*Coping with*

# SEALED GLASS FAILURES

*By Harvey Buford*

*The author can replace a fogged glass unit on their vinyl replacement windows in about 10 minutes.*

**Improve your company's success with sealed glass by choosing the right sealant systems, glazing details, and warranties**

I sell remodeling jobs, which include a broad assortment of window products. I promote insulating glass in those windows for their energy efficiency, condensation control, and comfort. But the insulating glass available today has a serious problem. Sooner or later moisture enters the dead air space between the panes and as the dew point fluctuates, condensation fogs the view. Most homeowners expect and demand a clear view, and for many it is more important than ease of operation or energy efficiency.

### Warranties Not Advertised

In my experience, most customers feel deprived of expected value if their windows require replacement within the first 10 years of installation. But after 20 years, they accept replacement as normal maintenance akin to re-roofing or pumping a septic tank. The object then is to push the average lifespan of an insulated glass unit (IGU) well past 10 years. The builder/installer has a major say in a window's life expectancy when specifying the product and installing it.

Manufacturers' warranties cover material, but no labor, with 5 to 20 years of full or prorated coverage. You will not, however, find any discussion of warranties in the manufacturers' sales literature. I usually have to call and request this closely-held information. Needless to say, I do not have copies of written warranties to give the customer. But this is not a problem since very few customers ask about warranties anyway.

Different manufacturers seem to have different approaches to the cost of doing business, and I believe this affects the warranty length as much as does their true expectation of the IGU's life. We get the best warranty service from the suppliers we buy from the most. Our stated policy is to absorb labor costs the first year after we install, and we often choose to do repairs well beyond that point at no charge. The period of coverage runs from the date we install the unit, or from the year stamp that is visible on the aluminum spacer of the installed units, if done by others.

The weak point where moisture enters the insulating glass unit is the edge seal. Andersen and Pella used to make a fused all-glass edging like a vacuum bottle. This stayed sealed better than present units but could not be made with a sufficient dead air space to achieve good R-value. These fused units are no longer available, although PPG is supposed to be coming out with a low-e fused unit. Pella now offers both a double-glazed IGU and a non-sealed unit consisting of a fixed pane covered with a removable glass insert. The latter incorporates small vent holes to slowly exchange the air between the non-sealed panes. Pella claims a higher R-value due to a larger air space. Moisture occasionally condenses in the space requiring that the homeowner remove the panel to let the space dry, but with the benefit of no permanent seal failure.

### Sealant Strategies

IGU manufacturers have a choice of several sealing processes. Figure 1 shows a typical arrangement: A hollow aluminum spacer separates the two panes. It is tilled with a dessicant to absorb initial moisture and outgassing from the sealing plus a limited amount of moisture that intrudes from the exterior. The edge is sealed in a one- or two-step operation. Four common sealant-systems are used with the aluminum spacer. A variation is the "squiggle system," which uses a fat butyl tape that acts as both spacer and seal. A dessicant bead tills the core of the tape.

Aside from reasonable cost, sealants are expected to exhibit a balanced combination of good bonding to glass and metal, elasticity, the strength to resist wind shear and impact, resistance to ultraviolet radiation and atmospheric chemicals, low-permeability, slow aging, and ease and reliability of application during assembly.

Our standard vinyl replacement window uses a hot-melt butyl seal. Hot melt performs well over time if incompatible materials like silicone caulk are kept away from it, and if the edges of the glass unit are supported evenly reducing their tendency to shear. Site assembly, such as sunrooms and trapezoid lites, is where incompatible materials might be accidentally used. Both our replacement window and our sunroom suppliers who use hot melt offer a 10-year non-prorated warranty.

Two-part polysulfides and urethanes resist movement better than hot-melt butyl but are more water-permeable and age faster. They are often used as a secondary (outer) seal in dual-seal systems and where coatings and films are applied to the glass (see Figure 1). Hurd uses this process with a polyisobutylene (PIB) primary seal and has a 10-year non-prorated warranty.

One- and two-part silicones have excellent strength and aging properties

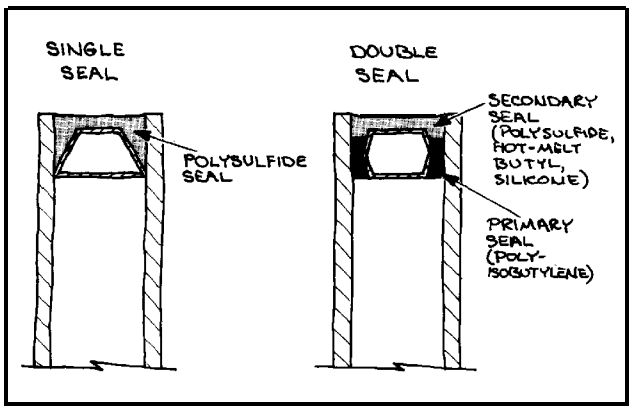


**Figure 1.** *Single-sealed units (left) are fine if kept away from incompatible sealants and if the glass is evenly supported. Double-sealed units (right) use one sealant for strength and a second for moisture protection.*

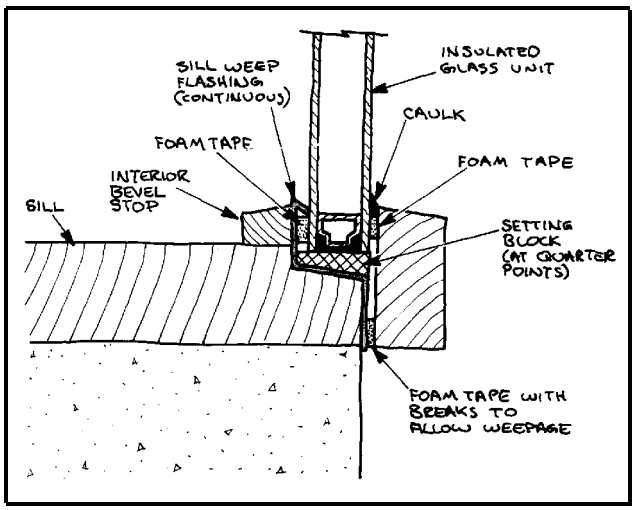


***Figure 2.*** *The sunroom design shown has a weepage channel to get rid of any condensed water that runs down the inside of the glass. The helps protect the edge seals.*

but transmit water vapor at too high a rate to be used without an additional sealant. Andersen uses a dual system of silicone and PIB which is warranteed 20 years, non-prorated.

PIB can be used as a primary inner seal with any of the preceding sealants. It adds its very low moisture permeability, excellent adhesion, and good resistance to chemicals, UV light, aging, and temperature extremes. A dual seal system using PIB is a premium system.

## Details For Long Life

Insulated glass using edge sealing has been around only since the mid-1960s. Four years ago I replaced enough 5- to 10-year-old patio door glass to realize that a limited life followed by replacement would be the norm. Should we go back to single glazing with storms? No! Today, half the busy storm-window business we do is replacing worn out aluminum storms installed 15 to 20 years ago. My current judgment is to use good quality IGU prime windows when the budget allows. When it doesn't, I hand out applications for Connecticut's low-interest energy loans. Similar programs exist in all the New England states.

Temperature, wind load, sunlight, atmospheric chemicals and water all affect window life in the field. Generally, the more desirable the view, whether seaside or mountaintop, the harsher the environment and shorter the life. Good detailing of overhangs, gutters, and wall recesses helps. Water will dissolve atmospheric chemicals and put them to work eating the edge seal Gaskets and glazing tapes are intended to keep this water away. I like the idea of weepage systems to conduct water and condensation away from the edge seal because I expect some water to get that far. We use a weepage system wit the three sunroom designs (see Figure 2) we install but most of our window suppliers omit weepage. They do elevate the glass so small amounts of water can't contact the seal.

## Replacing The Glass

Once I have the new glass on site can replace the old IGU in about 10 minutes on our vinyl replacement window. All bets are off on most other makes. Units with the double stick glazing tapes are especially time-consuming. You must either disassemble the sash at its corners, or remove some version of a stop, to get the glass out Some wood and vinyl sash have no provision for glass replacement; you replace the whole sash. We are moving toward sash replacement in all cases because it is more foolproof and a known quantity to the estimator and installer.

Good quality windows should outlast their glass. So I expect insulated glass replacement to become as common a service as upgrading already is today.■

*Harvey Buford has 20 years experience a: a contractor, building official, and sunroom and solar installer. He is currently a remodeling salesman for Shoreline Aluminum, Old Saybrook, Conn.*