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Corrosion performance of en coated steel rebars by electrochemical method

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Corrosion of steel reinforcement bar in concrete has become one of the horrifying problems with durability aspects. The most critical factor contributing to the overall deterioration of the concrete structures is the environmental, climatic, and geomorphologic conditions, in which they are exposed to during their lifetime. Due to corrosion problems in the steel reinforcement bars, the cost of repair and renovation of the concrete structures have increased the cost of construction. On account of the protective nature of steel in concrete, it takes reasonably a long time for initiation and progress of reinforcement corrosion even in the case of severe corrosive exposure conditions. Therefore it is very difficult to achieve a significant degree of reinforcement corrosion in a limited duration period available for performing the research work. That's why; various techniques are used for protecting the corrosion of steel in concrete used by the researchers. The purpose of the present investigation is to modify the surface of the bare mild steel by Electroless Nickel [EN] coating in three different thicknesses with respect to time. The efficiency of corrosion resistance properties of 10 μ , 20 μ , and 30 μ coated steel was evaluated by conducting the Electrochemical Corrosion test. The performance of coated rebars against chloride penetration under the wetting and drying conditions was studied by OCP test. The measured potential reading is no longer the corrosion potential of steel reinforcement, but the mixed potential of steel and nickel shows a simple comparison of potential readings with the ASTM criteria. From the above tests, the coated steel increased the tolerable limit compared to bare steel whereas the potential time studies confirmed the stability of the coating even in the presence of aggressive chloride medium during one month exposure. 12V accelerated impressed voltage test results indicated that the time taken for initial crack was doubled for increased coated steel. Finally the EN plated steel rebars possess necessary corrosion resistance properties irrespective of the coating thickness as required by the Indian Standard and ASTM standards.

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