XV International Conference on Durability of Building Materials and Components
DBMC 2020, Barcelona
C. Serrat, J.R. Casas and V. Gibert (Eds)

Influence of Lightweight Concrete Block Support on Physical and Mechanical Characteristics of Applied Mortars

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Keywords: *Mortar, Support, Performance, Lightweight Concrete Block.*

1 Introduction

Coating mortars have an important role in protecting buildings from degradation agents (Flores-Colen, 2016). One of the most important in-service degradation agents is water, which can lead to physical, chemical and, in some cases, mechanical deterioration. Thus, the performance of coating mortars is influenced by water capillary absorption, hygroscopic moisture content, water permeability, diffusion of water vapor, porosity, soluble salts content and propensity for the growth of microorganisms. Therefore, is very important to ensure the quality of the applied mortars, as they contribute significantly to the durability of buildings. For this, it is important to use mortars that are compatible with the supports and that will ensure adequate protection to the building. Thus, low water permeability, good water vapor permeability, good adhesion to the substrate, deformation capacity, among others, are sought (Martins, 2008). The influence of different factors on the behavior of mortars, such as the quality of the binder, aggregate particle size, water-binder ratio, application conditions, and dosage, have been extensively studied (Torres, 2014). However, there are still few studies on the influence of the support on mortar characteristics. This work aims to contribute to this knowledge. This research intends to identify how the lightweight concrete block support influences the performance of the applied mortar, considering that the applied mortar is in different conditions than those of mortars hardened in laboratory molds. Thus, the understanding of the characteristics of the applied mortar and the possibility of creating a correlation with the characteristics of the mortar hardened in laboratory molds, may enable a greater compatibility of the mortar with the support and provide data for the optimization of mortar composition. Such understanding may help to increase the in-service durability of mortars.

2 Materials and Methods

2.1 Methodology

A laboratory experimental campaign was carried out, for the comparison of the characteristics of the cement mortar hardened in standard laboratory metallic molds and the characteristics of the cement mortar applied to (and later detached from) lightweight concrete block supports. For the execution of the tests and comparison of the results, the mortars

hardened in the standard molds (with dimensions of 40 x 40 x 160 mm³) were cut into slices of 40 x 40 x 15 mm³, thus having the same dimensions of the mortar samples applied to the support and later detached. To prepare the applied mortars, wooden molds were made in order to ensure a constant thickness (1.5 cm) of the mortar applied to the lightweight concrete block support. As an initial step, the bricks were dried until mass stabilization, and, before applying the cement mortar, each support was wetted by spraying 100 ml of water. The tests were performed after 28 days of curing. The curing was carried out according to the indications of EN 1015-11: 1999, both for the mortar hardened in the molds and for the mortar applied to the supports. The tests carried out in this experimental campaign were: water absorption by capillarity, open porosity, bulk density, water vapor permeability and mechanical strengths

3 Conclusions

As a conclusion, it can be observed that the mortar detached from the support has slightly different characteristics in relation to the mortar hardened in the molds; however, it is not clear that these differences are due to the support. The support can influence the characteristics of the applied mortar, as already seen in previous works using the ceramic brick support (*e.g.* Torres, 2014), however this influence was not significant for the lightweight concrete block.

It can be seen that the mortar applied to the lightweight concrete block is slightly more compact, with less open porosity. Consistently, the lower water absorption and lower water vapor permeability occurred for the mortar applied to the support. Conversely, the compressive strength of the applied mortar is lower than that of the mortar hardened in the mold.

The influence of the support on the physical and mechanical characteristics of the applied mortar is a relevant issue in relation to performance and durability, and extensive studies on different types of supports and different types of mortar may increase the compatibility of the mortar/support interface.

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Acknowledgements

The work presented was carried out within the framework of the IF MORTAR project (POCI-01-0145-FEDER-032223, PTDC/ECI-EGC/32223/2017,), within the scope of the Portugal 2020 program, financed by FEDER through the POCI program. The funding provided is kindly acknowledged. The authors also thank CERIS and CERENA, research units from IST.

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