

Hussaya Singsri 2013: The Development of an Energy Saving Concrete Block from Plastic Drinking Water. Master of Architecture (Building Innovation), Major Field: Building Innovation, Department of Technology Building. Thesis Advisor: Miss Sopa Visitsak, Ph.D. 78 pages.

Concrete blocks are widely used as a building material normally for building envelope and internal walls. However, when considered as an energy conservation material, the limitation of heat transfer properties is its weakness. This research aims to develop a non-load bearing concrete block by applying used plastic water bottles to allow the flow of air within the walls that are built by natural mean with regards to the stack effect to help decrease the heat transfer into the building. The process is to develop the model, as well as finding the appropriate proportion and size of plastic bottles to concrete blocks. The concrete blocks are then supplied with used plastic water bottles inside. The results are compared to the normal standard concrete block (TIS 58-2533), regarding physical properties (weight, dimension, compressive strength) and heat transfer properties (field experimental comparison to common concrete and autoclaved blocks.)

The results showed that the energy saving concrete blocks with the aspect ratio in terms of weight of cement to stone as 1 : 6 along with water at 30% of the total weight of cement could support compressive strength at 31.75 kg /m<sup>2</sup> (higher than TIS 58-2533). Weighing 5.85 kg. or 1,026.32 kg/m<sup>3</sup>, the energy saving concrete block was 18.66% lighter than a regular concrete block. During daytime, the average flow rate of air through the underlying concrete block was 6.76 m<sup>3</sup>/hr or 21.125 m<sup>3</sup>/hr/m<sup>2</sup> when the average wind speed was 0.82 m/s. The average temperature inside the house model with energy saving concrete blocks was 43.65 °C , 2.77 °C lower than that of common concrete blocks and 1.44 °C higher than that of the autoclaved aerated concrete. Therefore, the results confirm that regarding the ability to reduce heat transfer, the energy saving concrete blocks is better than regular concrete and come close to the autoclaved aerated concrete.

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Thesis Advisor's Signature