CHAPTER 7

The Way Forward for Using PPC in Concrete Construction Industry

7.1 Introduction

Concrete is the most widely used construction material. Ordinary Portland cement has been used as binding material since a very long period of time. Whilst OPC has excellent performance and is most widely used; the use of PPC has gained much popularity. PPC is a blended product of OrdinaryPortland cement with fly ash. The use of PPC is not only economic, but also advantageous due to its slow process of hydration which results in lower rate of heat development and increases the durability of concrete. Since the inherent resistance of PPC to concrete is less than that of OPC, it is essential to design mix proportions of PPC so as to enhance the carbonation resistance and durability of PPC concrete in turn. This chapter throws some light on the way forward for using PPC in the concrete construction industry.

7.2 The Way Forward for Using PPC in Concrete Construction Industry

It is observed from the experimental results that the carbonation resistance of OPC concrete is more than that of PPC concrete. Also the results of OPC blended with fly ash reveals that depth of carbonation reduces up to 10 % replacement of cement with FA but the carbonation depth begins to increase at 30 % replacement of cement with FA. Hence, it can be concluded that an optimum replacement of 10 % of cement with FA in OPC can yield sustainable results with respect to carbonation resistance. PPC consists of 33 % of FA content. Thus,

carbonation in PPC is higher. Hence, to reduce the carbonation in PPC concrete, the fly ash content of PPC has to be reduced. This may be achieved by replacing the FA content of PPC with GGBS or micro silica. Decrease in carbonation of PPC concrete is observed with replacement of cement with micro silica up to 10%. However, since micro silica is costly and since the FA content with PPC is already 33%, an optimum replacement of 2.5% of cement with micro silica is recommended for use with PPC concrete. The replacement of cement with GGBS in PPC concrete also helps to reduce carbonation in concrete up to 30% replacement. GGBS is also an industrial waste and as such an optimum replacement of 2.5 – 5% of cement with GGBS is recommended in PPC concrete for industrial use, subject to fulfillment of strength criteria. Further, depths of carbonation in PPC concrete is found to consistently decrease with increase in percentage replacement of fine aggregate with FA. As, fine aggregate replacement with FA is recommended till the percentage that meets the strength criteria, simultaneously. Also, the slump criteria may be examined for construction purpose.

Also, the experimental results reveal that the use of super plasticizers helps to reduce carbonation in concrete. Thus, the use of super plasticizers in concrete is recommended. Further, curing helps to reduce carbonation in concrete and an ideal curing period of 28 days is advisable for increasing carbonation resistance. However, in practical conditions at construction sites, a minimum curing period of 14 days is recommended for better results.

7.3 Conclusions

From the above analysis, the following may be recommended for industrial use of PPC concrete:

- Binder mix of PPC + 2.5 % Micro silica replacement of cement.
- Binder mix of PPC + 2.5 % GGBS replacement of cement.
- Use of super plasticizers, Lower W/C and longer curing period.