
Korozija kovin in zlitin - Korozija in obraščanje v industrijskih vodnih hladilnih sistemih - 2. del: Vrednotenje učinkovitosti programov obdelovanja s hladilno tekočino z uporabo opreme za preskuševališča pilotne serije (ISO/DIS 16784-2:2023)

Corrosion of metals and alloys - Corrosion and fouling in industrial cooling water systems - Part 2: Evaluation of the performance of cooling water treatment programmes using a pilot-scale test rig (ISO/DIS 16784-2:2023)

Korrosion von Metallen und Legierungen - Korrosion und Fouling in industriellen Kühlwassersystemen - Teil 2: Bewertung der Leistung von Kühlwasser-Behandlungsprogrammen unter Anwendung eines Modell-Prüfstands (ISO/DIS 16784-2:2023)

Corrosion des métaux et alliages - Corrosion et entartrage des circuits de refroidissement à eau industriels - Partie 2: Évaluation des performances des programmes de traitement d'eau de refroidissement sur banc d'essai pilote (ISO/DIS 16784-2:2023)

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Corrosion of metals

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Corrosion of metals and alloys — Corrosion and fouling in industrial cooling water systems —

Part 2:

Evaluation of the performance of cooling water treatment programmes using a pilot-scale test rig

*Corrosion des métaux et alliages — Corrosion et entartrage des circuits de refroidissement à eau industriels —**Partie 2: Évaluation des performances des programmes de traitement d'eau de refroidissement sur banc d'essai pilote*

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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.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT), see www.iso.org/iso/foreword.html.

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

ISO 16784 consists of the following parts, under the general title *Corrosion of metals and alloys — Corrosion and fouling in industrial cooling water systems*:

— *Part 1: Guidelines for conducting pilot-scale evaluation of corrosion and fouling control additives for open recirculating cooling water systems*

— *Part 2: Evaluation of the performance of cooling water treatment programmes using a pilot-scale test rig*

This second edition cancels and replaces the first edition (ISO 16784-2:2006), which has been technically revised.

The main changes compared to the previous edition are as follows:

- Modified the Introduction
- Modified the Scope
- Modified the Normative references, and added TC156 related standards
- Modified the Terms and definitions, comply with the latest requirements of the ISO/IEC guidelines.
- Modified the Principle
- Modified the Regent and materials to Testing water
- Modified the Apparatus, adding the components and their descriptions
- Modified the Assessment of results
- Modified the bibliography.

A list of all parts in the ISO 16784 series can be found on the ISO website.

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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ISO/DIS 16784-2:2023(E)

Introduction

ISO 16784-2:2006 plays an important role in preventing cooling system corrosion, maintaining optimal operating efficiency and extending the economic life of equipment.

With the continuous development of circulating water treatment technology, some new circulating water treatment technologies, such as reverse osmosis treatment and electrochemical treatment, have been widely used and become an important part of cooling water treatment scheme.

This revision in accordance with the ISO guide to the standard format has been revised, and combined with the development of technology in the field of this standard, on the basis of the original added a new test device, increased the description of component.

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Corrosion of metals and alloys — Corrosion and fouling in industrial cooling water systems —

Part 2:

Evaluation of the performance of cooling water treatment programmes using a pilot-scale test rig

1 Scope

This document specifies the principles, reagents and materials, test apparatus, test methods, evaluation of results and requirements for test reports using pilot test for industrial cooling water systems

This part of ISO 16784 describes a method for preliminary evaluation of the performance of treatment programmes for open recirculating cooling water systems. It is based primarily on laboratory testing but the heat exchanger testing facility can also be used for on-site evaluation. This part of ISO 16784 does not include heat exchangers with cooling water on the shell-side (i.e. external to the tubes).

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For undated references, only the edition cited applies, For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 3696, *Water for analytical laboratory use — Specification and test methods*

ISO 8044, *Corrosion of Metals and Alloys — Basic Terms and Definitions*

ISO 8407, *Corrosion of metals and alloys — Removal of corrosion products from corrosion test specimens*

ISO 8501-1, *Preparation of steel substrates before application of paints and related products - Visual assessment of surface cleanliness — Part 1: Rust grades and preparation grades of uncoated steel substrates and of steel substrates after overall removal of previous coatings*

ISO 11463, *Corrosion of metals and alloys — Evaluation of pitting corrosion*

ISO 11845, *Corrosion of Metals and alloys — General principles for corrosion testing*

ISO 16784-1, *Corrosion of metals and alloys -Corrosion and fouling in industrial cooling water systems -Part 1: Guidelines for conducting pilot-scale evaluation of corrosion and fouling control additives for open recirculating cooling water systems*

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 terminological 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/>

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3.1

ATP

adenosine tri-phosphate, an active chemical present in living bacteria

Note 1 to entry: ATP concentrations can be indirectly measured and are used as an indicator for the presence of biology in cooling water

3.2

blow-down

discharge of water from the cooling water circuit expressed as a discharge rate

3.3

Cfu

colony forming units which are a unit of measure for the amount of bacteria in cooling water

3.4

cooling tower

tower used for evaporative cooling of circulating cooling water, normally constructed of wood, plastic, galvanized metal or ceramic materials

3.5

cooling water treatment

adjustment of cooling water chemistry by which corrosion and fouling can be controlled

3.6

cycles of concentration

ratio of the concentration of specific ions in the circulating cooling water to the concentration of the same ions in the make-up water

3.7

heat rejection capacity

amount of heat that can be rejected by a cooling-tower system

3.8

half-life

time needed to reduce the initial concentration of a non-degradable and/or non-precipitable compound to 50 % of its concentration in the cooling water

3.9

make-up water

total water mass per time unit, which is added to the system to compensate for the loss of water due to evaporation, blow-down, leakage and drift loss

3.10

Reynolds number

dimensionless form, $\frac{LV\rho}{\eta}$ which is proportional to the ratio of inertial force to viscous force in a flow system

where:

L is the characteristic dimension of the flow system, expressed in metres (m)

V is the linear velocity, expressed in metres per second (m/s)

ρ is the fluid density, expressed in kilograms per cubic metre (kg/m³)

η is the fluid viscosity, expressed in kilograms per metre per second (kg/m/s)