

Service Life Study of Polymers Used in Renovation of Heritage Buildings and Other Structures

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Abstract : Degradation of building materials particularly pipelines causes environmental damage during renovation or replacement and is a time consuming and costly process. Rehabilitation by polymer composites is a solution for renovation of degraded pipeline in heritage buildings and other structures which are less costly, faster and causes less damage to the environment; however, it is still not clear for how long these materials can perform as expected in the field and working condition. To study their service life, two types of composites based on Epoxy and Polyester resins have been evaluated by accelerated exposure and field exposure. The primary degradation agent used in accelerated exposure has been cycling temperature with half of the tests performed in presence of water. Thin films of materials used in accelerated testing were prepared in laboratory by using the same amount of material as well as technique of multi-layers application used in majority of the field installations. Extreme intensity levels of degradation agents have been used only to evaluate materials properties and as also mentioned in ISO 15686, are not directly correlated with degradation mechanisms that would be experienced in service. In the field exposure study, the focus has been to identify possible failure modes, causes, and effects. In field exposure, it has been observed that there are other degradation agents present which can be investigated further such as presence of contaminants and rust before application which prevents formation of a uniform layer of polymer or incompatibility between dissimilar materials. This part of the study also highlighted the importance of application's quality of the materials in the field for providing the expected performance and service life. Results from extended accelerated exposure and field exposure can help in choosing inspection techniques, establishing the primary degradation agents and can be used for ageing exposure programs with clarifying relationship between different exposure periods and sites.

Keywords : building, renovation, service life, pipelines

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