

Aspen Homes' system first to include guarantee

Builder rockets forward in 9-month span; new systems approach is comprehensive, backed up by testing and an energy guarantee

Aspen Homes of Colorado, Inc. (Loveland, CO) builds around 135 homes a year, priced between \$150,000 and the mid-\$200s. Beginning in December of 2002, all their buyers will be moving into high-performance homes.

The company has shifted their focus towards building systems that lead to the construction of very energy-efficient, comfortable, healthy, durable and environmentally responsible homes.

All homes will earn the Colorado Built Green label. Since the shift, the first 10 homes have all achieved the EPA's Energy Star Home qualification.

This comes with a cost. Says Aspen Homes' president Jim Sabin, "Right now our extra cost runs between \$1800 and \$2100." But in an era when the price for home heating fuel has bottomed out and is clearly headed up, energy savings will offset increased mortgage payments.

Why the switch?

Last March Aspen tested some homes with E-Startm home energy ratings. The results were just average for the industry. On the uniform rating scale of 0-to-100, the models averaged about 77. (A score of 80 is the lower limit for achieving energy-efficient status.) Today, all their homes are scoring between 87 and 90, making them at least 30% better than the toughest new energy code.

"We started heading in this direction because we needed to differentiate ourselves," said Sabin. "Research indicated that energy costs were headed up again. Our initial thought was to just load up on extra insulation, but by April we decided to take a complete systems approach for our new direction."

The end result is the biggest change Sabin has seen during his 26 years in the building industry. "We went to see how Artistic Homes [Albuquerque, NM] was doing it last September. Our field people saw the changes we were talking about and bought into it."

Building envelope package

In the average new home, a handful of building shell items need an upgrade. Aspen systematically changed them all.

Windows: Aspen switched to a low-e vinyl window throughout, including basements. For homebuyers, this significantly improves comfort on cold days, reduces cooling loads and cooling equipment sizing by 25%, cuts down on fabric fading, saves some energy, and reduces condensation.

Wall insulation: While Aspen stayed with 2x4 framing, they upgraded from R-13 batts to the Optima system--an R-15 blown-in dry fiberglass product installed behind netting (see photo) by Thermal Concepts. Infrared camera scans show that sprayed and

blown-in products provide even insulation coverage by eliminating voids and compressions found with typical batt installations.

Wall sheathing: Traditional OSB exterior sheathing was replaced with one-inch Dow extruded polystyrene foam. This additional R-5 insulating layer creates an R-18 insulated wall, one that is more effective than R-19 batts in 2x6 walls because the R-5 foam covers the 25% of total wall area that is otherwise uninsulated solid wood. Just as important as this insulation benefit is the substantial reduction in the potential for condensation and moisture problems within walls. (Some models with corner windows have a few sheets of OSB covered with ½-inch foam.)

Drainage plane: The extruded foam sheathing (with joints taped) covering 100% of the building shell provides a surface for draining wind-driven rainwater that, over time, leaks in around windows and doors. This improves any home's durability.

Crawl space moisture: Historically, crawl spaces have been sources of moisture in homes; moisture evaporates from the dirt and migrates into the rooms above. Aspen substantially reduced the potential for this moisture flow by installing an unusual ground cover: a thin concrete slab poured over a polyethylene film. The crawl space is no longer vented to the outside in winter, which improves house comfort and eliminates the risk of freezing pipes. Now this space can provide storage for infrequently used items without risking damage to the ground cover.

Foundation insulation: Other foundation elements—basement walls and the perimeter of at-grade slabs—that used to be uninsulated now are covered with an insulating product.

Tighter construction: Aspen's homes are now roughly two-thirds tighter than they used to be (which was of average tightness). Since attics are typically the leakiest part of the home, Aspen switched to denser attic insulation (cellulose). Next they paid more attention to sealing off large holes: between the house and garage, up into the attic, at the joint between the frame and foundation walls, and around tubs, showers and fireplaces against outside walls. The Optima blown-in insulation system tightens up the walls. Testing indicated that the biggest single tightening step in homes with crawl spaces was eliminating vents to the outdoors. Finally, use of sealed combustion gas furnaces and water heaters eliminated two 6-inch combustion air ducts; this tightens up homes by roughly 10 percent.

Complete HVAC makeover

Once a building envelope is substantially upgraded, the HVAC system needs a complete overhaul. Emphasis on 'complete.'

Since Aspen's ductwork was as leaky as that in the typical Colorado new home, they needed serious work to avoid the usual comfort problems. The quickest way to tighten ducts is to eliminate use of wall and ceiling cavities for return ducts--exactly what Aspen did. This required minor reworking of floor plans in two-story homes. Today, tin or flex-duct is used to return air to every furnace. Additionally, their heating contractor, Woods Heating and Cooling, uses mastic sealant on all joints. Finally, all ductwork is tested to the standard of tightness recommended for Colorado: no more than 10% leakage of the furnace blower's rated delivery capacity under test conditions. The Woods crews met the goal in the first 10 homes with the new system; that made their handiwork 1/10th as leaky as the average new home's ductwork.

A well-insulated home doesn't need nearly as large a furnace or air conditioner as those installed in typical new homes. Additionally, homes with tight ducts need that ductwork to be carefully sized. Since Woods Heating didn't immediately downsize all furnaces, the first homes suffered an immediate performance problem: the furnace was "overheating" (high "heat rise") because of insufficient return air and oversized capacity. As soon as performance testing turned up the problem, Woods increased the size of the return air ducts and downsized their furnaces by roughly 25%. Problem solved.

Indoor air quality (IAQ)

Aspen's high-efficiency furnaces (92% AFUE) and their more efficient water heater (62% Energy Factor) are sealed combustion appliances. This approach provides a home's most important potential IAQ benefit; it prevents back-drafting and spillage of combustion gases down the typical water heater's flue and into the conditioned space.

Every home needs a controlled supply of fresh air. In most homes, that fresh air is provided randomly, in an uncontrolled, accidental way. Sometimes you have it, often you don't. Once you tighten up a home, it's even more important to install controlled mechanical ventilation. Aspen provides every new home with an AirCycler system. This consists of a controller and a single duct bringing fresh air from the exterior to the furnace's return-air duct. Every time the blower runs to supply heated or cooled air, it draws in a controlled amount of fresh air, mixes it with heated or cooled air, and circulates it throughout the home. If the blower hasn't run for half an hour, the controller turns it on at low speed for a few minutes, circulating fresh air to all rooms.

Wind energy innovation

In Colorado, most of our electricity comes from coal-fired power plants. Aspen Homes is the first production builder to step up to the plate and purchase 12 months of 100-kwhr/month of wind power for every one of their buyers. Wind power provides environmental benefits to everyone. The hope is that those buyers continue paying the extra \$2.50 per month for wind power.

Chipping Away at Waste

Last year, Aspen Homes spent \$96,000 to landfill construction waste from one subdivision. This grated on Aspen Homes' sense of environmental responsibility and kept drilling their bottom line. "We're wasting money and resources," said Sabin, who then made several big changes.

First, he mandated smarter use of wood; in that process, he ended up having to let go several framers who weren't buying into the changes. Second, his people now recycle all cardboard. Third, he bought a truck-and-grinder rig for roughly \$100,000 and started chipping all their remaining wood waste. Today that grind is used for on-site landscaping, is tossed on the ground around front yards to reduce the mud factor, or is given away free to homebuyers or nurseries as mulch.

The reduction in landfill tipping fees should save roughly \$40,000, giving the investment a two- or three-year payback. But the environmental and goodwill payoff is immediate.

Educating consumers

Kevin Cook of Cottage Realty explained that, “Aspen has combined good architectural features with this great new package. We have to educate the consumers on the value of this new approach. Some buyers who are very visual simply don’t care. Those from the trades are very impressed. But what we’re doing here is economical for all buyers.”

Aspen will soon be setting up an energy center in their sales offices in Loveland and Severance. It will show the features and sales staff will explain associated benefits.

Bottom line guarantee

Aspen Homes is Colorado’s first production builder to offer their homebuyers a heating energy consumption guarantee. The details are being worked out as this article goes to press. It probably will cover two years and should be based on each home’s size.

Is this hype? Not if the builder pays rigorous attention to detail during the design and construction of their homes. Chicago builder Bigelow Homes started offering energy consumption guarantees exactly two decades ago and it is still at it. New Mexico’s Artistic Homes started their guarantee over two years ago. Of their first 600 homebuyers, only three asked for a small refund. Both builders provide consistent home testing to make sure their trade contractors are delivering the required performance that makes the guarantee possible.

“We’re doing all the hard work to make these homes very efficient for our buyers,” said Sabin. “Now we’re going to take some credit for that effort.”

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