

## ANALYSIS OF HEAT DEMAND AND THERMAL COMFORT IN NATURALLY VENTILATED SINGLE-FAMILY HOUSES OF VARIOUS CONSTRUCTIONS

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### Abstract

The aim of the paper was a comparative analysis of energy demand for heating and human thermal comfort of a model single-family house with natural ventilation in various construction technologies (wood and brick), located in the Polish temperate climate. The frequency, as well as, the window opening area in the building have been optimized taking into account two objective functions: heating demand and number of thermal discomfort hours. The analyses were based on thermal simulations using the EnergyPlus program on the nine-zone model of the selected house. Each building construction case was calculated for two variants of external partitions insulation. The thermal model, separately for each zone, contained hourly internal heat gain schedules. All simulations were carried out with a 15-minute step for the full calendar year. Analyses have shown that the heating demand for a building made in wooden technology is higher than a building in brick technology. The wooden building has a greater number of thermal discomfort hours. Increasing the insulation properties of the house increases the number of hours of discomfort.

**Keywords:** Brick building; Building optimization; Building performance simulation; Heating demand; Thermal comfort; Wood building.