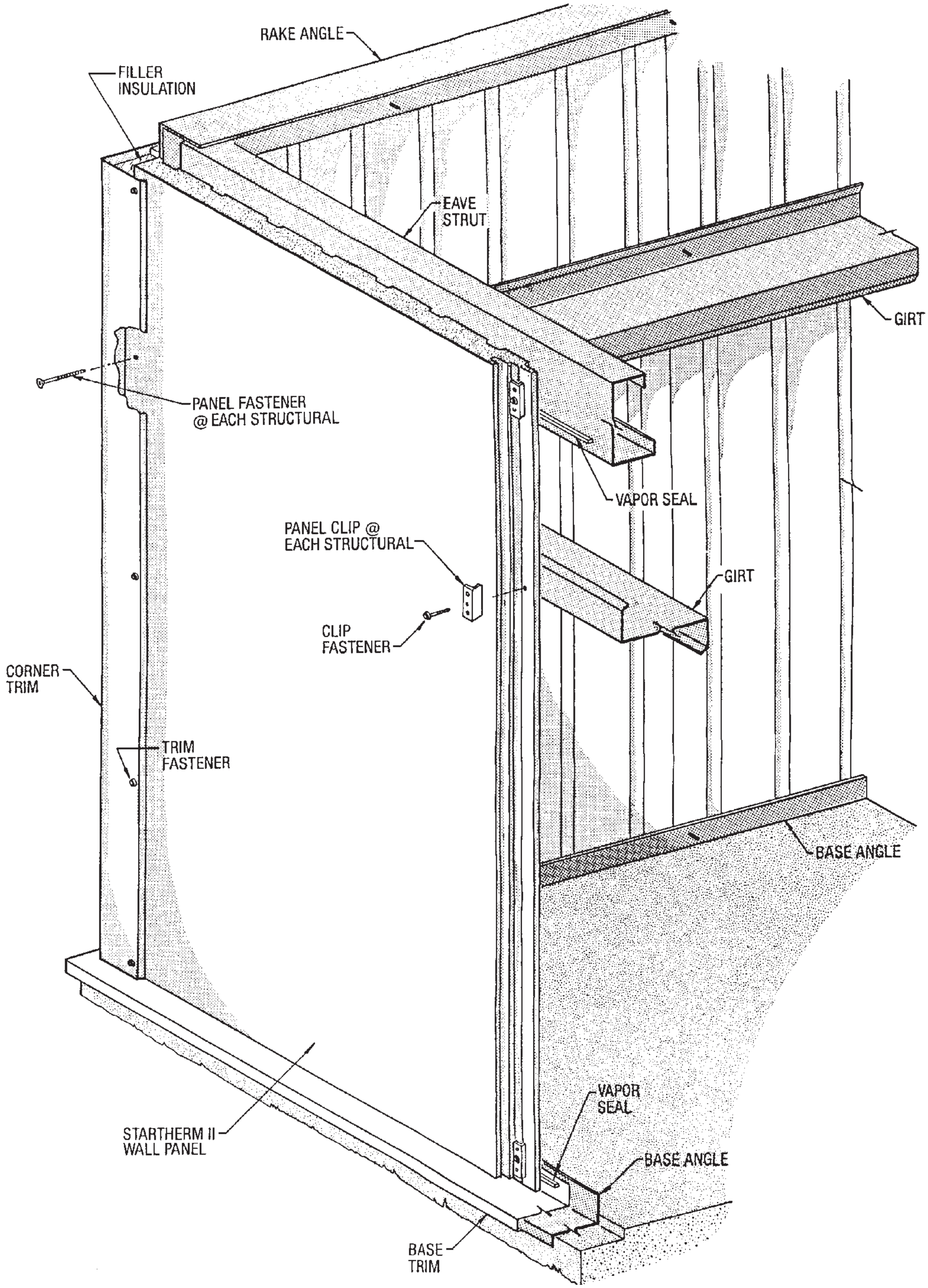

FIGURE 7.6 Typical installation of factory-insulated panels. (*Star Building Systems.*)

7.2.3 Exposed-Fastener Panels

These panels originated from the basic corrugated sheets that came with the first pre-engineered buildings. A typical exposed-fastener panel is attached to supports with self-drilling screws or similar fasteners (Fig. 7.7). Sidelap fasteners might be spaced 24 in apart or closer.

Today's choices go well beyond the basic and are quite varied (Figs. 6.4, 6.5, and 7.8). Wall panels with exposed fasteners behave similarly to through-fastened roofing; the products shown in Figs. 6.4 and 6.5 may be used as both roofing and siding. Galvanized-steel or Galvalune-coated siding is produced in thicknesses from 29 to 18 gage, with the midrange gages being the most popular. Aluminum sections are also available. Panel width can range from 2 to 4 ft; panel length is limited by shipping and handling constraints of about 40 ft.

Exposed-fastener siding is still the most economical exterior wall material available; it is widely used for buildings ranging from factories to schools. For added versatility, the panels can run horizontally when the architectural intent so requires (Fig. 7.9). Horizontal orientation entails changes in the secondary framing, as discussed in Chap. 5. Deep-rib panels (3 to 4 in in depth) may be especially appropriate for this purpose, if able to span the distance between the frame columns (Fig. 7.10).

While the exposed-fastener system is easier to install and is more "forgiving" to field errors than composite panels, the installer's experience is still important. As simple a mistake as overtightening the fasteners may dimple or damage the panels and invite water penetration. Through-fastened panels tend to suffer from fastener corrosion (Fig. 7.11). This problem can be mitigated by using corrosion-resisting fasteners, as discussed in Chap. 6—or by concealing them within the panel as discussed below.

7.2.4 Concealed-Fastener Panels

In this system, the fasteners connecting panels to supports are hidden from view by interlocking edge joints (Fig. 7.12). In addition to a pleasing appearance, concealed-fastener panels generally provide better protection from water infiltration than exposed-fastener siding. Physical protection is enhanced, too, since these panels are difficult to remove. The panels are usually 1 to 1½ in in depth and are made of 18- to 24-gage steel; the length of 30 ft and longer can be procured.

Concealed-fastener design is often found in field-assembled insulated panels discussed in Sec. 7.2.1. The face and liner panels can be interconnected via hat-shaped subgirts (Fig. 7.4), or directly, if both the liner and the face sheet have identically spaced outstanding legs.

Factory-insulated panels also typically use concealed fasteners (Fig. 7.6). The product shown in Fig. 7.6 has a flat surface, but in many cases, concealed-fastener panels (and their exposed-fastener counterparts) have some kind of reveals, striations, or rough texture to avoid oil-canning. As explained in Chap. 6, oil-canning is a minor surface waviness that tends to affect smooth light-gage metal panels.

7.2.5 The Rain Screen Principle

Metal wall panels leak water mostly through the joints. The only waterproofing protection the joints typically offer is a bead of sealant applied between the edges of the adjacent sheets. When—not if—the sealant fails, the joint starts to leak. The situation is exacerbated by a common installation technique of applying the sealant between two panel sheets and driving fasteners through the interface, squeezing the sealant in the process. The flattened sealant won't last long, and a failure is invited.

A radically different method of preventing water intrusion is based on the *rain screen–cavity wall* principle that dispenses with the idea of a single water barrier. The rain screen principle was formulated in 1963 by Kirby Garden, a Canadian researcher who recognized the impossibility of sealing every little opening that can develop in an exterior wall. Instead, he argued, the seals should be moved to an *interior* wall, where protection from the elements and solar radiation is easier to achieve.