

VENTILATION RATE IN THE INDOOR ENVIRONMENT OF DIFFERENT TYPES OF ARCHIVES

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Keywords: ventilation rate, indoor environment, tracing gas

Ventilation rate in museums and archives is very important for assessment of interaction of indoor and outdoor environment and especially for estimation of amount of pollutants penetrating indoors from the outdoor air. This study was focused on measurements of the natural ventilation rate in the depositories of the State Regional Archives in Třeboň, the Research Library of South Bohemia at Zlatá Koruna and the Library of the Regional Museum in Teplice.

The ventilation rate was measured using tracing gas by the Indoor Air Quality Monitor PS32 (Sensotron, Poland), which measured temperature, relative humidity and concentration of CO_2 . The CO_2 concentration in the indoor environment was initially increased (by the evaporation of dry ice in Zlatá Koruna and Teplice and by launch from a cylinder in Třeboň). After that the ventilation rate was calculated from the decrease of CO_2 concentration using Eq. 1. An example of tracing gas concentration decrease during the experiment and fit by Eq. 1 is shown in Fig. 1. where $C_{\text{in}}(t)$ is the tracer gas concentration, C_0 is the tracer gas concentration in the beginning of the time period, C_{∞} is the tracer gas concentration in the infinite time, t is time, and λ^* is the ventilation rate.

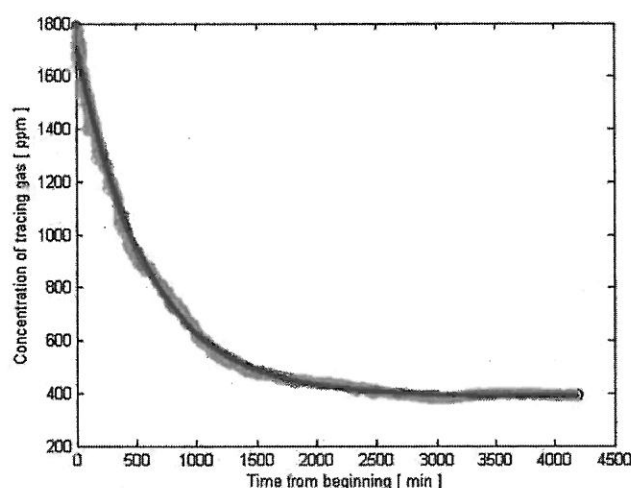


Figure 1. Example of the tracing gas concentration decrease.

The results revealed that the ventilation rate in Třeboň was in average three times higher than in Zlatá Koruna and four times higher than in Teplice (Tab. 1). It was probably caused by the fact that the archive in Třeboň is equipped only with simple windows with gaps while archives in Zlatá Koruna and Teplice have double glassed windows. A difference was also between seasons. The ventilation rate was lower in summer than in winter at every archive, probably due to lower temperature difference between indoor and outdoor environment.

Table 1. Ventilation rate [h^{-1}] during different seasons of the year in archives in Třeboň, Zlatá Koruna and Teplice.

	Winter	Spring	Summer	Autumn
Třeboň	0.44	0.34	0.28	0.43
Zlatá Koruna	0.14	0.13	0.10	0.13
Teplice		0.10	0.06	

Acknowledgements

This work was supported by the Ministry of Culture of the Czech Republic under grant DF11P01OVV020.