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Roman bricks in Northern Italy: Manufacturing technologies over time

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Building bricks entail a traditional material meaningfully linked with cultural identity of peoples and represent a sustainable solution for the built heritage conservation. Through an interdisciplinary approach based on archaeometric methodologies, the bricks of the Basilica of Santa Justina of Padua (Northern Italy) were studied. The city of Padova is located in the Eastern side of the Pianura Padana, characterized by the abundance of clayey materials, mostly corresponding to Quaternary alluvial deposits. The late antiquity (5-7th centuries), when the production of bricks in the city were made accordingly the Roman techniques, and medieval (12-13th centuries) areas of the basilica were selected.

The main objectives addressed were the analysis of bricks manufacturing by means of a multianalytical study (Spectrophotometry, XRF, XRDP, POM, FESEM-EDS) and the data transfer to current ceramic industry in order to afford more sustainable production, ensuring at the same time the bricks quality and aesthetics.

The studied bricks shown a quite good conservation state. Bricks with a yellowish colour and bricks with an orange hue were observed on the two areas selected. Compositional data stand out the important presence of gehlenite, diopside and anorthite, and hematite and calcite to a lesser extent. This indicates the use of mixtures of clays, illitic-kaolinitic and very calcareous, and firing temperatures of 900–1000 °C at oxidizing conditions. The significative presence of high-temperature mineral phases provided an important durability to bricks and the yellowing of the pastes was mainly due to gehlenite formation.

On the one side, these results might suggest that the knowledge regarding to the manufacturing technologies used could be transmitted over the centuries along the construction of Santa Justina, as well as that late antiquity bricks were reused during medieval times. On the other, they pointed out the important skills achieved at those times to reach such high temperatures. Nevertheless, the mixtures and the firing conditions were not properly controlled, so the formation of the high-temperature phases largely depended on where the bricks were placed inside the furnaces and for how long were remained in.

The data attained could allow the new production of a very high durability bricks from clayey materials outcropped nearby Padua that preserved the aesthetical values of the city. Such new bricks would be especially suitable for the proper conservation of the built heritage of Northern Italy shaped by bricks made according to Roman techniques.