GLAZING A Custom Sunroom

Build a stable frame, use dedicated system components, and redirect interior condensation outside

by John DeCiantis

There's nothing quite like a room with a full glass roof to capture the warmth of the sun. But all that overhead glazing can also collect a lot of condensed moisture when it's cold outside and warm within. On sloped glazing, the water drips and stains the woodwork; in extreme cases, the sunroom environment also supports mold growth and wood rot. A glazing system that allows condensation to weep to the outside is critical to the long-term success of a custom sunroom.

Component System

On a recent job, we built a custom, free-standing sunroom using Summit (Jeld-Wen, www.summitwindows.com) vinyl custom picture, awning, and trapezoidal units for the vertical glass, and three motorized Velux venting roof windows on the north-facing roof slope. Automatically controlled by thermostat and rain sensors, the roof windows allow cooler, fresh air to convect up from the low-mounted awning window vents. We also installed a separate,

thermostatically activated power vent to further control indoor temperatures. For the array of 3x9-foot fixed glass panels on the south-facing side, we used Pro-Seal glazing bars (Abundant Energy, 800/426-4859, www.abundantenergyinc.com), a versatile glazing system for sloped and vertical applications. Pro-Seal's glazing bars are made of extruded aluminum in a white or bronze finish and fit various glass thicknesses from 1/4-inch single-pane to 1-inch insulating glass. The bars come in 20-foot lengths, shipped by common carrier, or they can be factory-cut to lengths under 8 feet and shipped by overnight carrier. Since the components are field cut and installed, the shape of the glazing panels can be customized to suit eccentric or irregular openings. Panel size is limited only by the size of glass that can be manufactured.

The glazing bars come in various component profiles to make a complete

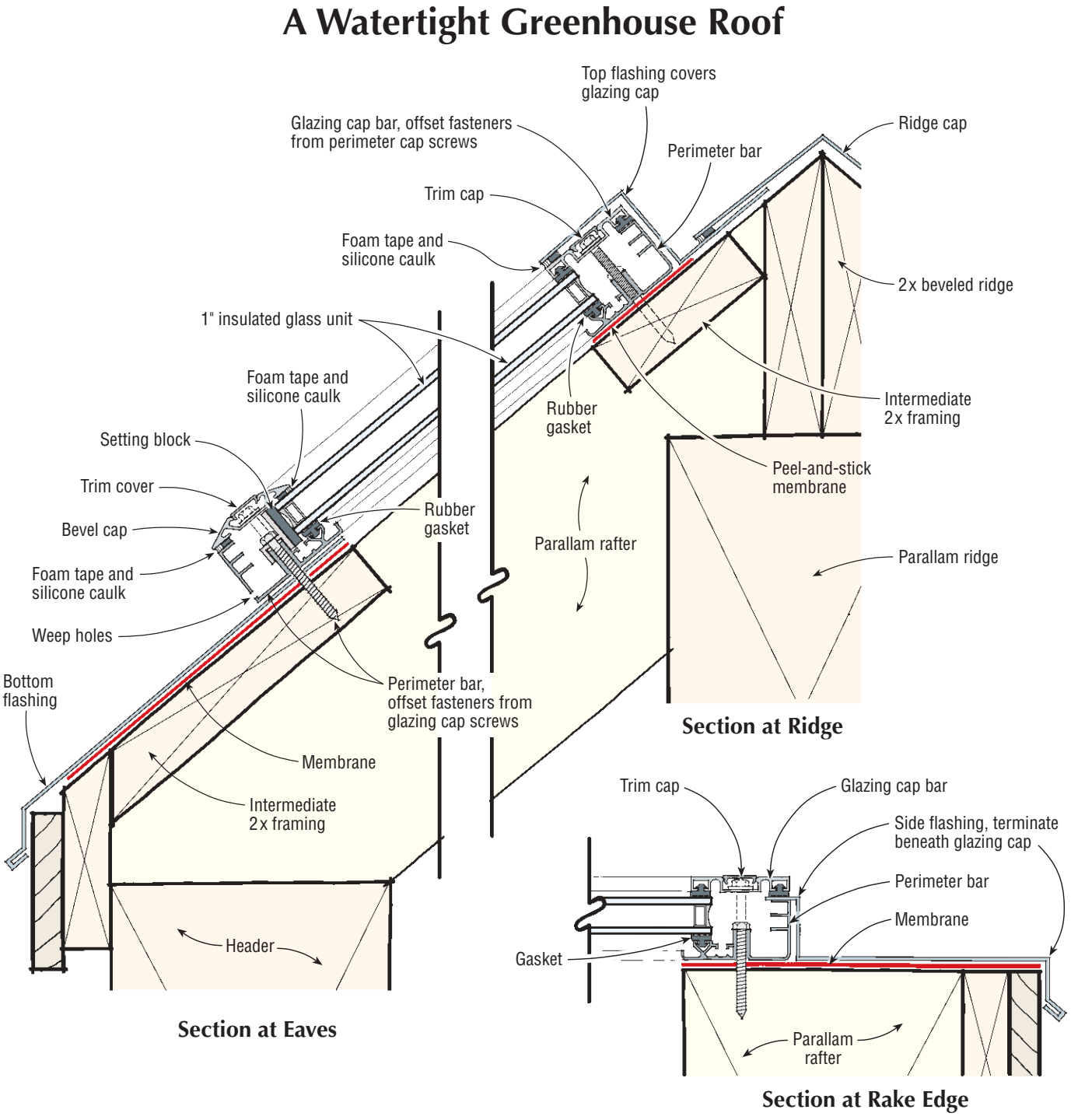

Figure 1. The Pro-Seal glazing system uses extruded aluminum profiles to clamp the insulated glass units between watertight rubber gaskets.

system. On this job, we used perimeter extrusions on the top, bottom, and sides, and mullion profiles for the vertical divisions between glass panels. A bevel-topped purlin made for intermediate horizontal divisions is also available.

Each component of the assembly consists of four parts: a gasketed base, or bottom bar that rests against the framing and receives the glazing panel; a gasketed glazing cap that clamps over the glass; continuous EPDM (ethylene propylene diene monomer) rubber gasketing; and a trim cover to conceal and protect the clamping screws (see Figure 1, previous page). The perimeter glazing bar is available with or without a thermal break strip separating the inner and outer surfaces.

Structural Support

Pro-Seal is strictly a nonstructural, or "skin," system and must be fastened to a wood or metal supporting frame. On this frame, we used 4x8 Parallam rafters, lag-bolted over an 8x16 structural Parallam ridge beam. While certain solid lumber species, such as Douglas fir or cedar, may be acceptable, stability is crucial. A wood frame that shrinks, twists, or allows excessive movement will spell big trouble for any glazing system. For this reason, pressure-treated lumber and green lumber are especially poor choices.

On the south-facing side of the building, which is fully glazed, we joined the wall corners and mullion posts to the roof framing with custom-welded 1/2-inch-thick steel moment connectors to resist wind racking. The north-facing walls and roof had conventional framing with enough sheathing to provide sufficient stiffness.

There are no rough openings in a custom sunroom; it's finish work from the beginning. The upper edge of the sloped framing supports the glazing system and must therefore be as true and square as possible. Headers must be flush at the top with the rafters, and any bumps or crowns must be planed flat. Everything lays out on centerlines; the extruded aluminum bars are a consistent 2 1/2 inches wide and have full-length centerlines inscribed on them to help with alignment.

Figure 2. As an extra precaution against condensation staining, the author lined the top edge of the rafter framing with a self-sticking rubberized asphalt membrane.

Figure 3. The crew used soapy water as a lubricant to help seat the gaskets in their raceways (left). Because the gasket material has memory, or a tendency to shrink back to its original form after stretching, it's important to install the gasket strips long and let them shrink for several hours before final trimming. The top perimeter bar is installed first, with mitered ends, then the side bars (below).

When we had completed the framing, we covered the rafter tops with a peel-and-stick membrane underlayment to prevent any possible condensation from contacting the wood (Figure 2). At the eaves, we installed custom-bent aluminum apron flashing that runs from the bottom edge of the roof opening over the edge of the roof.

Assembling the Parts

Before installing any of the extrusions, we pressed the EPDM gasket

material into its intended raceways (Figure 3, previous page). Each gasket should seal tightly against intersecting and adjacent pieces. Therefore, it's a good idea to allow the gasket material several hours' rest before final trimming to recover from possible stretching.

The first extrusion installed is the head member, which runs across the top of the openings, the full length of the glazing area. We predrilled the base of the perimeter bar with a series of holes, starting 2 inches in from each end and spaced 15 inches apart, for fastening the bar to the framing with the #10x2-inch stainless-steel screws provided. The prescriptive spacing ensures that there'll be no conflict with the cap-bar screws that are installed later, on 12-inch centers. The inscribed centerline in the underside of the bar helped prevent the 7/32-inch drill bit from wandering off center. Each end of the head piece gets mitered to the perimeter sides.

The perimeter sides are square-cut at the bottom ends, while the intermediate vertical members are square-cut at both top and bottom.

Bottom perimeter members are cut to fit between the mullions. It's important to drill the required 3/16-inch weep holes, one at either end of each bottom bar, before installation. Drilling later risks punching through the extrusion and chipping the glass edge. Nicking the edge of tempered glass courts disaster, as the sheet may spontaneously shatter into thousands of glittering "dice." The weep holes drain the interior gutter system and prevent condensation from overflowing onto and staining the supporting wood frame. Because of the importance of positive gutter drainage, the Pro-Seal system should not be installed on roof pitches less than 3 in 12.

Figure 4. Vacuum cup grips make large, heavy glass panels easier and safer to move.

Glazing

With the complete base-bar layout screwed to the frame and the gaskets

Figure 5. Because every overhead glazing job is different, flashings are custom-bent on site. The first installed is the eaves flashing (above), which goes on before any glazing bars. After the glazing is in place, the side flashings are installed (right).

set, we're ready for glazing. We use 1-inch insulating glass, with a laminated interior panel and a tempered exterior panel. If, by chance, the glass is hit and breaks, the exterior panel will break into small, harmless pieces; a bonded plastic sheet prevents the interior panel from shattering and catches the fragmented outer panel, preventing harm to anyone below. We ordered the interior panel with a low-e coating on the side facing the insulating void, as much to help reduce interior condensation as to control heat loss.

Pro-Seal uses a pair of 4-inch-long rubber setting blocks, screwed to the bottom perimeter bar of each panel section, to fully support the double edge of the glass panels. Neglecting to support the entire edge of an insulating glass panel — both the inner and outer panes — is a major cause of seal failure in sloped glazing. If only the bottom (inner) pane is stopped at the base of the panel, the upper panel may "creep" downward and rupture the seal. Generally speaking, thermal glass fabricators will not guarantee against seal failure in sloped glazing applications, especially when they're not in control of the installation.

The glazing panels are heavy as well as fragile; four of us working together boosted them onto the staging and lowered them into place. We used glazier's vacuum cup grips to handle the panels (Figure 4, previous page). A pair costs around $150, well worth it if you frequently install glass panels or mirrors.

Flashing

Because of the custom nature of each installation, flashing isn't included with the glazing bars. Pro-Seal recommends using minimum .032-gauge aluminum flashing to prevent rippling. We bent the profiles on a 10-foot brake, using bronze coil stock to match the system components. The manufacturer provides good detail drawings in its design manual.

The eaves flashing goes on first, before the extrusions are installed (Figure 5, previous page). After the glazing panels were in place, we installed side flashings, which overlap the apron flashing with a 45-degree end cut, giving the appearance of a mitered joint. The overlap is set in silicone caulk and secured with a few stainless-steel screws. The design manual offers two methods for sealing the side flashing to the glazing system: by running it flat beneath the side perimeter bar, or by making up-and-over right-angle bends and clamping it under the glazing cap and gasket. We decided to go with the second, more surefire method.

The head flashing breaks up and over the top perimeter bar to fully cover the glazing cap. A strip of foam-backed tape between the flashing and cap bar closes any gaps and serves as a backer rod behind a final bead of silicone caulk.

Glazing Caps

The gasketed glazing cap serves as the primary barrier to water intrusion around the glass. Because you can expect aluminum to expand in hot weather, the design manual requires butt joints in the cap to have a minimum 1/8-inch expansion gap, to be filled with silicone caulk. However, the EPDM gasket must be cut long to bridge the gap and butt snugly against adjacent gasketing. The glazing cap gets drilled every 12 inches for the 1/4-inch gasketed stainless-steel machine screws that connect it to the base extrusion (Figure 6). A running depression in the cap creates a recess for the fastener heads. The heads are finally concealed by a snap-in trim cover strip that must be gently tapped into place with either a wood block and hammer or a rubber mallet. A good grade of silicone caulk on all the joints and intersections tops up the glazing system.

The Pro-Seal design manual is detailed and clear. When properly installed, the system will remain leak free for a long time. We've been using this system for 15 years and have many satisfied clients.

Figure 6. Attaching the gasketed glazing cap makes the installation watertight. A snap-on cover trim will hide the screw heads.

John DeCiantis *owns DeCiantis Construction in Stonington, Conn.*