

Use of Coal Fly Ash in a Sprayed Mortar for the Passive Protection Against Fire of Metallic Structures

Luis Vilches Arenas, Constantino Fernández Pereira, Carlos Leiva, Joaquín Olivares del Valle and José Vale Parapar

University of Seville, School of Industrial Engineering, Department of Chemical and Environmental Engineering, Camino de los Descubrimientos s/n E-41092 Seville, Spain.

KEYWORDS: Coal fly ash, fireproof products, Passive protection against fire, Sprayed mortar

ABSTRACT

In this work the possibility of using coal fly ash as major ingredient in pastes that can be projected on metallic structures to protect them against fire has been studied. With the object of studying the projection of the product, a pilot plant for wet guniting, consisting basically by a mixer, a paste-pumping device, an air injection system, and different spray nozzles has been built. The paste has been sprayed on 30 x 20 cm panels and on 20-cm long normalized metallic profiles, in which the adhesion, the density, and the fire resistance has been determined.

In order to analyze the insulating properties, steel profiles with different surface/volume ratios have been used. The test pieces have been sprayed using the material tested and other commercial product commonly employed in the passive protection against fire. Subsequently, they have been placed in an oven and have been subjected to a heating program that provides in the outside of the protected steel profiles the standard fire resistance curve and that allows the temperatures to be measured in different points of the test piece. From these data an estimated fire resistance value has been calculated. The results obtained show that the sprayed material used in this work, containing a high proportion of fly ash (minimum 70% w/w), has acceptable physical and mechanical properties, and its fire resistance is comparable to that of other commercial products.