IEC TS 62788-5-2

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# TECHNICAL SPECIFICATION

colour inside

## Measurement procedures for materials used in photovoltaic modules – Part 5-2: Edge seals – Durability evaluation guideline

INTERNATIONAL ELECTROTECHNICAL COMMISSION

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

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# MEASUREMENT PROCEDURES FOR MATERIALS USED IN PHOTOVOLTAIC MODULES –

## Part 5-2: Edge seals – Durability evaluation guideline

## FOREWORD

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

IEC TS 62788-5-2, 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:

| DTS | Report on voting |
|---|---|
| 82/1665/DTS | 82/1712A/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- withdrawn,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.

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# MEASUREMENT PROCEDURES FOR MATERIALS USED IN PHOTOVOLTAIC MODULES –

## Part 5-2: Edge seals – Durability evaluation guideline

## 1 Scope

This part of IEC TS 62788 provides guidelines to assess the ability of an edge seal to prevent moisture ingress from the edges of PV modules. This document does not cover frame adhesives (sometimes colloquially referred to as edge seals) which by design do not serve to prevent moisture ingress to a meaningful degree. Edge seals should keep moisture out, remain adhered, and maintain electrically insulation from the environment. Much of the testing can be done on the material level, but given the fact that there are multiple surfaces, materials interactions, and mechanical stresses, testing on mini modules or modules is necessary. To accomplish this, this document contains three types of test sample types, materials, mini-modules, and full-size modules. It is intended that a quick evaluation and comparison can be made using materials only. This would be followed up by more rigorous tests using mini-modules where all the interfaces are correctly represented. And finally, full-size module tests are used to evaluate the actual construction process to allow unanticipated concerns to be addressed.

This document is structured to evaluate the ability of an edge seal and the overall packaging design to prevent moisture ingress and to provide sufficient electrical insulation according to accepted qualification standards. It seeks to uncover inadequacies in the permeation properties of the edge seal, electrical safety issues, or delamination resulting in moisture ingress. Here it is implied that mini-modules and full-size modules are constructed in accordance with IEC 61730 series This document does not attempt to evaluate the predicted service life of a module with respect to overall performance. It is designed to determine at the material level if the edge seal can keep moisture out, and then to uncover potential failure modes and/or evaluate the probable effect of manufacturing changes on the performance of edge seals. Test conditions focus on stresses likely to produce safety, moisture ingress, and debonding related failure modes.

For the purposes of this document, an edge seal is defined as a polymeric material designed to be placed between two impermeable (or extremely low permeability) frontsheet and backsheet materials to restrict moisture ingress from the sides. In some cases, an encapsulant with a diffusivity much lower than is found in polyethylene-co-vinyl acetate (EVA) may also serve the purpose of an edge seal and may be evaluated according to this document for comparison.

## 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 (all parts), *Photovoltaic devices*

IEC 61215-1:2016, *Terrestrial photovoltaic (PV) modules – Design qualification and type approval – Part 1: Test requirements*

IEC 61215-2:2016, *Terrestrial photovoltaic (PV) modules – Design qualification and type approval – Part 2: Test procedures*

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

IEC TS 62782, *Photovoltaic (PV) modules – Cyclic (dynamic) mechanical load testing*

IEC 62788-1-2, *Measurement procedures for materials used in photovoltaic modules – Part 1-2: Encapsulants – Measurement of volume resistivity of photovoltaic encapsulant and other polymeric materials*

IEC 62788-5-1, *Measurement procedures for materials used in photovoltaic modules – Part 5-1 Edge seals – Suggested test methods for use with edge seal materials*

IEC 62788-6-2, *Measurement procedures for materials used in photovoltaic modules – Part 6-2: General tests – Moisture permeation testing of polymeric materials*

IEC TS 62788-7-2, *Measurement procedures for materials used in photovoltaic modules – Part 7-2: Environmental exposures – Accelerated weathering test of polymeric materials*

ISO 10365, *Adhesives – Designation of main failure patterns*

ASTM D7869-13, *Standard practice for xenon arc exposure test with enhanced light and water exposure for transportation coatings*

ASTM G154 – 12a, *Standard practice for operating fluorescent ultraviolet (UV) lamp apparatus for exposure of nonmetallic materials*