

Optimized Module Performance Combined with Lower System Costs

**ENGAGE™ PV Polyolefin Elastomers
for Photovoltaic Encapsulant Films**

The DOW logo is a red diamond shape with the word "DOW" in white, bold, sans-serif capital letters. A small registered trademark symbol (®) is located to the right of the word.

DOW®

The bottom half of the image shows a close-up, low-angle view of a photovoltaic array. The solar panels are arranged in a grid pattern, with black interconnectors visible between them. The panels have a grid of silver lines on their surface. The lighting is bright, creating a strong perspective effect as the panels recede into the distance.



ENGAGE™ PV POEs: A Smart Choice for PV Encapsulant Films

Choosing the right photovoltaic solution for the growing industry

PV module manufacturers' long-term success depends on the material selection they make in an expanding global photovoltaic market. With opportunities for exceptional long-term performance, reliability, and total cost reduction, ENGAGE™ PV Polyolefin Elastomers (POEs) help make the choice for encapsulant films easier.

ENGAGE™ PV POEs provide improved film performance

ENGAGE™ PV POEs are used by leading manufacturers of photovoltaic encapsulant films and modules to create top and back encapsulants that provide exceptional PV cell protection while enabling improved performance and lower system lifetime costs. These exclusive materials are produced by Dow at cutting-edge facilities across the world and are supported by a committed workforce that combines excellent technical support and customer service.

At a glance

Key Advantages

PV encapsulant films made with ENGAGE™ PV POEs offer opportunities to significantly:

- Boost power generation, electrical efficiency, reliability, and service life
- Improve resistance to potential induced degradation (PID)
- Reduce both levelized cost of electricity (LCOE) and total system costs

Product Portfolio

Different grades of ENGAGE™ PV POEs are available to meet specific applications:

Properties	Density	Melt Index (190 °C / 2.16 kg)	Tensile strength (Break, compression molded)	Tensile elongation (Break, compression molded)	Volume resistivity
ENGAGE™ PV 8660	0.872 g/cm³	4.8 g/10min	5.70 MPa	>1100%	> 1.0 E+15 ohms·cm
ENGAGE™ PV 8669	0.873 g/cm³	14 g/10min	5.95 MPa	>1100%	> 1.0 E+15 ohms·cm
ENGAGE™ PV 8680	0.872 g/cm³	5 g/10min	5.32 MPa	>1100%	> 1.0 E+15 ohms·cm
ENGAGE™ PV 8688	0.873 g/cm³	14 g/10min	4.32 MPa	>1100%	> 1.0 E+15 ohms·cm
Test Method	ASTM D792	ASTM D1238	ASTM D638	ASTM D638	Dow Method

Module Types

- Rigid (c-Si, N-type, P-type, thin film)
- Flexible

Applications

- Commercial
- Residential
- Utility

Figure 1: Crystalline silicon photovoltaic module using ENGAGE™ PV Polyolefin Elastomers

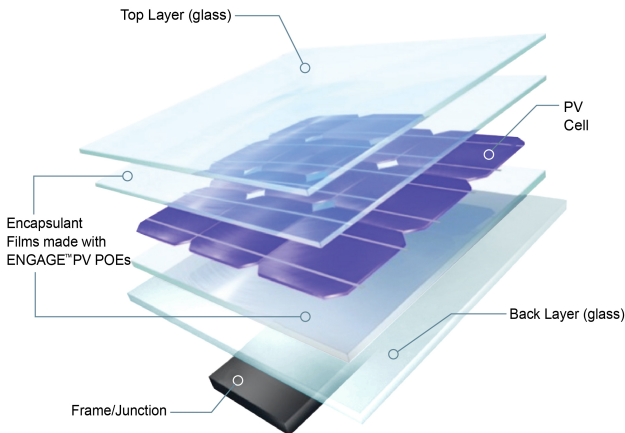
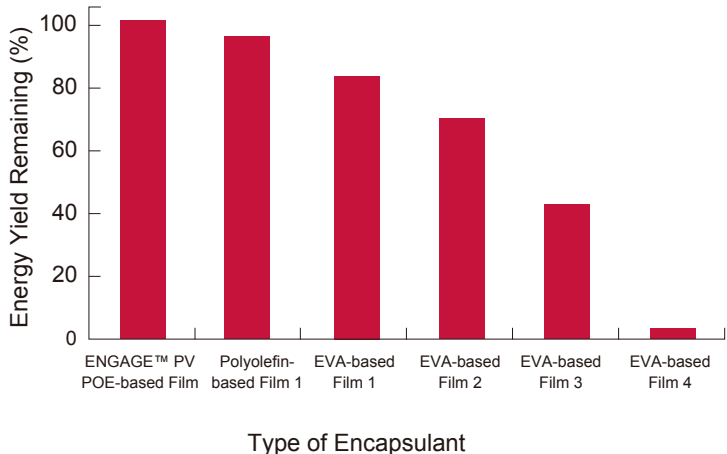


Figure 2: PID performance (85% RH, 85°C, -1000 V, 48 Hours)⁽²⁾





Performance Advantages⁽¹⁾

The following are just a few of the numerous factors PV modules made with ENGAGE™ PV POE-based encapsulant films function better than modules made with ethylene vinyl acetate (EVA)-based films:

Key attributes

- Superior electrical properties – extremely high volume resistivity and low leakage current
- 10-20X reduced water vapor transmission rate (WVTR)
- Non-yellowing
- No generation of acetic acid
- Increased UV and weather resistance

Advantages in the field

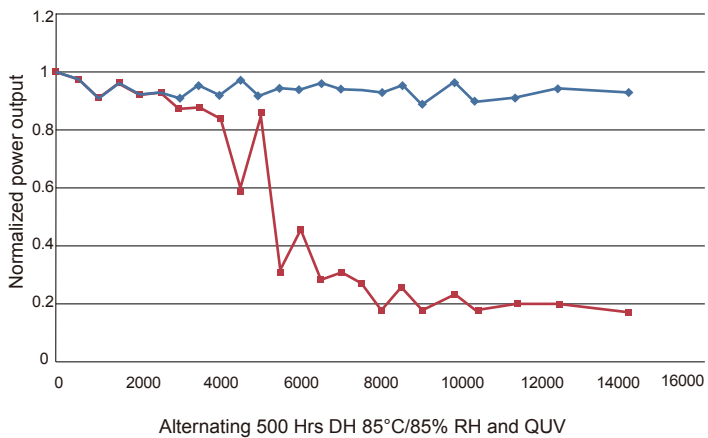
- Outstanding anti-PID performance with reduced degradation rates
- Enhanced energy output, operational effectiveness, and dependability
- Extension of service life
- Lower LCOE
- Reduced total system costs



Figure 3: Anti-PID qualities of films made with standard EVA as against Dow ENGAGE™ PV POE resin (85% RH, 85°C, -1000 V, 96 hours)⁽³⁾

	Normal EVA film		POE film using Dow ENGAGE™ PV POE resin	
	Front	Back	Front	Back
Initial				
PID 96h				
Power loss	18.4% ±5.4%	30.6% ±7.7%	0.6% ±0.2%	2.2% ±0.7%

Figure 4: Power retention performance of encapsulated film modules manufactured from regular EVA as against Dow POE resins under conditions of alternate damp heat ageing and QUV ageing⁽³⁾



(1) Data per tests conducted by Dow. Additional information available upon request. Properties shown are typical, not to be construed as specifications. Users should confirm results by their own tests.
 (2) Data per tests conducted by Dow per PI Berlin test conditions. Competitive materials tested are commercially available. Additional information available upon request.
 (3) Data per tests conducted by Dow. Based on physical property testing and validated degradation rates. Assigned representative values. Additional information available upon request.

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