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Influence of paper industry effluent sludge in ceramic formulation for red wall tiles (BIII group)

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At present, the friendly recycling of paper industry effluent sludge has gained great prominence due to environmental and economic benefits. The aim of this work is to evaluate the influence of incorporating paper industry effluent sludge into a red wall tile formulation (BIII), replacing natural calcareous material by up to 10 wt.%. For this purpose, five red wall tile compositions were developed by the dry process, pressed at 47 MPa, and fired at 1170 ºC by using a fast-firing cycle. The wall tile formulations were characterized in terms of chemical analysis, X-ray diffraction, thermal analysis (DTA-TG), and dilatometric analysis. The influence of paper industry effluent sludge on the technical properties (linear shrinkage, apparent density, apparent porosity, water absorption, and flexural strength) and sintered microstructure were investigated. The results obtained showed that red wall tiles containing up to 10 wt.% of paper industry effluent sludge have very good usable final properties, indicating their conformity for the wall tile industrial production (BIII group - ISO 13006 Standard). Such results emphasized the feasibility of recycling of paper industry effluent sludge in an ecological and economical way for the production of wall tiles.