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Overview of methods available for particle-free erosion corrosion testing in flowing liquids

National foreword

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Foreword

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

This second edition cancels and replaces the first edition (ISO/TR 16203:2016), which has been technically revised.

The main changes are as follows:

— In addition to “erosion corrosion”, the description on the “corrosion” under flowing water was added.

— Description on application method of electrochemical measurement was added.

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Introduction

Particle-free erosion corrosion is a major problem in metallic materials in industries handling liquids flowing rapidly which are corrosive. Specifically, the metallic materials include copper, copper alloys and steels, and the liquids are various types of liquids such as seawater, tap water, industrial water, chemical water (e.g. acid and alkali aqueous solution), waste water, etc. Particle-free erosion corrosion usually leads to rapid metal loss with possibly catastrophic consequences. In order to prevent, mitigate and/or control the problems, it is important to select methods for particle-free erosion corrosion testing. This document provides an overview of the methods available for particle-free erosion corrosion testing in flowing liquids.

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TECHNICAL REPORT **ISO/TR 16203:2023**

Overview of methods available for particle-free erosion corrosion testing in flowing liquids

1 Scope

This document provides an overview of the erosion corrosion tests of materials in single-phase flowing liquids and the test methods available.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 8044, *Corrosion of metals and alloys — Vocabulary*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 8044 and the following 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
erosion
progressive loss of original material from a solid surface due to mechanical interaction between that surface and a fluid, a multicomponent fluid, or impinging liquid or solid particles

[SOURCE: ASTM G40-22 [1]]

3.2
particle-free erosion corrosion
erosion corrosion of metallic materials in single phase flowing liquids free of solid particles and gas bubbles

4 Principles

4.1 Particle-free erosion corrosion

Particle-free erosion corrosion describes the synergistic metal dissolution and mechanical removal of corrosion products formed on a metal surface leading to enhanced corrosion due to distributed or turbulent flow. The details of the predominant phenomena between the dissolution and the mechanical removal are ambiguous.

4.2 Particle-free erosion corrosion test

The conditions in which particle-free erosion corrosion occurs are sensitive to the application, but there are a range of laboratory test methods that have been developed to simulate typical service applications. These test methods can provide a basis for assessing the relative susceptibility of materials to damage development. Particle-free erosion corrosion tests are conducted either by setting up a uniform flow

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