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COOLING BASIN HEAT CAPACITY CHANGES IN THE OUTDOOR AIR PARAMETERS INFLUENCE

K. Grinbergs[1], P. Shipkovs[2]
[1] *Institute of Physical Energetics, Energy Resources Laboratory*
[2] *Riga Technical University*
Riga – Latvia
Phone: +371 6755353
E-mail: shipkovs@edi.lv

ABSTRACT

There are a number of cooling systems known across the world, water thanks to its universal properties, remained an undying presence in this technology. Water is used as a carrier heat or cold for cooling spaces and some cooling equipment itself, for accumulating and radiating heat to an environment with lower heat potential, for heat evaporation, and as a solvent which is great at dissolving substances we know as cooling agents.

Pools are an especially practical and aesthetically appealing execution of a cooling system – provided appropriate temperature modes and external air temperature during the operational season. In centralised heat supply conditions, heat production companies choose to install cogeneration engines to increase energy production efficiency and profitability, allowing both electricity and heat to be produced from one type of fuel. However, the world at large has also seen trigeneration systems – these systems provides heat production all year long, because heat is used to produce coolant for cooling, for example, households or offices, that means that heat plant is loaded despite the weather conditions. Conversion of heat into cold energy takes place at heat absorption cooling facilities. Heat absorption facilities require a fluid overcooling cycle to store a concentrated fluid. The temperature modes of this cycle (which vary between producers) produce low-potential heat which cannot be reused to produce heat energy, e.g. 35-29^{o}C. To support such a temperature schedule, producers generally recommend installing heat evaporation towers, but they are expensive and will often clash visually with the landscape. A cooling pool may be used instead for both practical and aesthetic reasons, using water sprayers to promote evaporation. Water spraying is necessary to increase the surface area of water-to-air contact: this way, the surface area is equal to the combined areas of all water droplets. The depth of a pool must be no less than 1.5 m, preventing heating by sun rays. Pool cooling properties improve with finer droplet size, although this carries higher electricity expenses to produce adequately high pressure before pulverisation. Such pools may use fountains which serve both as a cooling facility and an attractive landscaping piece. An evaporation pool is also significantly cheaper to build than an evaporation tower, although water loss may be higher.

In consideration of the facts described above, a pool with a water spraying device was built for this research project. With appropriate air temperature, pressure and relative humidity, heat yield and yield changes were measured.

The goal of this study was to compare the research and experimental parts of the project to similar studies performed previously, in order to determine the practical viability of using heat evaporation pools as well as to develop a complete prototype which may be used as the basis for building similar structures.