Chloride-Induced Corrosion Rates of Steel Embedded in Mortar with Ordinary Portland and Limestone Calcined Clay Cements (OPC and LC3)

Sripriya Rengaraju and Radhakrishna G. Pillai

Abstract Chloride induced corrosion is a serious deterioration mechanism in concrete structures. Corrosion rate is an important parameter required to estimate the service life, especially propagation life, of concrete structures. The corrosion rate of the embedded steel significantly depends on the properties of the surrounding concrete and cementitious systems. The thermo-mechanically-treated (TMT) steel is widely used in Indian construction. However, literature provides very limited information on corrosion rates of TMT steel embedded in concrete with Ordinary Portland Cement (OPC) and Limestone Calcined Clay Cement (LC3). This makes it difficult to quantify and compare the service life of such systems. This paper presents experimental results on the corrosion rates of TMT steel embedded in mortar (w/c = 0.5) with OPC and LC3. Each test specimen (lollipop type) consisted of an 8 mm diameter steel rod embedded in a 100 mm long mortar cylinder with a 10 mm cover. To accelerate the corrosion studies, chlorides were premixed to the mixing water/mortar. Four levels of premixed chloride content (i.e., 0, 3, 6, and 9 % NaCl) were used. A total of 40 lollipop specimens with 5 replicas for each variable combination were prepared. Corrosion rates were measured using Linear Polarization Resistance (LPR) technique and were monitored for a period of 2 months. Comparison of the corrosion rates and propagation periods for the steel embedded in systems with OPC and LC3 are presented.

S. Rengaraju · R.G. Pillai (✉)
Department of Civil Engineering, Indian Institute of Technology Madras, Chennai, India
e-mail: pillai@iitm.ac.in

© RILEM 2015

K. Scrivener and A. Favier (eds.), *Calcined Clays for Sustainable Concrete*,
RILEM Bookseries 10, DOI 10.1007/978-94-017-9939-3_86