

Thesis Title	A Comparative Study of Ground Coarse Fly Ashes as Pozzolanic Material
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#### Abstract

In this thesis, five different sources of fly ash in Thailand were classified as fine and coarse particle sizes. The coarse fly ashes which had low pozzolanic activity were ground to have higher fineness and classified again into 3 different particle sizes. Chemical composition, physical properties of all fly ashes and strength activity index when using fly ash as 20 percent by weight in replacing Portland cement type I were investigated. The compressive strengths of cube mortars of 5x5x5 cm<sup>3</sup> were determined at the ages of 3, 7, 14, 28, 60 and 90 days. In addition, fly ash concrete cylinders, Ø10x20 cm., with 50 percent of cement replacement were tested for their compressive strengths at 28 days of curing. Other concrete specimens with the same mix proportion were immersed in 3 percent by weight of sulfuric acid solution and the weight loss of the concrete specimens was measured at the ages of 3, 7, 14, 21, 28, 56 and 84 days.

The result revealed that all fly ash from five sources belonged to Class F fly ash. Fly ash with solid spherical shape helped reducing water requirement in mortar while the irregular and porous particles gave the opposite manner. Fineness and chemical composition of fly ash had affected on strength of mortar, however, the fineness played more important factor on compressive strength than the chemical composition. Strength activity index of all fly ash mortars increased with ages as well as with fineness of fly ash. With the same flow of 110±5, mortars with higher fineness of fly ash and less water to cementitious material ratio had more

compressive strength. Mortar mixed with the smallest fly ash produced the highest strength activity index and was 121 percent at 90 days. In addition, the strength activity indices of all fly ash mortars were higher than 75 percent at 28 days.

Corrosion resistance of all fly ash concretes in term of weight loss were less than that of concrete without fly ash in the mix. Weight loss of fly ash concretes did not depend on their compressive strength. Concrete mixed with different sources of fly ash had different weight loss after immersing in sulfuric acid solution, however, concrete with fly ashes having lower CaO and SO<sub>3</sub> content tended to resist the attack by the acid better than the one with higher CaO and SO<sub>3</sub> content.

Keywords : Ground Coarse Fly Ashes / Cement Replacement / Compressive Strength / Strength Activity Index / Pozzolanic Activity / Sulfuric Acid