Installing Fixed Glass

by Raymond Brewster

Workers set an insulated glass unit onto an extruded aluminum batten system. Suction handles help them maneuver the glass.

Designs that call for sunspaces or heavily glazed walls and roofs can often be handled with sunspace kits or commercially made sash and skylights. But in many cases, the best solution is to install fixed glass in simple framing systems built on site. If designed well, these glazing systems are economical and durable. And they give the designer great flexibility in the size, shape, and type of glazing.

Although installing insulated glass units (IGUs) is not that difficult, there is no trade that specializes in the craft. Commercial glass dealers often have little knowledge of framing, while building contractors don't know glazing tapes and setting blocks. To successfully install or repair fixed glass, a builder needs both skills.

I've built and repaired many sunspaces, and I've learned from the rehabs that some designers and builders take on sunspaces without knowledge of the right materials and techniques. Glass can be quite an unforgiving material. One leak in a glass system will make a system defective the day it was built, and it will deteriorate over time. Here's an overview of some of the proper materials and techniques, as well as some of the pitfalls of installing fixed glazing.

Choosing the Glass

Standard-size IGUs are a popular and economical choice for sunspaces. Common sizes are 28x76 (inches), 34x76, and 46x76. (In larger installations, 8-foot-long units are sometimes used.) These standard sizes are made for patio door replacements, and, at approximately $4.50 to $5.50 per square foot, are less expensive than custom sizes.

Tempered glass. Standard IGUs are generally tempered glass, the type that crumbles into small pieces when broken. This type of glass is now required by law in glass doors. It is advisable to use tempered glass in vertical installations at ground level to minimize injuries in case of direct impact with a pane. Tempered glass, while otherwise amazingly strong, can be shattered by sharp impacts.

For sloped-glass systems where some of the glass goes overhead, the shower of small fragments from broken tempered glass is a hazard. In these cases, it's best to use tempered-over-laminated glass. This type of IGU costs approximately $15 per square foot at glass dealers. The sheet on the interior will crack on impact but not fall out in a dangerous shower of fragments; the pane's perimeter seal generally holds all the pieces together. The tempered sheet on the exterior resists impacts.

Seals. Not all IGUs are of the same quality. The seals around the perimeter of the units can be made of various substances, but the most common types are hot butyl (polybutylene) and silicone. Knowing which type you are using is important, because the seals are finicky. Many common caulks can come in contact with the seals on siliconed units. However, some caulks, including silicone, should not touch butyl seals. The best units are double-sealed with a butyl inner seal for moisture protection and a silicone outer seal for its strength and flexibility.

On-site installation of sloped and vertical glass demands quality materials and careful workmanship

Sometimes the amount of rubber sealing the two panes of a unit is minuscule at points, making the seal vulnerable to damage. Examine the seals of any IGU you buy to see if there are visible flaws. If a seal is faulty, or fails once installed, the pane will usually fog up due to moisture from the warm side getting inside the air space and condensing. If this happens, the IGU needs to be replaced.

Detailing important. Good details are essential to preserving the integrity of the seals. Regardless of whether glass is in a vertical or sloped installation, special care has to be taken to ensure that the weight of both the inner and outer panes is supported equally at the bottom edge. If the inner (or bottom) pane is supported firmly while the outer (or top) pane is not, the resulting sliding motion can break the delicate seal on the unit. Such "shearing" can occur in any type of installation, but is more commonly found in sloped-glass jobs.

Because so many builders fail to install sloped glass properly, many glass dealers will not guarantee glass put in sloped installations, regardless of how well it is done.

Another thing to keep in mind is that sunlight will break down an IGU's rubber seal. Be sure that your trim details will cover the seals from

Figure 1. *Glazing posts and rafters must be strong and dimensionally stable to prevent excessive movement. Douglas fir in Clear or B-grade is the author's favorite for sunspaces. The horizontal divider makes an attractive shelf.*

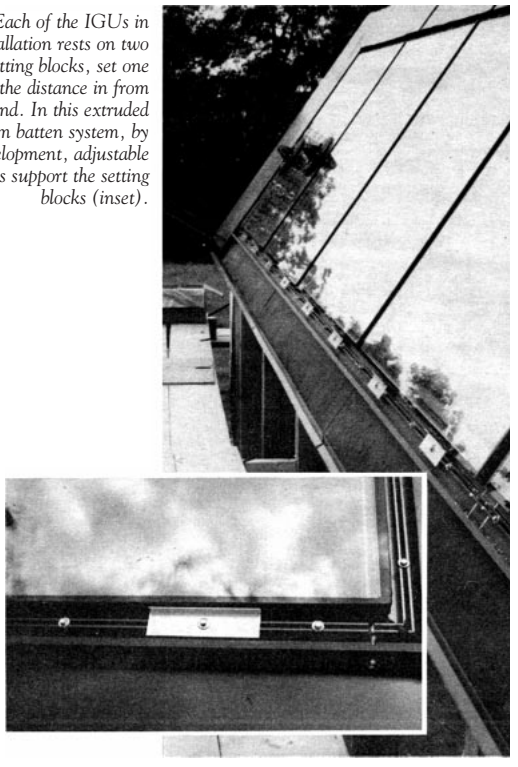

Figure 2. *Each of the IGUs in this installation rests on two neoprene setting blocks, set one quarter of the distance in from each end. In this extruded aluminum batten system, by Idea Development, adjustable brackets support the setting blocks (inset).*

direct exposure to the sun.

Getting Framed

Getting a high degree of precision in a sunspace foundation is even more important than it is in ordinary house construction. Make sure any slab or frost wall under a sunspace is as level and straight as possible. The opportunities you typically have to "fudge" just aren't there in a wall essentially sheathed with glass.

Even greater precision and care are needed in the framing of a sunspace. Framing for fixed glazing has to sit in a perfectly flat plane, or the seals may open up. Also, the reflections off a large glass system will show up any twisting of the glass. Don't skimp on framing lumber, because unless you use good quality wood, all your care and skill go for nothing. And even if you use the costliest framing materials, they'll still be an insignificant part of the total cost of a sunspace.

Ideal lumber for glazing rafters should be strong and dimensionally stable; you want it to stay straight and flat over time, and not have any bothersome problems such as oozing pitch pockets, wane, bad knots, and so on.

Builders familiar with lumber will realize that very little of it meets these requirements. A favorite of ours in sunspace construction is Douglas fir of No. 1 or even Select grade (see Figure 1). Though not as strong as Doug fir, good redwood makes good glazing rafters, but the cost may be prohibitive. Most common framing softwoods used around here give results ranging from mediocre to disastrous.

Avoid pressure-treated lumber. Particular enemies of long-lasting, precise glass installations are pressure-treated (PT) wood, rough-sawn or green dimensional lumber, and, to a lesser extent, spruce-pine-fir framing lumber. Think about your experiences with these woods and the problems for glass are self-evident.

PT is a particular problem, since it is usually fairly wet and may tend to warp and twist. Also, most adhesive glazing tapes stick poorly to PT because of the chemicals. Many customers will object to the use of PT in what is really an interior application, especially in a setting where foods are sometimes grown or consumed. It's generally not necessary to use rot-resistant woods for anything but the mud sill that sits in contact with concrete.

Vertical vs. Sloped

Glass has to be installed and sealed carefully in vertical walls, and even more carefully in sloped systems. With vertical glass you can, with skill and luck, get away with good wood batten systems to hold the glass in place and seal the joints. I've seen acceptable results using clear red cedar, redwood, or mahogany battens, but I've also seen disastrous results using most other types of wood. Wood batten systems are more likely to survive in systems sheltered from the full brunt of weather by overhangs.

Sloped glass is much trickier. In addition to taking more of a beating from the weather, there are structural considerations, since the weight of the glass itself may tend to deform the glazing tape that it's set on. With sloped glass, stay away from wood battens. You're much better off with the extruded aluminum batten systems, described below, that are now available from a number of suppliers (see "Sources of Supply," page 41).

Setting your blocks. Many glass dealers provide neoprene rubber setting blocks with the glass they sell. An ideal block for insulated glass is 1/4 inch thick by 4 inches long by 1 inch wide. Whether in sloped or vertical position, support each IGU on two setting blocks placed about one quarter of the way in from each corner along the bottom edge (see Figure 2). The two support points should share the weight of the glass unit equally. And make sure that the setting blocks are flush with the outside pane of the IGU, to avoid the shearing effect mentioned before.

Vertical Installations

In vertical installation the IGU can be set in one of two ways: either *between* the wood framing members, resting against stops, which I refer to as the "flush" method; or outside the framing, resting against the framing members, which I call the "offset" method. Either way, the IGU must be firmly supported at the bottom by a sill or other positive stop that is square, i.e., at 90 degrees to the unit. The bottom batten, or trim, should be particularly well sealed, and should present a sloped surface on the outside so it can't trap water.

Flush method. When setting an IGU between the framing members, allow 1/4-inch tolerance around all edges of the glass. Check the diagonals of all openings to ensure that they are square; never attempt to force glass into an opening that isn't right. With 2x framing the IGU typically rests against stops, usually of 1x lumber, attached to the sides of the framing (see Figure 3). For a neater appearance inside, you can use the same general method with 4x lumber. In the outside-facing edges of the 4x4s, cut a 3/4-inch-wide rabbet to the proper depth, typically 1 inch, and then set the glass into this rabbeted frame.

Whether you use 2x lumber with stops or wider lumber that's rabbeted, the outer surface of the installed glass should be close to flush with the outside edges of the framing. Care has to be taken to work out a detail at the bottom of a row of panes that is well sealed. Also run a "safety" bead of sealant along all batten-to-glass joints for extra protection. Keep in mind that when using wood battens you should prime any surface to be caulked, as silicon caulk will not adhere well to the porous surface of untreated wood.

Offset method. This method of installation is in many ways easier, and some would say, cleaner-looking than the above, particularly from the inside. With the offset method the IGUs sit on top of, or

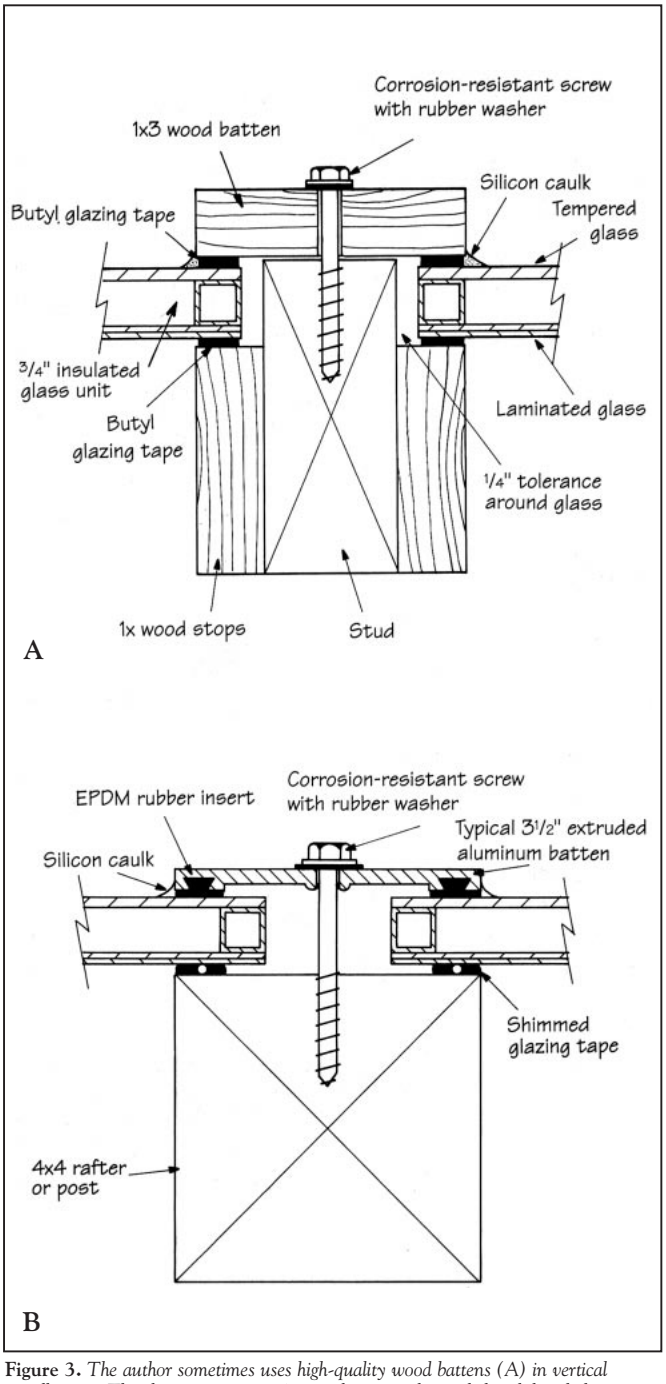

Figure 3. *The author sometimes uses high-quality wood battens (A) in vertical installations. The glass rests against 1x wood stops and is sealed with butyl glazing tape. For sloped installations, aluminum battens (B) work better. EPDM inserts and silicon caulk form a good seal against water penetration.*

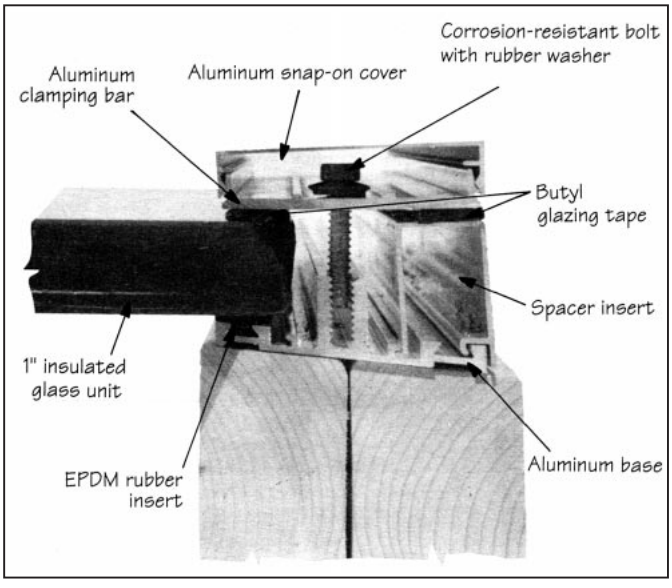

Figure 4. *This aluminum glazing system, made by Idea Development, uses EPDM rubber inserts underneath the glass, which allow the installer to adjust the glass as needed. The batten is then set on sticky butyl glazing tape for a good top seal. A cap snaps into place to cover the bolt heads.*

fully outside, the framing members, overlapping the posts by as much as an inch. This inch of overlap — you can get away with less — allows a little bit of tolerance in framing. It also assures that the IGU seals will be well protected from sunlight by slightly wider battens, either wood or aluminum.

Glazing tape. For vertical glass systems, glass can be set against ordinary butyl glazing tape. The soft tape is usually 1/8 inch thick by 3/8 inch wide, is sticky on both sides, and forms an airtight seal between the glass and the framing member or stop system. It is inexpensive: about $6 to $7 for a 25-foot roll. As long as everything is fitting together nicely, vertical glass systems may also make use of foam glazing tape, similar to foam weatherstripping but very sticky on both sides, and usually measuring 1/8 inch by 1/2 inch.

Sloped Installations

Unlike vertical glass installations, which may use ordinary glazing tape, sloped-glass systems *require* the use of so called "pre-shimmed" glazing tape. This special tape looks like the ordinary stuff, but contains a hard rubber cord down the center. This cord or shim prevents the weight of the glass from squeezing out the seal, resulting in leaks and possible movement of the glass units. If you use regular glazing tape in sloped installations, such "squeeze-down" is virtually guaranteed. The pre-shimmed tapes are typically 1/8 inch thick by 1/2 inch wide. Expect to pay about $9 a roll.

Aluminum battens. For sealing a sunspace's glass system, nothing rivals extruded aluminum battens specially designed for the purpose. These battens usually have either a ridged area designed to grip glazing tapes, or a pair of channels which accept special EPDM rubber gaskets designed to seal tightly against glass. Different widths are available for different framing details, and a variety of finishes and colors are available. The simplest type of extruded aluminum batten is a single piece that seals against the surface of the glass panes with EPDM rubber inserts (see Figure 3B). It is wise to augment this sealing with a fine bead of good-quality silicone caulk.

Metal battens can get more elaborate (and costly); some involve two or more components. Many aluminum batten systems use a component which goes under the glass as well as the one which goes over it; these are commonly called double battens (see Figure 4). Some of these double battens, such as the ones made by US Sky, include a small "gutter" on the under component to allow any condensed water to run neatly away. However, moisture condensation on the warm side of double-glass units is usually not a serious problem in residential sunspaces. With two-piece battens, the row of screw heads is typically hidden by snap-on covers.

Another item that's useful is a batten specially made by Idea Development for horizontal use. It's called a horizontal clamping bar, and is well designed for the top or bottom of a row of glass, or for covering the troublesome joint between an upper and lower row of IGUs in a two-tiered sunspace. This component can save you from having to improvise a Z-flashing between an upper and lower row of panes. The horizontal clamping bar presents gently sloped edges both top and bottom, avoiding any ponding of water.

The cost of these aluminum batten systems ranges from around $2 per lineal foot for the simplest one-piece battens to about $5 per foot for the horizontal clamping system. But for keeping out the weather and lowering maintenance costs, that's cheap insurance for an overhead glazing system. ■

Ray Brewster builds and repairs sunspaces in Lyme, N.H.

Sources of Supply

The following companies manufacture and sell extruded aluminum batten systems.

Idea Development, Inc.
PO Box 44
Antrim, NH 03440
603/588-6544

Rocky Mountain Solar Glass
7123 Arapahoe
Boulder, CO 80303
303/442-4277

US Sky
2907 Agua Fri
Santa Fe, NM 87501
505/471-5711