

Manufacturing of Fire-Resistant Panels Using FGD Gypsum and Fly Ash from Power Plants in Xinjiang, Northwest China

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ABSTRACT

Xinjiang is the largest coal producing and consuming provinces in Northwest China. The large coal consumption for energy promotes the economic development, but on the other hand, it gives rise to huge amounts of coal combustion byproducts (CCPs) from the coal-fired power plants in Xinjiang, which may cause serious environmental threat. Flue gas desulfurization (FGD) gypsum and fly ash are two kinds of important CCPs that need to be recycled, and they have a variety of beneficial use applications, among which manufacturing of fire-resistant panels is a promising utilization with high added value. Different proportions of FGD gypsum and fly ash are mixed with appropriate amount of water to obtain a homogeneous paste, from which the fire-resistant panels are prepared. Physical, mechanical properties and insulating capacities of the fire-resistant panels were determined. Both European Standard EN 12457 and NEN 7345 leaching tests were carried out to evaluate the leachable potential of trace elements in the panel products from environmental point of view. The fire-resistant panels are characterized by relatively alkaline pH (8.8-10.5), high density (1088 -1269kg/m³) and high moisture content according to the EN 12859 regulations. Both compressive and flexural strength of the fire-resistant products decrease when increasing fly ash proportion in the mixtures, but are still higher than the limit values established by EN 13279 regulations for gypsum panels. These panels present comparable or higher insulating capacity than pure commercial gypsum panels. Furthermore, according to the leaching results, these fire-resistant panels can be used without environmental implication.