

USE OF COLOMBIAN RAW MATERIALS FOR THE DEVELOPMENT OF CERAMIC TILES WITH A HIGH DEGREE OF VITRIFICATION

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Based on the characterisation of Colombian raw materials, formulations of porcelain tile bodies were developed based on mixture of feldspars, (illitic-kaolinitic) clays, and quartz, which allowed tiles to be produced that were highly resistant to abrasion, with low porosity, high mechanical characteristics, impermeability, and resistance to chemical attack and frost.

This project permitted local raw materials to be selected from national mines, focusing on clays, kaolins, feldspars and quartzes, to determine the chemical, mineralogical and physical ceramic characteristics of the selected raw materials. Body compositions were formulated and the corresponding physical-ceramic and thermal tests were performed, and the optimum working conditions in each of the grinding, spray-drying, pressing, glazing and firing processes were defined in the laboratory.

A study was carried out on the selection of Colombian raw materials. To study the bodies, 23 samples of raw materials were taken from the Euroceramica mines, commercial exploitation and exploration materials. These materials were subjected to mineralogical characterisation using X-ray diffraction; chemical characterization by X-ray fluorescence, DTA-TG thermal analysis, dilatometric analysis, microstructural analysis by SEM electron microscope, particle size analysis; and evaluation of physical ceramic properties by determination of the vitrification curves, mechanical strength, plasticity and pyroplastic deformation.

This individual characterisation of the materials was used to design formulations evaluated in a temperature range between 1090 and 1200°C, taking into account an energy optimisation by including fluxing materials, while at the same time different clay materials with high iron content were considered, which made it possible to reduce the cost of the resulting composition without affecting the whiteness of the fired tile. These results were evaluated through the measurement of the colorimetric coordinates in a spectrophotometer.

The results and the behaviour of each of the raw materials included in formulation were correlated, obtaining optimum process conditions aimed at industrial scale-up in order to be able to offer this product on the Colombian and international market, and partially reduce porcellanato imports into Colombia.