CMU WALLS

Concrete Masonry Unit (CMU) walls do not fulfil thermal code requirements unless exterior or interior insulation is added. Insulation will result in better thermal performance and, in general, increases airtightness and moisture performance. Exterior insulation is typically a better option for new construction, since otherwise existing cladding must be removed. Compared to interior insulation, exterior insulation typically provides better conditions for building durability and the benefits of thermal inertia can be better utilized. CMUs are not sensitive to high humidity levels and can actually store moisture. As such, CMU walls require specific moisture control principles.

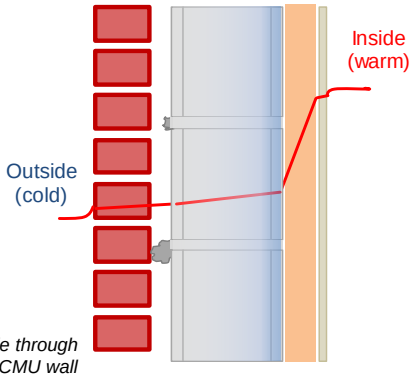


Figure 1: *Temperature profile through an internally insulated CMU wall*

Cause and Effect

Figure 2: *Typical rainscreen cavity at CMU wall with anchored masonry veneer*

There are a few things that are different for CMU Walls compared to stick-built.

- CMUs contain a large amount of water after construction (built-in or construction moisture), which can result in delayed and prolonged moisture damage of adjacent building materials, such as furring strips or fasteners. Depending on which side the insulation is installed, and whether the insulation is vapor permeable or not, moisture can be trapped inside the wall assembly (see *Trapped Moisture*).
- For CMUs with stone/brick cladding, excess mortar can block ventilation gaps (see Figure 2), resulting in a reduced drying capacity. Even worse, because of the arising mortar connection, absorbed rain water can travel from the cladding through the mortar and into the CMUs, resulting in a slow increase of moisture content. If moisture is driven inwards (see *Inward Vapor Drive*), an interior vapor retarder can trap moisture and result in mold and organic decay.
- If the CMU remains wet, it may undergo freeze-thaw cycles that cause cladding damage due to spalling (Figure 1).

Preventive Actions

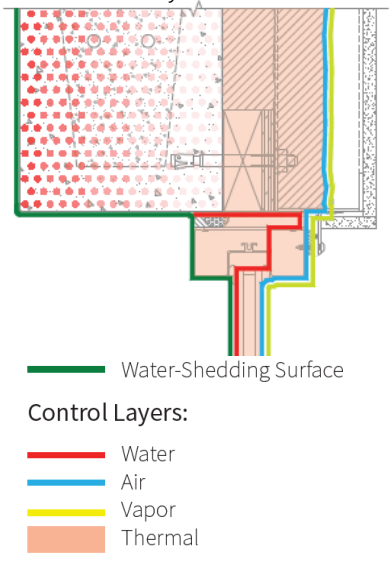
As mentioned, CMUs can hold plenty of water and will do so immediately after being constructed. Therefore, allowing CMU walls to dry out is essential. Since the drying process is slow, CMU walls must be designed so that drying allows to proceed while in service. In general, CMU walls should be able to dry inward in warm climates (see *Inward Vapor Drive*), and outward in cold climates (see *Outward Vapor Drive*). Drying in both directions is typically a good option.

Also, make sure to never attach moisture sensitive material directly to the CMU surface, unless the CMU is dry (including core), and will not absorb rain water.

For interior insulated mass walls, controlling bulk water entry into the walls is of great importance. Special attention must be given to details around windows and other openings, for which rain water entry must be controlled at the CMU exterior surface (Figure 3). Note that the exterior surface coating may need to be vapor open (cold climate) if built as a rain screen system (see *Drainage Plane*) to allow for outward drying while preventing liquid water absorption.

The risk of spalling (freeze-thaw) will be reduced if the CMUs are allowed to dry out and not absorb ground or rain water.

Figure 3: *Detailing of all control layers for an internally insulated CMU wall*



References and Further Reading

BA-1105: Internal Insulation of Masonry Walls
BA-1204: External Insulation of Masonry Walls
Masonry Systems Guide
BSI-037: Mold in Alligator Alley
BSI-079: Deep-Dish Retrofit