

**ADOBE as PHASE-CHANGE MATERIAL (PCM);
Concerning a proper classification for earthen building material.**

Abstract

Latent heat is thermal energy released or absorbed during a phase-change of a chemical substance. *Latent heat of fusion (L_f)* is a phase-change from solid to liquid or liquid to solid; *latent heat of vaporization/condensation (L_v)* is a phase-change from a liquid to vapor or vapor to liquid. The reaction is exo- or endothermic depending on the direction of the phase-change. The building industry has long searched for phase-change materials (PCMs) that could be incorporated into a building's fabric to take advantage of latent heat flux. Such chemicals are intended to augment other means for maintaining moderate indoor temperature. To date, no PCMs have been developed for commercial use in the building industry.

Earthen building material, with unaltered clay, contains water as PCM. Clay, carrying a negative charge, draws water (a polar compound) from the atmosphere when relative humidity is highest, as in early morning. The resulting latent heat of condensation is endothermic thus rising the temperature of the earthen fabric. Conversely, a highly exothermic reaction occurs when the relative humidity is low, as in late afternoon, and liquid water vaporizes out of the adobe as latent heat of vaporization. The result is evaporative cooling that lowers the temperature of the building fabric.

Latent heat of vaporization of water is several folds greater than latent heat of fusion of any currently recognized PCMs of industry. There are thus two broad categorized of PCMs those involving latent heat of vaporization, currently restricted to water and identified a L_v - or $_{-}$ -PCM and PCMs associated with latent heat of fusion identified as L_f - or $_{-}$ -PCM.

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