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March 26, 2012

Mr. Maziar Shirakh
Project Manager
Building Energy Efficiency Standards California Energy Commission
1516 9th Street, MS-25, Sacramento, CA 96814
Submitted Electronically to DOCKET@energy.state.ca.us

Subject: Comments / Questions regarding California Title 24, Part 6, Building Energy Efficiency Standard, 2013 Proposed Revisions, 45-Day Language, Docket Number 12-BSTD-01

Dear Mr. Shirakh,

The Extruded Polystyrene Foam Association (XPSA) appreciates the opportunity to submit the following questions and comments on the proposed changes to the 2013 California Building Energy Efficiency Standards. XPSA is the national trade association representing the manufacturers of extruded polystyrene (XPS) foam insulation products and their raw material suppliers.

Definitions Section

AIR BARRIER is combination of interconnected materials and assemblies joined and sealed together to provide a continuous air-tight boundary of the building envelope that separates conditioned from unconditioned space, or that separates adjoining conditioned spaces of different occupancies or uses.

XPSA comment regarding definition of "Air Barrier":

1. "air tight" may not be achievable. Perhaps "air retarding"?

PROPOSED DESIGN BUILDING ENERGY USE is the predicted energy use of proposed building derived from application of the building energy use modeling rules described in the Alternative Calculation Method (ACM) Approval Manual. ~~In order for a building to comply with the standards, the energy use of the proposed design building energy use must be less than or equal to the energy use of the Standard Design Building and meet the mandatory requirements in the Title 24 Building Energy Efficiency Standards.~~

XPSA comment regarding definition of "Proposed Design Building Energy Use":

1. The technical requirement for compliance (the entire 2nd sentence) should not be part of the definition, but should be in the body of Part 6 as a requirement, as is proposed in Section 140.1.

THERMAL RESISTANCE (R) is a measurement of the resistance ~~over~~ in unit time of a material or building component to the passage of heat ~~in (hr x ft² x ºF)/Btu~~.

XPSA comments regarding definition of Thermal Resistance:

1. "over time" may be better stated as "in unit time"
2. Should there be a corresponding definition of Thermal Transmittance?

Section 110.8

(g) Insulation Requirements for ~~Heated~~ Slab-on-Grade Floors. ~~Heated s~~Slab-on-grade floors enclosing conditioned space shall be insulated according to the requirements in TABLE 110.8 ~~TABLE 118-AB.~~

XPSA comments regarding 110.8 (g):

1. Consider further revisions.
2. Existing language excludes slab-on-grade floors enclosing conditioned space that is cooled only (not heated). Suggested further revised language expands scope of requirement to address slab-on-grade floor enclosing all conditioned spaces (heated only, cooled only, heated and cooled).
3. Revise title of Table 110.8-B: ~~*SLAB*~~ *INSULATION REQUIREMENTS FOR* ~~*HEATED*~~ *SLAB-ON-GRADE FLOORS ENCLOSING CONDITIONED SPACE*

SECTION 120.7

(text copied in this summary for reference)

Any newly constructed nonresidential and high-rise residential and hotel/motel buildings shall meet the minimum requirements in this Section.

(a) Roof Insulation. The opaque portions of the roof that separate conditioned spaces from unconditioned spaces or ambient air shall meet the applicable requirements of Items 1 and 2 below:

1. Metal Building- The weighted average U-factor of the roof assembly shall not exceed 0.098.
2. Wood Framed and Others- T he weighted average U-factor of the roof assembly shall not exceed 0.075.

(b) Wall Insulation. The opaque portions of framed walls that separate conditioned spaces from unconditioned spaces or ambient air shall meet the applicable requirements of Items 1 through 54 below:

1. Metal Building- The weighted average U-factor of the wall assembly shall not exceed 0.113.
2. Metal Framed- The weighted average U-factor of the wall assembly shall not exceed 0.098.
3. Light Mass Walls- A minimum 6 inch Hollow Core Concrete Masonry Unit having a U-factor not to exceed 0.440.
4. Heavy Mass Walls- A minimum 8 inch Hollow Core Concrete Masonry Unit having a U-factor not to exceed 0.690.
5. Wood Framed and Others- T he weighted average U-factor of the wall assembly shall not exceed 0.110.

6 Glass Spandrel Panels and Glass Curtain Wall- The weighted average U-factor of the Glass spandrel panels and glass curtain wall assembly shall not exceed 0.280. .

(c) Floor and Soffit Insulation. The opaque portions of floors and soffits that separate conditioned spaces from unconditioned spaces or ambient air shall meet the applicable requirements of Items 1 and 2 below:

1. Raised Mass Floors- A minimum of 3 inches of lightweight concrete over a metal deck or the weighted average U-factor of the floor assembly shall not exceed 0.269.
2. Other Floors-The weighted average U-factor of the floor assembly shall not exceed 0.071.

XPSA questions and comments regarding Section 120.7:

1. Should a reference to this new Section 120.7 be added to Table 100.0-A (in the same cell as 110.6, 110.7, and 110.8)?

2. The “Roof Insulation” items seem to not address buildings where the ceiling of the top floor encloses the conditioned space. Perhaps “roof / ceiling” should replace “roof”.
3. Suggest revising as follows: “(b) Wall Insulation. The opaque portions of ~~framed~~ walls…“ as there are requirement for mass walls in this section, which may not be framed.
4. Some floors may separate conditioned space from other than a conditioned space or ambient air. For example, slab-on-grade floors separate conditioned space from grade, which is neither conditioned space nor ambient air.
5. Note: Where appropriate, these questions / comments may also be considered for Section 141.0(b)2 Mandatory Insulation Requirements for Roofs, Walls, and Floors *(for additions, alterations, repairs . . .)*

Section 140.3 (a) 4.

4. Exterior Floors and Soffits. ~~External~~ Exterior floors and soffits shall have an overall assembly U-factor no greater than the applicable value in TABLE 140.3-B, TABLE 140.3-C, or TABLE 140.3-D.

XPSA comment regarding 140.3 (a) 4.

1. Consider further revision as illustrated above.

Section 140.3 (a) 7.

7. Opaque Exterior doors. All opaque exterior doors that separate conditioned space from unconditioned space or ambient airs shall have a U-factor not greater than the applicable value in TABLE 140.3-B, TABLE 140.3-C, or TABLE 140.3-D. Doors that are more than one-half glass in area are considered Glazed Doors.

XPSA comments regarding 140.3 (a) 7.

1. Consider adding a definition for “Opaque Doors” or “Opaque Exterior Doors”.
    a. Not clear in Part 6 if a door with less than 50% glazing is considered an opaque door or opaque exterior door.
2. Consider further revision as illustrated above.

Section 140.3 (a) 9. Air Barrier

(text not copied)

XPSA comments regarding 140.3 (a) .

1. Consider specifying requirements for fenestration and opaque exterior doors, as fenestration and opaque exterior doors function as part of the air barrier of a building.
2. Current language in 140.3 (a) 9.B. could be interpreted as applying to fenestration and opaque exterior doors, but openable fenestration cannot achieve the performance requirements of 140.3 (a) 9.B.

Table 140.3-B – PRESCRIPTIVE ENVELOPE CRITERIA FOR NONRESIDENTIAL BUILDINGS (text not copied)
Table 140.3-C – PRESCRIPTIVE ENVELOPE CRITERIA FOR HIGH-RISE RESIDENTIAL BUILDINGS (text not copied)

XPSA comment regarding Table 140.3-B and Table 140.3-C

1. For the cell labeled "Insulation" consider revising: "Insulation, U-factor"

Section 150.0(d)

(d) Raised-floor Insulation. Raised floors separating conditioned space from unconditioned space or ambient air shall meet the requirements of either Item 1 or 2 below:

XPSA comment regarding Section 150.0(d)

1. Consider further revision as illustrated above.

Appendix JA3 (revised from Appendix JA4)

Appendix JA3

- **Table 4.3.1** – U-factors of Wood Framed Walls (table not copied)
- **Table 4.3.3** – U-factors of Metal Framed Walls for Nonresidential Construction (table not copied).
- **Table 4.3.4** – U-factors of Metal Framed Walls for Residential Construction (text not copied)

XPSA comments and reasons regarding Table 4.3.1, Table 4.3.3, and Table 4.3.4:

1. **XPSA Comment: Add a column to Table 4.3.1 and to Table 4.3.3 for R-5 continuous insulation**
    a. Extruded polystyrene (XPS) continuous insulation is commonly used on the exterior of wood stud walls. XPS may perform as the required water resistive barrier and required vapor barrier if the XPS is installed and joints sealed according to the manufacturer's instructions.
    b. 1" thick XPS, at R-5, is a commonly supplied continuous insulation (as is 1" thick expanded polystyrene (EPS) insulation at R-4).
    c. Including R-5 in these tables supports the use of a commonly available continuous insulation product, helping to reduce cost pressures of requiring additional insulation (compared to using a non-standard thickness of continuous insulation).
    d. Including R-5 continuous insulation in Table 4.3.1 and Table 4.3.3 is consistent with Table 4.3.4 U-factors of Metal Framed Walls for Residential Construction, which includes a column for R-5 continuous insulation.
2. **XPSA Comment: Retain columns in each of these three tables for R-8, R-10, and R-14 continuous insulation (Table 4.3.1, Table 4.3.3, and Table 4.3.4)**
    a. For the same reasons this table provides nine options of common cavity insulation, the table should offer more than a limited five choices for common continuous insulation.
    b. These three tables should include columns for higher R-value continuous insulation because higher R-value continuous insulation helps to reduce in-wall condensation, especially in climate zones with cold winters.
        i. The building science community is realizing walls insulated with higher R-value continuous insulation has the potential to significantly reduce moisture condensation within the wall, especially during the heating season in cold climates.
            1. In walls with cavity insulation, and none or low R-value continuous insulation, the dew point temperature (i.e. where moisture condenses) may occur within the cavity insulation, in the framing members, on the

interior surface of the exterior sheathing (sheathing board, or continuous insulation board), or within the sheathing / continuous insulation. If the dew point temperature occurs anywhere to the interior of the exterior sheathing, water vapor may condense into liquid water inside the wall assembly.

2. In walls insulated with higher R-value continuous insulation, the dew point temperature (i.e. where moisture condenses) is more likely to occur within the layer of continuous insulation. Continuous insulation products are much less vapor permeable, and may have far less water vapor available to condense where the temperature in the wall is at or below the dew point.

ii. An excellent resource from Building Science Corporation, published Oct. 2011, describes reducing condensation in walls: BSD-163: Controlling Cold-Weather Condensation Using Insulation, http://www.buildingscience.com/documents/digests/bsd-controlling-cold-weather-condensation-using-insulation

3. **XPSA Comment: Add a column in each of these three tables for R-12 continuous insulation (Table 4.3.1, Table 4.3.3, and Table 4.3.4)**
   a. For similar economic and practical reasons of adding R-5, adding a column for R-12 insulation in each of these tables encourages the use of relatively common thicknesses of continuous insulation. Extruded polystyrene insulation (XPS) at 2 ½" thickness commonly has an R-value of 12.5. Expanded polystyrene (EPS) at 3" thickness commonly has an R-value of 12.

Appendix JA3, text following Table 4.3.1 – U-factors of Wood Framed Walls

This table contains U-factors for wood framed walls, which are typical of low-rise residential buildings and Type V nonresidential buildings. If continuous insulation is not used, then choices are made from Column A. In this case, the insulation is installed in the cavity between the framing members. When continuous insulation is ~~also~~ used, this is typically installed on the exterior side of the wall, but can also be used on the inside. The continuous insulation is typically a rigid polystyrene or polyisocyanurate foam insulation.

When this table is used manually, the R-value of continuous insulation shall be equal to or greater than the R-value published in the continuous insulation columns. Continuous insulation of at least R-2 must exist in order to use ~~this table~~ values for continuous insulation. No interpolation is permitted when data from the table is used manually. CEC approved compliance software, however, may determine the U-factor for any amount of continuous insulation or for unusual construction assemblies using Equation 4-1 and Equation 4-2.

XPSA comments and reasons: Revise the text as illustrated above.

1. Table 4.3.1 may be used with cavity insulation only, or continuous insulation only, or a combination of cavity and continuous insulation.
2. Also see the reasons previously stated for retaining the columns for R-8, R-10, and R-14 continuous insulation in Table 4.3.1, Table 4.3.3, and Table 4.3.4.

Appendix JA3, text following Table 4.3.3 – U-factors of Metal Framed Walls for Nonresidential

This table contains U-factors for steel or metal-framed walls, which are typical of nonresidential buildings. The table may be used for any construction assembly where the ~~primary~~ insulation is installed in the cavity of a metal-framed wall, ~~e.g. uninsulated curtain walls with metal furring on the inside~~, or where continuous insulation is installed on the interior or exterior of the metal framing, or a combination of these two methods of insulating a metal-framed wall.

If continuous insulation is not used, then choices are made from Column A. In this case, the insulation is installed only in the cavity between the framing members. When continuous insulation is ~~also~~ used, it is typically installed on the exterior side of the wall, but can also be used on the inside. The continuous insulation is typically a rigid polystyrene or polyisocyanurate foam insulation.

XPSA comments and reasons: Revise the text as illustrated above.

1. Same reasons as the proposed revisions to the text following Appendix JA3 Table 4.3.1.
2. Additionally, the description of the walls in the first paragraph should be revised to address different methods of installing insulation in walls.

Appendix JA3, text following Table 4.3.4 – U-factors of Metal Framed Walls for Residential Construction

This table contains U-factors for steel or metal framed walls in low-rise residential buildings where the thickness of the framing members is 18 gauge or thinner. Table 4.3.3 in Reference Joint Appendix JA~~4~~3 must be used for steel or metal-.framed walls in nonresidential buildings (including high-rise residential buildings and hotels and motels) and in low rise residential buildings if the thickness of the framing members are thinner than 18 gauge.

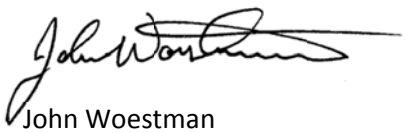
If continuous insulation is not used, then choices are made from Column A. In this case, the insulation is installed only in the cavity between the framing members. When continuous insulation is ~~also~~ used, it is typically installed on the exterior side of the wall, but can also be used on the inside. The continuous insulation is typically a rigid polystyrene or polyisocyanurate foam insulation.

XPSA comments and reasons: Revise the text as illustrated above.

1. Same reasons as the proposed revisions to the text following Appendix JA3 Table 4.3.1.

We appreciate the opportunity to comment on the proposed changes to the 2013 California Building Energy Efficiency Standards. Please do not hesitate to contact me if you have comments or questions on any of the above.

Sincerely,



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