

## Earth mortars produced with eco-efficient recycled cement

### Summary

The project in which this thesis participates is called "Eco-efficient recycled cement compressed earth blocks - ECO+RCEB". This thesis focuses on the design and characterisation of masonry earth mortars that are compatible with the stabilised earth blocks (CSEB) which will be produced in parallel in the project.

Earth as a building material has numerous benefits, both in terms of sustainability and in terms of comfort and health. However, low integrity and high susceptibility to water action are major disadvantages of earth building materials. Such problems can be minimised by stabilisation. The best performing stabiliser is ordinary Portland cement (OPC) but its use is not sustainable. For this reason, the production of these materials with sustainable stabilisers such as low-carbon thermo-activated recycled cement (TRC) is being explored. In the quest for sustainability, the idea of incorporating demolition and construction waste (CDW) to replace some of the earth used to produce these materials is also being pursued.

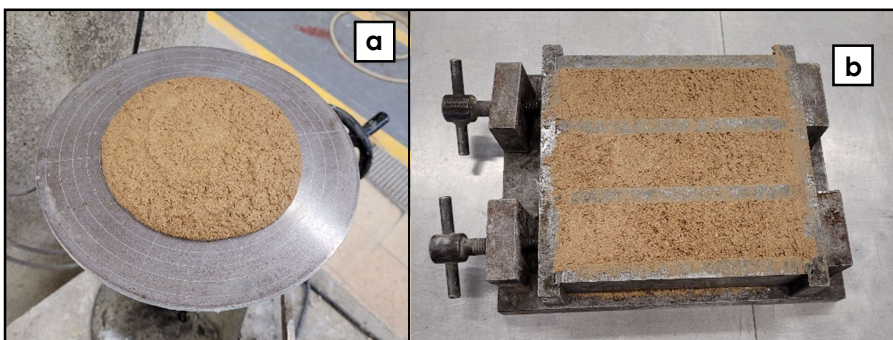
This thesis focuses on the design and characterisation of masonry earth mortars. They will be characterised in terms of both their fresh properties such as workability, fresh density or workable life as well as their physical and mechanical properties in the hardened state such as dry density, flexural and compressive strength, initial shear strength, dynamic elasticity modulus, shrinkage or adhesive strength on substrates. These tests will be carried out in accordance with the relevant regulations.

In addition, both the durability and the microstructure of the mortars will also be studied. The former, in terms of water vapour permeability, water absorption and water soluble salt content, among other things. The latter, using techniques such as scanning electron microscopy, mercury intrusion porosimetry or nitrogen absorption.

In parallel, 3 types of 1.5m high walls will be built with blocks and mortars of the same nature (unstabilised, stabilised with OPC and stabilised with TRC). They will be built in three regions of Portugal and one of Spain in order to expose the walls to different climates and study their susceptibility to it.

### Keywords

Earth mortars, thermo-activated recycled cement, ordinary Portland cement, demolition and construction waste.



Flow table test (a); and mortar prisms in the mould (b).



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