

OPPONENT'S REPORT

Opponent name, degree and profession: Ing. Richard Beber, designer in Metroprojekt Praha a.s.

Master's thesis: **Ground Source Water Heat Pump System for Heating and Cooling of a Building**

Aspirant name: **Raman Sridharan Chary**

The author of the thesis reviewed practical application of the cascade heat pumps earth-water. The theoretical observation is compared with the values measured in the operated system. The author managed to process large amounts of raw data, some dependences were generalized and some formulations were recommended for similar applications. Among other things, he describes the impact of dynamic regulatory changes of concurrent requirement for heating and cooling and other factors affecting the seasonal performance factor. Seasonal performance factor is a key indicator of the economy and operational efficiency of the heat pump.

The author processed main theme of his work systematically and efficiently, he fulfilled the task.

The author points out:

- The dependence of temperature difference between primary and secondary sides.
- Changing modes and the impact of transients.
- Winter mode and he recommends to use the waste heat from the cooling to be used for heating and pre-heating of hot water, then to use it for regeneration of the heat pump wells.
- Summer mode and he recommends to use the waste heat from the cooling to be used for preparation of hot water and regeneration of the heat pump wells.
- Transition period and he advises to maximize the usage of the heat pumps as a heat source.

Based on these findings, the author recommends optimizing (to enlarge in the specific case) storage tanks of cold and heat.

Reproached could be:

- weaknesses in clarity eg. graphs, diagrams, pictures
- range of theoretical part - calculation formulas are missing as well as precise formulation of boundary conditions
- there is mentioned a description of BREEAM and LEED certification, but it is not used in the work further
- in the list of references, there are publisher and year of publication missing

	excelent	good	acceptable	marginal	poor
Originality of the work		x			
Relevance		x			
Technical merit		x			
Completeness of the work		x			
Refernces				x	
Effectiveness of the manuscript		x			
Clarity of tables, graphs and illustrations				x	

**RECOMMEND THESIS DEFENCE
GRADE: B**

Prague 10.8.2015

Signature

