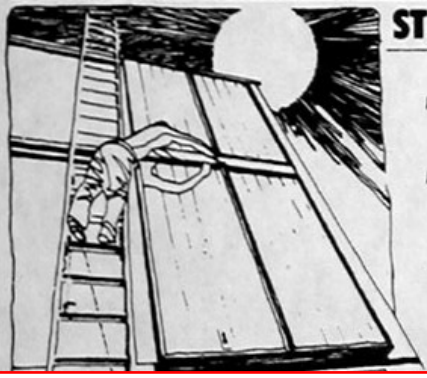

STEVE BLISS: BUILDING IT RIGHT

The Almost-Too-Tight House

Not a problem, if builders take reasonable precautions

Most energy-efficient builders don't make their houses as tight as plastic bags. More often, new energy-efficient homes have natural infiltration rates of 0.2 to 0.5 air changes per hour (ach).

These houses have almost enough average ventilation to meet current guidelines. Yet, because natural air leakage varies with outdoor temperature and windspeed, it doesn't ventilate reliably. Also, some parts of the house may be left unvented.

Still, in parts of the country these almost-too-tight houses are mandated by law or promoted with financial incentives. They often arise as a compromise between hard-core superinsulation dogma and what builders think they can build and sell.

How tight are your houses?

The most important factor in getting a tight shell is the quality of construction. Second is the type of housing. All other things being equal, two-story and split-level houses leak more than one-story houses. Flueless houses are tighter than those with flues by as much as 50 percent. Other features likely to add leaks to your houses are cantilevers, bay windows, fireplaces, and odd angles in the plan.

Chances are that if you're not wrapping band joists and running continuous, protected poly, your buildings are no tighter than a quarter of an air change per hour. On a blower door, they're probably in the range of 4 to 7 ach at 50 Pascals. If you don't do the test, it's anybody's guess.

Air quality

No one can really be sure yet whether these house have air-quality problems. For one thing, the health effects of low-level exposure to indoor pollutants are unknown. Second, at a given level of tightness, different houses have very different levels of pollutants, because their pollution sources and occupant lifestyles aren't the same.

While there are no true standards, guidelines have been set for several of the better-studied indoor pollutants. Of the houses that have been monitored, some exceed these health limits; others don't. To confuse matters, there's no direct relation between tightness and degree of pollution. In general, the houses with problems have an obvious pollution source that can be singled out and controlled. High levels of particulates are often tied to smoking. High levels of formaldehyde may be due to new furniture or exposed particleboard. Elevated levels of radon gas often come from radon-rich soil combined with openings in the basement.

Homes tested before and after weather-sealing offer clues. In several studies, cutting infiltration by 20 to 40 percent—typical of what professional retrofitters do—didn't degrade air quality much. Many pollution levels stayed the same; some actually fell. An exception to this is radon, which seems to go up more or less in proportion to the tightening.

Reasonable precautions

While the data are sketchy, there are some broad conclusions you can draw.

First of all, retrofits are no cause for alarm. Unless the house is very tight to start with or you are gutting the building and adding a continuous air/vapor barrier, it's unlikely a retrofit can be too tight. At best, it will approach typical new housing. If there were no air-quality problems beforehand, there are probably none after. But you can take reasonable precautions. For example, add kitchen and bath vents if they are lacking. Also, if known radon levels in the area are high, take pains to seal basement cracks and gaps and cover (and possibly vent) open sumps. If moisture levels are high, take care of that before tightening. You may end up improving the air quality.

In new construction, you have more control over potential sources of indoor pollution. The two key strategies are source control and spot ventilation.

The best way to control the source is to get rid of it. Seal out radon as described above and be careful in choosing materials. Avoid large amounts of products made with urea-formaldehyde glues. Steer clear of unvented combustion appliances. If you must install a gas stove, go for a pilotless model.

For spot ventilation, provide topnotch

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