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Measurement method of corrosion for weathering steel structures

Méthode de mesure de la corrosion des structures en acier autopatinable

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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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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

Weathering steels are environmentally friendly steels that are used in structures without painting. For example, weathering steel is often used in bridges in mountainous areas in the world. In structural steels, reduction of the cross section of members due to corrosion can cause deformation and buckling and thus fracture. For this reason, it is important to understand the corrosion behaviour of each part of the structural members.

Corrosion depends on the microclimate of each part of a member. For example, corrosion is affected by whether the member is directly exposed to rainfall, whether its surface is horizontal or vertical, how much de-icing salt is applied, etc.

In the outdoor exposure test using a normal rack, the corrosion behaviour of the individual parts of complicated structures cannot be evaluated. Although evaluation is possible by using a simulation or the actual structure, coring samples cannot be evaluated by weight loss. A method using a depth gauge and ultrasonic waves is also possible but has low accuracy for thickness reduction.

To solve these problems, a unique exposure test method, in which small steel coupons are attached to the target parts of members of the actual structure, has been established. This method makes it possible to measure the corrosion loss on only one side of the members of the structure. It is useful for making decisions regarding the timing of maintenance, or whether a new structure should be constructed at the site.

This document is useful and effective for the security of structures worldwide.

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Measurement method of corrosion for weathering steel structures

1 Scope

This document specifies a method for measuring the corrosion loss of each part of structures using unpainted steel such as weathering steel by using the attached coupons.

This document also provides a prediction method for corrosion loss over a long period from the measurement results and a method for determining the applicability of existing and new constructing weathering steel structures.

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
weathering steel
low-maintenance steel widely used for large structures

Note 1 to entry: Weathering steel typically contains Cu and Ni. It is widely used for large structures like bridges, buildings and towers.

Note 2 to entry: This type of steel is low maintenance because a protective and adhesive rust layer forms when exposed to the atmosphere.

4 Object

For this test, the object of measurement of corrosion loss is large structures with specific microclimates for either different elements or different surfaces or both. The material of the object structures is uncoated steel, such as weathering steel, to which a corrosion protective covering is not applied and is limited to cases that take the form of general corrosion.

5 Exposure test method

5.1 Shape of coupon

The coupon structure shall be as follows:

a) The standard shape of the coupon is square with a one-side length of 50 mm as shown in Figure 1. However, square coupons with a one-side length of 40 mm to 150 mm may also be used, provided it is possible to secure the accuracy of mass measurements.

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