

USING THE BLOWER DOOR: Part 2

EA&R editor Alan Meier recently spoke with blower door contractors from New Jersey, California, and Washington about the art of using the blower door. The contractors discussed blower door accuracy and their experiences marketing an air leakage service.

Technical Issues

EA&R: *Do you take wind and barometric pressure measurements when you perform a blower door test?*

Ray: We don't take wind velocity measurements, but we record the temperature and barometric pressure.

David: We're about to begin using something called a Beaufort scale to deal with wind velocity. It's apparently a way to look out at the breeze and at how much debris is floating around and assign a value to it.

Ken: We measure air temperature, and we estimate the wind velocity—would you believe it?—by looking at the trees. We don't measure wind velocity unless the job requires following the ASTM standard. Then we do everything in accordance with ASTM 779-81. Normally we don't measure barometric pressure, since the effects are fairly small compared to other errors in the blower door tests.

EA&R: *Are you satisfied that we understand enough about the theory of infiltration to satisfactorily relate blower door measurements to air infiltration? Ken, would you start, since you've done more on the research side?*

Ken: From the research viewpoint, there probably isn't enough known at this time. We're not getting enough data from the people working in the field. I think a blower door test gives a good qualitative measure, though. You have to realize that blower door measurements are accurate within 10-15 percent, or more typically within 20-25 percent when we're relating the measurement to natural air change rates. People who try to get down to the nitty-gritty and tell somebody that they have an equivalent leakage area or air change rate to the third decimal place are just kidding themselves.

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EA&R: *Ken. You claimed an accuracy of 10 percent and then escalated to 25.*

Ken: The measurement on a typical calibrated door is within 10 percent, if the test is done in accordance with the ASTM standards. But this is not usually the case.

Ray: Well, I don't want to make anybody mad here, but I've attended a lot of seminars recently—at Retrotec, and at Enercorp for updates—and I think people really get off on a tangent with the technical aspects. You go into a home and say to the homeowner, "Look, you've got a problem. You've got air leaks and they're probably causing 40 percent of your heat gain and heat loss." We don't even get people involved with the [blower door] readings. We show people that they have a lot of leaks, and then we show them that it's fixed. We find a lot of leakage sites, correct them, and give people their money's worth. But we don't really get into technical material with the customer. I think that's why a lot of people can't sell this system.

EA&R: *What about you David?*

David: Well, I concur with what Ray is saying on the customer marketing side. I have learned to watch for the "MEGO" reaction, where their eyes start to glaze over, and you know you're losing them.

EA&R: *(confused) What kind of reaction?*

David: My Eyes Glaze Over. And then they go, too; they go somewhere else. On the other hand, I'm quite interested in the theory. If I'm going to go out and make presentations to people, I've got to feel like they know what I'm talking about. As Ray's saying, the customers are relying on me to deal with technical theory. They don't want to know about it; they just want to have a warm, cozy feeling that I *do* know about it and I'll take care of it.

Marketing

EA&R: *Ken's situation is a little bit different because he's got a small chain of franchises—Princeton Energy Partners.*

Ken: We do limited advertising in newspapers and the Yellow Pages. Our sales are mostly direct or through referrals. We are known well enough in our franchise territories that many of our sales come from word of mouth.

EA&R: *What areas do your franchises cover?*

Ken: We are located mostly in eastern Pennsylvania and New Jersey. We have seven or eight franchises in this area and one each in Minnesota, North Dakota, and upstate New York.

EA&R: *Do you plan to expand?*

Ken: Yes, we do. We are working on that right now. We had our first franchise show in August.

EA&R: *Ray, you do a lot of work with newspapers and the press don't you?*

Ray: We've gotten some feature articles on the results we've achieved for our customers.

EA&R: *So you're getting free advertising. How do you set up the newspaper articles?*

Ray: I do it all myself. It's news because it's something that nobody has heard of. Very few people know about air leakage. It's not a topic of conversation over morning coffee in most houses.

The media are generally interested in our type of business, because they think they can expose you as a con-artist. But when they fail, they usually write a positive story.

EA&R: *David, where do you advertise?*

Dave: We're listed in the Yellow Pages, but most of our business comes from word of mouth. We've been doing a lot of promotional work with other contractors in this area, working with public and private utilities. We just got our first air-sealing job through a local utility.

EA&R: *Did the utility recommend air sealing as a measure and then refer you as a air sealing contractor?*

Dave: They don't recommend us directly, they recommend a professional organization, the Energy Business Association. Then the homeowner calls the Energy Business Association, and we give them a list of contractors in their area.

Ken: We're involved in a project with Philadelphia Electric—the Experts in Energy Efficiency (EEE) program. They pay us to construct a model home in a development. For a builder to qualify for the EEE program, he must meet the strict efficiency standards set by Philadelphia Electric. The builder stays in the program as long as each of his homes is within 10 percent of the model house. The utility can always return to compare houses—that is, to compare the model house to a just-



Ken Gadsby
Princeton Energy Partners and
Princeton University
Princeton, NJ

"We can't get away with just the wet finger technique. Some of the very important air leaks are obscure, and you need an infrared camera to detect them."



Ray Hall
H & L Energy Savers
Upland, CA

"Too many people put an emphasis on before and after testing. If a contractor really knows how to seal a home—get in there and do what is supposed to be done—the results will speak for themselves."



David Ott
Sound Conservation
Seattle, WA

"First we certify the contractor's ability to perform the pressurization test. In addition, the contractor must present at least five air-sealing reports from previous jobs."

completed house. This connection with the utility company has generated a lot of business.

EA&R: *Oil prices are plummeting and they may have hit rock bottom. What kind of response do you see among your customers? Does air leakage still sell?*

Ken: Our approach to energy conservation is broader than just the air leakage business. Our business is growing, and the franchise royalties are increasing. I would say that the oil glut has had no effect whatsoever on us; we have a backlog of work.

Ray: The utility programs ended about eight months ago, and right now our competition is virtually nil. There aren't many insulation contractors left. They've gone on to sell satellite dishes or alarm systems. Only one other contractor in our area of southern California—that I know of—even does air leakage. Our business has been up and down—we have our good weeks and bad weeks—but we're definitely paying our bills, and we're definitely making money. Our average consumer is tired of all the promises and all the fly-by-nights, and the solar scandals that occurred out here. If you just mention energy, they'll slam the door in your face. But we have enough referrals and enough good press going for us that we've managed to survive and prosper.

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— Ray Hall

Dave: Here in the Northwest our business is doing better this year, but last year was a disaster compared to the previous year. We felt the impact of lower public concern, but we're back on the way up again. We're trying to move away from the government and utility programs and concentrate on the private sector.

EA&R: *Are you going to buy another blower door and expand your business?*

Ray: We have three blower doors now, and if we hadn't gotten into air leakage six years ago, we wouldn't be around today. Insulation contractors in southern California are considered along with the worst of the used car salesmen, and there is no doubt that the blower door saved our business. We didn't need to make claims because we got results. About four months ago, we surveyed a hundred of our whole-house customers. (It took us

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about a week to do the darn survey.) First of all, our customers weren't that interested in energy savings, because they'd already heard good things about us. They anticipated the savings on their heating and air-conditioning bills but were more concerned with comfort—reducing the amount of dust in the home and reducing noise levels.

Dave: That's our experience too. Energy saving puts people to sleep, but they're interested in comfort. They pay for comfort, and they'll rave about it. You make their house more comfortable, and they'll tell their friends. If you save them a few bucks on their utility bill, they're not going to talk about it.

EA&R: *Do you use comfort in your sales pitch?*

Dave: Yes, we downplay the savings.

EA&R: *So you are finding that comfort is more important than payback when you're making a sales call.*

Dave: Yes, that was a hard thing to learn. I got into this door-fan thing thinking, "Boy, here's an easy way to sell cost effectiveness." I had to learn through a lot of failures that cost effectiveness is not what the marketplace is particularly interested in, at least not at this time and in this area.

User Certification

EA&R: *Correct usage of the blower door is critical, especially if you perform before and after measurements and calculate an ELA. What are your thoughts about user certification?*

Ken: Certification is fine if we can come up with some national—not just local—standard. It would be great if ASHRAE or the National Bureau of Standards would develop an enforceable standard. We prefer to talk dollars rather than percent savings. Say, for example, you have a fairly leaky 1,600 square-foot house, with 16 air changes at 50 Pascals. You reduce infiltration by 40 percent, down to 9 air changes. With the present tariff on gas here, you would save \$83.00 a year. If the job costs several hundred dollars, the payback is very long.

EA&R: *How do you derive those numbers? Do you use a computer program?*

Ken: We convert back to natural air changes. We use the LBL approach or we divide by 20. [See "Infiltration: Just ACH_{50} Divided by 20?", EA&R, Jul/Aug '86.] We try it both ways to see where we are. We assume an accuracy of plus or minus 20 percent, so that if the homeowner wants to know how much he will save, we tell him it's somewhere between 60 and 110 dollars. We actually calculated \$83.71, but it is a "soft" number.

EA&R: *Dave has some direct experience working on standards up in the Northwest.*

Dave: I've been meeting for the last 18 months with a number of other contractors, as well utility and low-income weatherization specialists. One of the local utilities, Puget Power, set up a program and realized that they needed to know more. They also saw the need for some industry standards. So we started to develop a set. We looked at all the standards that we could get our hands on before writing ours. We are not part of the research community, but we didn't want to ignore relevant research results. We wanted to incorporate the latest technology and theory, accurately report to the homeowner how tight the house is, and still make a dollar. Another contractor should be able to repeat the measurement within 20 percent. Our standard is similar to the Canadian General Standards Board 11th draft, with some modifications. We went to depressurization testing only.

EA&R: *What does the certification involve for the blower door user?*

Dave: The contractor must demonstrate that he understands the instrument. First, we certify the contractor's ability to perform the pressurization test rather than just seal cracks. Sealing air leaks and performing the test are skills requiring different knowledge. In addition, the contractor must present at least five air-sealing reports from previous jobs. We assume that the contractor already knows how to work the hardware. The five tests demonstrate that the guy has some experience. There is also a written test and a field test where the contractor measures the leakage area of the house. We introduce a couple of orifices of known size, and the contractor has to measure, within 20 percent, the size of that orifice.

Ken: You're saying, then, that the equivalent leakage area is the same size as that orifice?

Dave: Yes, that's what they're testing.

Ken: We know that the equivalent leakage area is just that—it will not be the area of an orifice as such unless you have the exact discharge coefficient. It seems like there's an automatic error built in right there.

Dave: Well, there may be. You're the research side of the fence. What should we be doing instead?

Ken: I just question the discharge coefficient. LBL and the Canadian model use a different discharge coefficient, so your test would automatically come up with a different number. A sharp-edged orifice might have a discharge coefficient of 0.6, but a rounded orifice will have a higher discharge

coefficient. It can range between about 0.6 and 0.9, and the variation can introduce some error. The "equivalent leakage area" is equivalent assuming certain things, but it is not a real number.

EA&R: *Dave, are your standards voluntary? If a contractor fails a test, does he lose the right to participate in the Puget Power program?*

Dave: Currently, no. But the utilities are looking for a way to get themselves off the hook—for an independent body to come in and say that the blower door contractors are providing a reliable, decent service. Our feeling is that if we don't regulate ourselves, it's going to come from the outside.

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— Dave Ott

Ken: There is currently an ASTM standard, but it's not even being used by the research community. I feel that those of us in the research community and the people on the ASTM committee have not pushed hard enough to have that requirement. In normal everyday work, it takes too long to do the test. If you do that several times during the day, you eat up a lot of man hours. That's a lot of dollars.

We have to be very careful about inferring a high level of savings directly from reductions in air infiltration. Otherwise, it might catch up with us, because these are soft numbers. The industry as a whole over the last few years has been using claims of 50 percent savings and better just from air infiltration reduction. This is virtually impossible.

Ray: I'd like to comment on what Ken said about the claims of 40 to 50 percent energy savings. We can safely make that claim because our average home needs the whole package—attic and wall insulation as well as leakage reduction. If you consider that 70 percent of a person's total utility bill is heating and air conditioning, you're bound to save them an average of 40 to 50 percent on their bills. That's a good figure.

Ken: That's for the total package. I'm just talking about air infiltration reduction. There are some very desperate people out there claiming savings of

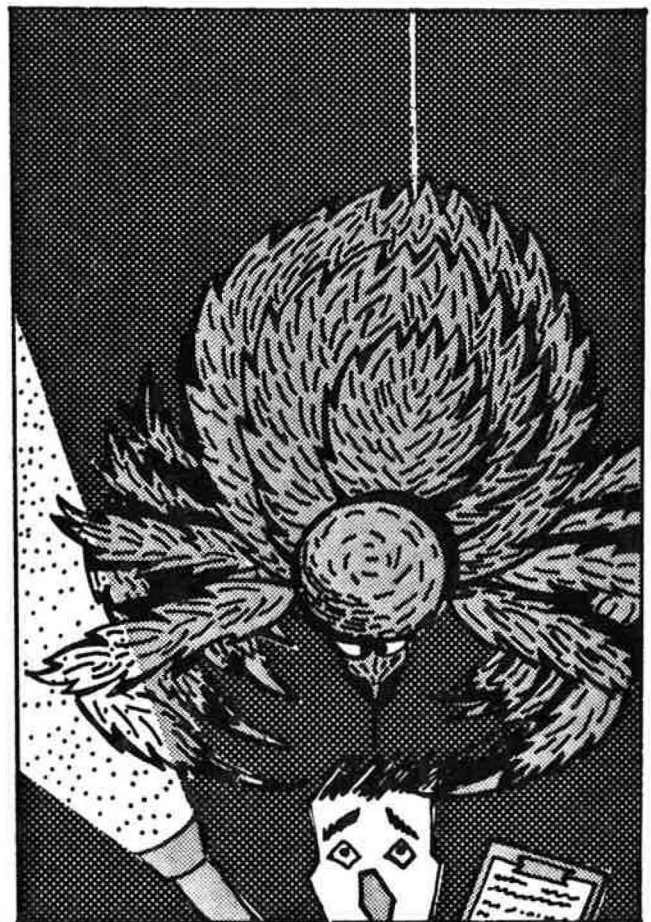
50 percent on infiltration reduction, and they're the ones who are going to ruin this industry.

Dave: Ken, what else do you guys do besides shell-tightening?

Ken: We're old rocketeers from NASA research, so we're systems analysts. We look to see that everything is working properly, and working together. We look at air leakage, the heating system, the cooling system, the water system, the insulation system—every system in the house including the people. So our technique looks at a lot more than just air leakage. We can't get away with just the wet finger technique. Some of the very important leaks are obscure, and you need an infrared camera to detect them.

Ray: Yours is a much more technical approach than ours. Where are your jobs coming from? Through utility companies, grants, or what?

Ken: Our jobs come from all segments of the market. We do some low-income work, middle-income neighborhoods, and we do some pretty fancy houses, too.



An auditor's nightmare

Ray: Where does the money come from for your low-income work?

Ken: It comes either through a governmental channel or some charitable organization. We don't do a whole lot of low-income work, although we've done some demonstration programs in lumps of one or two hundred units.

We typically provide a one-day service for an 1,800 square-foot home. We do the analysis while we're there. It takes an hour or an hour and a half for two people. Then the homeowner gets a prioritized list of options based on cost effectiveness. We also address comfort, because it does no good for an occupant to spend all of this money and save energy just to be uncomfortable at a lower cost.

EA&R: What kind of software do you use to prioritize the retrofits?

Ken: We have a proprietary system based on CIRA®. We've adapted it to a database system. We feed in the results of our audit and come up

We don't like to use the term "house doctor" because it's so bastardized. There are a lot of people out there saying they're doing house doctoring, and they're really just tightening the shell. It's so bad now, that anyone who buys a blower door calls himself a house doctor.

— Ken Gadsby

with a list of prioritized retrofits. We also have a very simplified program that we use in the field, with a hand-held Sharp computer, that offers rough estimates. The rest of the calculations are done back at home. We don't like to use the term "house doctor" because it's so bastardized. There are a lot of people out there saying they're doing house doctoring, and they're really just shell-tighteners. We don't want our reputation associated with the average "house doctor."

EA&R: And yet you are the ones who developed the term.

Ken: We're the ones [at Princeton] who developed the term, the technology and everything else; but it's so bad now that anyone who buys a blower door calls himself a house doctor.

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