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CPI Spray Foam Coalition Comments re Revised Draft ACM 10.8.15

Additional submitted attachment is included below.

American Chemistry Council | Center for the Polyurethanes Industry

October 8, 2015

California Energy Commission
Dockets Office, MS-4
1516 Ninth Street
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RE: Docket #15-BSTD-04
Revised Draft 2016 Residential Alternative Compliance Method Manual

Dear California Energy Commission,

The Spray Foam Coalition[1] (SFC) of the Center for the Polyurethanes Industry is pleased to provide comments on the revised draft of the 2016 Residential Alternative Compliance Method Manual (Revised ACM).[2] These comments build on the work we have undertaken to ensure that California Building Energy Code Compliance (CBECC) software provides energy savings estimates for unvented attics (UVAs) that are consistent with field data and based on sound assumptions.

We are writing to draw attention to inconsistencies and inaccuracies in the Revised ACM for sections 2.6.4 Attic Conditioning and 2.2.5.2 Defining Air Net Leakage. Additionally, we are including proposed revisions to sections 2.6.1.2 Vent Area and 2.6.1.3 Fraction High. While these two sections only *directly* pertain to ventilated attics, the SFC is concerned that inaccuracies in the ventilation assumptions could cause CBECC to overestimate savings for vented attic designs, thereby reducing the relative performance of UVAs constructed with spray polyurethane foam (SPF).

2.6.4 Attic Conditioning

The SFC appreciates the changes that were included in the Revised ACM that bring the calculation method closer into alignment with current construction practice and the current version of CBECC. However, we believe the follow sentence is inaccurate:

[1] The Spray Foam Coalition (SFC) champions the use of spray polyurethane foam in U.S. building and construction applications and promotes its economic, environmental and societal benefits while supporting the safe manufacture, transport, and application of spray polyurethane foam. SFC consists of manufacturers of spray polyurethane foam systems as well as suppliers of raw materials and machinery used to apply the foam.

[2] The SFC submitted comments on August 20, 2015 in response to the public comment period for the draft version of the ACM.

~~and for an u~~Unventilated attics usually have insulation located at the roof deck ~~may be~~ and sometimes on ~~at~~ the ceiling ~~or roof level~~ (§150.0(a)).

The sentence should be revised to read as follows:

Unventilated attics generally have insulation located only at the roof deck.

In order for a UVA to function properly, there should be some air exchange with the conditioned living space in the home.[3] A typical UVA design removes ceiling insulation and only insulates the roof deck and gable ends, bringing the attic into the conditioned building enclosure.[4] Therefore, we suggest that the CEC encourage the use of insulation only at the roof deck for UVAs. Implementing the change described above will also maintain consistency with the following sentence, which immediately follows the incorrect sentence currently included in the Revised ACM:

In an unventilated ~~(conditioned)~~ attic, the roof system becomes part of the insulated building enclosure.

2.2.5.2 Defining Air Net Leakage

Table 2-3 in the Revised ACM, "Air Leakage Distribution," indicates that either 40% or 50% of a home's air leaks occur at the ceiling plane. We understand that this is based on field data collected from homes with vented attics and do not question the validity of that assumption for vented attic configurations. However, the table does not show any distinction in the assumptions for a home constructed with SPF UVAs. Our understanding is that the 50% air leakage assumption is maintained for homes constructed with an SPF UVA and applied to the roof deck (versus the ceiling plane for a home with a vented attic).

This assumption is not consistent with the performance of homes in the field constructed with SPF UVAs. A home constructed with an SPF UVA will typically have very little leakage through the roof deck – in both an absolute sense and as a percentage of total envelope leakage.[5]

Therefore, an additional configuration of "unventilated attic" with reduced air infiltration as a percentage of total envelope leakage should be added to Table 2-3. This addition should be made due to the ability of SPF UVAs to limit stack effect by creating a tight "lid" on the home and reduce infiltration of unconditioned air into the attic. Furthermore, installing an SPF UVA does not increase the leakage in other parts of the home. Therefore, the reduction in air leakage through the roof should be an absolute reduction in the specific leakage area for the roof. Any changes related to SPF UVAs in the modeling assumptions should not result in an increase to the modeled leakage in other parts of the home.

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[3] "BSD-149: Unvented Roof Assemblies for All Climates," Building Science Corporation's Building Science Digest, dated July 24, 2007. Available at: http://buildingscience.com/documents/digests/bsd-149-unvented-roof-assemblies-for-all-climates.

[4] Id. "[Unvented roof] assemblies are created by eliminating ventilation openings and moving the thermal, moisture and air control boundaries to the plane of the roof deck."

[5] *See* id. The article discusses how unvented assemblies can control air flow, heat flow and vapor diffusion.

We would be happy to work with staff to provide field data and/or engineering analyses to identify the appropriate relative and absolute air infiltration assumptions for use in modeling SPF UVAs.

2.6.1.2 Vent Area and 2.6.1.3 Fraction High

The Revised ACM states:

> ***2.6.1.2 Vent Area***
>
> **This value is the vent area as a fraction of attic floor area. This value is not a compliance variable and is assumed to be a value equal to attic floor area/300.**
>
> ***2.6.1.3 Fraction High***
>
> **The fraction of the vent area that is high due to the presence of ridge, roof or gable end mounted vents. Soffit vents are considered low ventilation. Default value is 0 for attics with standard ventilation. Attics with radiant barriers are required to have a vent high fraction of at least 0.3.**

This language is in conflict with the International Residential Code (IRC). According to the IRC, the only circumstance where it would be acceptable to use 0 as the "fraction high" is for attics with a 1/150 vent ratio.[6] A typical new home constructed in California uses 1/300 attic vent area. Additionally, the IRC states that attics using the 1/300 ratio would need to have a minimum 40% fraction high rather than the 30% figure provided in the Revised ACM.[7] Furthermore, the IRC does not distinguish between attics with or without radiant barrier – the 40% fraction high should apply to all attics constructed with the 1/300 ratio.[8]

The relevant language from the IRC reads:

> **R806.2 Minimum vent area.**
> The minimum net free ventilating area shall be $^1/_{150}$ of the area of the vented space.
>
> **Exception:** The minimum net free ventilation area shall be $^1/_{300}$ of the vented space provided one or more of the following conditions are met:
>
> 1. In Climate Zones 6, 7 and 8, a Class I or II vapor retarder is installed on the warm-in-winter side of the ceiling.
> 2. At least 40 percent and not more than 50 percent of the required ventilating area is provided by ventilators located in the upper portion of the attic or rafter

[6] 2012 International Residential Code (IRC), Section R806, Roof Ventilation. Available at: http://publicecodes.cyberregs.com/icod/irc/2012/icod_irc_2012_8_sec006.htm.

[7] IRC, Section R806.2, Minimum vent area.

[8] *See* id.

> space. Upper ventilators shall be located no more than 3 feet (914 mm) below the ridge or highest point of the space, measured vertically, with the balance of the required ventilation provided by eave or cornice vents. Where the location of wall or roof framing members conflicts with the installation of upper ventilators, installation more than 3 feet (914 mm) below the ridge or highest point of the space shall be permitted.

The overly conservative assumptions currently used in the Revised ACM will likely cause the model to estimate an unrealistically low amount of air exchange for vented attics. This may in turn overestimate the compliance margins for ventilated attics, and therefore the relative performance of SPF UVAs. To address this issue, we believe the modeling assumptions in the Revised ACM should be brought in line with IRC requirements.

We look forward to addressing these topics with CEC staff. In the interim, please do not hesitate to contact me at Justin_Koscher@americanchemistry.com, (202) 241-6617, or Rick Duncan, rickduncan@sprayfoam.org, (410) 920-9920, with any questions.

Kind regards,

Justin Koscher, Director
Center for the Polyurethanes Industry
Spray Foam Coalition