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Influence of Wall Composition on Thermo-Physical Properties and Energy-Saving in Wooden Houses

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Abstract: As one of the countermeasures against global warming, it is effective to make use of wood resources that serve as carbon storage and improve energy-saving efficiency of buildings. In this study, it is examined how the wall composition of a wooden house affects indoor thermal environments and its energy-saving effects. Three types of wooden wall panels with different compositions are used to examine each type's thermo-physical properties by JIS-compliant tests as well as large-scale tests with experimental buildings. Moreover, power consumption of a heated building was also measured in order to make clear the effect of the wall composition of a wooden house on energy-saving. The obtained results are as follows : 1. Coefficients of overall heat transmission were qualitatively larger in the following order : general mud wall > wall composed of wood and mud > wall primarily composed of heat insulating material. 2. The air-conditioner's power consumption was larger in the following order : house with mud walls > house with walls composed of wood and mud > insulation-type house. As the temperature difference between indoors and outdoors increased, this tendency became more notable. 3. In the cases of insulation-type houses, the ratio of electric power consumption for heating to temperature difference between indoors and outdoors was generally constant, while in the case of a house with walls composed of wood and mud or with mud walls, the ratio was not constant,

denoting the effect of heat capacity. 4. The compound wall of Japanese cedar and mud showed a better heat insulation property than the mud wall, and its energy-saving effect was improved.

Keywords: wooden house, wall composition, thermo-physical properties, insulation efficiency, energy-saving

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