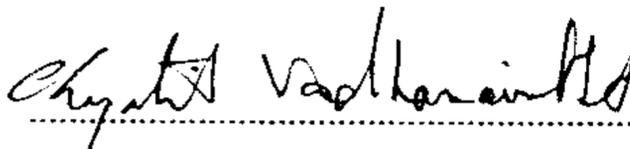


THESIS TITLE : A STUDY OF PROPERTIES OF PORTLAND CEMENT CONTAINING
ELECTRIC ARC FURNACE SLAG , MICROSILICA AND
SUPERPLASTICIZER

AUTHOR : MR. ANURAK SAWADDEE

THESIS ADVISORY COMMITTEE :

.....Chairman

(Associate Professor Chayatit Vadhanavikkit)

.....Member

(Associate Professor Yingsak Pannachet)

ABSTRACT

The aim of this thesis was to study the properties of portland cement containing electric arc furnace slag , microsilica and superplasticizer. Electric arc furnace slag 0 - 30 percents and microsilica 0 - 15 percents by weight were used to replace portland cement. The tests were carried out to find the optimum superplasticizer content. The physical properties of cement tested were , specific gravity and fineness. The properties of portland cement containing electric arc furnace slag , microsilica and superplasticizer tested were normal consistency , setting time , compressive strength and tensile strength.

It was found that the specific gravity of portland cement , electric arc furnace slag and microsilica were 3.11 , 3.43 and 2.15 and their fineness were 3,000 , 2,100 and 142,200 sq.cm./gm. (measured by air - permeability method) respectively. it was also found the an optimum superplasticizer content was 1.75 percents by cement weight. When the excessive amount of superplasticizer was used , water was expelled from the mix and lead to a lower compressive strength.

Test results revealed that , electric arc furnace slag reduced the normal consistency of cement paste but microsilica increased the normal consistency of cement paste. From the setting time test , electric arc furnace slag and microsilica increased both initial and final

setting time. Compressive strength of mortar containing electric arc furnace slag was lower than that of plain mortar's at early ages (3 days and 7 days), but was higher at later ages (28 days and 90 days). From the tensile strength test , it was found that a mortar containing electric arc furnace slag had a lower the tensile strength than that of plain mortar's at all ages in the period tested. However , there is a tendency that the tensile strength of all mixes will come closer in a longer time period. Microsilica increased the compressive and tensile strength in all ages. From the test , it was found that the mixture ratio of portland cement : electric arc furnace slag : microsilica of 85 : 10 : 5 , 80 : 10 : 10 , 75 : 10 : 15 and 65 : 20 : 15 were within the requirements of the Thai Industrial Standards for portland cement type I.