Corrosion Behaviour of Welded Steel Bars in Concrete with and without Cracks under Potentiostatic Conditions

Shicai Li, Zuquan Jin*, Xiaoying Zhang

Engineering Research Center of Concrete technology in marine environment, Ministry of Education, Qingdao University of Technology, Qingdao 266033, China

*E-mail: jinquan@126.com

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Welding is a simple and effective way to connect steel bars in concrete structures. However, the high temperature during welding can affect the phase composition of the steel bars. In particular, when the welding part is located at the crack, it will be directly affected by corrosion ions, which will destroy the corrosion resistance and the durability of the steel bars. This study aimed to investigate the effects of welding on the corrosion behaviour of steel bars in concrete with and without cracks under potentiostatic acceleration. The corrosion time of the steel bar is shortened 48 h by welding, and the depassivation time of welded corrosion-resistant steel bars was approximately 18 h shorter than that of welded ordinary steel bars. In addition, the depassivation time of the welded steel bars and that of nonwelded bars in concrete was advanced by approximately 15 h and 14 h, respectively, due to cracks. Because the progress of galvanic corrosion has been promoted, the influence is most significant when the type of welded steel bar is LC & CR. For the welded LC & LC types, the corrosion current density was increased by cracks.

Keywords: crack; concrete; welding; potentiostatic acceleration; corrosion behaviour

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