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Physical and Mechanical Behavior of Compressed Earth Blocks Stabilized with Ca(OH)2 on Sub-Humid Warm Weather

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Abstract : The compressed earth blocks (CEBs) constitute an alternative as a constructive element for building homes in regions with high levels of poverty and marginalization. Such is the case of Southeastern Mexico, where the population, predominantly indigene, build their houses with feeble materials like wood and palm, vulnerable to extreme weather in the area, because they do not have the financial resources to acquire concrete blocks. There are several advantages that can provide BTCs compared to traditional vibro-compressed concrete blocks, such as the availability of materials, low manufacturing cost and reduced CO2 emissions to the atmosphere for not be subjected to a burning process. However, to improve its mechanical properties and resistance to adverse weather conditions in terms of humidity and temperature of the sub-humid climate zones, it requires the use of a chemical stabilizer; in this case we chose Ca(OH)2. The stabilization method Eades-Grim was employed, according to ASTM C977-03. This method measures the optimum amount of lime required to stabilize the soil, increasing the pH to 12.4 or higher. The minimum amount of lime required in this experiment was 1% and the maximum was 10%. The employed material was clay unconsolidated low to medium plasticity (CL type according to the Unified Soil Classification System). Based on these results, the CEBs manufacturing process was determined. The obtained blocks were from 10x15x30 cm using a mixture of soil, water and lime in different proportions. Later these blocks were put to dry outdoors and subjected to several physical and mechanical tests, such as compressive strength, absorption and drying shrinkage. The results were compared with the limits established by the Mexican Standard NMX-C-404-ONNCCE-2005 for the construction of housing walls. In this manner an alternative and sustainable material was obtained for the construction of rural households in the region, with better security conditions, comfort and cost.

Keywords : calcium hydroxide, chemical stabilization, compressed earth blocks, sub-humid warm weather
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