

Physical and Microstructure Analyses of Fired Bricks Containing IGCC Slag

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ABSTRACT

A slag material generated from an integrated gasification combined cycle (IGCC) process was pulverized into three different samples: named SG1-8, SG1-60, and SG1-100 with different particle sizes of -8, -60, and -100 meshes respectively. With an exception of the SG1-8 material, full-size fired bricks containing up to 20 wt-% of SG1-60 or SG1-100 material were successfully produced by using our laboratory mold-pressed and kiln-firing methods. The engineering properties of these fired bricks containing SG1-60 or SG1-100 passed ASTM specifications for building bricks for severe weathering grade. These fired bricks showed similar red color, appearances, and surface textures as observed on the regular fired bricks that contain only mixture of clay and shale. However, the slag containing bricks tend to have lower water absorption capability than that of the regular bricks. In this study, the apparent porosity was measured and the microstructures of these slag containing bricks were also analyzed through thin section slides and scanning electronic microscopic images. The results obtained were compared with that of the regular bricks. The issues encountered in making fired bricks containing SG1-8 material were also discussed. The results of this study indicated that incorporation of IGCC slag material with smaller particle sizes (-60 or -100 meshes) in fired bricks could benefit the quality of the final fired bricks products.

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