



Data-driven corrosion risk assessment for structures using ISO 9223

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Abstract

The new reality of a changing climate influences how infrastructure is designed and built. The materials used for construction are significant contributors to greenhouse gas emissions and need to change to minimise both first use and life cycle impact.

The appropriate choice of materials to enhance initial durability and reduce maintenance throughout an asset's life requires a change in the approach to assessment of risk and mitigation of corrosion.

This paper presents a methodology for a data-driven corrosion risk assessment. The method is built on open-source environmental data, and utilizes the quantitative methods described in ISO 9223. The paper discusses validation of the estimated corrosion risk for a wide range of locations using existing on-site measurements and presents two cases where the methodology has been put to use.

Keywords: Atmospheric corrosion, ISO 9223, open-source global data, corrosion risk, sustainability

1 Introduction

As climate changes, it is more important than ever to build more sustainable and resilient structures for future generations that remain serviceable for many decades. Further, as all structures will inherently have an environmental footprint it is also just as important to build any new structure in the most sustainable way possible. Reducing the environmental footprint during construction means, in simple terms, using less material without

sacrificing the function or the service life of the structure. For structural steel, degradation due to corrosion is a durability limiting factor that requires prevention.

Corrosion has a tremendous cost to society. Several studies report that an estimated total cost of corrosion could be more than 6.2 % of the global Gross Domestic Product (GDP) including indirect cost [1, 2]. So, reducing the impact of corrosion by building more resilient structures, at the same time reducing the need for periodic maintenance will