Wood-built “stick” walls come in two sizes: 2x4 with plywood on the outside and drywall on the inside to create a wall thickness of 4⅜ inches, and 2x6 that provides a total wall thickness of 6⅝ inches. This makes it easy for window manufacturers to produce standard jamb depths. And since windows in wood-frame construction are always set in wood, installation is relatively easy. Many window manufacturers make installation even easier by attaching a plastic “fin” in the window jamb at the right depth. The fins come with predrilled holes for screws or nails, so workers can quickly position the windows flush with the wall surfaces and fasten them.

Concrete walls, on the other hand, are challenging for manufacturers because there are many different building systems, each with unique requirements.

The Challenge

Only a few companies specialize in making windows for concrete walls—usually basement windows for foundation walls. Over time they’ve developed units that install easily. Manufacturers of traditional wood-frame windows, however, are beginning to notice concrete homes; some are watching the interest level in concrete housing to determine future product development.

All of the major manufacturers are, however, making windows that meet the special needs of hurricane states where building codes mandate window glass with high impact resistance and attachments between window jambs and building frames that will withstand code-specified wind loads. Florida, with the most stringent wind codes also leads the nation in concrete home construction—causing window manufacturers to

Above: Fortunately for concrete homes, the buying public favors thick exterior walls. Window openings can help to achieve this look. The wood trim shown here provides a nice way to finish a window well for this ICF home. Left: Using the PVC plastic window buck system by Vinyl Technologies, workers can quickly assemble the buck to any size window. The reusable corner braces keep them square and support the buck during concrete placement.
develop products that meet the code requirements for both wood and concrete homes.

WHAT’S DIFFERENT ABOUT CONCRETE?

The greatest difference between wood-frame and concrete construction is the variety of concrete home-building systems. They fall into four general categories: cast-in-place removable forms, insulating concrete forms (ICF), precast concrete, and concrete block (CMU). The primary construction issues for window manufacturers are wall thickness, the attachment system, and moisture movement between jambs and walls.

Until concrete home-building systems standardize wall thicknesses, window manufacturers will find it difficult to produce a standard “off-the-shelf” window for concrete walls. Removable form homes have typical wall thicknesses of 4 or 6 inches plus the thickness of the insulation. ICF manufacturers, according to Pieter VanderWerf, Building Works, Brookline, Mass., produce wall systems with as many as 50 different thicknesses. CMU walls are typically 6 or 8 inches thick plus insulation and inside and outside finishes. Precast walls can be any thickness the customer wants. Window manufacturers will probably meet this challenge by selling standard windows with custom jamb extensions included with each unit.

The second most important difference between wood-frame and concrete is that there are different methods for attaching windows to concrete walls—influenced in part by the location of insulation on or in a wall. ICF systems have 2 inches of expanded foam on both sides of a wall. Removable form concrete wall systems place foam insulation on either side of the wall or in the center (referred to as a “sandwich panel”). Precast wall systems are increasingly using the sandwich panel approach.

WINDOW BUCKS

Rough openings (inside the window buck) are different for windows designed for concrete walls versus wood-frame walls. Anthony Head, the Regulatory Product Planner for Marvin Windows, Warroad, Minn., says that the shim space for wood construction should be ½ inch, but only ¼ inch for concrete walls. It’s also important that pine jambs not come in contact with concrete because rotting can result.

The selection of a window buck system determines how windows will be attached to walls. A buck is the form used to block out openings for doors and windows in concrete walls. It is either removed after concrete placement or left in place to become the attachment point for windows. Some form manufacturers sell removable metal bucks that block out for standard window dimensions. Pressure-treated, rot-resistant wood is the most often used forming material for bucks that are left in place and anchored to the concrete for attaching windows.

PVC plastic window bucks are also increasingly popular. Vinyl Technologies, Logan, Utah, makes a product called “VBuck,” which is fast be-coming the standard for ICF construction. It is shipped in 16-foot lengths that workers onsite cut to the proper size and insert the corner pieces to the ends. Removable galvanized steel corner braces keep them square and support the buck during concrete placement. The buck also surrounds the ends of the ICF forms to provide them with support. A fin in the center projects into the concrete for anchorage. Afterwards, windows are anchored to the PVC with screws. Justin Anderson, Vinyl Technologies’ president, adds that it’s important to drill holes in the bottom buck to allow air to escape during concrete placement.

THE RECESSED LOOK

Thick walls are in vogue. Recessed windows can help create this look. Dave Pfanmiller, Security Built Homes, Raleigh, N.C., says its removable form concrete wall system is 6 inches thick, including 2 inches of insulation. He in-
installing windows in precast–double wall panel

Fig. 3. Using double-wall precast panels there’s the opportunity to install windows from the inside. This is how windows are fastened.

stalls windows designed for 2x4 stud walls (jamb widths of 4 7⁄8 inches). To make this work, his company constructs window bucks from 2x6 pressure-treated lumber, nailing 1⁄2-inch plywood gusset cross braces to the outside to make a 6-inch width and also to brace the frame. Next he rips the buck to 4 7⁄8 inches wide to match the width of the window jamb then re-attaches this “ripper strip” to the buck prior to concrete placement. Afterwards he removes the strip to provide the recess. (See Figure 1.) His company usually installs a wood sill and drywall on the other three sides, careful to follow the window manufacturer’s air space requirements between the buck and the jamb.

VanderWerf says that it’s also possible to create what he refers to as “stucco bucks.” (See Figure 2.) This involves recessing the outside of the window jamb a couple of inches from the outside wall surface, exposing the edge of the insulation. Polymer cement finishes are then placed over the insulation edge to give the impression of a thick wall on the outside.

With CMU walls, window jambs made from wood or metal designed for particular window products are often set into window openings during the construction of the wall. Windows are easily attached to the jambs afterwards.

Dukane Precast, Naperville, Ill., uses a particularly interesting method for window installation. It manufactures precast “double wall” panels for home construction which have 2 3⁄8-inch concrete wythes (panels) on each side and a 3 1⁄4-inch-thick void in the center, filled with a soybean derivative foam insulation. Brian Boch, Dukane’s director of marketing, says that by increasing the inside wythe opening, windows can be installed from inside the building. Workers use the fin strip that comes mounted on the window and secure it to the outside wythe with screws rated for use in concrete. (See Figure 3.) The walls are 8, 10, or 12 inches thick, so the window is recessed on the inside. The recessed area is trimmed with wood or drywall, and the window molding covers the wythe opening.

Providing waterproofing details

Planning for waterproof connections between walls and windows is very important, and is best done before wall construction begins. Unfortunately, it often happens after the walls are constructed, causing remedial solutions.

Framing carpenters typically install windows. But Julio Chiarella, manager of the Architectural Services Commercial Group for Pella Windows, Pella, Iowa, thinks that workers specifically trained for window installation should do the work. His company is encouraging its distributors to install the windows since they are the most familiar and experienced with the issues and details that affect weatherproofing.

Chiarella recommends a three-step approach to moisture control. The first level of defense is to design the opening for a 3⁄8-inch-wide space between the window and the finished outside wall surface. This gap is filled with sealant. The second level of protection is the application of a “peel-and-stick” waterproofing tape between the window buck and the jamb. The tape must have good temperature and weather resistance, and be compatible with sealants. Chiarella’s third step is placing a caulk sealant between the inside wall and window jamb. “Winds cause positive pressures that can push water and air through walls. During the winter months many furnaces cause negative air pressures inside homes, which sucks moisture and air inside from leaks around windows and other places. An inside sealant helps to prevent that.”

What manufacturers are doing

European concrete building systems are more advanced than those in the United States, where wood construction has dominated. But U.S. concrete housing is growing now, and so is the development of systems for window and door installation, HVAC, electrical, and other home systems for concrete buildings.

As noted previously, some of this development is due to concrete home construction in hurricane areas. Wind code requirements in many states now mimic the Florida requirements, so large window companies like Pella, Marvin, and Anderson are designing windows to meet these code requirements and to provide more effective installations.

Head says that Marvin Windows has solved the problem of variable width walls by offering jamb extension kits with their standard-sized windows in 1⁄8-inch width increments to work with any wall thickness. This is becoming standard for their window orders.

Pella Windows established a service to help customers plan for window installations. Chiarella says Pella consults on 300 to 400 projects each week to help work out installation details.

These big window manufacturers now compete with the manufacturers of basement windows who have considerable experience with easy attachment systems for concrete walls. Benefiting from this, some of the basement window manufacturers are moving above grade, providing quality vinyl windows for concrete homes.

Progress on the development of window systems for concrete homes has paralleled the slow-growing popularity of concrete homes. Now that concrete home construction is poised to take off, the major window manufacturers have taken an interest and new, simpler systems, and some standardization, should soon emerge.