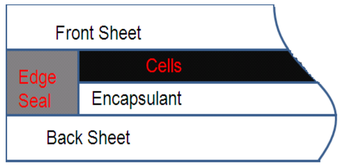
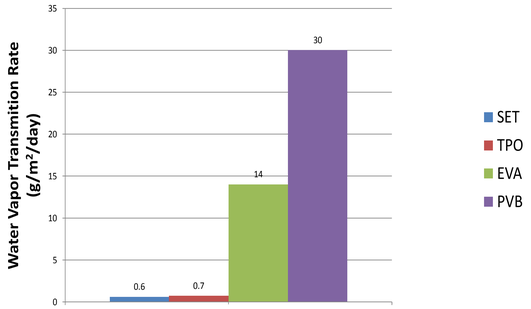
Benefits of a Desiccated Edge Seal in TFPV

1 Purpose of Packaging

- Protect TFPV device from environmental damage
  - Corrosion due to water inflow
  - Maintain water concentration in encapsulant below threshold level for 25+ years
- Protect Environment from TFPV device
  - Electrically insulate TFPV device from environment for 25+ years



2 Steady-State WVTR Comparison commonly Used Encapsulants vs. Truseal Solargain™ Edge Tape (SET)

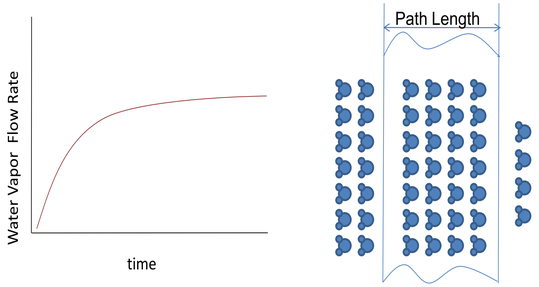


Actual Truseal laboratory results using MOCON Permatran-W equipment, Method ASTM F1249, 1.52mm (60 mil) film at 37.8° C, 100% RH. Various material suppliers. Steady-State conditions were achieved after materials were saturated with moisture.

3 Free Water Vapor Permeation Into PV Module

Without desiccant, water penetrates the edge seal quickly

In a non-desiccated edge seal water diffuses freely through the seal

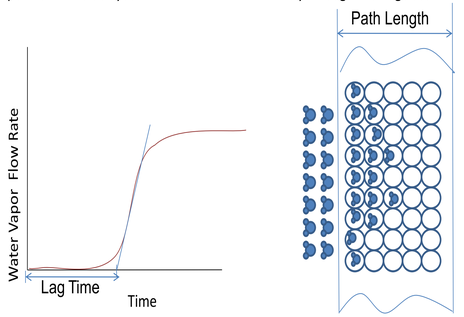


Paul, D.R. & Kemp, D.R. "The Diffusion Time Lag in Polymer Membranes Containing Adsorptive Fillers" *Journal of Polymer Science*, Vol. 41, pp 79 – 93 (1973)

4 Delayed Water Vapor Permeation Into PV Module

In a desiccated edge seal, water permeation is delayed

Water captured and not allowed to move freely through the edge seal

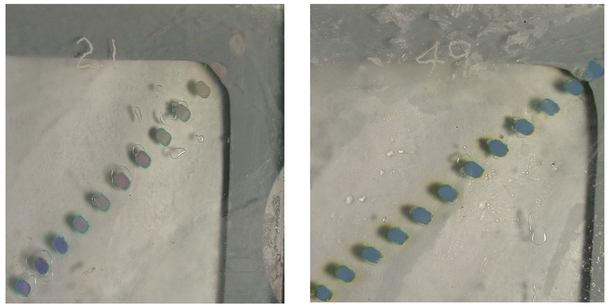


Paul, D.R. & Kemp, D.R. "The Diffusion Time Lag in Polymer Membranes Containing Adsorptive Fillers" *Journal of Polymer Science*, Vol. 41, pp 79 – 93 (1973)

5 Water Vapor Permeation into PV Module

Non-desiccated edge seal, 13 weeks at 60 °C/100%RH. Path length 15 mm.

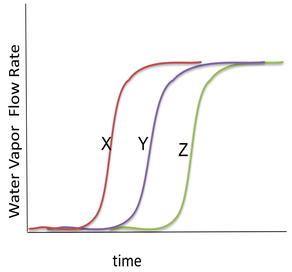
Desiccated Edge Seal, 13 weeks at 60 °C/100%RH. Path length 15 mm.



In non-desiccated seal moisture indicator dots changed color from blue to pink indicating that moisture went through the seal

6 Path Length Effect on Lag Time

- Lag time depends on presence of desiccant
- Lag time also depends on path length of a seal
- X, Y and Z represent different path lengths of the same sealant where X < Y < Z



7 Desiccated Edge Seal Effectively Reduces Water Ingress

- Reduced water concentration in TFPV increases module life
- Desiccated edge seal is necessary to provide adequate protection for TFPV from water
- Incorporation of desiccant into and an edge seal increases lag time

8 Desiccated Edge Seal Effectively Reduces Water Ingress

- Increasing lag time delays water penetration into a module
- Desiccated edge seal + Longer path length = Longer lag time = Longer module life

tru seal technologies

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