

Conclusions

A comprehensive understanding of the detailed mechanisms of edge defect formation was not within the scope of this study. However, it is likely that the observed defects are the result of one or more of several possible mechanisms:

- Low molecular weight by-products released during sealant cure can adversely affect the PVB interlayer. This was seen from the results of the polysulfides which release water and various plasticizers, along with the silicones, which release acetic acid, ammonia, alcohols or amines.
- The presence of plasticizers, solvents or other ingredients can potentially diffuse into the interlayer resulting in defects.
- Sealants in which PVB interlayer plasticizers are soluble can cause leaching of the plasticizers from the interlayer edge into the sealant.
- Moisture vapor migration through the sealants can propagate delamination.

The general conclusions drawn from this study are summarized below:

1. In general, the tendency to cause edge defects varies among sealant types, but remains fairly consistent within each sealant group for the sealants evaluated. Also, with the exception of low-modulus silicones, all sealant group defects typically plateau after a few months.
2. As a class, the high-modulus silicones tested in this program produced defects which occurred early in the exposure cycle and subsequently plateaued to 2 to 3 mm average depth. Little difference was observed between Florida and Arizona, and accelerated exposure results indicated good resistance to the effects of UV exposure.
3. Edge defects with low-modulus silicones, in general, took longer to develop than with high modulus silicones, suggesting a slower curing process. As with high modulus silicones, good UV resistance was indicated.
4. As a class, polysulfide sealant weatherability tends to deteriorate over time when exposed to UV light. Edge defects generally start very gradually but do not tend to plateau. Adhesion to glass also deteriorates with exposure time. The types and amounts of tackifiers, plasticizers, solvents or fillers can affect/improve results for individual formulations.
5. Butyl polyisobutylene tapes should not be used as primary sealant since they never cure, their adhesion to glass is poor, and the migration of some of their components to the surface of the glass increases with exposure time.
6. One- and two-part polyurethane sealants tested developed minor edge defects. Higher UV exposure tended to increase edge defect depth.
7. Cleaning with solvents like methyl ethyl ketone (MEK) did not have a long-term effect upon edge defects. This is significant because sealants should be applied to clean glass. However, care should be exercised when cleaning laminates. Laminates for this study were cleaned under laboratory conditions. Laminates cleaned in a way that permits excessive exposure of the interlayer edge to solvent could give poorer results.
8. Edge Seal Products.

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