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Not Just an Afterthought

Contractors stress the value of engineered systems, involvement in design

By John Frith

Many times, the design and selection of a heating and air conditioning system for new homes has been almost an afterthought in the homebuilding process. After all, the technology is relatively stable and from the sales perspective, homebuyers take it for granted that they will be able to heat and cool their new home.

But if portions of the house are too hot or too cold, the HVAC system can become a major call-back item. When that happens, contractors and energy consultants say, it's probably because the home's heating and cooling system was not properly engineered.

"Builders should care about (HVAC systems)," says Rob Hammon, principal of ConSol, a Stockton-based energy consulting firm. "A common consumer complaint is that there's a room that doesn't get hot or cold enough."

And with a two-story house, once the drywall's on, it's almost impossible to go back and fix a problem, says Eric Olson, president of MJB Heating and Air Conditioning in San Marcos.

"You only get one opportunity to do it. With a two-story house, you can't go back in and repair it. It's real important that it's done right," he says.

Doing it right

So how should an HVAC system be done right? From the very beginning, Hammon and Olson agree.

Hammon says heating and air conditioning systems need to be designed for each floorplan, using mechanical engineering procedures that take into account the entire heating and cooling loads, based on the size and construction of the home and its rooms, including the type, number, and placement of windows.

The most commonly used procedure for calculating loads is *Manual J - Residential Load Calculation*, published by the Air Conditioning Contractors of America, which has related procedures for calculating duct sizes, register type and placement, and system size. Hammon recommends that the firm doing these calculations should either be the installing subcontractor or a registered engineer.

"When using a third party to do the design, make sure they will stand behind their designs, have the technical ability to help if there are problems, and are properly insured, carrying both general liability and errors and omissions insurance, in case there are problems," he says.

Rule of thumb

Unfortunately, he says, many contractors determine system needs by rule of thumb.

"Too many systems are 'designed' using experience as opposed to mechanical engineering principles. The contractor says, 'I know this size room requires this kind of duct and register.' Those choices are usually inadequate," Hammon says.

And when it comes to ducts, size matters.

"People have a tendency to put in systems that have ducts that are too small. That causes too much back

pressure and not enough air flow across the coil,” Hammon says. Air return systems are also frequently too small. And insufficient airflow can lead to major problems for the homebuyer down the line.

“A poorly designed duct system will shorten the life of the compressor and blower motor,” Olson says.

Hammon says using a thermostatic expansion valve (TXV) can help compensate for design errors and another common problem, using an improper amount of refrigerant.

Olson says besides requiring proper mechanical design, builders need to work with HVAC contractors from the beginning when designing a new home. Too often, he says, contractors are not involved when a home is being designed, and as a result the design makes it difficult to properly install bulky equipment in attics and to ensure that the flexible ducts reach all the registers without kinking.

“We need to be involved at the front end when the project is on the design table. As we develop relationships (with builders), we become part of the design team. For example, we work with the truss designers to provide adequate clearance in the attic and places for duct chases between floors. We design a system looking at it as though it’s going into our own house,” he says.

Builders agree

Loren Smets, vice president for architecture for Pardee Homes in San Ramon, says his company sees things the same way.

“ConSol is involved in designing our systems. ConSol and our subs work hand-in-hand in designing and delivering a unit size appropriate for each home,” Smets says. “We’re working to get (the designer’s and contractor’s) input earlier in the value engineering process to ensure we have adequate space for the ducts, appropriate sizing of the units, etc.”

Olson notes his firm’s ability to partner with the homebuilders he works with and be involved in the entire home-design process has paid big dividends – the firm’s warranty service costs have been cut in half.

And Hammon says there’s one more good reason for homebuilders to insist on engineered systems – there’s proof that the contractor did the job right.

“If you have a mechanical design, you know how much heating and cooling is supposed to be produced and what the air flow should be, and you can measure those to evaluate if the system’s performing the way it’s supposed to,” he says. “If there’s no design, there’s nothing to measure against and you’re at the mercy of the installer to say if it’s working OK.”