Technical Report

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Guidance on marine environment zonation for steel corrosion embedded in concrete

Recommandations relatives au zonage de l'environnement marin pour la corrosion de l'acier encastré dans le béton

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

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This document was prepared by Technical Committee ISO/TC 156, *Corrosion of metals and alloys*.

Any feedback or questions on this document should be directed to the user’s national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

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Introduction

Due to the different exposure zones encountered by reinforced concrete structures within marine environments, the mechanisms of chloride penetration vary, resulting in various levels of steel corrosion. It is imperative to design the durability of reinforced concrete structures in these distinct exposure zones to satisfy specific requirements and implement appropriate anti-corrosion strategies. Underestimating the environmental effects without implementing sufficient protective measures can precipitate premature degradation of reinforced concrete. Conversely, overestimating environmental effects and adopting excessive protective measures can incur superfluous construction costs. Therefore, it is essential to accurately identify the boundaries of exposure zones to categorize the effect of the actual environmental action.

The division of exposure zones is based on the assessment of the durability of marine reinforced concrete structures. From the outcomes of exposure zone division, the intensity of environmental effects can also be broadly categorized. However, similar levels of environmental effect can manifest across different exposure zones, indicating the necessity for a more refined categorization tailored specifically to marine environments.

This document aims to highlight the main exposure zones that infrastructure services need to consider when providing corrosion protection for reinforced concrete structures. It provides a general method for determining the exposure zone of marine reinforced concrete structures. The identified exposure zones are used for durability analyses of corrosion damage and for making informed decisions about corrosion protection measures. This document is a supplement to existing specifications, such as ISO 13823, ISO 16204 and ISO 12696.

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Guidance on marine environment zonation for steel corrosion embedded in concrete

1 Scope

This document sets out a methodology for the exposure zone division of reinforced concrete structures in marine environments, based on a test procedure that is provided in this document.

This document is applicable to the division of coastal and offshore marine environment areas. It is not applicable to typhoon, strong tide and other marine environment areas.

Annexes B, C, and D provide examples of marine environment zonation to illustrate the methodology.

2 Normative references

There are no normative references in this document.

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at https://www.electropedia.org/

3.1
durability
capability of a structure or any component to satisfy, with planned maintenance, the design performance requirements over a specified period of time under the influence of environmental action, or as a result of a self-ageing process

3.2
environmental action
chemical, electrochemical, biological, physical and/or mechanical action causing material degradation of a component

Note 1 to entry: For the purposes of this document, the term "environment" mainly refers to the marine environment and related influence factors.

3.3
category of location
conventionally defined typical exposure conditions of a component or structure

Note 1 to entry: Exposure can mean in the open, under seawater, in an aggressive salt spray environment, etc. The typical exposure conditions include the atmospheric zone, splash zone, tidal zone and submerged zone.

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