

Influence of Grid Presence in the Characteristics of Applied Mortars

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1 Introduction

Mortar based coverings are widely used in all types of constructions, whether new or old, in need of rehabilitation or requalification. When we talk about exterior coverings, we are talking about the outermost layer of protection of these constructions, i.e. the layer that will contribute most strongly to their durability (Torres *et al*, 2018).

When applying a mortar to a real substrate, which will always have some porosity — unlike the laboratory moulds where the specimens that are used to characterize mortars are made, which have virtually no porosity — an interaction will occur between the two surfaces. The same mortar moulded into specimens and hardened in laboratory, under standard curing conditions, when applied to real substrates subjected to real climatic conditions, will not acquire identical characteristics. With the objective of being able to estimate the characteristics of the mortars applied to a substrate, using the mortar characteristics determined in laboratory, a research project funded by FCT is under development: IF MORTAR.

The aim is to compare, for the same mortar, the characteristics analysed in laboratory specimens with the characteristics determined after application to the substrates. For this, it is necessary to apply the mortars to the substrates and, after hardening, to detach and analyse them. To facilitate the detachment of these mortars, a fiberglass grid has been introduced between the mortar and the substrate. However, a question arises: will the introduction of the grid change the characteristics of the applied mortars?

2 Experimental Campaign

The experimental campaign developed aimed to analyse the behaviour of cement and hydraulic lime mortars applied to hollow ceramic brick substrates, in two different conditions: with and without the introduction of a fiberglass grid between the mortar and the substrate. It began with the execution of 40x40x160 mm³ prismatic specimens, for the determination of the bulk density, open porosity, capillary water absorption and compressive strength and cylindrical specimens (100 mm diameter and 15 mm thickness) for the determination of water vapour permeability. After the detachment of all mortars from the substrates, specimens of appropriate dimensions for the respective tests were cut. Given the thickness of the applied mortars (1.5 cm), it was not possible to obtain specimens with the exact dimensions indicated in the standards. Therefore, instead of 40x40x160 mm³ specimens, 40x40x15 mm³ specimens were

used for the determination of bulk density, open porosity, capillary water absorption and compressive strength. For the determination of water vapour permeability, cylindrical specimens with 100 mm diameter and 15 mm thickness were used.

When comparing the results obtained for bulk density by the geometric method and open porosity of the mortars applied with the grid with those of the mortars applied without grid, it can be seen that they are very similar, i.e. the presence of the grid does not affect the results obtained. In what concerns to water absorption once again, was possible to observe that the difference between the results corresponding to the two conditions of application (with and without grid) is small. The water vapour permeability coefficient was determined according to ISO 12572:2016, using the wet cup method. In the case of the cement mortar applied to the substrate without grid, it was not possible to detach specimens for this test. For the hydraulic lime mortar, it was verified, once again, that the difference between the results of the detached specimens with and without grid were not significant. Compressive strength was determined on specimens measuring 40x40x15 mm³, both for the mortars hardened in the laboratory moulds and for the mortars applied to the substrates. It can be seen that the introduction of the grid does not have great influence on the results.

3 Conclusions

To have knowledge of the in-service characteristics of mortars, it is necessary to apply them to the substrates, wait for harden, detach them from the substrates and, finally, analyse them.

To facilitate this detachment, a grid can be introduced between the substrate and the mortar, but it is important to know whether this grid will affect the final properties of the mortar. The main objective of this work was thus to analyse the influence of the presence of a fiberglass grid, placed between the mortar and the substrate, on the properties of the applied mortars.

The experimental campaign conducted, which included the analysis of the influence of the presence of the fiberglass grid in the behaviour of cement and hydraulic lime mortars, concluded that the properties of the mortars do not change significantly due to its the presence.

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