Case study of indirect adiabatic cooling system in historical building

Artūrs Brahmanis, Arturs Lešinskis, Andris Krūmiņš

Riga Technical University, Latvia

Corresponding email: Arturs.Brahmanis@rtu.lv

1 Introduction

The objective of the present study is to investigate the efficiency of indirect adiabatic chiller-based cooling system in historical building, located in temperate climate of Latvia. The present building of The Riga Bourse was initially built in the 19th century. Nowadays, it was completely restored, and opened as an Art Museum in 2011. To preserve artifacts the Museum is equipped with climate control and Building management systems. Cooling system consists of indirect adiabatic chiller with integrated compressor, air handling units with cooling coils to cool and dry the air and fan-coil units on separated loop.

2 Methods

Electricity consumption, water consumption, chiller operation stages, cooling average temperatures, and outdoor air parameters data have been acquired for the period of three month, during the cooling season. Using data acquired by BACnet based BMS controllers and adiabatic chiller control system, we have analyzed efficiency of indirect adiabatic process and its dependence of outdoor air humidity. Saved data has been exported as CSV files and imported in Matlab / Simulink software. Specific calculation software in Matlab is written for data analyses and graphical visualization on h-x diagram.

3 Results

Information about Electrical energy consumption, water consumption and produced cooling energy allows us to calculate chiller operation efficiency, and compare it with water – cooled chillers.

4 Conclusions

Collected data and analysis provides the basis for assessment of energy savings, what is very important to do next considerations for similar projects.