

TECHNICAL SPECIFICATION



**Measurement procedures for materials used in photovoltaic modules –
Part 7-2: Environmental exposures – Accelerated weathering tests of polymeric
materials**



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IEC Central Office
3, rue de Varembe
CH-1211 Geneva 20
Switzerland

Tel.: +41 22 919 02 11
Fax: +41 22 919 03 00
info@iec.ch
www.iec.ch

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Part 7-2: Environmental exposures – Accelerated weathering tests of polymeric
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INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

ICS 27.160

ISBN 978-2-8322-4735-8

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

**MEASUREMENT PROCEDURES FOR MATERIALS
USED IN PHOTOVOLTAIC MODULES –****Part 7-2: Environmental exposures –
Accelerated weathering tests of polymeric materials**

FOREWORD

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- the subject is still under technical development or where, for any other reason, there is the future but no immediate possibility of an agreement on an International Standard.

Technical specifications are subject to review within three years of publication to decide whether they can be transformed into International Standards.

IEC TS 62788-7-2, which is a technical specification, has been prepared by IEC technical committee 82: Solar photovoltaic energy systems.

The text of this technical specification is based on the following documents:

Enquiry draft	Report on voting
82/1212/DTS	82/1262A/RVDTS

Full information on the voting for the approval of this technical specification can be found in the report on voting indicated in the above table.

This document has been drafted in accordance with the ISO/IEC Directives, Part 2.

A list of all parts in the IEC 62788 series, published under the general title *Measurement procedures for materials used in photovoltaic modules*, can be found on the IEC website.

The committee has decided that the contents of this publication will remain unchanged until the stability date indicated on the IEC website under "<http://webstore.iec.ch>" in the data related to the specific publication. At this date, the publication will be

- transformed into an International standard,
- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.

A bilingual version of this publication may be issued at a later date.

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MEASUREMENT PROCEDURES FOR MATERIALS USED IN PHOTOVOLTAIC MODULES –

Part 7-2: Environmental exposures – Accelerated weathering tests of polymeric materials

1 Scope

This part of IEC 62788 defines test procedures to characterize the weatherability of polymeric component materials used in photovoltaic (PV) modules or systems. The methods in this document have been focused on polymeric backsheets and encapsulants, but may be applied to other materials; however, these were not verified as part of the preparation.

This document includes a suite of artificial weathering exposures, consisting of a steady-state application of simulated solar irradiance, temperature, and humidity conditions maintained at stable levels through the weathering test. Cyclic stresses, including thermal and wet/dry cycles are left for future specifications.

Exposures in this document are intended for reference by other standards and as a tool to support research and product development for PV components and modules. Different exposures may be used to target specific climate/mounting configurations, with the specifics of how to apply the exposures left to those standards (e.g. component characterization standards, module qualification standards).

An informative annex including parametric descriptions of a range of climate/application configurations used in developing the exposure suites is provided as a reference.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

IEC 60904-3, *Photovoltaic devices – Part 3: Measurement principles for terrestrial photovoltaic (PV) solar devices with reference spectral irradiance data*

IEC 61730-1, *Photovoltaic (PV) module safety qualification – Part 1: Requirements for construction*

IEC TS 61836, *Solar photovoltaic energy systems – Terms, definitions and symbols*

IEC 62788-1-4, *Measurement procedures for materials used in photovoltaic modules – Part 1-4: Encapsulants – Measurement of optical transmittance and calculation of the solar weighted photon transmittance, yellowness index and UV cut-off wavelength*

IEC TS 62788-2, *Measurement procedures for materials used in photovoltaic modules – Part 2: Polymeric materials – Frontsheets and backsheets*

ASTM G151, *Standard Practice for Exposing Nonmetallic Materials in Accelerated Test Devices that Use Laboratory Light Sources*

ASTM G154, *Standard Practice for Operating Fluorescent Ultraviolet (UV) Lamp Apparatus for Exposure of Nonmetallic Materials*

ASTM G155, *Standard Practice for Operating Xenon Arc Light Apparatus for Exposure of Non-Metallic Materials*

ASTM D7869, *Standard Practice for Xenon Arc Exposure Test with Enhanced Light and Water Exposure for Transportation Coatings*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in IEC TS 61836, IEC 61730-1, as well as the following apply:

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- IEC Electropedia: available at <http://www.electropedia.org/>
- ISO Online browsing platform: available at <http://www.iso.org/obp>

3.1

natural weathering

degradation of materials in response to the naturally occurring climatic stresses at the site where PV modules are installed

3.2

artificial weathering

degradation of materials in response to controlled stresses applied using an artificial weathering chamber designed to simulate the effects of natural weathering

Note 1 to entry: Applied stresses, which should be automatically controlled, include simulated solar irradiance, temperature, and humidity.

3.3

specimen

material test coupon designed to comprise a part or component of a PV module, or a sample designed to replicate a part of a PV module

3.4

polymeric material

natural or synthetic materials that are primarily composed of chained molecules of monomers, that may also contain combinations of monomers, combined polymers, crosslinking agents, inorganic fillers, colorants, stabilizers, and other additive materials

3.5

laminated

product made by bonding together two or more layers of the same or different materials

3.6

ambient temperature

temperature of the air in degrees Celsius surrounding the modules or equipment at a PV installation location as measured and documented by meteorological services for that physical location