RAW MATERIALS FOR PORCELAIN TILE BODIES IN BRAZIL

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ABSTRACT

Porcelain tile is the fastest growing type of tile in the international ceramic tile market, although it is still produced on a small scale in Brazil. By 2001 production should reach 10 million m² of tiles (2% of all produced tile). This expansion of production is considered highly likely, but it also entails the necessity for appropriate standard raw materials, associated with greater technical manufacturing demands. The main minerals used in porcelain tile formulation are the traditional triaxial porcelain minerals - quartz, feldspar and kaolinite - present in quartzitic and feldspathic sands, feldspars, plastic clays and kaolin. In this work an overview is presented of the current supply of raw materials for the production of porcelain tile, and some geological perspectives concerning new deposits of such materials are analysed.

1. INTRODUCTION

World porcelain tile production capacity has been estimated at 400 million square meters per year, of which 10 million are produced in Brazil, in spite of being the 4th largest ceramic tile producer. The expected expansion of Brazilian porcelain tile production can be expected to lead to concern with regard to the production of local raw materials, with the aim of improving the competitiveness of the sector. The main minerals involved in the porcelain tile composition are the traditional triaxial porcelain minerals - quartz, feldspar and kaolinite - present in quartzitic and feldspathic sands, feldspars, plastic clays and kaolin. Based on Motta (2000) and Coelho (2001), this study presents an overview of raw materials supply for the production of porcelain tile in Brazil, as well as a review of the current situation of the porcelain tile industry.

2. THE PORCELAIN TILE INDUSTRY

The most recent development in the tile sector has been related to the formulations of tile bodies, with a view to reducing their firing cycle of 30-50 hours to 60-70 minutes, lowering production costs and, at the same time, providing the tiles with aesthetic characteristic and the necessary durability to enable competing with other types of non ceramic coverings, such as marble, granite and other decorative stones at a lower price for the consumer. Porcelain tile production began in Italy in the 80s, and in 1999 total production was estimated at 400 million m^2, with about 180 manufacturers spread over Italy, Spain, China, Taiwan, Germany, France, the United States, Venezuela, Argentina, Egypt, amongst others. The "Asian tigers " - Thailand, Indonesia and the Philippines - are making large investments in this field.

In Brazil, the first company started porcelain tile production in 1996, with a production capacity of 90,000 m^2/month. In 1999 production reached 3.4 million m^2, almost 0.8% of tile production and in 2000 it reached 4.9 million m^2, an increase of 44%. At the moment, porcelain tile in Brazil is produced by four companies with a predicted production in 2001 of 6.5 to 10 million m^2. (Menegazzo *et al.* 2000 and Melchiades & Boschi 2001, respectively). Among the 140 Brazilian companies that manufacture tiles, many are developing porcelain tile production programs for the coming years, and should enlarge their production significantly.

3. RAW MATERIALS IN THE PORCELAIN TILE INDUSTRY

The main porcelain tile raw materials, based on the Italian bodies (Biffi, 1979), are: plastic clays, kaolin, feldspar and feldspathic sand, quartzitic sand and talc.

Plastic clays: These make up 25 to 35% of the body. The deposits are of sinsedimentary origin and by supergenic alteration of sedimentary rocks. Among the former there are medium to large deposits, associated with refractory clays, such as Tijucas do Sul - PR and Guarda Mór-MG, and small lenses in modern alluvial plains (São Simão, High Tietê, Mogi Mirim, all in SP, etc). The alteration deposits are of variable importance; the largest are associated with the high plains relating to the South American flattening, such as those of Oeiras - PI and Lages - SC.

Kaolin: This makes up almost 10% of the body. The most important deposits are formed by supergenic alteration of sedimentary rocks as well as of crystalline rocks, widely found in Brazil, of good quality and with large reserves.

Feldspar: This makes up 25-40% of the body. The deposits are generally pegmatites of minor significance, with difficulties for current production (223,000 t in 1997). Demand is expected to grow considerably in the next few years, with a projection for 2005 ranging from 327,000 to 941,000 t respectively, according to pessimistic and optimistic forecasts (BRAZIL, 2001 and Coelho, 2001).

Feldspathic sand: This makes up 10 to 20% of the body. The feldspathic sand produced in Brazil comes from the exploitation of granitoid massifs, generally as a by-product of other major mining products (e.g.: quarry aggregate).

Quartzitic sand. This makes up 5 to 10% of the body. They are many quartzitic sand deposits. Of particular note are the fanerozoic fluvio-eolic sands, quaternary coastal and fluvial sands, besides the quartz found in feldspathic rocks.

Talc and Carbonates. These minerals together make up 0 to 3% of the body. Carbonates are abundant in Precambrian platforms silts, widely found throughout the Brazilian territory. Talc is found less extensively, but there is enough to attend to current and future demand.

4. CONCLUSIONS

Considering current and future demands, the supply of raw materials for porcelain tile bodies is problematic regarding the supply of feldspar and white-firing plastic clays, main constituents of the body.

With regard to the search for a supply of feldspars and other fluxes, several mining companies are conducting projects in various regions of the country, but as yet there are no guarantees of being able to meet the demands. As far as deposits of plastic clays are concerned, at least in the south and south-east of Brazil, no significant deposits have been discovered comparable in quality to the clays from the Ukraine, England, United States and Germany, due to factors of a geological nature. Little by little, some new location will be incorporated into the market, but just as a solution for local supply. Investments for discovering new feldspar and plastic clay deposits are indispensable.

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