

QUALITY CONTROL OF RED CERAMICS FROM RIO GRANDE DO NORTE, BRAZIL

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1. INTRODUCTION

In Rio Grande do Norte, Brazil, there is an area containing ceramic companies that produce bricks, tiles and other red ceramic products. These companies are predominantly located in rural areas, concentrated around Natal, in the valley of the Assu river, and in the Serido region. The sector is composed predominantly of micro-management groups or family businesses with low-demand technology. These characteristics make this segment very important to the economy of the state, because they generate jobs in rural areas, contributing significantly to the economy of people living in the country, preventing their migration to large cities. Overall, however, product quality is very poor leading to inappropriate use of raw materials, energy waste, poor forming of the product, environmental degradation, non-compliance with Brazilian and international standards, etc. Therefore, it is crucial to improve the bricks produced. The Weibull distribution is mostly used for designing purposes in ceramics and it adequately fits a wide range of data. For samples of constant size and shape, the resultant distribution is given by an expression where the survival probability at a given stress shows which percentage of the samples survive, and it provides a parameter called the Weibull modulus. The variation in fracture strength under tension of this composite has been modelled using the Weibull distribution. In this respect, the Weibull distribution allows researchers to describe the fracture strength of a composite material in terms of a reliability function. It also provides material manufacturers with a tool that enables them to present the necessary mechanical properties to the end-users with a certain confidence. In this work, the physical and mechanical properties of ceramic bricks from Rio Grande do Norte (Brazil) are presented, showing their low quality. Suggestions are also presented to improve these properties.

2. METHODOLOGY

The physical properties of ceramic bricks from the Rio Grande do Norte state (Brazil) were studied by measuring porosity, water absorption, linear shrinkage, bulk density and mechanical strength. Mechanical strength test data resulted in Weibull distributions. The Weibull statistic parameter was calculated to better evaluate ceramic quality.

3. RESULTS AND DISCUSSION

Table 1 shows a summary of the visual tests of ceramic tiles.

ITEM	CRACK	BREAK	DEFORMATION	IRREGULAR SURFACE	COLOUR VARIATION
Brick	62%	29%	91%	87%	83%
Brazilian standard	0%	0%	0%	0%	0%

Table 1.

Figure 1 shows the medium compressive strength of a set of bricks compared with the Brazilian standard. The results are below the allowed minimum. Figure 2 presents the fracture probability x breaking stress, showing low values to breaking stress.

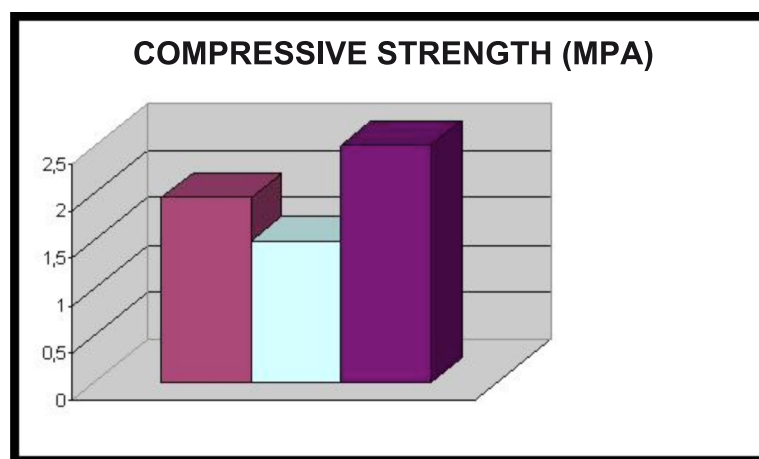


Figure 1.

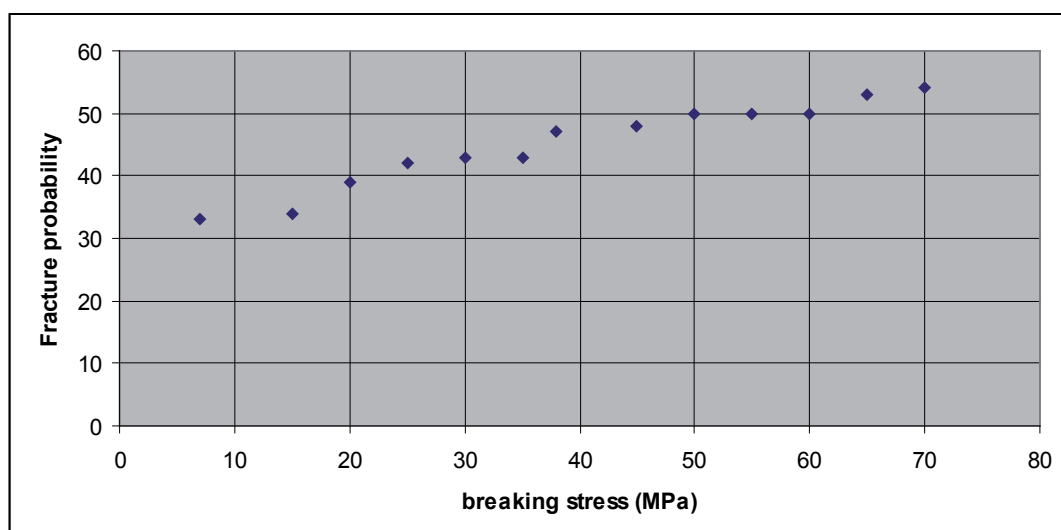


Figure 2.

The results support our initial considerations about low quality current stands of ceramic tiles from Rio Grande do Norte and underline the importance of testing and improving these products.

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