Rainscreen Systems for Stucco

If you want to install stucco and not rot your walls, choose one of these products to create a drainage plane and ventilation space between the water-resistive barrier and the stucco

BY BRIAN PONTOLILO

If you ask too many questions about how to install stucco right, you will eventually hear some discouraging anecdotes of what amounts to a conspiracy—builders knowingly installing stucco poorly to save money and hedging their bets against callbacks, warranty claims, and extensive repair work. While it may make for interesting investigative journalism and potentially protect some home buyers, that story is not helping teach builders who really don't know how to install stucco right.

Cost, however, is an important part of this story. John Koester, founder of Masonry Technology Incorporated (MTI), told me that he believes that the residential building industry will move away from manufactured products for stucco installation—products like his company's Sure Cavity rainscreen drainage matt—and adopt site-built assemblies using furring strips. John said he simply cannot price his product at a cost that builders are willing to pay. And it's not the cost to manufacture the product that is the problem.

"It costs more to market and sell the product than it does to make it," John said, "Early on I had a potential investor who asked me how much it would cost to notify the entire building industry about our products. I told him that if I had that much money, I'd retire." John told me that he thinks builders would be willing to pay as much as $0.20 per sq. ft. for a rainscreen product to use with stucco. But while prices vary widely for these products, none of them meet John's $0.20-per-sq.-ft. threshold.

John's commentary is interesting for a few reasons. Like the rumor of builders knowingly installing stucco wrong, it's another peek inside the building industry. And it's interesting because before builders can move away from rainscreen drainage matts to create a drainage plane and ventilation space behind their stucco installations as John suggests, the industry must first accept that this is best practice.

Building codes only give hints

By now you have probably heard the mantra "all siding leaks" from experienced builders and leading building scientists. This is as true for stucco as it is for lap siding, and getting flashing details right is imperative with all siding. A drainage space behind the stucco will allow water that gets behind the siding to drain down the wall to the ground.

Along with other masonry siding materials, stucco comes with another concern: It's a so-called "reservoir cladding." This means that when stucco gets wet, it absorbs water, and it can hold that water for a while. Sometimes, it will dry to the exterior. But when weather conditions are right, the absorbed water will be driven inward and can make its way into the walls. In this situation, the ventilation space allows for inward drying of the stucco.

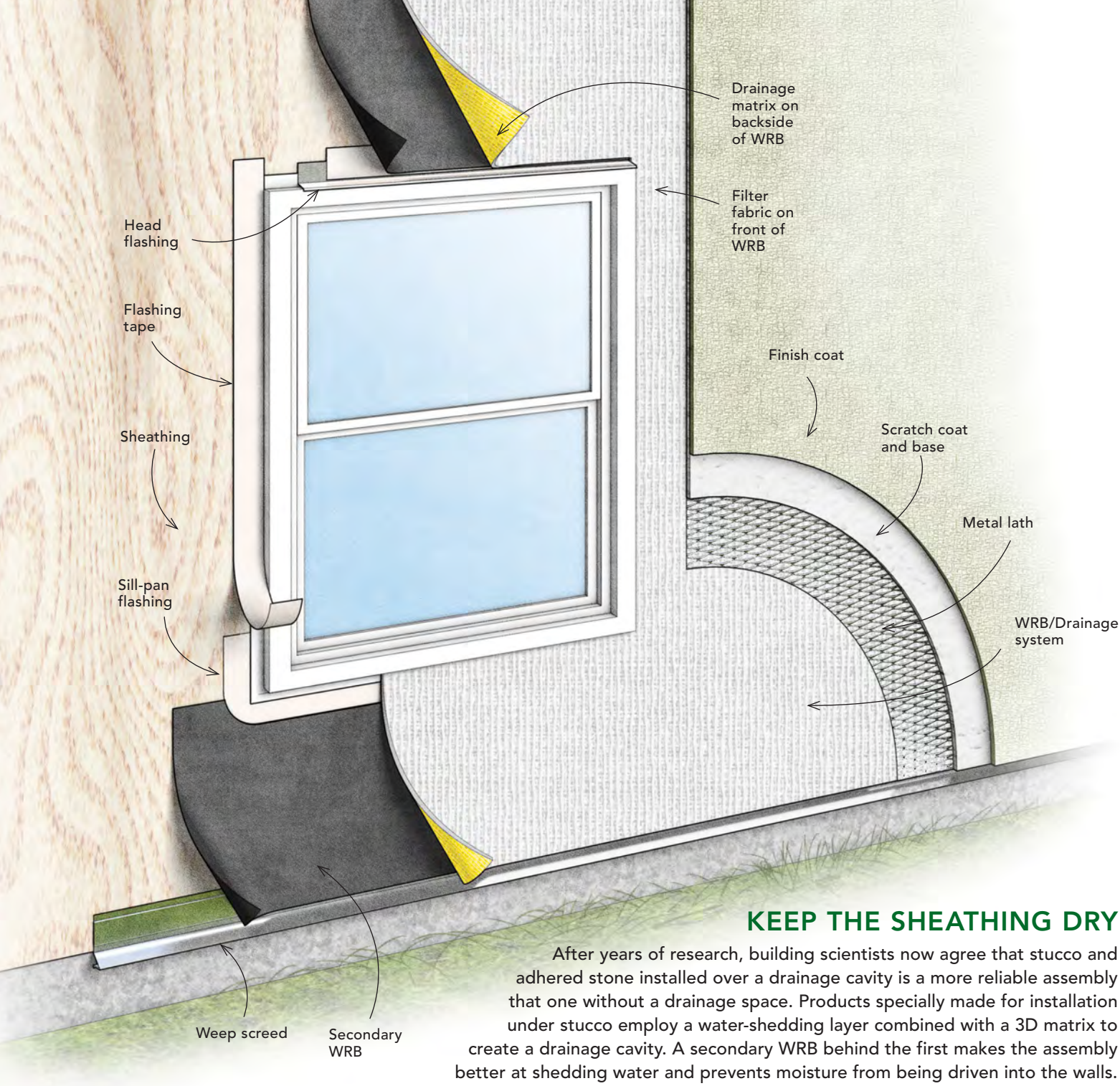
On wood-framed homes, the International Residential Code (IRC) section R703.7.3 (water-resistive barriers for "exterior plaster," or stucco) calls for a "water-resistive, vapor-permeable barrier with a performance at least equivalent to two layers of Grade D paper." Flashing is to be integrated with the first layer of building paper, the code says, which is an attempt to create a drainage plane between the two sheets.

In his Green Building Advisor article "To Install Stucco Right, Include an Air Gap," Martin Holladay explains, "The idea is that when the wet stucco mixture is troweled onto the metal lath, the stucco soaks the outermost layer of paper, which wrinkles when it dries. These wrinkles are said to create a drainage gap." Whether or not that happens is irrelevant, because most experts will tell you that in many areas, two layers of building paper have proven not to be enough to protect the sheathing behind stucco from moisture damage.

The IRC does offer an exception to R703.7.3 where "the water-resistive barrier that is applied over wood-based sheathing has a water resistance equal to or greater than that of 60-minute Grade D paper and is separated from the stucco by an intervening, substantially nonwater-absorbing layer or designed drainage space."

This can be understood as saying that an alternative to using two layers of building paper behind stucco is to use an approved water-resistive barrier (WRB) and a product like those on the following pages. You could design your own ventilation space with fur-

Drawing: John Hartman



KEEP THE SHEATHING DRY

After years of research, building scientists now agree that stucco and adhered stone installed over a drainage cavity is a more reliable assembly that one without a drainage space. Products specially made for installation under stucco employ a water-shedding layer combined with a 3D matrix to create a drainage cavity. A secondary WRB behind the first makes the assembly better at shedding water and prevents moisture from being driven into the walls.

ring strips and paper-backed lath (or building paper plus lath). But despite John Koester's comments about a looming switch to furring strips, most builders who install stucco right are using a product to create the rainscreen.

Product design varies

Christine Williamson is a building scientist, a consultant, and the creator of the educational @buildingsciencefightclub on Instagram. She responded to some of my questions about stucco installation in an email: "I don't have much of a preference on how a drainage gap behind stucco is achieved, but I care immensely that a gap is present," she wrote. "The drainage mats are nice because part of getting a good stucco installation is maintaining a consistent thickness. Anything fully supported (like drainage mats and meshes) helps with that."

If the IRC is failing to keep up with what experts like Williamson know to be best practice, more and more manufactures are on the ball, and there are a number of products available today that builders can use to create a drainage plane and ventilation space behind stucco. Even DuPont, who has long offered StuccoWrap, a grooved housewrap meant to create a drainage space behind stucco, now offers a more robust rainscreen product (see p. 48).

John Koester is proud of the compressive strength of Sure Cavity, which meets

or exceeds ASTM D1621, the plastic compression testing standard. Most competitive products boast comparable compression resistance, which is important. Though product designs vary, there does seem to be two general types of rainscreens emerging that can be used to create a drainage plane and ventilation space behind stucco. The first style has some type of rigid plastic with grooves, dimples, or another three-dimensional shape used to create space between the wall sheathing and stucco. The second type uses an entangled mesh to create the drainage space.

Most of the mesh products have a layer of filter fabric glued to the face. The fabric prevents the stucco from infiltrating and clogging the rainscreen gap. This isn't a concern with some of the ridge plastic products because they create an impermeable barrier between the stucco and the rainscreen product. However, Peter Barrett, a product and marketing manager at Dorken, told me that some builders still want the fabric as a way to prevent installers from pushing too much of the first coat of stucco—the scratch coat—through the lath. Though Dorken offers Delta-Dry Stucco & Stone with a filter-fabric facing, the company doesn't believe that this is a real concern, which is one of the reasons why there is no fabric on their new Delta-Dry & Lath. Choice of product, and whether it comes with or without an applied filter-fabric facing, may be based on where you live.

Installation details

"One thing I've noticed is that there is considerable variation in local practice," Williamson wrote to me. "For example I think in some areas it's hard to buy lath without a paper backing, and other places it's standard for lath to just be a stand-alone product. This matters with drainage mats because if you're using a paper-backed lath, you could use a mesh product like Benjamin Obdyke's [Slicker Max] …. If you have a non-paper-backed option, you'll want to stick with a drainage mat that has some sort of facer that will prevent it from getting clogged with stucco (and not drain as a result)."

If you live in an area where paper-backed lath is common, you could eliminate a step on the other side of the rainscreen gap by using another Benjamin Obdyke product, Slicker HP Rainscreen, which has the same entangled mesh as their Slicker Max, but instead of having a fabric facing, it has a WRB backing. The mesh can be peeled away from the WRB so that the WRB can be integrated with flashings. From there you can install paper-backed lath and start troweling stucco.

When it comes to installation, most of these products roll out, though there are a few products that come in sheets. Vertical and horizontal seams are typically butted together, not overlapped. Many of the filter-fabric facings extend below the bottom of the sheet to act as a bug screen and to overlap the course below. Most of the installation guides call for corrosion-resistant ½-in. staples or nails to tack the products to the walls—the lath installation will ultimately hold them securely in place.

One possible installation mistake with these products is to block the bottom of the drainage plane and ventilation space. Whether you are using a weep screed or drip edge at

A CLOSER LOOK AT DRAINAGE PRODUCTS

Drainage systems for stucco and adhered stone use a waterproofing layer and a drainage matrix for managing bulk water and inward-driven water vapor.

DuPont's new **TYVEK DRAINVENT RAINSCREEN** is a 6.8-mm-thick "honeycomb" mesh with an applied filter fabric and an integral insect screen. Like most of its competitors, DrainVent is a good option for stucco but can also be used behind other masonry siding materials as well as wood and metal sidings. Installation details are familiar—though instructions specify a fastener schedule of ½-in. staples, the product is essentially tacked into place until lath is installed. Tyvek recommends taping vertical seams with their housewrap tape. The product has a 10-year warranty, including labor if installed with a full lineup of Tyvek products. DrainVent costs about $1.20 per sq. ft.

Kingspan's **GREENGUARD DC14** is a 4-ft. by 48-ft. fanfold sheet of extruded polystyrene with drainage and ventilation channels on both sides. The lengths of the product connect in a shiplap style between courses and the installation calls for taped seams. Kingspan also calls for specific fasteners for different building types and requires ¾-in. penetration into studs. The product does not have a filter-fabric screen like many of its competitors, nor do they call for additional housewrap or paper-backed lath to serve this purpose. Kingspan offers a 10-year warranty on GreenGuard DC14, upped to 15 years when installed with their compatible WRB and flashing products. It costs about $0.45 per sq. ft.

Photos: courtesy of the manufacturers, except where noted.
Facing page right: Rodney Diaz

MTI's **SURE CAVITY** is corrugated, 100% recycled polystyrene covered by a polypropylene fabric. The plastic is perforated for permeability and the corrugations create 3⁄16-in. vertical channels for drainage and ventilation behind stucco. MTI also offers Gravity Cavity, which has a slightly different corrugation profile with smaller, 1⁄8-in. drainage channels, and 10mm Sure Cavity, which has a slightly larger profile with 7⁄16-in. channels. MTI's founder, John Koester, said that he doesn't believe that there is a significant difference in performance between the three products, but that his company offers them to help builders satisfy their building inspectors who may specify a certain-size ventilation space. Sure Cavity's filter fabric extends beyond the bottom edge of the plastic and can be used as a bug screen along the bottom course and should be overlapped as successive courses are installed. MTI offers a weep screed to use with Sure Cavity. Sure Cavity costs about $1.30 per sq. ft.

Benjamin Obdyke's **SLICKER MAX** is a 6-mm mesh with vertical channels and a filter fabric facing. The polypropylene mesh is 40% recycled material. A 10-mm version is available to meet Canadian building codes. The product is installed similar to its competitors—you don't need to lap the plastic mesh, just butt the horizontal and vertical seams, and lap the filter-fabric flap to keep stucco out of the joints. Benjamin Obdyke's installation instructions, which offer details for all critical transitions and flashing, recommend a weep screed for the bottom of the wall and an open ventilation space at the top. Slicker Max has a 30-year warranty that extends to 35 years when used as a system with Benjamin Obdyke's HydroFlash flashing and FlatWrap HP water-resistive barrier, which must be installed with cap fasteners. Slicker Max costs about $1.20 per sq. ft.

Dorken's **DELTA-DRY** is a high-density polyethylene membrane with 10½-mm dimples that create a drainage plane and ventilation space. One difference between Delta-Dry and many of its competitors is that it is impermeable, creating a capillary break behind reservoir claddings to prevent vapor from being driven to the interior. Delta-Dry is the base for two other Dorken products—Delta-Dry Stucco & Stone is the Delta-Dry drainage mat with a filter-fabric facing, and Delta-Dry & Lath (shown) is the Delta-Dry drainage mat with fiberglass lath attached. Delta-Dry's design doesn't require fabric facing to keep stucco from clogging the ventilation space, but some builders prefer it to prevent too much of the scratch coat being pressed through the lath. Those who don't feel this is a problem can skip a step and save on fasteners by installing Delta-Dry & Lath over an approved WRB. Expect to pay $0.85 to $2.45 per sq. ft. for these Dorken products.

the bottom of the wall, one way or another, it's important to make sure that the stucco installers don't clog the bottom of the rainscreen gap with stucco. Likewise, it's best to vent the top of the wall for as much air flow and pressure equalization as possible.

Where the IRC gives an exception to the requirement for a felt WRB on houses, it uses very specific language. It says, or "other approved water-resistive barrier," and the International Code Council's Evaluation Services (ICC-ES) have acceptance criteria for the different types of products that may be "approved" for this purpose. For stucco installations, the exception calls for "an intervening, substantially nonwater-absorbing layer or designed drainage space."

There is no ICC-ES acceptance criteria for these products yet. If you are interested in testing, there is a testing standard—ASTM E2925-17. Your building inspector is likely to accept any of the products shown in this article to meet the IRC's requirements. Keep in mind that first you must install an approved water-resistive barrier. You should follow the manufacturers' installation instructions for the rainscreen product you are installing and the IRC's requirements for installing lath. It's also critical that all other flashing and water-management details are properly designed and executed. □

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