KAW
2006 Mid-Year Report

Changes in KAW Governance

The success of any program can most often be measured by how successfully it adapts, expands and embraces new challenges. Another measure of success is seen in structural changes of not the program but rather within the governing structure of the program which were approved in the spring of this year. In recent action, AEC elevated the campaign to full committee status – the KAW Committee. Most importantly this facilitates the ability of KAW to have its own subcommittees and task groups. "Like most associations AEC's ability to include non-members, or as in this case non-industry companies, within its committees or programs is limited," said Greg Patzer, AEC's Director of Government Relations. "While we have always sought the counsel and input of concerned parties from outside of AEC, we now have the methodology with new subcommittees to receive more direct input from those whom our advocacy is directly affecting, the manufacturers of aluminum fenestration products."

In addition to the establishment of the KAW Committee, two subcommittees were established at the same time. The two subcommittees under the KAW Committee are the Manufacturers Advisory Subcommittee and the Technical Advisory Subcommittee. Both groups are open to participation by non-AEC companies. The Technical Advisory group, which existed before as a small task group, will be expanded to again include more representatives from the fenestration manufacturing sector. The primary mission of this group is to examine the technical aspects and effects of KAW actions, such as code proposals, relative to aluminum products. The Window Manufacturers Advisory Subcommittee will be solely comprised of those representing that particular group. "Manufacturers in the aluminum fenestration niche have no entity looking out solely for their interests. With this subcommittee we are now formalizing what we had been attempting to do, to give these manufacturers an opportunity to assist and direct KAW efforts. In essence to have a place for their concerns to be heard and acted upon." said Patzer.

An Active Spring & Summer for KAW

The newly christened KAW Committee has wasted no time to put its mark on several initiatives during the first half of the year. The final push to fill all slots available on the two KAW subcommittees, the Manufacturers Advisory Subcommittee and the Technical Advisory Subcommittee, continues. As noted in previous reports we have entered a period of relative calm with DOE activities following our success in having an alternative performance path implemented within the Energy Star Program, relative to residential fenestration, for select zones.

The expansion of KAW activities into commercial applications has greatly increased the time and funding needs. Being active in the code arena (ICC & IECC) as well as ASHRAE by its nature increases activities with both NFRC as well as AAMA. What follows is a brief notation of current activities. For more inclusive details consult the most recent KAW Report which will be released and appear on the AEC website.

ICC & IECC Code Proposals
KAW has submitted two code proposals independently for the 2006-2007 Code Development Cycle. The Hearings are to be held in September, 2006.

Revision to Section 101.5 of the IECC
The first is a revision to Section 101.5 of the IECC. As stated within the proposal – *The purpose of this proposal is to add an alternative pathway of compliance for certain residential building types which may have functional design requirements closer to commercial buildings. Currently, the definition of residential buildings which must comply with chapter 4 includes R-3 buildings, and R-2 and R-4 buildings three stories or less in height. This includes not just single- and dual-family detached homes, but also dormitories, apartments, long-term motels, and assisted care facilities. While many of these buildings can be built in a manner consistent with typical residential methods and requirements, there is also a large variation in buildings. Certain buildings will have special functionality or design requirements which are more appropriately covered under commercial methods and requirements. One example is dormitories*

or assisted care facilities with high abuse / durability / lifetime requirements. Another example includes larger (but not tall) multizone buildings which need complex HVAC systems. A third example includes apartment and dormitory buildings which have multi-story atriums or enclosed stairways which utilize curtainwall-type glazing systems. This proposal acknowledges that many of these R-2 and R-4 buildings bridge the boundary between residential and commercial buildings, and thus allow either chapter 4 or chapter 5 to be used for compliance.

In reviewing this proposal, it is appropriate to explore the differences in chapter 4 and 5, which differ in envelope, HVAC, and lighting requirements. First, chapter 5 gives more options for the different construction types used in commercial buildings, and as a result, envelope requirements vary from chapter 4. Some requirements are more stringent, whereas other requirements are less stringent. For example, the chapter 5 floor and slab requirements are generally more stringent in the southern zones, and equivalent in the northern zones. The wall and roof / ceiling requirements in chapter 5 are generally equivalent in the south, and somewhat less stringent in the north. The chapter 5 fenestration U-factor requirements are equivalent to chapter 4 for non-metal windows, and less stringent for metal-framed fenestration to acknowledge their use in high durability and structural applications. These differences in envelope requirements, whether more or less stringent, are justified given the different types of building construction.

Section & Table 402.3.7 in the IECC and a corresponding new Section & Table N1102.3.7 in the IRC.

The second is a proposed new Section & Table 402.3.7 in the IECC and a corresponding new Section & Table N1102.3.7 in the IRC. As stated within the proposal – *The purpose of this proposal is to increase the flexibility and usability of the code, by adding an alternative method for complying with the residential fenestration requirements with equivalent energy performance. Currently, the code treats windows like walls in the north by only specifying the U-factor, while ignoring the influence of solar heat gain coefficient. Obviously, a window is not opaque, and the complete energy balance of a window must consider both U-factor and SHGC (as well as air infiltration to a lesser extent). Whereas solar heat gain is detrimental in the cooling-dominant south, solar heat gain is beneficial in the heating-dominated north by providing free solar energy to offset heating demand. As heating fuel prices continue to increase to record highs, it is important to utilize every available resource to reduce overall energy demand. This proposal introduces an alternative method of compliance for residential fenestration in zones 6-8 which includes the benefit of solar heat gain in heating-dominated climates.*

Specifically, this proposal provides combinations of U-factor and SHGC which are equivalent in energy performance to the current fenestration requirements of Table 402.1.1 / Table N1102.1. As the beneficial solar heat gain coefficient increases, maximum U-factors are given which provide equivalent overall performance. The proposed values are taken exactly from the report by Lawrence Berkeley National Laboratory prepared for the U.S. Department of Energy as part of their recent analysis for the Energy Star® program for windows. (J. Huang, R. Mitchell, S. Selkowitz, and D. Arasteh, "Analysis Results for Performance-based Ratings for the Energy Star® Windows Program", Windows and Daylighting Group, Lawrence Berkeley National Laboratory for the U.S. Department of Energy, October 2004.) This analysis explicitly examined what combinations of U-factor and SHGC have equivalent energy performance as the prescriptive 0.35 U-factor requirement for residential windows in 23 cities throughout zones 5-8. The analysis included detailed hour-by-hour simulations, calculation of total annual source energy consumption (heating and cooling), and population weighting. The results are the values given in Table 402.3.7 / Table N1102.3.7, although this proposal is more conservative by limiting the alternative values to just zones 6-8.

Some have argued that this type of alternative compliance method is unnecessary as it is already allowed by Section 404 of the IECC. It has also been argued that there is increased variability in the assumptions used in the LBNL report compared to Section 404, which requires a complete simulation for each individual building including the specific orientation. However, it should be noted that any variability in the LBNL report is certainly less than the variability assumed in the prescriptive requirements by ignoring SHGC in the north altogether. The LBNL report also uses source energy in its analysis, resulting in values that are more conservative than if they had used either site energy or energy cost, particularly with the recent very large increase in heating fuel prices. Finally, we have made this proposal even more conservative by limiting the alternative values to zones 6-8 rather than zones 5-8 used in the report. Therefore, for this type of fenestration performance trade-off, Section 404 needlessly adds complexity and expense. This proposal achieves the same purpose in a manner which greatly simplifies the use for both code officials and builders. This facilitates enforcement, while also promoting the use of technologies to reduce heating demand in the north.

Others have argued that the proposed values could somehow lead to problems with condensation, thermal comfort, peak heating demand, or peak cooling demand. These concerns are exaggerated and unfounded. First of all, the current requirements allow any SHGC value in these heating-dominated zones, so if anything, the top SHGC value of 0.54 in this proposed alternative would limit or reduce peak cooling demand compared to the current requirements. Furthermore, the Energy Star®

Windows program has determined that a maximum SHGC of 0.55 in the North Central zone (roughly zone 4) is sufficient for mitigating any peak cooling demand or comfort issues there, so the top SHGC value of 0.54 in this proposal is certainly satisfactory for zones 6-8. As for U-factor, the top value in this proposal is 0.40 which is consistent with the maximum value allowed by Section 402.5.1 of the IECC. When this value was placed in Section 402.5.1, the proponent specifically selected this value to avoid any comfort, condensation, or peak heating demand problems, so it is clearly also acceptable here. The IRC has determined that even higher values are acceptable in Section N1102.5.1, but we have chosen to use the more conservative value in this proposal. The LBNL report also concluded that "the impacts on heating or cooling peaks are minor and do not appear to be a major determinant for the performance tradeoff approach."

This proposal is a unique case where product flexibility and energy efficiency are not at odds with one another. The proposal includes a simple and easily enforceable alternative method for complying with the residential fenestration requirements. At the same time, it encourages product flexibility and availability while guaranteeing equivalent energy performance. In the end, consumers, builders, code officials, manufacturers, and energy efficiency advocates all benefit.

Revision and addition to Section 102.1.3, Section 102.1.3.1, Section 202 – Chapter 6 IECC

KAW, in conjunction with the Glass Association of North America and Craig Conner (Building Quality), is a co-proponent in a revision and addition to Section 102.1.3, Section 102.1.3.1, Section 202 – Chapter 6 IECC. This proposal adds an alternative useable method for complying with the IECC's commercial glazing U-factor and SHGC requirements, in particular commercial glazing that is assembled in the field. This is of major importance to the commercial sector and is drawing strong opposition from NFRC whose procedure is the only one currently cited within the code.

As stated within the proposal - *This proposal adds a useable method for complying with the IECC's commercial glazing U-factor and SHGC requirements, especially commercial glazing that is assembled in the field.*

The existing section of the code specifies NFRC procedures for rating window U-factor and SHGC. The existing procedures (NFRC 100 and NFRC 200) were originally developed for residential windows. These procedures work well for residential windows, which are produced in a factory where the manufacturer produces the final product and knows the specifications for that product. NFRC labels are very commonly seen on residential windows.

In contrast, no workable procedure exists for rating commercial glazing, particularly for products that are glazed and/or assembled in the field. Although NFRC has added a procedure for site-built fenestration, the evidence that the existing procedures are not working for commercial buildings is the lack of NFRC labels on curtain wall and storefront fenestration in the field. Most commercial inspectors have never seen a single rating label on curtain wall or storefront windows.

Lacking a label, this section of the code assigns a default value for U-factors and SHGC from the tables in this section. A quick comparison of the default values with the code requirements in Table 502.3 shows that curtain wall and storefront fenestration would never meet the code requirements based on the default values. This fenestration will always fail the SHGC requirements in zones 1, 2 and 3; and always fail the U-factor requirements in zones 4 through 8.

Curtain wall and storefront fenestration, common types of commercial glazing, are assembled in the field. The specific combination of frame, glazing, and sizes are determined by the professional who designs the fenestration for a particular building. The glass fabricator assembles the glass and spacer into a sealed IG unit. This fabrication step alone can have many combinations of glass type (different low-e coatings, reflective coatings, tints, thickness, tempered, laminated, etc), spacer type, and gas fill. Similarly, the large variety of framing components leads to a huge number of possible configurations in the final product assembled in the field by the glazing contractor. To increase enforcement of the code for these commercial products, there is a need for a standard to more easily rate these products in a realistic, cost-effective, and simple manner.

With the AAMA 507-03 procedure, once the thermal test procedure has been performed then the AAMA 507-03 charts can be used for the specific fenestration size, glazing, and framing used. This system is by far the most cost effective because the glass and framing options are only tested once; then the charts and linear interpolation is used to quickly produce a value for each product.

The AAMA procedure uses the same test and computer simulation tools required by NFRC. From a technical basis they are very similar and result in similar values for U-factor and SHGC. The main difference in the two procedures is that the AAMA procedure combines frame and glass ratings to provide an overall system rating without requiring additional project specific simulations and lab fees.

AAMA 507-03 can also be used to easily calculate performance of actual products with the real size and real spandrel area, not just some hypothetical model size from the NFRC procedure. Using the NFRC model size gives a comparative value which is not appropriate for estimating actual demands and HVAC sizing when the real product varies from the model size.
AAMA 507-03 is a simple, usable, and enforceable option for rating commercial windows, and is well suited

to the process used to construct commercial fenestration.

Position Paper Relative to NFRC

In July KAW (AEC) issued "AEC and the proposed NFRC Component Modeling Approach for Rating Fenestration Products." The paper sets forth KAW's recommendations and concerns relative to the procedures being developed within NFRC.

NFRC, ASHRAE, & AAMA

Constant monitoring and participation in the above groups is needed by KAW's consultant, Tom Culp, to keep abreast of activities and proposals detrimental to aluminum interests. The issues and areas needing monitoring are, in short: NFRC, the component modeling issue and their attack to the IECC code proposal we have sponsored; ASHRAE, monitoring of recommendations coming from the 90.1 Envelope Subcommittee; AAMA, dissolution of L175 Task Group and the proposed changes in AAMA/WDMA/CSA relative to L175 and changes in classifications.

Assistance Needed

The need for funding has never been greater for KAW. To effectively continue to cover all the fronts, we need your assistance. Your generous donation to the KAW fund will be greatly appreciated.

KEEP ALUMINUM WINDOWS (KAW) PLEDGE FORM

We would like to suggest the following levels of participation (choose one):

- ❑ **Aluminum Sponsor $ 5,000**
- ❑ **Gold Sponsor $ 3,500**
- ❑ **Silver Sponsor $ 2,000**
- ❑ **Other $_____**

- ❑ **One Time Pledge**
- ❑ **Invoice Annually For Indicated Amount**
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- ❑ We need more information before committing funds. Please contact me.

Company: _____

Authorized by (print name): _____

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Signature: _____

Phone: _____ Date:_____ Amount: _____

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Please fax your completed form to 847/526-3993, attn: Greg Patzer. You will receive a pledge confirmation and a written summary of the program. Thank you!

Payments should be submitted by check to the AEC Executive Office. Include a copy of this form. If you need an invoice from AEC to make your payment, please contact Lisse Jurcenko at 847/526-2010 x 19. Pledged funds are due to AEC no later than 30 days from the date of the pledge. Contributors are entitled to a summary report on request of all spending against this project. For any other questions regarding this program contact Greg Patzer at the AEC Executive Office.