Wood Treatment Compatibility with Insulating Glass Sealants

The vapors from petroleum-based solvents such as those found in wood preservatives, glazing sealants and wood stains/varnishes can permeate through the seals of insulating glass units, fabricated with hot melt butyl, polysulfide, polyurethane and/or silicone sealants. With dual-seal insulating glass units, the vapors can permeate through the secondary sealants and attack the primary sealant (polyisobutylene) of the insulating glass unit. Symptoms of solvent-based attacks of the primary sealant are slumping of the polyisobutylene (PIB) material into the airspace, spacer read-through, and in severe cases separation of the carbon black fillers from the PIB, as shown in Fig. IG16-1. The separation results in a clear thick liquid (drool) running down the glass, as seen in Figs. IG16-3 & IG16-4.

The resulting exposure of wood treatment solvents to insulating glass sealants can lead to the following:

- Increase moisture permeation with eventual moisture between the panes (seal failure)
- Decrease argon gas concentration and possible collapse of the airspace
- Chemical fogging of the airspace from the solvent vapor (see Fig. IG16-2)
- Degradation of the PIB, resulting in formation of a clear viscous liquid running down the airspace surfaces of the glass
- Adhesion loss of the sealants to the glass and/or spacer resulting in premature seal failure

The Window & Door Manufacturers Association (WDMA) requires the treatment of its wood components with a wood preservative as specified by the WDMA standard IS.4 “Water Repellent Preservative Non-Pressure Treatment for Millwork”. The common wood preservative solution consists of anti-fungi-mold components, as well as petroleum-based solvents. The solvents have two functions: one function enables the anti-fungi components to be put into a solution, and the second function is to act as a vehicle for transporting the anti-fungi components into the wood. Most window lineal parts are treated by dipping the wood for a brief time (3 minutes typically) into a tank containing the wood preservative solution. The window lineal parts are then moved to an area for drying where typically most of the solvents will evaporate, however if the drying process is curtailed prematurely, or if the lineals are permitted to remain in the treatment tank for an extended period of time, solvents can remain in the lineal parts. In the tightly sealed reglet of a wood sash, the remaining solvent is trapped, and when exposed to high temperatures it can volatilize - with subsequent attack to the insulating glass edge seals. The same phenomena can occur with solvent laced glazing sealants and paints/varnishes. The solvents (naphtha & mineral spirits) that are not removed from the wood in the drying process can cause the problem with the insulating glass seals.

To reduce the chance of chemical attack to the insulating glass sealant, Cardinal recommends the following:

- Window manufacturers need to have good quality assurance to ensure complete drying of their window lineal parts.
- Glazing sealants that are high in petroleum-based solvents are not recommended (check with Cardinal R&D).
- Protection of the glazing reglet of the window sash should be made to eliminate rundown from paint, stain and varnish solutions.

By following the above recommendations, the window manufacturer can assure themselves that their glazing system will not produce premature IG unit failures, due to wood treatment solvents entering the IG unit seal system.

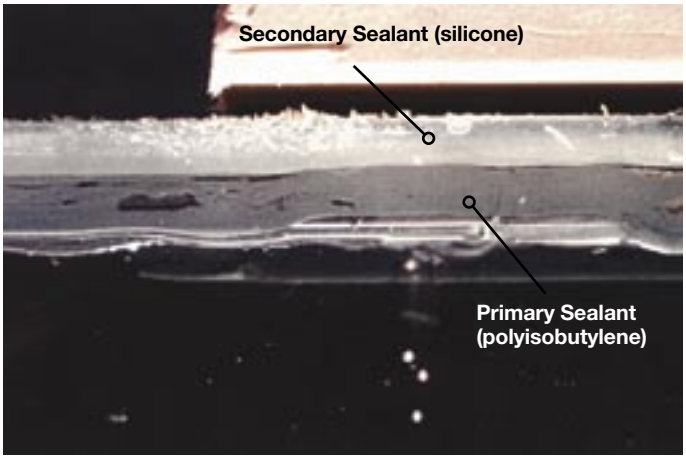

Fig. IG16-1. Effects of wood preservative solvents on insulating glass primary seal. Primary seal (polyisobutylene) shows softening, slumping, and chemical breakdown.

Fig. IG16-2. Photograph showing chemical fogging of low-E IG unit. Solvent vapors on the low-E coating results in a purple color when viewed in reflected light.

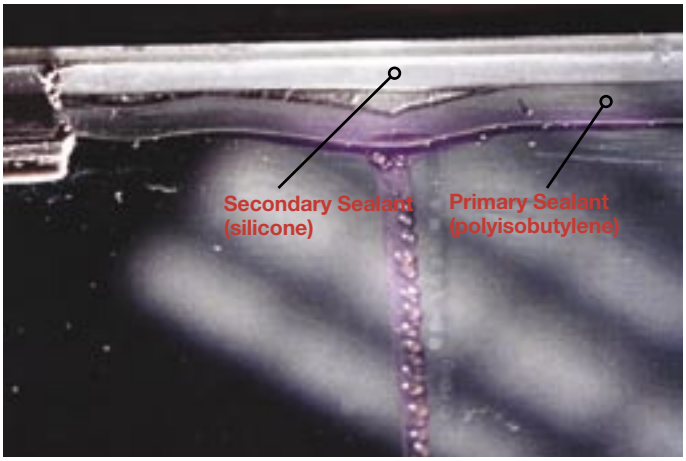

Fig. IG16-4. Close-up photograph of PIB drool, from exposure to petroleum-based solvents.

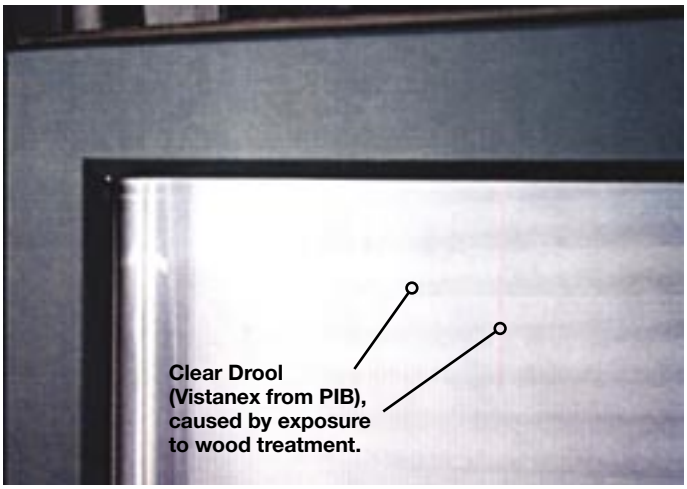

Fig. IG16-3. Photograph showing clear liquid (drool) running down the glass. Drool appears purple in color because of contact with low-E coating.