

FRACTURE TOUGHNESS VARIATION INDUCED BY STRESS CORROSION CRACKING OF PRESTRESSING STEELS

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ABSTRACT

The stress corrosion cracking process developing in metals is at present an unknown mechanism of deterioration. It is a surface process that implies a corrosion and stress synergy, but the most practical consequence is that stress corrosion cracking can modify the mechanical characteristics of the metal. Due to it leads into brittle failures, it generally involves high level of uncertainty in the prediction.

This research deals with steels for prestressed concrete and has the aim to show that the Fracture Toughness changes when the steel is susceptible to stress corrosion cracking, questioning the idea that the toughness is an intrinsic characteristic of the material. The reduction in the fracture toughness of prestressing steels when they are in contact with aggressive media, involves that the material, for the same stress level, may reach a fracture having a lower crack size. That means the material becomes less damage tolerant, which implies that it is necessary to develop techniques able to detect defects of smaller size, as for example, small notch, pits or superficial cracks.

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