

# FIELD STUDY OF A CHILLER WITH WATER MIST-ASSISTED CONDENSER PRE-COOLING

Artūrs Brahmanis<sup>1</sup>, Andris Krūmiņš<sup>2</sup>, Arturs Lešinskis<sup>3</sup>

<sup>1,2,3</sup>*Institute of Heat, Gas and Water technology, Faculty of Civil Engineering, Riga Technical University, 16 Azenes street, LV-1010, Riga, Latvia*

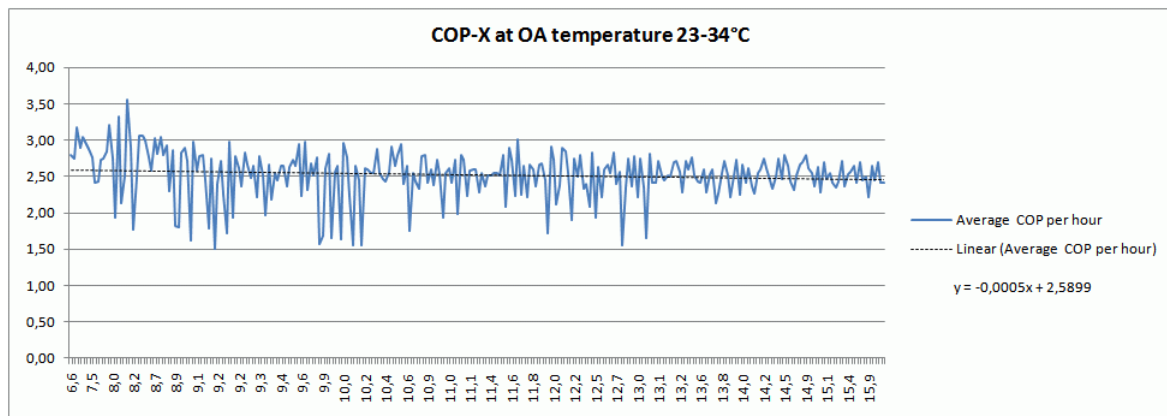
*E-mail: <sup>1</sup>Arturs.Brahmanis@rtu.lv (corresponding author); <sup>2</sup>Andris.Krumins@rtu.lv; <sup>3</sup>Arturs.Lesinskis@rtu.lv*

**Abstract.** The present engineering tendencies shows that, due to the development of HVAC system and control equipment, indirect evaporative cooling system variations becomes even more attractive for use not only in hot and arid regions, but also in European countries located in temperate climates. The aim of the present study is to investigate the impact of outdoor air moisture content variations on the chiller efficiency in real site conditions. The investigated system is located in restored historical building, The Art Museum Riga Bourse, which is located in the centre of Old Riga, Latvia.

Electricity consumption, chiller operation stages, cooling fluid temperatures, and outdoor air parameters data has been acquired for the period of eight month, during the year 2012.

Each minute recorded data was processed, and recalculated for hour's average values. Data analysis for 7 different constant air temperatures showed that for the studied period of time chiller's COP slightly depends on the outdoor air moisture and this dependence is inverse proportional.

This dependence is much less expressed at highest registered outdoor air temperatures – from 23°C to 34°C (Fig. 1).



**Fig. 1.** COP (y) and OA moisture content (x, g/kg) at temperature ranges from 21 to 23°C, and from 23°C to 34°C

This fact can be explained by the adiabatic compensation effect. In our case refrigerant – air heat exchanger effectiveness decreasing, caused by low humidity, is compensated by adiabatic intake air pre-cooling.

The results of the present and related studies are aimed to clarify the possibilities of increasing energy efficiency of air conditioning equipment by using indirect evaporative cooling systems and variations in temperate climate.