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

GB/T 46983.703-2025

**Measurement procedures for materials used in photovoltaic
modules - Part 7-3: Accelerated stress tests - Methods of
abrasion of PV module external surfaces**

光伏组件用材料测试程序 第7-3部分：加速压力测试 光伏组件外表面的磨损测试
方法

(English Translation)

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Foreword

This document complies with the provisions of GB/T 1.1-2020 "Standardization Work Guidelines Part 1: Structure and Drafting Rules of Standardization Documents".

Drafting.

This document is Part 7-3 of GB/T 46983 "Test Procedures for Materials Used in Photovoltaic Modules". GB/T 46983 has the following published...

part.

---Part 7-3. Accelerated stress testing method for wear testing of the outer surface of photovoltaic modules.

This document is equivalent to IEC 62788-7-3:2022 "Materials for photovoltaic modules - Test procedures - Part 7-3. Accelerated stress testing" Wear test method for the outer surface of the component.

The following minimal editorial changes have been made to this document.

---Incorporating the amendments to IEC 62788-7-3:2022AMD1, the relevant clauses are indicated by vertical margins.

The double lines (||) are used to indicate this.

Please note that some content in this document may involve patents. The issuing organization of this document assumes no responsibility for identifying patents.

This document was proposed by the Ministry of Industry and Information Technology of the People's Republic of China.

This document is under the jurisdiction of the National Technical Committee on Standardization of Solar Photovoltaic Energy Systems (SAC/TC90).

Introduction

The following parts of GB/T 46983 "Test Procedures for Materials Used in Photovoltaic Modules" are proposed to be released.

---Part 7-3. Accelerated Stress Testing Methods for Abrasion Testing of Photovoltaic Module Outer Surfaces. The purpose is to evaluate photovoltaic modules or their...

He studied the wear and tear of materials and coatings in photovoltaic devices.

The photovoltaic industry needs wear testing methods, especially for the front and back of photovoltaic modules. This document defines a set of testing methods using...

This document describes methods for assessing the wear and tear of materials and coatings in photovoltaic modules or other photovoltaic devices. It specifies methods for

linear and rotating mechanical wear.

It can be used to solve the wear resistance problem in the cleaning of photovoltaic devices. The purpose of linear wear is to simulate traditional manual cleaning methods.

In traditional cleaning methods, cleaning equipment typically acts perpendicularly to the surface, generating a scraping motion. Rotational abrasion aims to mimic common robotic cleaning methods.

In this method, the cleaning equipment typically performs a wiping motion along the surface. Compared to DIN 53778-2 and ASTM D2486, this method is more suitable for applications with specific surface conditions.

The application has been modified for mechanical wear testing, including increasing the bristle length and adjusting the size of the abrasive (test dust) encountered in photovoltaic systems.

The same abrasive, dry or wet abrasive that may be encountered when using the cleaning module, and the number of test cycles related to photovoltaic system maintenance.

A sand removal method is specified, which can be used to solve the abrasion resistance problem caused by normal use in application environments (usually weather events).

The question, compared to DIN 52348, includes modifications such as testing the quality of the sand used to inspect photovoltaic surfaces and coatings. It specifies the high-strength sandblasting...

This method can be used to address abrasion resistance issues caused by severe weather events and/or the most challenging usage locations. (Compatible with IEC 60068-2-68) Compared to the previous version, the modifications in this document include the composition of the test sand compared to photovoltaic applications and sand-falling tests, as well as the specific carriers used in photovoltaic applications.

Speed. The methods described in this document can be used to assist in performance analysis and/or material design/selection. A comparison is made between linear brushing, rotary brushing, drop brushing, and high-strength brushing.

The force-impact sand method, different test methods may produce different wear rates and/or damage morphologies (i.e., the same results are not expected).

This document aims to address wear issues on the surface of photovoltaic modules and any coatings using representative specimens (such as centimeter-sized specimens); here the methods and equipment used can also be applied to photovoltaic module samples (e.g., those with a size of meters). This document defines a series of tests and their methods, including drop tests.

Abrasive, high-intensity sandblasting impact, and mechanical (brush) abrasion. Materials and coatings may have different intended design purposes and design lifespans, therefore

this article...

Specific pass/fail criteria are not defined. However, the test results can be used to determine the performance of the coating in various outdoor environments and cleaning practices.

Regarding durability, these methods can be used for relative comparisons when selecting materials and coatings.

This document does not define methods related to the characterization of wear specimens (which may include optical transmittance, optical reflectance, surface roughness, and surface properties).

Other standard characterization methods (including optical transmittance, optical reflectance, electrical properties, surface roughness, and surface energy) can be applied to make...

The test specimens are worn using the methods defined in this document. The methods for checking specimen contamination (including artificial contamination) are not covered in this document.

Prior to the methods described in this document, additional sample preparation can be performed. The wear test described in this document can be performed in conjunction with accelerated tests or test procedures in other standards.

List them together and/or apply them.

This document establishes the formal working reference materials, the purpose of which is to verify the correct installation and operation of the device.

The features of interest will be validated periodically (monthly, weekly, etc.). Based on the results of laboratory accuracy studies, reference documents or future versions of this document will be provided.

Provide relevant characteristics and their values (including acceptable limits for accuracy).

Testing procedures for materials used in photovoltaic modules Part 7-3. Accelerated Stress Testing of Photovoltaic Modules Wear test method for outer surface

1 Scope

This document describes test methods that can be used to assess the wear and tear of materials and coatings in photovoltaic modules or other photovoltaic devices.

This document applies to components on the incident surface (including coatings, front panels, and glass) and the rear surface (including back panels or rear glass). Each Quantitative correlations established between artificial wear and field erosion for specific materials or coatings (depending on factors such as climate, location of use, and