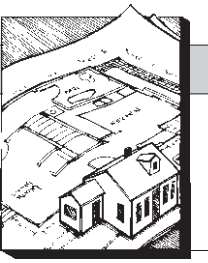

Exterior Joints That Keep Water Out

by Gordon Tully

Many of my working hours are spent envisioning how water will enter a building, in order to keep it out. While water can enter through deteriorated surface materials, most leaks occur at inadequately designed field joints. This is a quick look at various strategies for sealing joints.

Gunk

There are two basic forms of gunk used to seal joints: paint and caulking. Both are used too often and in the wrong places. For example, in many traditional exterior railings, the balusters sit on a lower rail, creating a joint that is sure to rot. The common solution is to paint the sucker and hope the paint will keep the water out.

It will — until it cracks. Older paints on dense, first-growth wood might keep such a joint sound for a long time. But with today's young wood, don't count on it. A good rule: If stain wouldn't adequately seal a joint, don't expect paint to.

Many builders apply caulking as if it were glue. Caulking is not glue. It works only when it is securely bonded to the two sides of the joint, prevented from bonding to the back of the joint, and thick enough to withstand the expected movement. Make sure you don't make the gap too small to seal effectively. Even the best sealants and caulks, bonded well in optimum conditions, stretch to only twice the width of the joint they're sealing without opening. More typically, you'll get stretch from 10% (with butyl and acrylic latex caulks) to 25% (polyurethane) or 50% (using the best silicone). Size the joint accordingly.

Seals and Gaskets

By seals, I mean gizmos like the flexible v-strip used in door and window weatherstripping.

Gaskets are used to seal pipe joints and to weatherstrip doors and windows. For a gasket to work, the joint's movement must be carefully controlled, and the gasket must be able to expand and contract enough to keep the joint closed. Bulb weatherstripping generally does this best.

Interlocking Joints

Interlocking joints are used almost exclusively in fabricated metal, such as standing seam roofs or flashings. Such joints must be designed to stay watertight while the metal expands and contracts. Standing seams and crimped joints can transfer thermal stresses for long distances. This can create stress concentrations at corners, which can cause the buckling, shearing, and wrinkling failures one often sees in metal roofing.

Taping

Many materials, notably house wrap, vapor barriers, and ductwork, can be taped together. I don't recommend ordinary duct tape for any of these applications; instead, use one of the special tapes made for house wrap, such as Sheathing Tape #1585 CW-2 from Venture Tape Corporation (30 Commerce Rd., P.O. Box 384, Rockland, MA 02370; 800-343-1076), Tyvek House Wrap tape (Cantech Industries, P.O. Box 1432, Johnson City, TN 37605; 800/654-3947), or 3M Contractors Sheathing Tape #8086 (3M Contractors Products, St. Paul, MN 55144; 800/362-3456). Tape won't stand up to the weather for long, however, so taped joints should be either indoors or protected behind other weather-resistant materials.

Battens

A batten is a piece applied over a joint between two other pieces. Consider that a window or door casing is actually a batten, and you can see that the batten is a basic tool for excluding water.

Vertical battens, such as corner boards or jamb casings, can simply be nailed in place. But horizontal battens, such as the casing at the

Watertight Windows

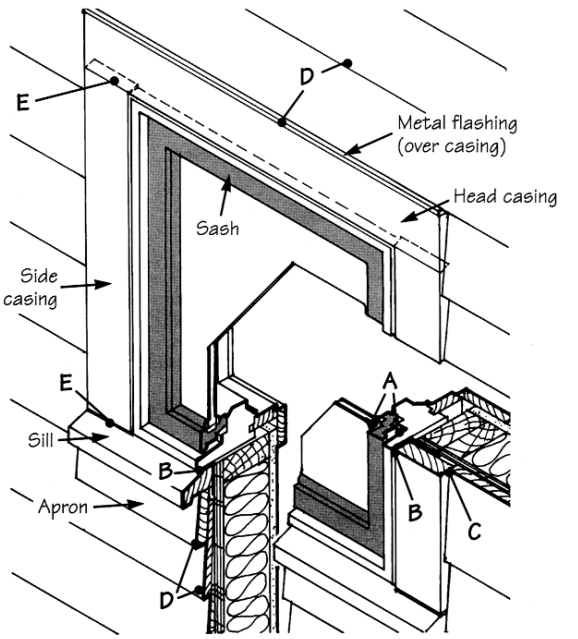

Figure 1.
(a) The sash of this vinyl-clad window depends on a sophisticated system of gaskets, all factory installed. Field-installed gaskets are commonly used to weatherstrip doors.

(b) The vertical and horizontal butt joints between the decorative trim and the clad window frame need to be sealed to prevent water from running behind the decorative sill and wetting the siding.

(c) The books say to seal this joint, but many builders install the siding tight. Since the joint is fully backed up and the siding tends to lead water out of it, the consequences of failure are minor.

(d) Overlapped joints are very common in wood construction because they usually work. Here metal flashing covers the head casing; the window flange laps the sheathing; the decorative sill laps the decorative apron; the apron protects the top of the first layer of siding; and each piece of siding laps the one below.

(e) The joints at the top and bottom of the side casing are especially vulnerable. Sealant would be an excellent idea at the bottom joint, where water can stand and wick up into the side casing. At the top it is common to bevel the top of the side casing by five or ten degrees and carve out a corresponding recess in the head casing, in order to drain the joint. A miter in this location is a bad idea except on narrow trim such as brick mold.

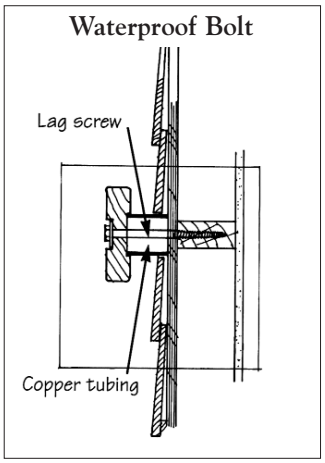

Figure 2. *Use this detail to protect a bolted joint holding anything to a vertical wooden surface. A short length of heavy-wall (type K) copper tubing fits into a groove or recess cut in the wood with circle-cutting bits. The pressure of the bolt keeps the joint watertight, and water runs off the curved surface of the metal. As shown, it is easy to attach to tilted or irregular surfaces, since the bottom of the groove is in a vertical plane.*

The joint gets stronger when the tube is short relative to its diameter, has a big cross-sectional area, and is made of strong material. It is easy to imagine stronger variations on this idea using nested tubes, washers (to spread out the pressure from the tube), galvanized steel piping, or blocks of teflon.

head of a door or window, must be protected at the top. Overlapped z-flashing and caulking are the two common approaches.

One thing to watch: Take pains to keep water from entering the end grain of a batten strip. Soak the bottom ends of corner boards in preservative and seal the end grain with paint or wood sealer to prevent water from wicking up and staining the board. I always cut the bottom edge of any vertical board on an angle to create a drip.

Overlapping

Overlapping is the basic tool for keeping water out of any joint. It is not foolproof, but it works well enough that the backup can be very simple. Clapboards, for example, overlap only 1 to 1 1/2 inches, but keep out almost all water. Any wind-driven water that enters hits building paper or house wrap and runs back out.

How far water will travel up a shingled joint seems to depend upon how open the joint is. A slotted roof shingle on a 3:12 roof gives only 1 1/4 inches of vertical protection, but that seems sufficient.

Tongue and Groove

A tongue-and-groove detail works well for vertical joints (such as in vertical siding), but it is a no-no for diagonal and horizontal joints exposed to water.

Even small puddles on an interior wood floor will cause the boards to cup, so T&G porch floors need some other waterproof covering to work.

Butt and Side-By-Side Joints

Vertical butt joints are very common in buildings, for instance between siding ends and trim pieces. The books tell you to leave such joints open and caulk them, but many builders butt siding tight to the trim with satisfactory results. Generally speaking, however, you should assume that a vertical butt joint will open up, and overlay a batten or caulk the joint.

Horizontal butt joints can be a problem, depending on the configuration. The worst case is a vertical member resting on a larger horizontal one, such as the baluster toenailed into a wider lower rail mentioned earlier. Here water can sit on the projecting horizontal surface and wick up into the end grain of the vertical member. Even if the bottom member is beveled, as in a traditional window sill, the vertical member (the casing, in this case) will sooner or later stain or rot where it meets the horizontal member.

A good solution to the baluster detail (but not the window casing) is to run the vertical member past the horizontal one, so water will flow through the joint and the joint can dry out. Sometimes I separate the members in such a joint with washers or a metal collar set into both members. This works to attach any horizontal member to a vertical one (see Figure 2).

Another problem is the butt joint between two pieces of vertical siding. If cut square, shrinkage of the long pieces will open up the joint, inviting water in to rot or stain the ends of both pieces. Cutting the butt ends of each piece on a steep bevel so water will run *out* of the joint solves the problem.

The joint between a horizontal top casing at a window and the vertical side casing below presents little problem. Here there is no projection to catch water, and the small pieces can be held tightly together. I would discourage miter joints between casing members, especially if the casing is wide.

Integrating Details

Many of the most interesting (and difficult) problems occur at corners. Many a "perfect" wall section becomes a nightmare when it has to accommodate a dormer or overhang. Don't polish the typical detail sections until you have followed each one to the bitter end. Every detail has to end somewhere; make sure the end won't leak. ■

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