The Houston division of David Weekley Homes, worked with Building America research partner Building Science Corporation to design Builders Challenge homes in two Houston-area developments that achieved HERS scores of 59 to 68. The production builder, who operates in eight southern states, has qualified 1,500 homes for the U.S. Department of Energy’s Builders Challenge, more than any U.S. home builder except Lennar Homes, which also builds in Texas. David Weekley Homes is also one of America’s largest privately held home builders, having completed more than 65,000 new homes since opening in 1976.

The team used advanced framing techniques that include open headers over windows, 2x6 24-inch on-center framing with framing member alignment, two-stud corners, insulated corners, and insulated headers above windows and doors. These techniques reduce thermal bridging (i.e., a heat conduction path) by allowing more space for wall insulation and requiring fewer studs. The techniques save lumber as well. Any remaining thermal bridging was stopped by the exterior wall sheathing of R-5 extruded polystyrene (XPS) rigid foam insulation, which was sealed at the seams and edges to also form an exterior air barrier that was fully aligned with the R-20 damp-sprayed cellulose wall cavity insulation. The builder achieved whole-house air-tightness of 3.0 air changes per hour with this wall system and other air barrier details including gluing sheetrock to the framing; applying draft stopping in the building chases and behind the bathtubs, showers, and fireplace inserts; air sealing all holes for electrical wiring, plumbing/piping, and duct shafts; and caulking wall corners and the top and bottom plates. High-efficiency HVAC, appliances, and lighting add to savings.

(Project top left) David Weekley Homes’ Houston, Texas, division has partnered with Building America since 2008 to design and test energy-efficient homes that achieve HERS ratings of 59 to 68 with minimal added costs to buyers.
The major challenge for any builder is to look at their home as a whole system. This isn’t something that a builder can do just by flipping a switch or spending more money. You have to fail a lot of blower door tests and duct blaster tests first.”

David Weekley, president of David Weekley Homes

Lessons Learned

• Onsite training is essential. Framing contractors did not implement correctly advanced framing until site supervisors started making them redo incorrect framing.

• Climate-specific details (for Houston, Texas) include a radiant barrier in the attic and low-solar-heat gain windows (SHGC=0.34), which result in cooling load savings.

• Analysis by Building Science Corporation on one home model showed switching from 2x4 16-inch on-center to 2x6 24-inch on-center construction can reduce board feet by 40% (from 5,186 ft to 3,082 ft) and cut costs 40%, from $2,749 to $1,632. The number of 8-ft studs in this analysis was cut by 52% from 1,403 to 665.

• MERV 11-filtered central fan-integrated supply ventilation with variable-speed fan cycling, a motorized damper on the fresh air intake, jump ducts in bedrooms, a 15 SEER air conditioner, and a 95% AFUE gas furnace provide highly efficient HVAC and balanced ventilation for health and comfort.

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