

**Effect of partial short cover depth on design life of RC structures  
under chloride environment**

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**Abstract**

Corrosion of steel in concrete structures near the coast is a major reason of premature deterioration. Concrete cover significantly influences the corrosion of rebar. In this study the impact of deficiencies in concrete cover thickness that occurs just after construction were investigated. Macrocell current shall enhance due to electrochemical potential difference. A partial short cover specimen with a concrete cover thickness of 20 mm and 7.5 mm was made. A special divided bar electrically connected was embedded in two different mortars with water cement ratios of 0.30 and 0.70; with variable cover thickness and different chloride content. Electrochemical methods such as macrocell, microcell and, total corrosion current densities were used to measure the corrosion current densities at the age of 28 days. Fick's 2<sup>nd</sup> law of diffusion was used to estimate the corrosion initiation time. For W/C of 0.30, the corrosion rate,  $V_{corr}$  for partial short cover of 7.5 mm was 0.0134 mm/year, while for 20 mm cover was 0.0087 mm/year. Based on a case study of structure at 500 m from the coast, the corrosion initiation period was reduced by 65 year due to partial short concrete cover and corrosion weight loss (%) significantly affect the design service life. However, For W/C of 0.70, there was no significant change in corrosion rate and corrosion weight loss (%). It was concluded that even if good quality of concrete was used for concrete cover, due to deficient thickness the durability shall be compromised.

**Keywords:** Reinforced concrete; Chloride attack; Partial short cover; Water-cement ratio; supervision.

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