

6.2 Q&A – Coveme



Alessandro Anderlini, Global Division Manager Photovoltaics at Coveme, explains why he believes that PET based backsheets are equally effective as fluoropolymer based products

TaiyangNews: While Coveme has been the flagship for High Grade PET based backsheets development, your product portfolio still contains fluoropolymer based products, how do you explain this conflict?

Alessandro Anderlini: Polyester based backsheets are our main products and they have been in focus for all major product developments. However, if customers insist for fluoro based backsheets due to whatever reason, we have products for them. As a matter of fact, like any other backsheets supplier we also started with fluoro backsheets. Then we shifted to High Grade PET.

TaiyangNews: What was the reason for this major shift?

Alessandro Anderlini: Dupont had built a strong position in the backsheets market based on its biaxially-orientated Tedlar films. Before 2007, more than 90% of the backsheets were based on PVF (Tedlar). However, DuPont was not able to meet the demand from the growing PV market and introduced a new cast Tedlar, which kind of missed some key processing properties over the earlier one. On top there was also an upward trend in the pricing of Tedlar. This was the starting point for the PV industry to look for alternatives to Tedlar. The research went in both directions — fluoro and non-fluoropolymers. We took the non-fluoro path and developed PET based solutions.

TaiyangNews: Why PET?

Alessandro Anderlini: The first choice we made was to go for non-fluoro in order to be part of the green image of PV. Then PET was a easy choice. A prerequisite for an alternate material was non-

exclusive and unrestricted supply, which is very much the case with High Grade PET.

On top, PET has already been present as core layer of the backsheet. It already demonstrated excellent electrical insulation, low moisture permeability and high mechanical strength. Due to its poor UV stability, it took the role of the passive central layer. However, significant advances in polyester chemistry and polyester film production engineering have allowed the development and commercialisation of highly UV durable and hydrolysis resistant polyester films. In cooperation with DuPont Teijin Films (DTF) we developed backsheets using High Grade PET also as outer layer.

TaiyangNews: Nearly every backsheet suppliers we have talked to — even the ones supplying both fluoro and non-fluoropolymer based backsheets — says that PET based backsheets are only suitable for rooftop installations, while fluoropolymer based backsheets are highly recommended for ground mount installations. What's the opinion of the pioneer in using PET-only solar backsheets?

Alessandro Anderlini: This is completely not true. The rumors that PET based sheets are not suitable for high UV areas is purely because of strong lobbying of the fluoropolymer producers. High Grade PET based backsheets, at least offered by Coveme, are very well suitable for both ground mount as well as rooftop installations. We have proof that modules based on High Grade PET have been performing well without any failures for over 9 years. For example, PV panels made with our PET outer-layer backsheets were first installed in 2008 in Italy, followed closely by Spain and India and they are working fine. Touch wood, no failures were reported so far!

TaiyangNews: Can you share any test results?

Alessandro Anderlini: *Needless to mention all our products qualify for IEC test norms. But going into the specifics, especially for UV testing, we have conducted an outdoor accelerated test in Florida. High Grade PET film, the kind we are using as the outer layer, have been exposed in Florida directly to the sun for 3 years with a total UV dose of 354 kWh. This has been done at a large ground-mounted installation site, where the PET film is directly facing the sun. This is equivalent to 30 years of exposure for a backsheet, as usually only 10% of direct radiation reaches the backsheet by means of albedo.*

The aim of the test is to measure mechanical properties after the UV exposure, and the results showed that the mechanical properties of the PET film are exactly the same as for PVDF and PVF. Any brittleness, crack or delamination developed in the film is an indication of failure, but nothing of that sort happened with our PET film. Yes, there is some sort of yellowing, but the Delta Yellow Index is less than 2% after exposure, while no yellowing occurs with PVF or PVDF. However, yellowness has no correlation with mechanical properties and nothing to do with the backsheet functionality, as very well shown in our tests.

TaiyangNews: How do you justify the usage of “primer” as inner layer, as about 10% of UV also reaches the backsheet from the sunny side and the primer layer has poor UV stability?

Alessandro Anderlini: *The primer side in a PV module is protected by glass and EVA encapsulant that cut off the majority of UV light. All our tests performed in external qualified labs with UV dose up to 400 kWh/m² has shown excellent result (in terms of colour change and mechanical strength) both on PET and on Primer side in a PV module construction.*

TaiyangNews: Is it correct to say fluoropolymers have better UV stability?

Alessandro Anderlini: *Of course, fluoropolymers have unmatched UV stability, but that is required for backsheets applications only to a certain extent. It is a bit of over-engineering to use a fluoropolymer film in a backsheet configuration. It is simply not necessary when High Grade PET can do the same job with equal effectiveness as shown in the test results and in the field.*

Then fluoro backsheets are superior only in UV resistance, but a backsheet has not just to tackle UV - at least for installations on earth. If they are on the moon, that's a different story. UV is only a part of the weathering effect, while moisture ingress is equally important. In desert areas, sand abrasion is also critical. In these two aspects, PET is superior to fluoro films. Most of the fluoropolymers are very poor in water vapor resistance – about 10 times less. In this account, UV resistant PET overall shows a better performance, combined with strong mechanical strength.

TaiyangNews: Often we get to see reports on PET films showing cracks, some pictures even show failures?

Alessandro Anderlini: *It could be true, because all PET films are not UV resistant, but they have to be made UV stable. We know how to do that. Our products are UV stable and hydrolysis resistant. As a matter of fact, backsheets with UV resistant PET were not available before 2008, so any data showing that PET backsheets fail after 10 years is related to the use of standard PET which is not UV stable and neither hydrolysis resistant*

TaiyangNews: How do you make your PET stable against UV radiation?

Alessandro Anderlini: By adding titanium oxide and other UV resistant additives. This titanium oxide is also responsible for yellowness in UV testing.

TaiyangNews: Have you supplied your backsheets to any areas with strong UV radiation?

Alessandro Anderlini: Yes. The entire Europe, USA, Middle East and China. We see that even parts with strong climatic conditions have left fluoropolymers behind and are using PET based solution. We have also supplied our products to India. In fact, PET was well accepted in India in the initial days, but today people are investing also in fluoro based products. And again, this is because of lobbying as is the case of most of the Eastern part of the world.

TaiyangNews: What are the other advantages of PET?

Alessandro Anderlini: With fluoro polymers the innovation has stopped. Tedlar has remained the same for many years and this is also the case with

PVDF. On the other hand, PET has lot of scope for innovation. There are different methods to make PET UV resistant and the material offers a high degree of flexibility in terms of thickness.

On top, the fluoropolymer based backsheets suppliers have to meet certain cost targets. In order to do that they have to go down on the performance of the inner layer. Why? The outer layer is a fluoro film, which is highly priced. They cannot reduce the cost of Tedlar or PVDF, that leaves no option other than reduce the cost for the material of the inner layer. So the general practice is to use standard PET, while we always use hydrolysis-resistant PET, which can withstand 48 to 56 hours in the pressure cooker test compared to 30 to 34 hours for a standard backsheet.

A well designed full PET backsheet with UV resistance on the outer layer and a hydrolysis-resistant inner layer, is more suitable for both residential as well as for the ground-mounted PV installations. Coveme has been the pioneer of offering such High Grade PET based backsheet solutions.

TaiyangNews: Thank you.

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