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Development of an Integrated Durability Assessment Methodology of Thermal Mortars Applied in Multi-layer Systems

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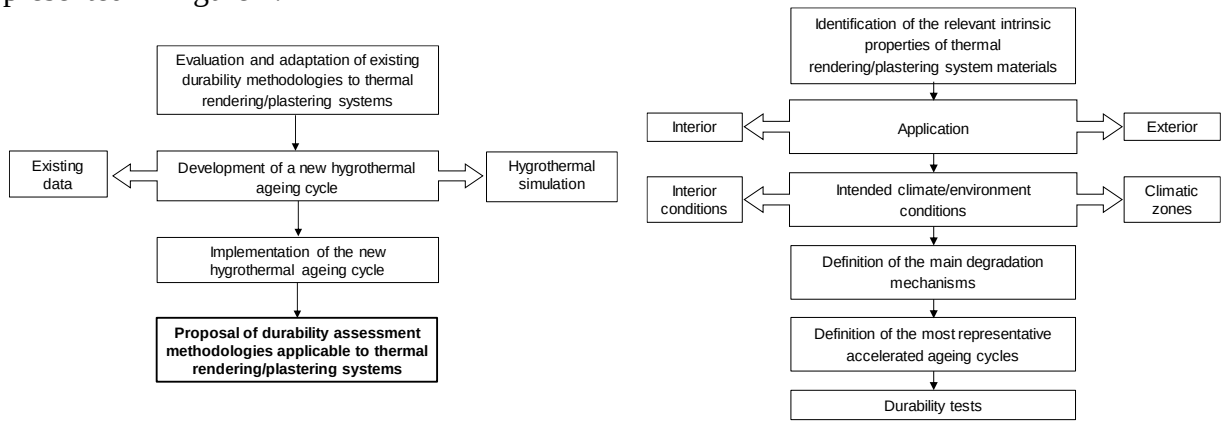
1 Introduction

The existing durability assessment procedures of thermal mortars and ETICS showed to be insufficient to a precise and realistic evaluation. In that way, the authors developed a new durability assessment methodology, based on real material characteristics and the performance of the system as a whole.

2 Integrated Durability Assessment Methodology

The developed methodology highlighted the importance of combining different evaluation methods, such as numerical simulation and experimental tests (existing and new procedures) (CEN, 2002; EOTA, 2013), as shown in Figure 1-a. The previous knowledge of the application requirements allowed the definition of different paths regarding the main degradation mechanisms and, consequently, the most representative accelerated ageing cycles. Figure 1-b summarises the different stages of the durability assessment methodology and the sequencing between them. The development of methodologies that reproduce the most relevant degradation mechanisms in thermal rendering and plastering systems were performed. According to the requirements applicable to thermal mortars and considering their relevant properties, a methodology regarding the application of the thermal mortars in multi-layer systems is presented in Figure 2.



a) b)

Figure 1. a) Methodological process for the durability assessment. b) Durability assessment methodology.

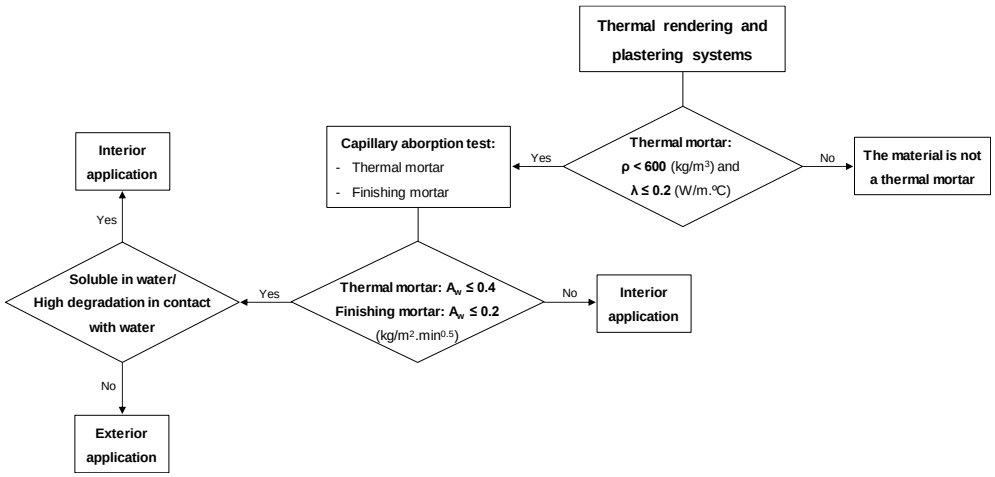


Figure 2. Methodology of application of thermal rendering and plastering systems.

3 Conclusions

The existing durability assessment procedures of thermal mortars showed to be insufficient to a precise and realistic evaluation. In that way, the authors developed a new durability assessment methodology, based on real material characteristics and performance of the system as a whole. The developed methodology highlighted the importance of combining different evaluation methods, such as numerical simulation and experimental tests. The previous knowledge of the application requirements allowed the definition of different paths regarding the main degradation mechanisms and, consequently, the most representative accelerated ageing cycles. The main degradation mechanisms include high temperature and relative humidity variations, exposure to high relative humidity, exposure to liquid water and freeze-thaw. The presence of liquid water and high relative humidity is a key factor for the decision on the applicability conditions of thermal mortars. In summary, the implementation of the standard procedures to different thermal rendering and plastering systems allowed understanding the deterioration caused by each degradation mechanism. The acquired knowledge contributed to the development of the hygrothermal ageing cycles since the relevant gaps were identified and bridged. This knowledge is fundamental to develop the durability assessment methodology, applicable to thermal rendering and plastering systems, together with the developed hygrothermal cycle.

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