

# Silva Solutions

## LET IT BREATHE

A ventilated house is a healthy house

**N**o matter where you live, whether it's the Sun Belt or snowy New England, insulation traps the heat (and the cold) that makes a house more comfortable. But insulation also traps the moisture emanating from basements, boiling pots, steamy showers, clothes dryers, plants, even the simple act of breathing.

Before the current era of insulation, houses could easily rid themselves of this moisture—typically one to two gallons a day. Warm air, with its load of water vapor, escaped through gaps in the top and sides of a house and was replaced by an equal amount of fresh air infiltrating through cracks and openings near the bottom. Life inside could be drafty, yet everything stayed dry. Ever since the Arab oil embargo of 1973, however, Americans have obsessively insulated

their houses and weather-stripped or caulked every opening to keep fuel bills to a minimum, effectively

locking all that water vapor inside. With no means of escape, wet, saturated air readily condenses wherever it contacts a cold surface, and fosters the growth of rot and such serious allergens as molds and mildew. "The tighter the house is, the more humidity is trapped inside," says *This Old House* contractor Tom Silva. "As a rule, the more you insulate, the more you have to ventilate."

To prevent moisture buildup, Tom doesn't suggest that we go back to building drafty houses or leaving windows open in the winter. Instead, he makes sure that specific areas inside the house are actively ventilated. In bathrooms, the kitchen, and the laundry room, for instance, he installs exhaust fans to whisk away moisture at the source and propel it outside. And if a house is very tight, he'll balance the outgoing air with a supply of warmed "makeup" air provided by a heat exchanger. Roofs need their own ventilation, either via gable vents or fans where an attic has no insulation, or air channels between the cold roof deck and the warm insulation where it does exist. "Ventilation makes the difference between a house that will last and one that doesn't," says Tom.

### ATTIC

When there's no insulation beneath the roof sheathing in an attic, Tom keeps the air fresh with louvered vents and fans at the gable ends. Well-ventilated attics prevent ice dams in winter, and lower cooling bills in summer.

### KITCHEN AND BATHROOMS

Tom always installs exhaust fans above showers or stovetops to draw the moisture produced by cooking and bathing. "But the fans have to be vented outside the house, not into the attic," he says. "Otherwise you're dumping moisture on the underside of the roof." In his own house, he installed timer switches to allow bathroom fans to run for a full hour.

### DRYER

A clothes dryer should be vented directly outside, but not less than two feet beneath a soffit vent. "That warm, wet air can rise and accumulate underneath the roof sheathing," he says. For houses with hip roofs, Tom installs dryer vents straight through the roof.

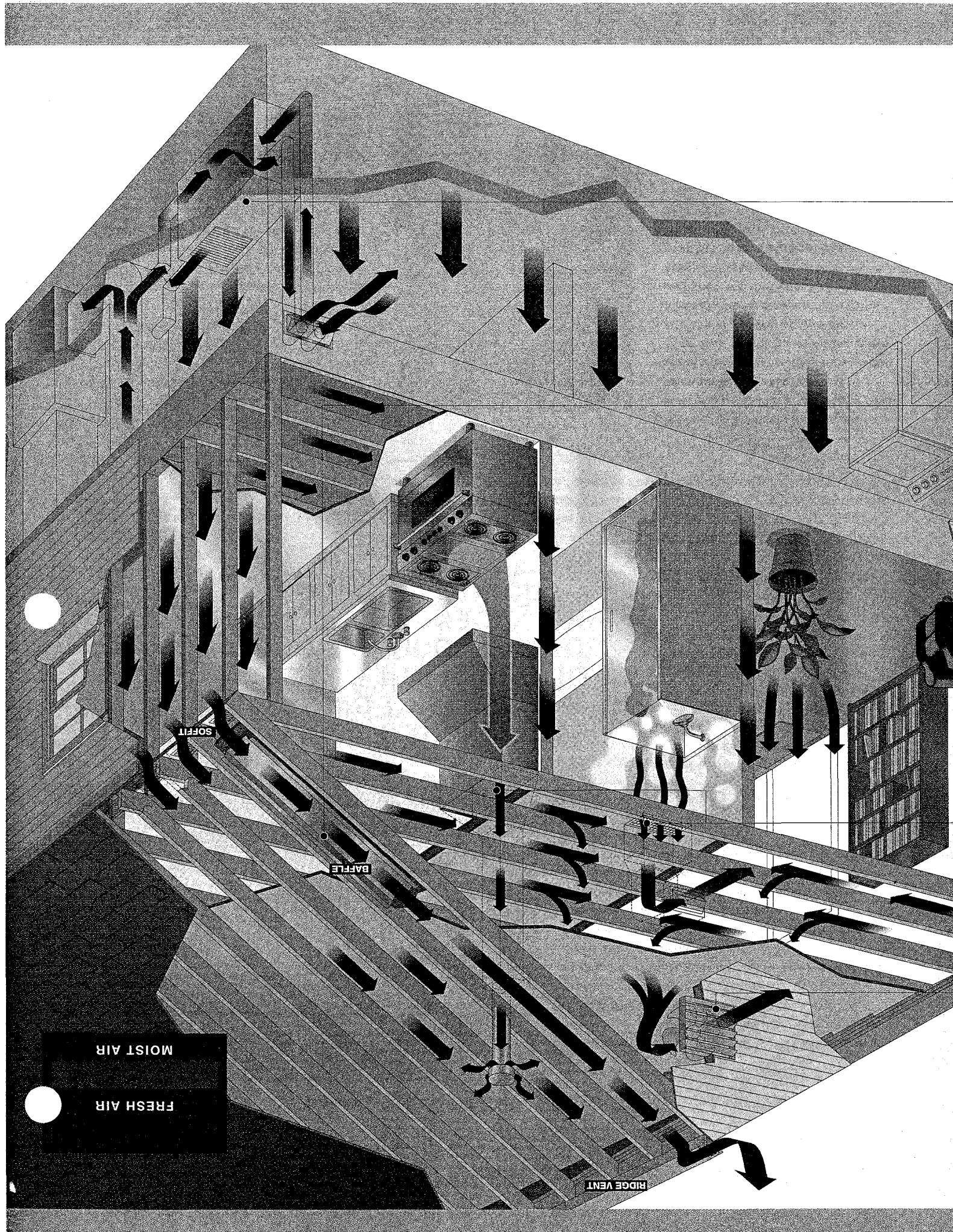
### ROOF

Humid air trapped in a roof means one thing to Tom: "Goodbye roof. It'll rot out in just a few years." So he creates a path for air to move underneath the roof sheathing from the soffits to the ridge. He installs continuous vents at the soffits, makes sure there is an uninterrupted air channel at least an inch or two deep underneath the roof, and lays a continuous vent along the ridge. If a ridge vent isn't possible, he'll put mushroom vents on the back side of the roof.

### AIR EXCHANGERS

In a tight house, exhaust fans can pull outside air down chimneys and furnace flues to make up for the moist air they expel, causing fires or a buildup of dangerous gases. To prevent such backdrafts, Tom installs heat exchangers to balance the flow of exiting air with an equal supply of incoming fresh air. The exchanger captures some of the heat from the expelled flow and warms the entering air.

Y CURTIS RIST



MOIST AIR

FRESH AIR

SOFFIT

BAFFLE

RIDGE VENT



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“People think they should heat up the attic in the winter to keep the house warm, but that’s exactly the wrong approach.”

—TOM SILVA

## VAPOR BARRIERS

To prevent warm, moisture-laden air in a house from migrating through the walls and ceilings and condensing on cold wood surfaces, Tom Silva—like all good carpenters—adds plastic vapor barriers whenever he insulates exterior walls and ceilings with fiberglass or cellulose. (Expanding foam insulation is relatively impermeable to moisture and needs no such barrier.)

When installing a vapor barrier, Tom is nothing less than exacting. After the insulation is in, he overlaps the 4- to 8-mil plastic sheets 24 to 32 inches and staples them from stud to stud on the walls and between joists on the ceiling, letting it fold out on the floor at the bottom. Finally, he seals the seams and the areas around electrical outlets and light switches with silicone, butyl, or urethane caulk and foil tape. For doors, windows, and skylights, he will use spray foam insulation. “If you do anything less than this, you’re gambling with the long-term survival of your house.” As a case in point, he was working in the bathroom of a relatively new house a few years ago, when he removed the drywall and sighted an area that lacked the necessary vapor barrier. “The entire corner from the studs to the sheathing was starting to grow mildew,” he says. Had Tom not fixed it, “there could have been major structural rot within a matter of a few years.” ■

## WHAT’S AN ICE DAM?

A house without effective roof or attic ventilation is susceptible to ice dams, a seasonal frustration often suffered by denizens of snow country. The problem starts when warm air builds up under the roof and melts the snow on top. As the water slides down the roof, it freezes again when it reaches the cold, overhanging eave or gutters. Glittering icicles may form, but the problem is that a reservoir of water builds up behind this frozen barrier. “Eventually, that water backs up under the shingles, then pours into the rooms below,” says Tom.

## HOW TOM KEEPS UNINSULATED ATTICS COOL

“You want a roof to be as cold as possible to prevent ice dams,” advises Tom. At his brother’s house in Billerica, Massachusetts, he installed a pair of 12-inch fans to gently push hot air out in the summer, but one of them can also pull cold air inside during the winter when there is an insulating layer of snow on the roof.

Tom once used this principle to stop an ice dam in mid-flood. “I got a call from some frantic home owners, and went to their house to see water dripping down the plaster walls of their bedroom,” he says. Going

up to the attic, he took an ordinary box fan and pointed it as close to the leak as possible. “That cooled the back of the roof in that spot, and everything froze,” he says. “The leak stopped within minutes.”

## INSULATING AN ATTIC ROOF

Whenever he insulates the underside of a roof, Tom first installs rigid foam baffles against the roof sheathing. These baffles leave a gap of an inch or two between the batts and the sheathing so that air can circulate freely from soffit to ridge and keep the roof cool and dry. The area of biggest concern is down near the eave, where zealous insulators often stuff material tightly against the roof. “If moisture gets trapped there in the winter, it forms a big frosty build-up like you’d find in an old freezer,” he says. “Then, when it melts, it starts to drip inside.” The baffles prevent any wood-to-insulation contact so moisture can readily escape.

