



Mylar[®]
Specialty Films

Mylar[®] UVHPET

Sustainability Without Compromise



Mylar[®] UVHPET[™] based backsheets

Sustainability Without Compromise

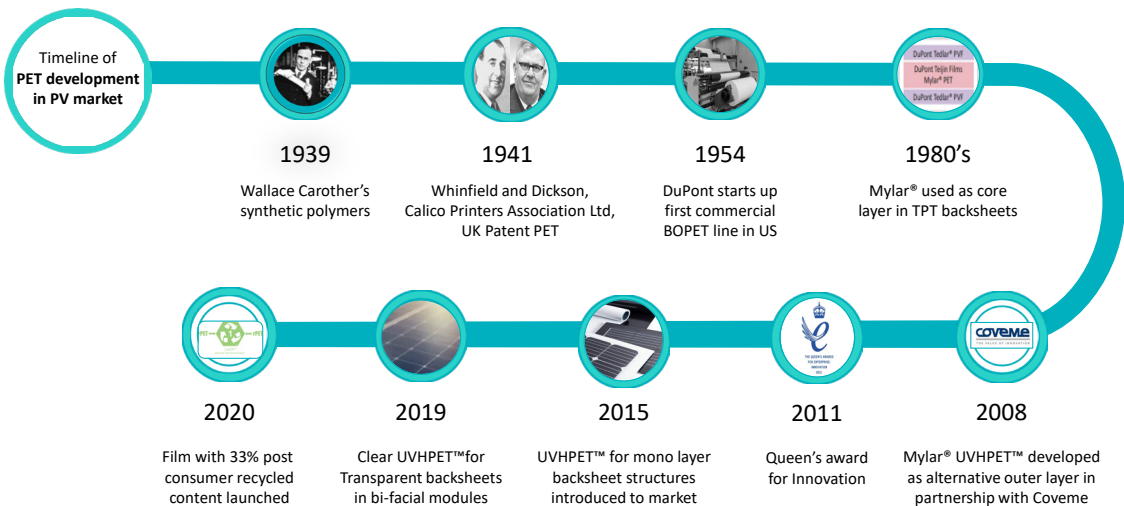
Mylar Specialty Films are the world's leading supplier of halogen free backsheet films with over 50GW of installed capacity relying on the unique set of properties delivered by the Mylar[®] UVHPET[™] range of products.

Our product testing exceeds industry standards and is backed up by the ongoing monitoring of Mylar[®] UVHPET[™] based backsheets in real life applications across the globe.

This is underpinned by over 60 years experience supplying Mylar[®] PET Film into high quality electrical insulation applications and 20 years for ongoing developments supplying the growth in the PV industry.

Sustainability Without Compromise

From the invention of polyester to the cutting edge of developments in the solar industry, Mylar Specialty Films have been at the forefront of sustainable innovation.



Mylar Specialty Films mission is to deliver products which generate a positive environmental, social and economic impact to the communities we serve.

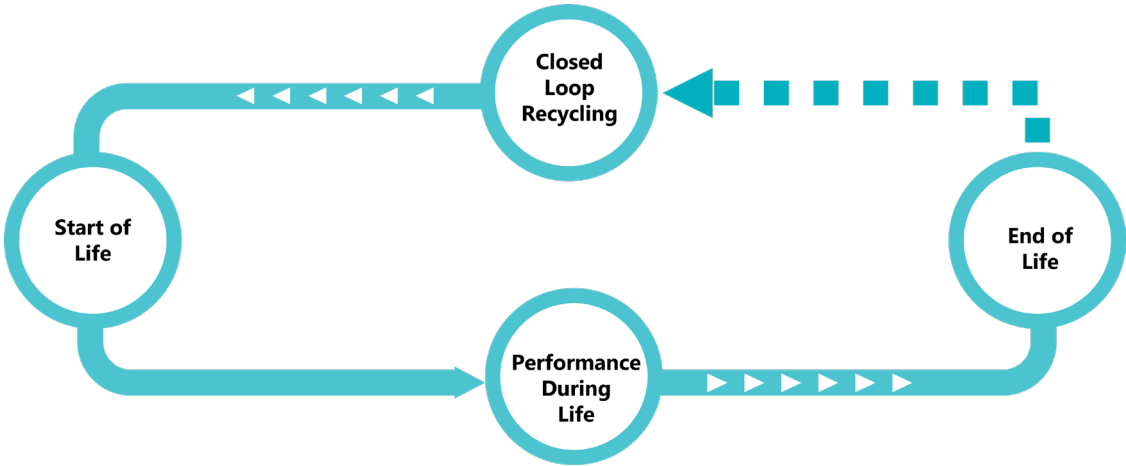
We are proud of our heritage with a proven track record of innovation in the solar industry and we believe that Mylar® UVHPET™ based backsheets provide the industry with a more sustainable product without compromise in performance during the lifetime of modules.

Our approach to product sustainability is to assess the environmental impact across the full product life cycle, taking into account the footprint during production the performance during life and then the eventual end of life outcomes.

Mylar® UVHPET™ based backsheets have a significantly lower carbon footprint compared to alternative backsheets materials, with cradle to gate GHG emissions estimated at 3.364kg CO2eq per kg of film.

As they are halogen free there are safe and economically viable end of life options such as incineration, pyrolysis or monomer recycling.

However, the start and the end of the life are irrelevant if the backsheet fails to protect the module throughout its lifetime, and this is where the product testing data and track record of over 50GW of installed capacity without a single reported field failure gives us the confidence to make the claim of "Sustainability Without Compromise"



1. Mylar® UVHPET™ has significantly lower carbon footprint compared to alternative materials

2. The manufacture of Mylar® UVHPET™ produces no hazardous by products

3. Multi award winning range with 33% post consumer recycled content
1. Over a decade of experience in a wide range of climates with zero reported in field failures

2. Testing regimes for Mylar® UVHPET™ far exceed industry standards
1. Mylar® UVHPET™ is halogen free and can be processed in waste to energy by processes of pyrolysis

2. PET has best in class mechanical and chemical recycling processes with ongoing trials specific to the PV industry



**When it comes to halogen
free backsheets, not all films
are created equally**

Over 50GW of installed capacity

Over 200 million modules

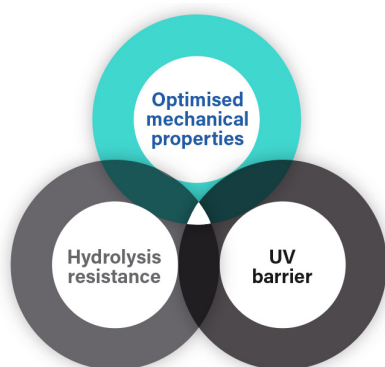
**Over a decade of proven
performance**

ZERO in field failures

Performance during product life

Too often in the PV industry generic PET films are referred to when talking about field failures which simply do not have the material properties needed to withstand the stresses seen in demanding backsheet applications.

Mylar® UVHPET™ products balance the complex mix of material properties needed for long life backsheet applications.



All Mylar® UVHPET™ products offer enhanced UV barrier and hydrolysis resistance and are extensively tested to ensure durability and reliability with a series of test protocols aimed at replicating the impact of weathering for more than 25 years in a variety of different climatic conditions.

Our product testing protocols exceed industry standards and are backed up by the ongoing monitoring of our products in real life applications across the globe. As well as Mylar Specialty Films own internal tests, we also routinely test against ISO and IEC standards and the range of Mylar® UVHPET™ also perform exceptionally well in sequential testing such as the DuPont MAST test with minimal colour change and excellent retention of physical properties.

In addition to our extensive internal testing protocol, we understand there is no substitute for real life data which is why we monitor the performance of our products in a variety of different climatic conditions. The data we have collected from Mylar® UVHPET™ product exposed to 100% irradiance in a variety of locations correlates to over 30 years performance as a backsheet without a drop in product properties.

Ultimately the most important real life data is our proven track record with over 200 million modules relying on Mylar® UVHPET™ products without a single reported in field failure.

As well as protection from the effects of weathering, Mylar® UVHPET™ based backsheets also deliver enhanced levels of protection from surface damage, protecting the module from abrasion in harsh climates such as deserts and from damage which can be caused during installation and cleaning. This is a function of both the thickness and hardness of the Mylar® UVHPET™ layer, with fluorinated backsheets relying on relatively thin, soft layers of film or coating for protection against the impact of long term weathering.

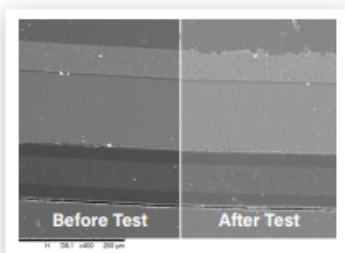
Industry standard scratch and abrasion test protocols reveal how easily these fluorinated layers can be destroyed, exposing the unprotected core layer to the effects of weathering. The electron micrographs below show the structures of two backsheets before and after a falling sand test which is designed to replicate the harsh conditions seen in deserts.

The images clearly show the damage caused to the CPC backsheet with the complete removal of the outer protective layer.

These samples were then tested against the IEC 62788-7-2 standard with the CPC backsheet failing after just 500 hours, highlighting how critical it is to choose a backsheet which can stand up to the challenges of real life transportation, installation, cleaning and exposure in harsh climates.

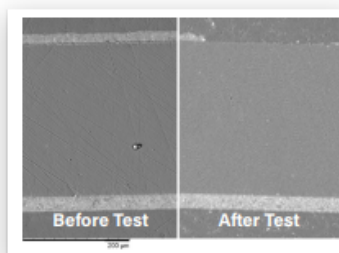
Electron micrographs showing images of Mylar® UVHPET™ and CPC backsheets before and after a falling sand abrasion test

Mylar® UVHPET™ based PPE backsheet



- Slight damage to surface of PET
- Core PET still fully protected from UV
- Mono Mylar® UVHPET™ gives even more protection due to thickness of UV protected PET

CPC backsheet



- "F" coating completely removed from surface by sand
- Core (unstabilised PET exposed)

Images clearly show the outer layer of a CPC backsheet is destroyed during standard falling sand test where the UVHPET™ based backsheet remains intact.

Backsheets and the circular economy

Mylar Specialty Films have pioneered the use of post consumer recycled content in backsheets, reducing the carbon footprint and giving another life to single use plastic waste.

Plastics have improved society in countless ways, but as the inventor of polyester film we also know there is a responsibility to minimise its environmental impact and to strive for circular business models where precious resources are re-used rather than wasted.

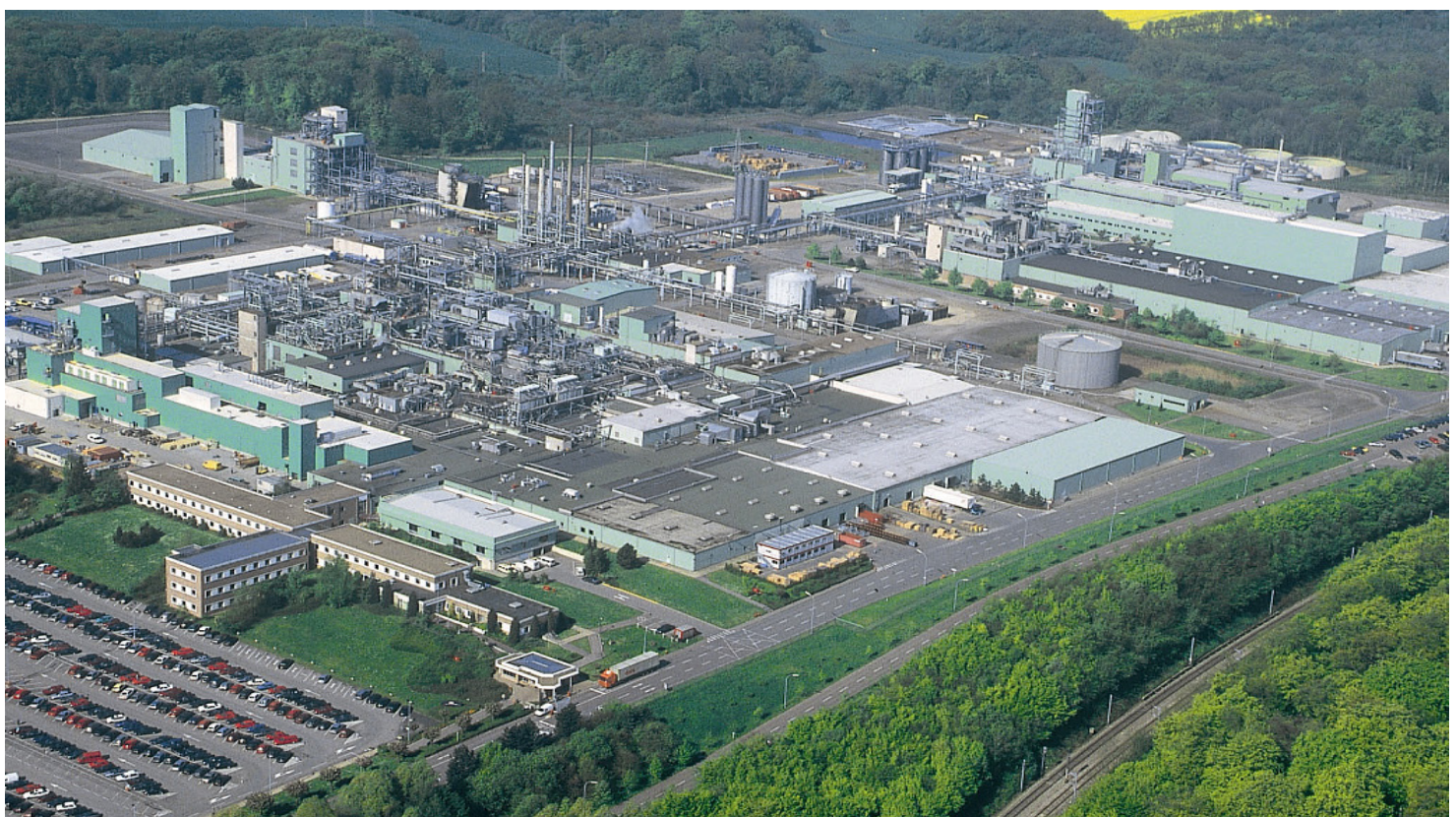
We are proud to be pioneering the use of advanced monomer recycling processes with our multi-award winning LUXCR™ depolymerisation process. This enables us to upcycle post consumer waste, restoring its optical, mechanical and chemical properties to the point where we can give it another life as part of a Mylar® UVHPET™ based backsheet.

As well as commercialising backsheet films with recycled content, we are exploring the potential of monomer recycling to offer future closed loop recycling processes for backsheet film.

To date we have completed proof of principle trials demonstrating the possibility of recovering PET from end of life modules and recycling this back into new backsheet film, and we continue to work across the supply chain to push this forward and develop economically viable processes for the future.



- **Mylar® UVHPET™ based backsheets are available with 33.3% post consumer recycled content which further reduces the carbon footprint of our products to 2.962kg CO2eq of film produced.**
- **Using Mylar® RPET based backsheets in a typical 1MW installation will give another life to over 16,000 waste bottles**





Circularity is the next big challenge facing the solar industry

Halogen free backsheets help to make module recycling safer and more economic

Up to 10% of a PV module by weight is polymeric material.

By 2050 there is forecast to be 24 billion modules installed globally, and 78 million tonnes of cumulative waste generated by EoL modules.

Mylar® UVHPET™ is safe by design, containing no hazardous materials.

PET is the most widely recycled plastic globally, offering the potential for future closed loop recycling of backsheets materials.



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