



Analysis in Support of Energy Star Compliance

The most recent statement from the Energy Star Office concerning mass walls is reproduced below.

"Mass walls that are not part of a passive solar design (e.g., CMU block or log home enclosure) shall either utilize the strategies outlined in Section 4.4 or the pathway in the assembly with the least thermal resistance, as determined using a method consistent with the 2009 ASHRAE Handbook of Fundamentals, shall provide $\geq 50\%$ of the applicable assembly resistance, defined as the reciprocal of the mass wall equivalent U-factor in the 2009 IECC – Table 402.1.3."

For example, in CZ 2, the inverse of the mass wall equivalent U-factor in the 2009 IECC – Table 402.1.3 is $1 / 0.165 = 6.06$. As long as the path through the assembly with the least resistance provides at least 50% of this value (i.e., R-3.0), then the mass wall would meet the intent of the thermal bridging requirements in Item 4.4 of this Checklist. The resistance of the path would be determined using a method consistent with the 2009 ASHRAE Handbook of Fundamentals, such that air layers and all other assembly layers are included.

The 2009 IECC requirement for mass walls in Zone 2 is U no greater than 0.165 Btu/ft²·h·°F. As indicated in the above note, this corresponds to an overall R-value of 6.061 ft²·h·°F/Btu. Applying the 50% factor results in a minimum value R 3.03 ft²·h·°F/Btu for the least resistive path that is contained in the wall.

The candidate wall assembly includes:

Outside air film
0.5-in. thick layer of stucco
Standard weight uninsulated 8-in. concrete block
R 4.1 reflective insulation in 0.75-in. space
0.5-in. gypsum interior sheathing
Inside air film
The framing factor (16 in. OC) is 0.88

1. The U-factor for this assembly is 0.160.
2. If 5/8 in. gypsum replaces ½ in. gypsum the U-factor is 0.157.
3. If ½ in. gypsum is used with ¼-in. of stucco the U-factor is 0.167.
4. If the assembly is built as described with framing 24 in. OC the U-factor is 0.156.

The R for the path from the exterior air to interior air through the least resistive (the web of the concrete block) replaces the 4.1 reflective insulation with R 0.825 for the wood framing strips. The block resistance of 1.036 is replaced by 0.7625 for the concrete path through the block. (actual dimension 7.625 in.)

The R-value for this path is 3.388 thus satisfying the requirement R greater than 3.03.

The elements for this path:

Outside air film resistance	0.17
0.50-in. stucco	0.50
7.625 in. of concrete	0.763
0.75 in. of wood	0.825
0.50 in. gypsum	0.45
Inside air film	0.68
Total	3.388

Zone 2 requirements are satisfied.

Zone 1 requirements are also satisfied.

Masonry wall assemblies with Fi-Foil's R 4.1 reflective insulation installed on nominal 1 by 2 in. wood furring or Fi-Foil's R 7 reflective insulation installed on nominal 2 by 2 wood furring satisfies the "mass wall" requirements for Energy Star Version 3 that are given above.



David W. Yarbrough, PhD, PE
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