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Nonresidential Mass Wall Comments

Additional submitted attachment is included below.

Nonresidential Envelope - Mass Wall Comments
California Energy Commission
Draft 2025 Energy Code Express Terms, posted November 3, 2023
Submitted by: Kurt Siggard, Concrete Masonry Association of California and Nevada (kurt@cmacn.org) and Martha VanGeem, Consultant (martha.vangeem@gmail.com)
November 15, 2023

The following are comments on the nonresidential envelope mass wall requirements.

We do not agree with the proposed changes in the U-factors for lightweight mass wall ("mass light") and heavyweight mass wall ("mass heavy") requirements in "TABLE 140.3-B – PRESCRIPTIVE ENVELOPE CRITERIA FOR NONRESIDENTIAL BUILDINGS (INCLUDING RELOCATABLE PUBLIC SCHOOL BUILDINGS WHERE MANUFACTURER CERTIFIES USE ONLY IN SPECIFIC CLIMATE ZONE; NOT INCLUDING HIGH-RISE RESIDENTIAL BUILDINGS AND GUEST ROOMS OF HOTEL/MOTEL BUILDINGS)" Martha VanGeem has previously commented on this issue, posted September 13, 2023.

- **The following are our comments and rationale.**

A. The cost analysis in the Final CASE report[1], which is the basis for the proposed changes, is unreasonable and underestimates the costs of insulation and labor for the proposed changes.

1. **The base light mass walls in Climate Zones (CZs) 5-9 and the heavy mass walls in CZs 2-10 are not insulated in the current requirements.** The base wall, a fully grouted uninsulated concrete masonry unit (CMU) wall, meets the current U-factor requirements. The base wall U-factor with no insulation for "mass light" walls is 0.44; and for "mass heavy" walls is 0.65 or 0.69. The proposed changes to the Table require a small amount of insulation to be applied to these currently uninsulated walls.[2] **Therefore, the updated U-factor requirements need to include not only the cost of the insulation but the cost of framing** or other means of attaching insulation where previously there were none.
2. The cost effectiveness in the Final CASE report only takes into account the cost of the insulation as a material and **does not include the labor, overhead, and attachment of the insulation to these mass walls in CZs where the current requirement is uninsulated.** (Reminder: The light mass walls in CZs 5-9 and the heavy mass walls in CZs 2-10 are not insulated.)
    a. **In the Final CASE presentation, the incremental cost of adding R-2 insulation was presented as $0.10 per sq ft. This cost is unreasonably low and not valid**.
    b. **RS MEANS 2020 has costs of adding R-2 EPS insulation (not including framing or finish materials) on the order of $1.50 per sq ft including overhead and profit.**

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[1] Codes and Standards Enhancement (CASE) Initiative, 2025 California Energy Code, Nonresidential Envelope, Electronic document name: 2025_T24_Final-CASE-Report_NR-Envelope, dated August 2023.
[2] The CASE report indicates an increase in R-2 although the actual increases in R-value vary in proposed **TABLE 140.3-B.**

c. Home Depot has a cost of insulation for **R-2 as $0.44 per sq ft (not including tax or labor, nor framing or finish materials).** https://www.homedepot.com/p/Owens-Corning-FOAMULAR-1-2-in-x-4-ft-x-8-ft-R-3-Square-Edge-Rigid-Foam-Board-Insulation-Sheathing-36L/100320356

d. The cost effectiveness needs to take into account not only the incremental cost of insulation **but the full cost of attaching the insulation to the mass wall.** Attaching insulation on the indoor side of a mass wall usually requires attaching framing or clips and then gypsum wallboard or another finish material**. This attachment of insulation on the indoor side negates the benefit of the thermal mass effects that can be gained by exposing the mass to the interior of the building, thus absorbing internal gains. It also negates the benefit of a hard surface on the indoor side,** which is desirable in many building types. **Attaching insulation on the outdoor side of the mass wall** requires the addition of another finish material such as traditional or synthetic stucco. Framing indoors with gypsum wallboard, or applying exterior insulation with traditional or synthetic stucco, adds approximately $7 per sq ft to these costs. **Therefore, the true cost of adding insulation, where there was none before, is more than $8 per sq ft, not $0.10 per sq ft.**

e. **The CMU wall in these CZs is a resilient wall with hard surfaces on both sides and the thermal mass on both sides; it is durable, UV-resistant, moisture/condensation resistant, fire-resilient, and energy saving.**

f. **To obtain an insulated mass wall with hard surfaces on both sides would require a brick exterior with insulation between the brick and concrete CMU. This would cost even more than the costs above.** Framing costs and brick costs need to be added to maintain a hard surface and mass benefits on the indoor side and outdoor side. This is a resilient wall system. The cost of adding **only** brick veneer was approximately $12 per sq ft in a 2007 study. Today it is likely much higher.

g. Note that in some parts of the U.S. without seismic safety requirements, it is common practice is to fill hollow cores of CMU with insulation or use reduced web CMUs. However, due to California seismic requirements, CMU is generally fully grouted leaving no room for insulation in the cores, and reduced web CMUs are not used.

h. Additional costs not included in the per sq ft costs above include additional window and door framing costs for the added thickness of the wall, including flashing. Additional costs for a larger foundation should also be added. Furthermore, the costs of a wall with additional framing/furring, insulation, and indoor or outdoor finish is higher in California than the U.S. average due *to* seismic safety considerations of the additional weight of the wall.

i. **These points indicate that the cost analysis performed in the Final CASE report is unreasonable and arbitrary. The true cost effectiveness incorporating the**

above points into the Final CASE report Tables 49 and 50 would show that these proposed changes to Table 140.3-B are not cost effective.

B. **The Final CASE report also indicates that in some cases, in large buildings (such as the large office) or buildings with high internal gains (such as the hospital),** the proposed changes either do not save energy or **increase** energy use. This is not consistent with the state's goal of reducing energy use and does not provide a benefit to the public. In addition, thermal mass works particularly well in buildings such as small fast-food restaurants and schools with high internal gains/loads. These were not analyzed. The thermal mass without insulation on the indoor side absorbs heat during peak periods and releases it later in non-peak periods, thus moderating the load to the electric grid. In addition, the thermal mass of the wall itself decreases and modulates the heat flow through the wall.
C. **Adding insulation, framing materials, and another finish to a wall not only increases costs to the public but increases global warming potential by adding all of these unnecessary materials to the wall.** This conflicts with other environmental goals of the state.