11th International Conference
on Advanced Materials

Rio de Janeiro Brazil
September 20 - 25

ICAM2009

Study to reuse an industrial solid waste generated by foundry sands

J. M. Pablos[(1)*], E. P. Sichieri[(1)]

(1) Departamento Arquitetura e Urbanismo – EESC - Universidade de São Paulo, Av.Trabalhador Sancarlense,400,São Carlos-SP-Brasil, e-mail: pablos@sc.usp.br, e-mail: sichieri@sc.usp.br

* Corresponding author.

Abstract – The present abstract is a result of a research that investigated the technical viability to reuse a solid waste generated by foundry sands agglomerated with clay, for application in the sector of the civil construction. For that, the work established a methodology, which evaluated the stabilization of the waste in solidified matrices of Portland cement, improved with the addiction of silica fume. The investigated compositions had been used in the confection of solid bricks, conceived with a singular design, allowing modulation and rabbets that can significantly reduce the consumption of the layering mortar.

The present abstract is a result of a research that investigated the technical viability to reuse a solid waste generated by foundry sands agglomerated with clay, for application in the sector of the civil construction. The solid waste is originated from an industry located in the city of S. Carlos – SP - Brazil, being classified by ABNT NBR10004 (2004) [1] as Class IIA, that is, “not dangerous” and “not inert”, since it presents excess of the metals Aluminum (Al), Iron (Fe) and Chromium (Cr) in the solubilized extract. For that, the work established a methodology, which evaluated the stabilization of the waste in solidified matrices of Portland cement, improved with the addiction of silica fume. The stabilization of the solid waste was verified by a solubilization test, which submits the solidified matrices to dynamic and static contacts with distiled water. The mechanical and physical performances of the matrices were evaluated by compression strength, water absorption and air permeability (ASTM C577/1996)[2] tests. The obtained results demonstrate that the silica fume contributes for the metals Al, Fe and Cr fixation efficiency increase by the Portland cement matrices, besides providing significant increase of the compressive strength and reduction of the water absorption and air permeability. The investigated compositions had been used in the confection of massive bricks. For the molding of the bricks a hydraulic press was used, what made possible to maintain the dimensional regularity. The format of the bricks was conceived with a singular design (Figure), allowing modulation and rabbets that can significantly reduce the consumption of the layering mortar. The obtained bricks had been submited to tests of compressive strength, water absorption and solubilization, presenting satisfactory results and proving the technical viability for application in the execution of masonry.

Figure - solid bricks

[1] Associação Brasileira de Normas Técnicas – ABNT – NBR10004 – Resíduos Sólidos: Especificação, 2004.
[2] American Society for Testing and Materials – ASTM C577 – Standard Test Method for Permeability of Refractories. 1996.