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Assessing the Suitability of South African Waste Foundry Sand as an Additive in Clay Masonry Products

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Abstract : The foundry industry generates large quantities of solid waste in the form of waste foundry sand. The ever-increasing quantities of this type of industrial waste put pressure on land-filling space and its proper management has become a global concern. The South African foundry industry is not different when it comes to this solid waste generation. Utilizing the foundry waste sand in other applications has become an attractive avenue to deal with this waste stream. In the present paper, an evaluation was done on the suitability of foundry waste sand as an additive in clay masonry products. Purchased clay was added to the foundry waste sand sample in a 50/50 ratio. The mixture was named FC sample. The FC sample was mixed with water in a pan mixer until the mixture was consistent and suitable for extrusion. The FC sample was extruded and cut into briquettes. Water absorption, shrinkage and modulus of rupture tests were conducted on the resultant briquettes. Foundry waste sand and FC samples were respectively characterized mineralogically using X-Ray Diffraction, and the major and trace elements were determined using Inductively Coupled Plasma Optical Emission Spectroscopy. Adding purchased clay to the foundry waste sand positively influenced the workability of the test sample. Another positive characteristic was the low linear shrinkage, which indicated that products manufactured from the FC sample would not be susceptible to cracking. The water absorption values were acceptable and the unfired and fired strength values of the briquette’s samples were acceptable. In conclusion, tests showed that foundry waste sand can be used as an additive in masonry clay bricks, provided it is blended with good quality clay.

Keywords : foundry waste sand, masonry clay bricks, modulus of rupture, shrinkage
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