

Weathering Steel Exposure Test in Thailand: Long-term Corrosion Kinetics and Machine Learning on Bi-electrode Sensor Data

Wanida Pongsaksawad^{a,*}, Pranpreeya Wangjinaa, Piya Khamsuk^a, Warut Butratsamee^a, Benjawan Moonsri^a, Amnuaysak Chianpairot^a,
Ekkarut Viyanit^a, and Junhua Dong^b

^aNational Metal and Materials Technology Center, National Science and Technology Development Agency, 111 Thailand Science Park, Pathum Thani, 12120, Thailand

^bInstitute of Metal Research, Chinese Academy of Science, Shenyang, Liaoning, 110016, China *E-mail address corresponding author: wanidap@mtec.or.th

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Weathering steel exposed under proper wet-dry cycles can form patina or stable protective rust layer. Corten-B weathering steel had been tested at 7 test sites in Thailand from 2013 – 2023 to investigate the corrosion behavior of weathering steel in Thailand climate. The corrosion kinetics followed power law with exponential terms less than 0.5, indicating diffusion-controlled mechanism and compact rust layer. Corrosion loss of Corten-B was 70% lower than that of carbon steel after 10-year exposure in C4 environment. To understand the influence of weather parameters, electrochemical signals from a bi-electrode sensor made of Q420NH and 3Ni weathering steels obtained during 2022 – 2024 were investigated by machine learning. The results revealed different rust layer characteristics as a result of atmospheric parameters. The 3Ni weathering steel formed more compact inner rust layer that effectively inhibit chloride penetration.

Graphical Abstract

