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Nonresidential Mass Wall Comments

Additional submitted attachment is included below.

Nonresidential Envelope - Mass Wall Comments
Utility Sponsored Stakeholder Meeting 2025 T24 Code Cycle, August 30, 2023, concerning report released August 25, 2023.

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The following are comments on the nonresidential envelope mass wall requirements in the T24 Nonresidential Envelope CASE report dated August 2023, released Aug. 25, 2023, and presented Aug. 30, 2023.

- **We do not agree with the assumptions and analysis; they do not justify adding insulation to the lightweight and heavyweight mass wall requirements.**
- **We do not agree with the changes for walls "mass light" and "mass heavy" 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)"
- **The following are our comments and rationale.**

1. Table 34 is not accurate. The light mass walls in Climate Zones (CZs) 5-9 and the heavy mass walls in CZs 2-10 are not insulated. The base wall, a fully grouted uninsulated concrete masonry unit (CMU) wall, meets the U-factor requirements[1]. The third column is *not* correct where it indicates that these walls have insulation in the standard design. The base wall U-factor with no insulation is provided in the third column of Table 31 for these climate zones (mass light 0.44; mass heavy 0.65 or 0.69).

- Therefore, **Section 3.1 is incorrect where it states, "**updated U-factor requirements typically do not correspond to changes in the framing size or entail the addition of continuous insulation where previously there were none."
- **Section 3.2 is incorrect where it states, "**For mass walls, common practice is to fill hollow concrete masonry units (CMU) with insulation, while reduced webbed CMUs are sometimes employed." This occurs occasionally in parts of the country without seismic requirements. **However, in California, CMU is fully grouted leaving no room for insulation in the cores.**
- **The benefit of these walls in these CZs is the hard surface on both sides and the thermal mass on both sides, for durability, moisture/condensation resistance, fire-resilience, and energy saving.**

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[1] I have consulted with the Concrete Masonry Association of California and Nevada (CMACN) as to most common wall construction and verified that fully grouted walls are not insulated.

2. The mass walls should have been analyzed for all of the building types in Table 32. As shown in the analysis preformed, the performance and energy use vary dramatically across building types. **For some building types and CZs, adding insulation <u>increases</u> the energy use of the building.**

- **Note that Table 194 shows no increase in energy use or a small <u>increase</u> in energy use in some CZs for the hospital and large office when insulation is added**. (Heavy mass walls in CZs 2-10 are not insulated.) **The hospital has high internal gains.** Large buildings, like the large office, also result in high internal gains/loads due to the relatively low envelope area.
- **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 inside absorbs heat during peak periods and releases it later in non-peak periods. In addition, the thermal mass of the wall itself decreases and modulates the heat flow through the wall.
- **Within the variation in modeling and building configurations, we can expect other buildings to have increased energy use if insulation is added.**
- **It doesn't make sense to average the results for the building types analyzed** and use this as proposed criteria **when insulation <u>increases</u> energy use in some building types.**

3. Inadequate cost effectiveness has been shown for this.

- The cost effectiveness in Section 4.3.3 only takes into account the cost of the insulation as a material and **does not include the labor, overhead, and method of attaching 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.)
- **In the presentation, the incremental cost of insulation was presented as $0.10 per sq ft. This cost is extremely low and not valid**. 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 (usually framing), and applying another finish material, preferably a hard surface such as brick, on the outside of the insulation. The cost effectiveness needs to include the labor and overhead for all of these costs. **The incremental cost of insulation is at least an order of 10 times higher in RS Means**.
- Framing costs and brick costs also need to be added to maintain a hard surface and mass benefits on the inside and outside. This is a resilient wall system. Alternatively, a stucco surface could be assumed for the outside if the insulation is applied outside of the mass, or gypsum wallboard could be assumed if the insulation is applied inside of the mass. Additional costs also 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 inside or outside finish is higher in California than the U.S. average due to seismic considerations of the additional weight of the wall.

4. Requiring more insulation when the costs are primarily for natural gas and the metric is additional PV does not make a lot of sense. **Note that Tables 190 and 195 for mass walls show virtually no change in peak energy use when insulation is added.**

5. Since the costs are at least 10 times too low, **the cost to benefit factors in Tables 49 and 50 will likely be less than 1.0. Therefore, these proposed changes are not cost effective.** As stated before, the proposed changes can also **increase** energy use.

6. Other Factors.

- Insulation provides more energy savings when it gets colder than where temperatures are mild or warm. **Applying insulation negates the benefits of the mass wall surface on both sides of the wall** in mild climates in California such as CZs 2-10. **Mass walls assist in moderating the load to the grid; adding insulation on the inside hinders some of these benefits.**
- **Adding insulation, framing materials, and another finish to a wall increases its global warming potential by adding all of these unnecessary materials to the wall.**