بسم الله الرحمن الرحيم

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شبكة المعلومات الجامعية

التوثيق الالكتروني والميكروفيلم

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Indoor Air Quality in Archaeological museums and Its Impact on Artefacts

A Thesis submitted in partial fulfillment of the requirements of the degree of Master of Science in Architectural Engineering, 2021

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Statement

This thesis is submitted as partial fulfillment of M.Sc. degree in Architectural Engineering, Faculty of Engineering, Ain Shams University.

The work included in this thesis was carried out by the researcher and no part of it has been submitted for a degree or qualification at any other scientific entity. The candidate confirms that the work submitted is her own and that appropriate credit has been given where reference has been made to the work of others.

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Abstract

Climate change is one of the significant global problems nowadays. This is a resultant of the increase in human activities which causes an increase in air pollution levels. Air pollutants contributes to deterioration of both human health and valuable socio-cultural assets; such as archeological museums which functions as a preservation environment for the cultural heritage to future generations. This affects museums indoor air quality, which by turn affects valuable artefacts.

Museum indoor air quality is directly related to the site and context of the museum, the building envelope, HVAC system used, museum furniture, interior finishing materials and the mass flow of visitors every day. Significant indoor air pollutants, upon which, the adequacy for artefacts preservation is assessed are carbon monoxide (CO), hydrogen sulfide (H_2S), nitrogen dioxide (NO_2), Ozone (O_3), Particulate matter (PM10-2.5), radon (Rn), acetic and formic acids, sulfur dioxide (SO_2), and formaldehyde.

Upon that, the research aims at developing an indoor air quality assessment sheet, along with guidelines for artefacts conservation; to be used in archeological museums; which would help museum curators, conservators and design architects identify whether the museum indoor air quality is adequate for artefacts conservation or not. This research is composed of four chapters, upon which the main aim could be realized, by applying the following research methodology. The methodology starts with data collection to indoor air pollutants' sources and concentrations, along with the factors of an impact to museum's indoor air quality, which is presented in chapter one. After that, data collection is performed in terms of archeological artefacts classifications and the impact of selected indoor air pollutants on them, which is presented in chapter two. This is followed by another data collection in terms of preventive conservation and risk management approaches, in addition to analytical studies in terms of preventive conservation practices, which is presented in chapter three. Then analytical studies for indoor air quality assessment case studies for archeological museum's in different countries, which is found in chapter four. This is finalized by, developing an indoor air quality assessment sheet along with summarized guidelines for adequate artefacts conservation.

Keywords

Museum buildings, Archeological museums, Indoor air quality, Air pollutants, Archeological artefacts, Preventive conservation, Risk management, Indoor air quality assessment, Guidelines.