

## The incorporation of sustainable technologies in the rehabilitation of tabique walls

### Summary

This research studies the properties and behaviours of mortars existing in old buildings, with walls of wattle, in the context of mainland Portugal and the autonomous islands of Madeira and the Azores, through an extensive campaign of analytical and laboratory characterization, whose purpose is to contribute to a comprehensive and legitimist interpretation of the behaviour of these mortars. It will possible, in the end, the formulation of a range of mortars more suitable for its current use in rehabilitation of wattle walls, and that meets the functional requirements, the requirements of sustainability, easy to apply and with good productivity, with an attractive cost and that can be produced on an industrial scale. In these range mortars, it is intended to incorporate a residue (or more) of the Portuguese industry. Consequently, participate in the preservation of this material and cultural good for future generations.

The analytical and laboratory characterization of the pre-existing mortars in wattle walls it is the result of the performance of the granulometry tests, water absorption by capillarity, drying index, mechanical resistance to compression, X-ray diffraction, X-ray fluorescence, determination of insoluble in hypochlorite and porosimetry. Were studied 49 samples of mortars, collected in 22 buildings with walls of wattle, internal and external to the buildings. From the analyses and laboratory characterizations it can be concluded that 65% of the mortars used in the plasters of wattle walls consist of sandy soils and 35% of silt-clay soils. In 56% of the samples, lime was used as a binder, generically, in mortars with a predominance of sand, but in the vast majority, in a proportion lower than 22%. The values of porosity and compressive strength showed good results. The high values of water absorption by capillarity are balanced by a low resistance to drying, thus helping in the durability of the support. The most commonly found minerals come from the group of feldspars, phyllosilicates and calcite. The most abundant chemical elements are silicon dioxide ( $\text{SiO}_2$ ), aluminium oxide ( $\text{Al}_2\text{O}_3$ ), calcium oxide ( $\text{CaO}$ ), iron oxide ( $\text{Fe}_2\text{O}_3$ ), magnesium oxide ( $\text{MgO}$ ), potassium oxide ( $\text{K}_2\text{O}$ ) and sodium oxide ( $\text{Na}_2\text{O}$ ).

Through the comparative study between the values found, comparing them with the normative values and with the bibliographical references, in any case, the conservation conditions found show that the tabique construction system has expected durability to the standards currently required, and that it is an economic, durable and sustainable technique. The knowledge acquired is fundamental to proceed to the subsequent stage of this investigation – the formulation of a mortar that corroborates for a correct intervention in wattle walls, in order to preserve the constructive memory of this type of wall in Portugal.

### Keywords

Wattle, mortars, wastes, characteristics, costs, productivity, sustainability.



(a) Building

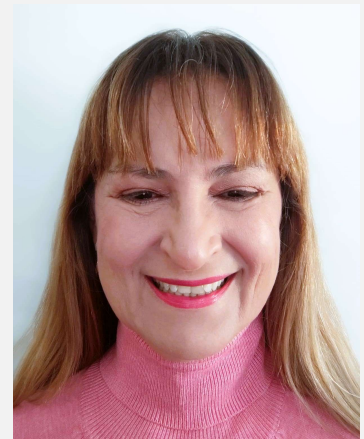


(b) Wattle wall



(c) Samples

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#### Period

2021-2024

#### Funding

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