THESIS TITLE : THE INFLUENCE OF TEMPERATURE ON WORKABILITY OF PORTLAND CEMENT CONTAINING FLY ASH AND PLASTICIZER OR SUPERPLASTICIZER

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Abstract

The influence of temperature on workability of Portland Cement containing fly-ash and plasticizer or superplasticizer was studied. The appropriate content of admixture, the flow rate through the marsh cone of fresh and the compressive strength of mortar cube at 20, 30 and 40^{0}C were tested using Portland Cement type I containing fly-ash at the ratio 80:20 by weight and plasticizers or superplasticizers type A, D, F and G (in accordance with ASTM C494). The specific gravities of the cement and fly-ash were 3.10 and 1.96 and the finesses 3,035 and 3,730 cm^{2}/g respectively.

From the study, it was found that the appropriate contents of water reducing and water tightness admixture A1, and water reducing and retarding admixture D were 0.5% by weight of cement, that of water reducing admixture A2 was 1.0%, and that of water reducing, high range admixture F and water reducing, high range and retarding admixture G were 2.0% . The addition of higher content of admixtures resulted in segregation and reduced strength.

The measurement of flow of mortar containing fly-ash and plasticizers A1, A2, D through the marsh cone within the standard flow time gave the appropriate cone outlet diameter of 1.5 cm. For the mortar containing superplasticizers F and G, the appropriate diameter was

2.0 cm. Because at standard flow time, superplasticizer increased the cohesion of cement and fine aggregate which resulted in the inability for mortar to flow through the small cone outlet.

From the tests of mortar containing all 5 admixtures, it was found that the temperature had significant effect on the flow of mortar. At 20^0C, the mortar having flow within the standard flow time of 5-20 seconds required less water and had low water/cement ratio. However, the range of water/cement ratio giving the flow within the standard flow time was quite wide which was quite convenient for water/cement ratio selection. At higher temperature of 30^0C, the water requirement of mortar was still low, but the range of water/cement ratio at standard flow time was narrower. At 40^0C, the water requirement of mortar was higher and the range of water/cement ratio at standard flow time was very narrow. The tests indicated that a 20^0C the workability of mortar was high and at higher temperature of 30 and 40^0C the workability was lower.