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California Energy Commission
Dockets Office, MS-4
Re: Docket No. 12-BSTD-1
Adoption of 15-Day Language for the 2013 Energy Efficiency Building Standards
1516 Ninth Street
Sacramento, CA 95814-5512

May 24, 2012

Via Email to docket@energy.ca.gov.

The Steel Framing Alliance has reviewed the proposed 15 day language for Title 25 Part 6 and offers the following comments and recommendations:

1. **The text is not clear and conflicts in different sections regarding how the mandatory provisions for wall insulation should be applied to low-rise residential buildings**. Section 100 (e) 2.D.ii.a requires compliance with the mandatory sections in Section 120.7, yet 120.7 has a scope that is applicable to other than low-rise residential buildings. Further, the requirements in Section 120.7 conflict with the mandatory wall insulation requirements (U-factors) in Section 150. Section 150 provides a maximum U-factor that is not only different than in 120.7, but it also gives an option for either meeting a maximum U-factor or providing minimum cavity insulation depending on the depth of the stud in a cavity wall.

   In order to address this apparent conflict, we recommend that the text in Section 100 (e) 2.D.ii.a be deleted and replaced with the following:

   a. Mandatory measures: The applicable provisions of Sections 150.0.

2. **There are inconsistencies in the mandatory wall insulation requirements between Section 150 and Section 120.7 that are difficult to rationalize technically or philosophically when applied to the performance compliance path**. The mandatory requirements for low-rise residential in Section 150 require cavity insulation of a specific minimum R-value depending on the stud depth for framed walls or a maximum U-factor for the assembly. The Steel Framing Alliance supports the use of a performance path that allows flexibility on the part of the designer and minimizes mandates for specific compliance requirements. Continuous insulation introduces significant constructability and fire safety issues into wall assemblies in all climates, and it is especially costly relative to the energy savings it provides in air- conditioning dominated climates. Section 150 does not make continuous insulation a mandatory requirement, thus offering designers the flexibility to look at more cost-effective solutions that often result in higher efficiency.

   Unfortunately, Section 120.7 takes a different approach for non-residential and larger residential occupancies. This section will discourage higher performing buildings by mandating continuous insulation since it is nearly impossible to meet the maximum U-factors specified without continuous insulation. The result is a mandate for continuous insulation with a relatively small return compared to other features or practices that produce better efficiency at much lower cost.

25 Massachusetts Avenue, NW, Suite 800
Washington, D.C. 20001-7400
T. 202.785.2022
F. 202.785.3856
www.steelframing.org

A performance approach by its very definition should mandate as few specific products or practices as possible, but especially when investment elsewhere provides a better return in terms of energy savings at a lower first cost. We recommend deleting the text at Section 120.7 (b) 1 for metal framed walls and 120.7 (b) 5 for wood framed walls and replacing it with the following item addressing all framed walls.

Framed walls with cavities shall be insulated between framing members with insulation having an installed thermal resistance of not less than R-19 in framing of 2x6 inch or greater depth, or the U-factor shall not exceed the U-0.074 that results from installing R-19 in a 2x6 inch wood framed assembly. Walls with 2x4 or smaller studs shall be insulated with insulation having an installed thermal resistance of not less than R-13, or the U-factor shall not exceed 0.102 that results from installing R-13 in a 2x4 inch wood framed assembly. (underline added intentionally to reflect that this is new text).

This language is consistent with the intent of Section 150 in mandating a reasonable amount of insulation in cavity areas that are not easy to access later but leaves the option of where to invest in higher levels of performance to the building designer. It also recognizes that there are other ways to insulate a wall than the traditional cavity approach by providing a U-factor alternative.

3. **Appendix JA4 is based on incorrect assumptions for metal wall framing factors and is no longer sufficient because it does not address continuous insulation above R-7.**

The framing factors used for metal wall framing are based on a procedure described in the EZ Frame documentation modeled after the framing factor calculation method used for solid wood members. This method results in severe overestimates of the framing factor for C-shaped studs in JA4 Table 4.1.1 (renumbered as Table 4.1.6 in the proposed language). When carried though to the U-factors in the Appendix JA4 Tables 4.3.3 and 4.3.4, the thermal performance of a metal stud wall is underestimated significantly.

Only the web thickness should be considered for metal framing factor calculations, not the flange width. The web is the only part that penetrates through the adjacent cavity insulation. This at least partially explains why the U-factors for given R-values in Appendix JA4 differ significantly from the values in ASHRAE 90.1-2010 Table A3.3. The current JA4 framing factors are at least a factor of three or four times higher than actual framing factors if calculated using the web thickness.

We recognize that at this stage in the Title 24 update process, fixing the issues with metal U-factor tables in JA4 would require a significant effort. In fact, we would not recommend "fixing" the current tables because the Zone method used as their basis is not an accurate method for steel framing that consists of thin C-shaped members. The Steel Framing Alliance is sponsoring research to analyze recent hot box tests results on modern steel wall assemblies conducted by Oak Ridge National Laboratory and is also conducting framing factor studies on steel framed buildings. We would be pleased to work with the CEC staff in bringing this latest research into Title 24 as work progresses to develop technically-defensible U-factors.

In the interim, we believe the U-factors that are listed in ASHRAE 90.1 are the most accurate for determining the performance of metal wall framing. We recommend that the metal wall values be deleted in JA4 Tables 4.3.3 and 4.3.4 and replaced with the values in ASHRAE 90.1 for residential and non-residential buildings. There is little to no technical rationale to keep separate tables that differentiate based on metal thickness both from a performance and industry practice perspective.

The substitution of values from ASHRAE 90.1 can be accomplished by direct reference to Table A3.3 in ASHRAE 90.1-2010. Alternately, we would be pleased to assist the CEC in calculating values based on the same path correction equation used for 90.1. This same equation has been used in ASHRAE 90.2 and the IECC in the past. It represents the only calculation method for determining metal framed wall U-factors that has been subject to a consensus process. Although the assumptions for cladding and other attachments to the metal studs differ slightly between JA4 and ASHRAE 90.1, those differences are minor compared to the framing factor impact, although they can be adjusted if so desired.

Adoption of the ASHRAE 90.1 U-factor values will also address the deficiency in the JA4 Appendix Tables 4.3.3 and 4.3.4 relative to continuous insulation. The tables currently stop at R-7 continuous insulation yet the prescriptive requirements in Title 24 exceed R-7.

We appreciate the opportunity to provide comments on the 15 day language and look forward to working with the CEC to help develop the best possible energy code for California.

Please feel free to contact me at mnowak@steelframing.org if the Steel Framing Alliance can be of assistance in addressing the comments raised above.

Respectfully submitted,

Mark Nowak
Manager of Codes and Research
Steel Framing Alliance