IEC 62788-6-2

Edition 1.0 2020-03

INTERNATIONAL STANDARD

NORME INTERNATIONALE

colour inside

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

Procédures de mesure des matériaux utilisés dans les modules photovoltaïques –
Partie 6-2: Essais génériques – Essais de perméation à l'humidité des matériaux polymères

IEC 62788-6-2:2020-03 (en-fr)

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International Standard IEC 62788-6-2 has been prepared by IEC technical committee 82: Solar photovoltaic energy systems.

The text of this International Standard is based on the following documents:

FDIS	Report on voting
82/1659/FDIS	82/1690/RVD

Full information on the voting for the approval of this International Standard 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 document will remain unchanged until the stability date indicated on the IEC website under "http://webstore.iec.ch" in the data related to the specific document. At this date, the document will be

- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.

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INTRODUCTION

This part of IEC 62788 describes methods to measure the permeation properties of polymeric materials. The degradation of PV modules is known to go through many different corrosion processes. These degradation processes may depend upon moisture ingress into the encapsulant, edge seal, frontsheet, or backsheet materials. Typical polymeric materials used include (amongst other polymers) ethylene-vinyl acetate (EVA) and polyolefins for encapsulants, polyisobutylene (PIB) for edge seals, and polyethylene terephthalate (PET), polyvinyl fluoride (PVF), or polyvinylidine fluoride (PVDF) for backsheets. Therefore, knowing the moisture permeation characteristics of polymeric materials is relevant for module design. These properties can be determined as a function of temperature and relative humidity. With these parameters, simple scaling rules for time and distance can be used to extrapolate to the use environments.

MEASUREMENT PROCEDURES FOR MATERIALS USED IN PHOTOVOLTAIC MODULES –

Part 6-2: General tests – Moisture permeation testing of polymeric materials

1 Scope

This document provides methods for measuring the steady-state water vapour transmission rate (WVTR), water vapour permeability (P), diffusivity (D), solubility (S), and moisture breakthrough time (T_{10}) (defined as the time to reach 10 % of the steady state WVTR) for polymeric materials such as encapsulants, edge seals, frontsheets and backsheets. These measurements can be made at selected temperatures and humidity levels as deemed appropriate for evaluation of their performance in PV modules. Measurement is accomplished by inspection of the transient WVTR curve and by fitting it to a theoretical Fickian model. This document is best applied to monolithic films. If multilayer films are used, the D and S values are only apparent values, but the steady-state values can still be measured.

This document was written for the measurement of water permeation, but it can equally be used for other permeants such as O_2. In this case the same diffusion equations, fitting procedures, and scaling arguments are used.

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

ISO 2528, *Sheet materials – Determination of water vapour transmission rate (WVTR) – Gravimetric (dish) method*

ISO 9932, *Paper and board – Determination of water vapour transmission rate of sheet materials – Dynamic sweep and static gas methods*

ISO 15106-1, *Plastics – Film and sheeting – Determination of water vapour transmission Rate – Part 1: Humidity detection sensor method*

ISO 15106-2, *Plastics – Film and sheeting – Determination of water vapour transmission Rate – Part 2: Infrared detection sensor method*

ISO 15106-3, *Plastics – Film and sheeting – Determination of water vapour transmission Rate – Part 3: Electrolytic detection sensor method*

ISO 15106-4, *Plastics – Film and sheeting – Determination of water vapour transmission Rate – Part 4: Gas-chromatographic detection sensor method*

ASTM F1249-06, *Standard test method for water vapour transmission rate through plastic film and sheeting using a modulated infrared sensor*