FIGURE 7.9 Horizontally spanning metal panels. (*Photo: Maguire Group Inc.*)

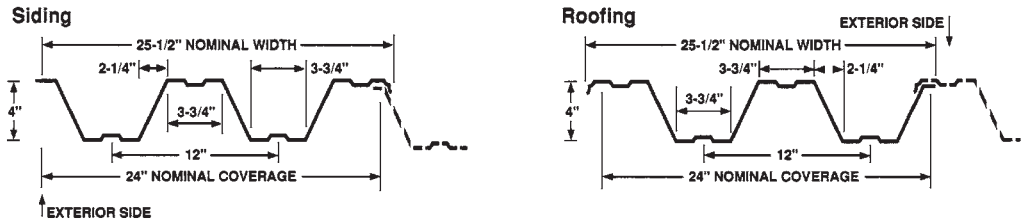
A rain screen wall consists of three parts: an exterior layer that resists most water intrusion, interior waterproofing, and air space in between. The interior waterproofing membrane is completely water-impermeable, with sealed joints and flashing. It is partly protected from the elements by the exterior sheet ("veneer"), which sheds most water. The air space physically separates the two layers and facilitates drainage of accumulated condensate.

Exterior panels of rain screen walls have no exposed sealants. Instead, some specific design steps are taken to block the various pathways of water intrusion into the cavity that are described below for a horizontal panel joint:[5]

1. Kinetic energy of nearly horizontal wind-driven rain, the most common way of water penetration. The best defense is to build a ridge in the lower panel and make an internal baffle.
2. Surface tension: Water clings to and flows along the underside of the top panel. Remedied by a drip edge.
3. Gravity force: Water simply follows the panel's exterior surface downward. Can be overcome by sloping the joint surfaces upward.
4. Capillary action: Water seeps into a thin joint as through a wick. Disappears when the joint is at least 1/2 in wide.
5. Air pressure drop and air currents: Water is sucked into the cavity by a pressure differential between the cavity and the outside. In a cavity wall, water intrusion can only be resisted by the backup waterproofing air barrier.

Walls built in accordance with the rain screen–cavity wall principle require two totally separated layers, as exemplified by brick veneer over steel studs. The studs are covered with interior waterproofing supplemented with flashing and weep holes. The regular single-leaf wall siding obviously does not qualify, and at best, only the joints can be designed in accordance with this principle.

The design steps listed above greatly reduce but not totally eliminate water intrusion into the cavity, especially due to an air-pressure differential. The interior waterproofing layer, flashing, and



SMITH STEELITE SUPER-RIB SIDING AND ROOFING MAXIMUM SPANS

Live Load			20 PSF (98 kg/m²)		30 PSF (146 kg/m²)		40 PSF (195 kg/m²)	
Gage/Weight		Span	Wall	Roof	Wall	Roof	Wall	Roof
GALV. STEEL 18 Gage (0.047") 3.04 lbs./ft²	L/120	SS	23'-11" (7.29 m)	22'-9" (6.93 m)	20'-11" (6.38 m)	19'-10" (6.05 m)	19'-0" (5.79 m)	17'-5" (5.31 m)
		DS	29-8 (9.04)	23-9 (7.24)	24-2 (7.37)	19-11(6.07)	20-11 (6.38)	17-5 (5.31)
		TS	29-7 (9.02)	26-7 (8.10)	25-10 (7.87)	22-3 (6.78)	23-5 (7.14)	19-6 (5.94)
	L/180	SS	20-11 (6.38)	20-0 (6.10)	18-3 (5.56)	17-9 (5.41)	16-7 (5.05)	16-3 (4.95)
		DS	28-1 (8.56)	23-9 (7.24)	24-2 (7.37)	19-11 (6.07)	20-11 (6.38)	17-5 (5.31)
		TS	25-10 (7.87)	24-6 (7.47)	22-7 (6.88)	21-9 (6.63)	20-6 (6.25)	19-6 (5.94)
GALV. STEEL 20 Gage (0.036") 2.28 lbs./ft²	L/120	SS	21-9 (6.63)	20-11 (6.38)	19-0 (5.79)	17-5 (5.31)	17-3 (5.26)	15-3 (4.65)
		DS	25-8 (7.82)	21-0 (6.40)	21-0 (6.40)	17-6 (5.33)	18-2 (5.54)	15-3 (4.65)
		TS	26-10 (8.18)	23-5 (7.14)	23-5 (7.14)	19-6 (5.94)	20-4 (6.20)	17-1 (5.21)
	L/180	SS	19-0 (5.79)	18-3 (5.56)	16-7 (5.05)	16-2 (4.93)	15-1 (4.60)	14-9 (4.50)
		DS	25-6 (7.77)	21-0 (6.40)	21-0 (6.40)	17-6 (5.34)	18-2 (5.54)	15-3 (4.65)
		TS	23-6 (7.16)	22-7 (6.88)	20-6 (6.25)	19-6 (5.94)	18-8 (5.69)	17-1 (5.21)
GALV. STEEL 22 Gage (0.030") 1.91 lbs./ft²	L/120	SS	20-6 (6.25)	19-3 (5.87)	17-11 (5.46)	16-0 (4.88)	16-3 (4.95)	14-0 (4.27)
		DS	23-5 (7.14)	19-4 (5.89)	19-2 (5.84)	16-0 (4.88)	16-7 (5.05)	14-0 (4.27)
		TS	25-3 (7.70)	21-7 (6.58)	21-5 (6.53)	17-11 (5.46)	18-6 (5.64)	15-8 (4.78)
	L/180	SS	17-11 (5.46)	17-3 (5.26)	15-8 (4.77)	15-3 (4.65)	14-2 (4.32)	13-11 (4.24)
		DS	23-5 (7.14)	19-4 (5.89)	19-2 (5.84)	16-0 (4.88)	16-7 (5.05)	14-0 (4.27)
		TS	22-1 (6.73)	21-4 (6.50)	19-4 (5.89)	17-11 (5.46)	17-6 (5.33)	15-8 (4.78)

All above weights are per net square foot.

Loads and spans are based on AISI Cold-Formed Steel Design Manual.

The above span tables are in accordance with the 1986 Light Steel Code with material having a yield strength of 33,000 psi (2320 kg/cm²), one-third extra strength for wind loads only.

Roof spans are for positive loading. Wall spans are for positive or negative loading.

Roof spans include dead weight of panel.

Minimum sheet length: 2'-0" (.61m). Maximum sheet length: 40'-0" (12.19 m). Consult Smith Steelite for sheet lengths less than 2'-0" (.61 m) or greater than 40'-0" (12.19 m).

Length tolerance: maximum variation ±1/2" (12.7 mm).

Roof spans include dead weight of panel.

FIGURE 7.10 Deep-rib exposed fastener siding. (*Super-Rib by Centria.*)

adequate cavity ventilation are therefore critical for success and should be designed and constructed with care.

Another type of rain screen is the *pressure-equalized wall.* The principle of pressure equalization assumes that if an air-pressure differential between the cavity and the exterior is eliminated, a problem of water leakage it causes, the Achilles tendon of cavity-wall rain screens, can be solved. To achieve pressure equalization, sufficient openings are left in exterior veneer to make the cavity essentially a part of the outside world. The cavity itself is divided into relatively small compartments that restrict air movement within it and allow for rapid changes in air pressure.

Some panel manufacturers now reflect the pressure-equalization principle in joint design of their composite panels. An example of factory-insulated wall panel with joints intended to conform to the rain screen–cavity wall design is Formawall,* shown in Fig. 7.13. The "cavity" in Fig. 7.13 is confined to the joint area and ends with a concealed sealant between the panels. Note that the joint contains a pressure-equalizing vent.

*Formawall is a registered trademark of Centria.