

NFRC well deployed to deliver national window rating system

By the end of the 80's, the writing was on the wall, or more pointedly on the window. The energy benefits of high performance IG units were becoming so enthusiastically accepted outside the window industry, that an imminent appearance in conservation-oriented state or federal legislation could almost be guaranteed.

That presumption has indeed been correct, with the America's first window labelling program, a U-value rating, set to begin this summer in California, and performance-rated, building code requirements soon to be a fact in Oregon, Washington, Alaska, and Minnesota.

While commendable from an energy efficiency perspective, this likelihood two years ago precipitated another less-sanguine thought, a potential blizzard of physical testing waiting to land on industry's door, unless a national window rating system could be fashioned in pretty short order.

"We had no uniform, energy-performance, window rating system in place to handle this eventuality, absolutely no industry-wide consensus on acceptable test procedures," says Chris Mathis, administrative director of the National Fenestration Rating Council in Silver Spring, Md.

His two-year-old, ASHRAE-inspired organization, created in anticipation of just such eventualities, is today well along in coordinating the development of both a national rating system, and the certification processes necessary to keep it up and running.

As a major part of its ratings activity, the NFRC is also undertaking a validation of the sophisticated computer simulation programs that have already played a big role in the commercial success of this industry.

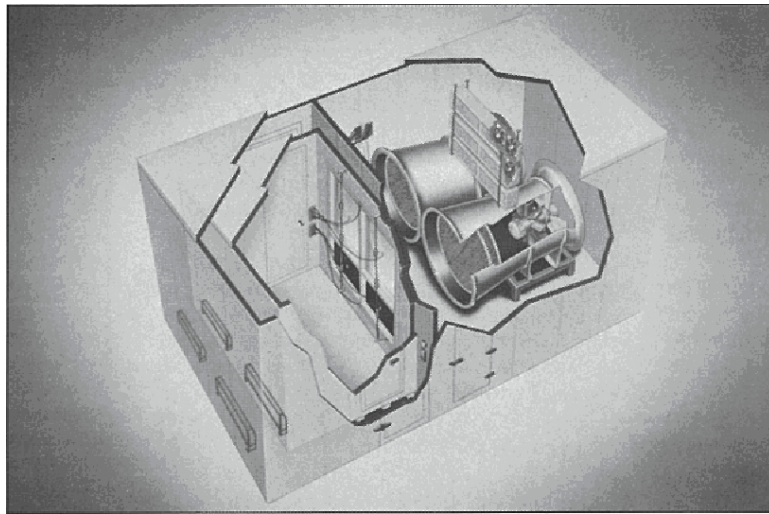
"It goes hand in hand with our test procedure work," says Mathis, "because only by validating this software's use, as a surrogate for physical testing, can manufacturers avoid facing duplicative state requirements, battery upon battery of laboratory tests, covering every single product, in every single glazing type, air space width, and frame configuration."

With this in mind, one of the NFRC's first acts was a nation-wide industry, utility and government survey on which energy performance parameters were judged most critical.

The consultative process generated a short list of five, overall U-value, solar heat gain, air infiltration, optical properties, and condensation resistance, and sub-committees were soon formed to address the various test procedure and computer simulation issues involved with each.

There was also enough concern raised about long-term durability, that a sub-committee was formed and a seventh committee struck with a long-term objective of developing an annual-energy-performance rating for specific locations.

The latter, a compilation of the first five parameters, will vary depending on the climate zone in which a window might be installed, thus allowing consumers a chance to match



Architectural Testing's cold-chamber facility

performance with their individual thermal need.

With a variety of test procedures and simulation software available from over five years of industry and government-sponsored U-value development, "This area proceeded first," says NFRC technical director, Willie duPont. "It was also the highest priority amongst survey respondents," he adds.

This past summer, five laboratories began U-value testing 12 different window types, in four standard frame constructions, wood, wood/vinyl clad, vinyl, and aluminum. Three labs gathered additional condensation resistance and air infiltration data for use by other NFRC sub-committees.

Nearly completed by year's end, testing was conducted at the following facilities: Architectural Testing Inc. of York, Penn.; Rolscreen Corporation of Pella, Iowa; Wanrock Hersey Intl of Middletown, Wis.; Quality Testing Inc. of Everett, Wash.; and Canada's National Research Council in Ottawa. Some of the raw data may be available for review at NFRC's late-January meeting in Anaheim, Ca., says duPont.

Simultaneous with this effort, six other laboratories began running U-value computer simulations of the same dozen windows, using WINDOW (3.1), Lawrence Berkley's center-of-glass heat loss software, and FRAME (2.2), a perimeter-heat-loss program developed in Canada by Enermodal Engineering of Waterloo, Ont.

"We don't anticipate any wild variations in the agreement between the tested and simulated U-values, because much of the comparative work was already done in a joint U.S.-Canada round-robin on window energy performance conducted over the past couple of years," says duPont.

As mentioned, three of the five test labs collected additional data on air infiltration and condensation resistance. The former followed a new ASTM procedure (E1424), involving conventional testing, both sides of the glass at ambient temperature, plus a second set of readings at a temperature differential of 70 F. Infiltration is measured at wind speeds of 15, 25 and 50 mph.

Condensation resistance, while not a new performance parameter, is being looked at from a

fresh angle to assess the value of some new techniques, with thermocouple data being gathered during the current round of U-value testing, via an extra row of sensors along the bottom edge of glass.

The relevant sub-committee is examining a variety of alternative test procedures, "One such being thermography," says its chairman, Michael Glover of Edgetech. "It's still pretty experimental yet, but 2D software, like that being developed at the University of Waterloo, might also play an important role."

Testing for the other two parameters, solar gain and optical properties is still at the developmental level. A whole new set of solar gain test procedures is being

written by its sub-committee, chaired by Ross McCluney of the Florida Solar Energy Center.

When it comes to optical properties, the transmission, reflection and absorption of both solar and visible-spectrum energy, "Numerous existing procedures exist, and some will probably be adopted as written, or with slight modification," says duPont.

"A comparison process is now underway, but, if we have to, we're prepared to write our own," he adds, "because in many ways this relates back to solar heat gain, which you can't really get a good handle on without first knowing what its optical properties are."

So far, the NFRC has spent about \$500,000 toward the creation of a uniform rating system, but its administrator Chris Mathis estimates, "The total financial and in-kind contribution from manufacturers, builders, utilities and government to be greater again by a factor of ten."

Test lab spokesmen feel the NFRC is off to an "excellent start" on an unavoidably tough job. "I just hope everyone doesn't feel overwhelmed by it all," says Scott Warner, executive vice president of Architectural Testing Inc.

"However, the technical people NFRC has pulled together on this project are the best that North America has to offer," he says. "So if any group can get the job done, it is this one."

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39 Vaughan St.

Ottawa, Ontario

1(613) 7490624

Tel. (613) 7490624

F. (613) 7490754

A Subsidiary of Lauren Manufacturing

2228 Reiser Ave. S.E.

New Philadelphia,

Ohio 44663

Tel. (216) 3393373

Fax (216) 3391515

Toll free Tel. (800) 6830676