

Timothy A. White
American Clay
Albuquerque, New Mexico, USA

The Effect Interior Earthen plasters and Exterior Lime plasters have on Controlling Temperature and Humidity in Building Envelope

Logged data of Temperature and Humidity were collected inside four test buildings, 3 of compressed earth blocks (CEB) and one of cinder block (CMU), with 1,260 cubic feet interior space and identical roofs and floors. Without Clay and Lime plasters the #2CEB temperature varied 4°F and humidity varied 15%RH, CMU temperature varied 17°F and humidity varied 33%RH. One year later with similar ambient conditions and Lime exterior plaster and Clay interior plaster #2CEB temperature varied 2°F and humidity varied 16%RH, CMU temperature varied 8.5°F and humidity varied 14%RH. The drop in the interior humidity in the CMU can be explained by Clay's interaction with the PCM properties of water. The variation of the interior temperature in the CEB and the CMU by half from the year before cannot alone be explained by this interaction. Lime has a low thermal conductivity and is a mineral of dual reflectivity index that is effective in reflecting solar radiation. This reduces the radiant energy that can be absorbed and converted into thermal energy as sensible heat. Lime is also vapor permeable and allows moisture to escape permitting evaporative cooling. Lime and Earthen plaster have traditionally been used together to create not only beauty but also comfortable homes. This data shows incorporate them in the buildings system minimize the rise and fall of humidity and temperature in building envelopes. This will in turn reduce the amount of external energy needed to maintain comfortable living conditions.