evaluate the components under a wide range of temperatures, irradiances, incident angles and spectra.

GB/T 45021 "Photovoltaic module performance test and energy evaluation" is planned to consist of four parts.

--Part 1: Irradiance and temperature performance measurement and power level assessment. The purpose is to specify the performance of the requirements for evaluating the performance of PV modules are based on the rated power (W).

--Part 2: Measurement of spectral responsivity, incident angle and component operating temperature. The purpose is to establish the measurement of incident angle and spectral response.

The test procedure for evaluating the effect of irradiance, ambient temperature and wind speed on the module is described in detail.

--Part 3: Rated Energy of Photovoltaic Modules. The purpose is to describe the calculation method of the rated energy (watt-hour) of photovoltaic modules.

--Part 4: Standard reference climate document. The purpose is to give standard time periods and weather conditions that can be used for energy rating calculations.

condition.

Photovoltaic module performance testing and energy assessment Part 1: Irradiance and temperature performance measurements and Power rating

1 Scope

This document establishes a test and rating system for photovoltaic modules to ensure that the power of photovoltaic modules [in watts] under a series of specific conditions (W)] to operate at maximum power; and a full set of characteristic parameters of photovoltaic modules at different irradiances and temperatures are given to facilitate the photovoltaic module Energy assessment of components (see IEC 61853-3).

This document applies to terrestrial flat panels, such as crystalline silicon panels and thin-film panels. This document also applies to monofacial panels.

2 Normative references

The contents of the following documents constitute the essential clauses of this document through normative references in this document.

For referenced documents without a date, only the version corresponding to that date applies to this document; for referenced documents without a date, the latest version (including all amendments) applies to this document.

GB/T 2828 (all parts) Sampling inspection procedures by attributes Note. GB/T 2828.1-2012 Sampling procedures for inspection by attributes Part 1: Sampling plans for batch inspection based on acceptance quality limit (AQL) (ISO 2859-1:1999, IDT) GB/T 2828.2-2008 Sampling procedures for inspection by attributes Part 2: Sampling procedures for inspection of isolated lots retrieved by limiting quality LQ Case (ISO 2859-2:1985, NEQ) GB/T 2828.3-2008 Sampling procedures for inspection by attributes Part 3: Skip lot sampling procedures (ISO 2859-3.:2005, IDT) GB/T 2828.4-2008 Sampling procedures for inspection by attributes Part 4: Procedures for assessing claimed quality levels (ISO 2859-4.

2002, MOD)

GB/T 2828.5-2011 Sampling procedures for inspection by attributes Part 5: Batch-by-batch sequential sampling based on acceptance quality limit (AQL) Inspection system (ISO 2859-5:2005, IDT) GB/T 2828.10-2010 Sampling inspection procedures for attributes Part 10: GB/T 2828 Guidelines for sampling inspection series of standards for attributes (ISO 2859-10:2006, MOD) ISO/IEC 17025 General requirements for the competence of testing and calibration laboratories testing and calibration laboratories) Note. GB/T 27025-2019 General requirements for the competence of testing and calibration laboratories (ISO/IEC 17025, IDT) IEC 60891:2021 Photovoltaic devices - Temperature and irradiance correction method for measured I-V characteristics cedures for temperature and irradiance corrections to measured I-V characteristics) IEC 60904-1 Photovoltaic devices-Part 1: Measurement of photovoltaic current-voltage characteristics assurance of photovoltaic current-voltage characteristics) Note. GB/T 6495.1-1996 Photovoltaic devices Part 1: Measurement of photovoltaic current-voltage characteristics (IEC 60904-1:1987, IDT) IEC 60904-2 Photovoltaic devices-Part 2: Requirements for standard solar cells ment for reference solar devices) Note. GB/T 6495.2-1996 Photovoltaic devices Part 2: Requirements for standard solar cells (IEC 60904-2:1989, IDT) IEC 60904-3 Photovoltaic devices Part 3: Measurement principles and standard spectral irradiance data for terrestrial photovoltaic solar devices [Pho-