

Thesis Title	Expansion and Compressive Strength of Fly-Ash Mortars in Magnesium Sulfate Solution
Thesis Credits	12
Candidate	Miss Pichaya Teerarnit
Supervisor	Assoc. Prof. Dr. Chai Jaturapitakkul
Degree of Study	Master of Engineering
Department	Civil Engineering
Academic Year	2001

Abstract

The objective of this research was to study the effect of magnesium sulfate solution on the expansion and compressive strength of mortars with the replacement of Portland cement type 1 and 5 by fly ash from Mae Moh. Portland cements were replaced by 3 sizes of classified fly ash at 0, 20, 30 and 40 percent by weight of cementitious materials. Mortar bars were cast and immersed in 5 percent by weight of magnesium sulfate solution. Expansion of mortar bars were measured from 1 to 543 days. In addition, 5 different finenesses of fly ashes were used to replace Portland cement at 0, 20, 35 and 50 percent by weight of cementitious material. The compressive strength of mortars which were immersed in water and in 5 percent by weight of magnesium sulfate solution were tested at 28, 90, 180, 365, and 730 days.

The results showed that the replacement of classified fly ash reduced the expansion of mortar bars. However, the mortar bars with the same replacement and size of fly ash in Portland cement type I had higher expansion than that of mortar bars with Portland cement type 5. The mortar bars mixed with smaller sizes of fly ash had less expansion than those with larger sizes. With the same size of fly ash, the mortar bars with 40 percent replacement of fly ash had less expansion than those with 20 and 30 percent replacement. The compressive strengths of ground coarse fly ash mortars immersed in water had higher compressive strength than those of ground coarse fly ash mortars immersed in magnesium sulfate solution. Mortars mixed with ground coarse fly ash had higher compressive strength than those of Portland cements mortars. The replacement by ground coarse fly ash about 35 percent by weight gave the highest

compressive strength in each size of fly ash. It was also found that the mortars with smaller sizes of ground coarse fly ash had higher compressive strength than those of mortars with larger sizes.

From this study, the increase of fly ash content as well as fly ash fineness resulted in reducing the expansion of mortar due to sulfate attack. The suitable replacement of high fineness of fly ash in Portland cement ranging from 30 to 35 percent by weight resulted in reducing the expansion as well as the corrosion of mortars due to magnesium sulfate solution.

Keywords : Fly Ash / Expansion/ Compressive Strength/ Magnesium Sulfate Solution