REDUCING THE R&D CYCLE FOR PHOTOVOLTAIC DEVICES

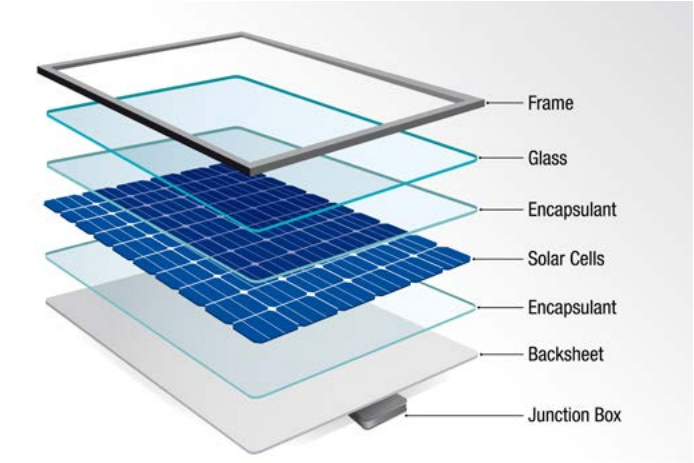
A Solution for Faster, More Accurate Barrier Testing of Solar Cells

The barrier materials used to protect solar cells can be difficult to test, causing delays for manufacturers.

Using AMETEK MOCON® instruments, customers were able to reduce their photovoltaic R&D cycle with improved accuracy, increased productivity and a faster time-to-market.

Solar panels are exposed to high temperatures and humidity levels.

Sensitivity to moisture and heat slows down R&D of photovoltaic devices.



Layers of a standard solar panel

Photovoltaic devices, or solar panels, continue to be a popular choice for safe and renewable energy. However, improving the lifespan of these photovoltaic devices remains a challenge. Solar cells can be degraded by prolonged sunlight, high humidity, and heat generated by the device itself. These factors undermine the quality and stability of the encapsulated system's barrier properties, the substrate, and the edge sealing used.

For any solar panel, water vapor can penetrate the encapsulated system through the polymer back sheet, while also entering the system through the seam or capsulation sealant. Moisture will weaken the adhesion between the interfaces and cause interlayer peeling of the multilayer structure backing. Consequently, it affects the performance and life of individual solar cells within the system.

REDUCING THE R&D CYCLE FOR PHOTOVOLTAIC DEVICES

APPLICATION NOTE

Next-Generation Instrument Solutions for Solar Panel R&D

Solar cell mock-up to examine the WVTR of edge sealant material

AQUATRAN Model 3 WVTR Analyzer

Barrier Property Testing for Photovoltaic Devices

It is imperative to accurately evaluate water vapor transmission rates (WVTR) through the barrier during R&D. For most solar panels, the barrier materials of interest include:

- The back sheet, or the rear-most layer of a solar panel.
- Encapsulation EVA, a durable transparent polymer to hold solar cells together, preventing moisture and dirt ingress.
- Photovoltaic sealants for edges and other parts of the solar panel.

Some tests must be conducted at high temperatures (e.g., 85°C) in accordance with the "damp heat test" portion of IEEE 1262 qualification specification for solar module exposure at 85°C and 85% RH for 1,000 hours. The traditional calcium test method is qualitatively performed and thus lacks accuracy. This test method also takes a long time, causing R&D delays for photovoltaic manufacturers.

To simplify and improve R&D of solar panels, AMETEK MOCON® offers two WVTR Permeation Analyzers: The AQUATRAN® Model 3, and the AQUATRAN 3/38 H modified for high temperature testing.

Get faster, more accurate results with MOCON WVTR analyzers.

Results obtained with the AQUATRAN Model 3 are objective and much more accurate for ultra-high barrier materials. The AQUATRAN 3/38 provides quick turnaround for most solar panel barriers and can test at elevated temperatures up to 60°C.

Purpose-built and designed to be user-friendly, these analyzers provide accurate results, an easier testing process and increased throughput. This enables photovoltaic manufacturers to develop and launch perfected products more quickly than their competitors.

For more information on WVTR and/or OTR measurement, visit our website or contact your AMETEK MOCON sales representative.

Accurate: AQUATRAN Model 3

- Ideal for ultra-barrier material measurements
- Absolute Coulometric sensor conforms to ISO 15106-3

Fast: AQUATRAN 3/38 H

- 4 cells for high throughput
- High temperature option available
- Conforms to ASTM F1249

Remote Test Cells

- Designed to withstand a high temperature environmental chamber
- Use with all Next Gen Analyzers

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AN-PPS-1000-Reduce Photovoltaic R&D Cycle-0324-1.2

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