



Masonry Technical Bulletin

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Why is the “R” value of masonry or concrete so low? Do we need to insulate this 8” CMU building material to comply to energy conservation code?



The R-value for an 8 inch fully grouted concrete wall is between 1.5 – 1.8. This does not automatically call for increasing the r-value by adding insulation to the wall system.

R-value measures the ability of a wall to slow heat transfer, under steady state conditions, with a constant temperature difference across the wall. In real life situations, the temperature differences are not always constant, resulting in changing patterns of heat flow through the wall unit. Thermal mass is the term used in describing transient heat transfer phenomenon.

Temperature swings during the day and heat storage effects are accounted for in thermal mass benefits. The slow rate of heat discharge from the thermal mass helps to maintain a steady comfortable temperature within the interior space of the building. Heat capacity (HC) is a material property used to assess a wall’s thermal mass. HC is defined as the amount of heat necessary to raise the temperature of a given mass one degree and is calculated as the product of a wall’s mass per unit area by its specific heat.

The International Energy Conservation Code (IECC) provides three alternatives for demonstrating building compliance for commercial buildings. They are as follows:

1. Prescriptive criteria present an independent requirement for each building envelop component.
2. The whole-building performance compliance is based on an analysis which simulates a year of building operation, accounting for almost all aspects of a building energy use.
3. Compliance using ASHRAE Standard 90.1

Using any of the preceding criteria, concrete masonry walls 8” or thicker used for commercial buildings , do not require any insulation in Hawaii. In section 4.2 of the Model Tropical Energy Code, no insulation is required for thermal mass wall.

When using software programs that optimizes energy efficiency within the building envelope, the design professional will typically find more value in upgrading the roof or the fenestrations rather than altering the mass wall component of a masonry wall system.

References:

NCMA TEK 6-12C International Energy Conservation Code & Concrete Masonry
NCMA TEK 6-16A Heat Capacity (HC) Values for Concrete Masonry Wall
NCMA The Advantages of Thermal Mass
Model Tropical Energy Code