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MONITORING OF INDOOR AIR QUALITY IN LIBRARIES AND ARCHIVES**M. Kouřil¹, M. Ďurovič², R. Straka², J. Smolík³ and L. Mašková³**

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It is essential that corrosion monitoring of indoor atmospheres be highly sensitive, especially, when corrosion rates corresponding to the lowest standard aggressiveness categories are supposed to be identified within one or a few days. The electrical resistance (ER) technique in combination with high sensitivity electrical resistance sensors enabled detection of a corrosion loss on an atomic scale. The aim of the testing was to indicate corrosive action of the outdoor and indoor conditions to corrosivity in the archive and to compare the response of the monitoring system with other techniques – quartz crystal microbalance (QCM) and coulometric reduction (CR) of corrosion products on coupons. Two case studies were performed in two historical buildings that are partially used as an archive.

The case studies follow the historical buildings of a monastery from 13th century and a chateau from 17th century that is currently used as an archive of historical documents. The conditions in the archive are not controlled and the indoor atmosphere quality is influenced by external aspects. The atmosphere aggressiveness inside the archive was monitored by three resistometric sensors – silver (50-nm), copper (100-nm) and lead (400-nm). Corrosion rates of silver and copper can be classified according to standards, while the lead aggressiveness classification is not available. And it is lead that is renowned for its significant sensitivity to organic substances that are a product of paper degradation. The loggers were placed 20 cm from a window. Both the ER and QCM techniques lead to the same corrosivity classification. The reason why the QCM does not distinguish between corrosivity towards copper and silver is probably the fact that the QCM register any increase in mass of the crystal, not just the corrosion products formation. CR provided the all-season overview of the corrosivity of the indoor as well as of the outdoor atmosphere.

Case studies have demonstrated the sensors' ability to timely inform the users about changes in the atmosphere quality. In confrontation with quartz crystal microbalance technique, resistometric sensors provided better explainable data. Case studies of indoor atmospheres of archives highlighted advantages of regular monitoring of corrosion aggressiveness. Sufficiently sensitive sensors are able to inform the user in time about the air quality impairment and may uncover unexpected influences crucial in terms of corrosion protection.