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Deep Abrasion Resistance of Porcelain Stoneware Tiles

M. Montazerian ^{a,*}, M. Shahriyari ^b, M.H. Khodabakhsh ^b

(a) School of Metallurgy and Materials Engineering, Iran University of Science and Technology, Tehran, Iran.

(b) Apadana Ceram Company, 42 km in Boeen Zahra Road, Qazvin, Iran.

* Corresponding Author: M. Montazerian

E-mail: montazerian@iust.ac.ir

Abstract

In this study, resistance of porcelain stoneware tiles to deep abrasion was investigated. Chemical, physical and microstructural analyses were accomplished in order to determine the relationship between the abrasion resistance and technical characteristics of commercially available tiles. The specimens were characterized by Vickers Microhardness (VHN), X-ray Diffraction (XRD), Mercury Intrusion Porosimetry (MIP) and Scanning Electron Microscopy (SEM). The statistical nature in measurements of technical features for porcelain tiles made it difficult to well determine a correlation between abrasion resistance and other physical/chemical characteristics. It seems that by increasing the mean pore size, the abrasion resistance decreases. XRD analysis revealed that the abrasion resistances of the samples in which the amorphous phase was dominant, were greater than of those with lower content of glass phase or higher amount of non-melted Na-feldspar. It seems that glass phase relieves residual stresses during firing and enhances interfacial cohesion between quartz particles and amorphous matrix, reducing material removal during abrasion.

Keywords: Technological properties; Porcelain stoneware; Tile; Abrasion resistance

