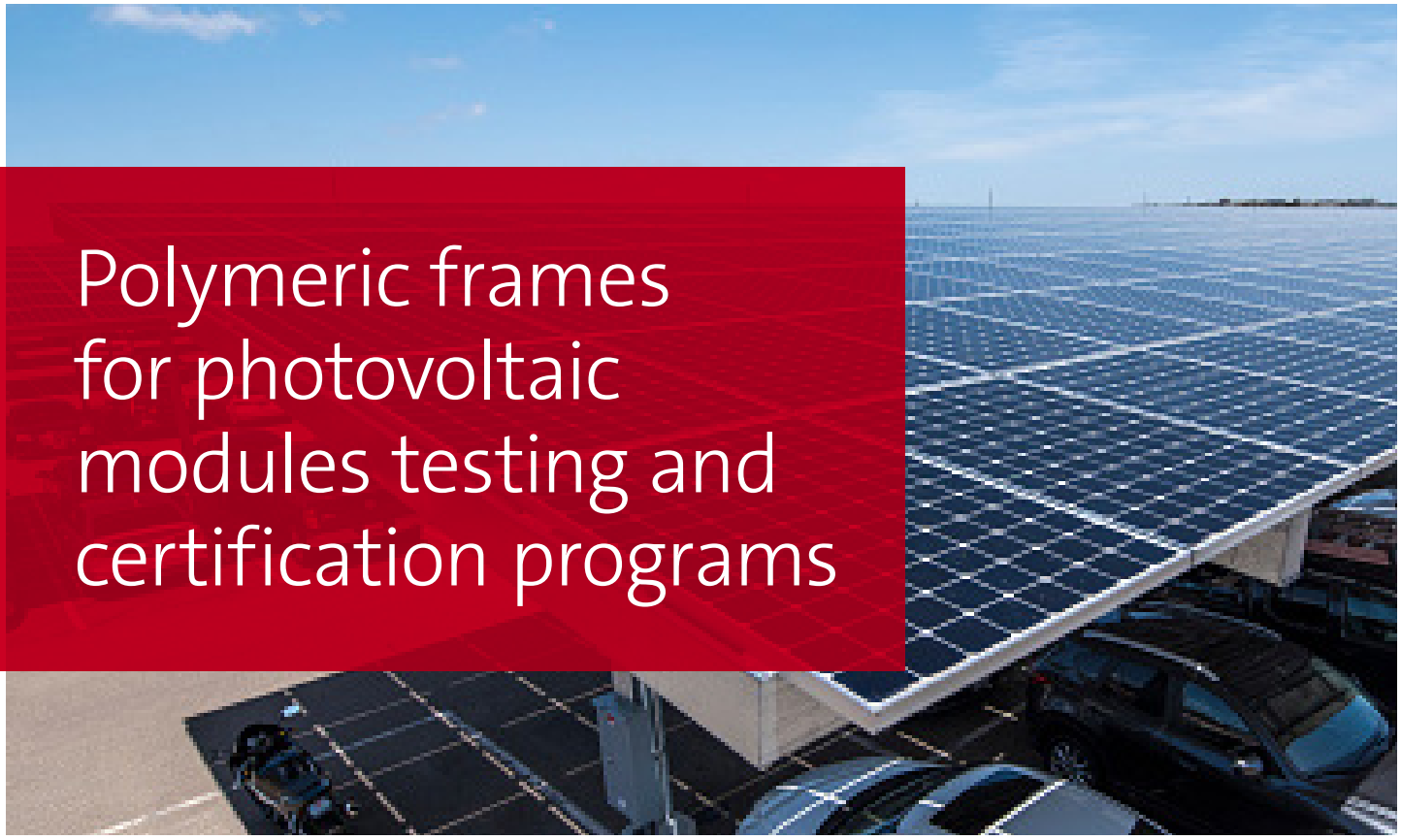

Polymeric frames for photovoltaic modules testing and certification programs

UL Solutions is a global safety science leader with expertise in the testing, certification and inspection of products and materials for the photovoltaic (PV) and plastics industries. Our specialized programs deliver reliable test data and assessments for polymeric materials used in PV frames to provide PV module customers and polymeric frame suppliers with greater confidence.

Why PV polymeric frames?

The frame is an important component of PV modules. It fixes and seals the modules, enhances strength, and facilitates transportation and installation. The performance of the frame also directly influences the mounting and service life of the modules.

Aluminum profiles are currently the dominant material for PV frames. With the rapid development of solar energy, the amount of aluminum resources used in the production of solar panels is increasing year by year. The production of primary aluminum requires high levels of energy consumption, which releases large quantities of carbon dioxide. However, under global carbon neutrality goals, it is increasingly difficult and expensive to expand new production capacities in primary aluminum industries.

Faced with rapid demand growth and limited production capacity, solar manufacturers are seeking new technology and cost-competitive alternatives to aluminum to better control the price of raw materials and curb the high energy needs typically encountered when transitioning to solar energy. The composite polymeric frame gives solar PV module manufacturers a new option beyond aluminum alloy.

The new composite material technology could provide the same level of strength and durability as existing aluminum alloy frames while decreasing the weight of solar panels, increasing convenience during transportation and installation, and reducing cost and carbon dioxide emissions. As a non-metal frame, the possibility of forming a leakage circuit is greatly reduced, helping mitigate occurrences of potential-induced degradation (PID) and improving the energy generation efficiency of solar panels. Further, the strong salt mist and chemical corrosion resistance features of polymeric materials could support solar panels installed in high moisture environments, such as offshore and coastal areas, for a longer service life than aluminum alloy.

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How to evaluate polymeric frames?

First, it is important to prove polymeric frames offer the same strength and durability as aluminum options. As PV frames are exposed to outdoor conditions for long periods of time, dimensional stability may shift. Temperature changes, chemical decomposition — including color fading caused by long-term ultraviolet ray exposure — and durability against external environment corrosion require specific evaluation.

Second, as a non-metal material, insulating and flame-retardant properties not typically evaluated in aluminum alloy frames must be considered for polymeric frames.

Finally, traceability across the entire supplier chain remains essential. The composition fingerprint should be precisely recorded initially and managed as a reliable benchmark for the entire life cycle of a polymeric frame.

Why choose UL Solutions as your testing and certification partner?

UL Solutions is a leading global provider of testing and certification services for innovative plastic materials. We have been testing plastics since 1941 and are proud to serve many of the world's top plastics manufacturers. We work closely with plastic industry stakeholders to maintain and enhance existing UL Standards, establish new standards and develop certification and testing programs that address emerging technologies and product applications.

Our Plastics Recognition Program is globally recognized and can help you demonstrate compliance with safety, quality, suitability and traceability requirements of your materials based on a specific set of third-party performance credentials. UL Solutions Yellow Card™ can help you market and differentiate your products and help downstream manufacturers save valuable time testing end products.

Our fingerprint ID and UL Solutions Follow-Up Services programs help keep your polymeric frame formulations consistent with the original requirements they were certified under, maintaining the traceability of these materials and supporting the ongoing integrity of your supply chain. This boosts confidence that the materials will meet sourcing requirements.

Learn more about our testing services for PV frontsheets and backsheets.

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