



International Standard

**ANSI/NACE SP0300-2016/ISO  
16784-1:2006(E)**

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

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

*Corrosion des métaux et alliages — Corrosion et entartrage des circuits de  
refroidissement à eau industriels —*

*Partie 1: Lignes directrices pour l'évaluation pilote des additifs anticorrosion et  
antitartre pour circuits de refroidissement à eau à recirculation ouverts*

**American National Standard  
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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.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

ISO 16784-1 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*

## Introduction

Environmental requirements, water shortages, and business pressures have forced industrial plants and power stations to operate with longer production runs, reduced maintenance outages, fewer operating personnel, and increased stress on cooling water systems. Similarly, commercial refrigeration (heating, ventilating, and air conditioning [HVAC]) systems have experienced increased heat loads and requirements for a long-term, continuous, cooling water supply to computer facilities, large retail establishments, campuses, and office complexes.

Under these increasingly severe conditions, cooling water chemical treatment programmes are expected to maintain optimum operating efficiency and, at the same time, protect the economic life of the equipment by inhibiting corrosion, mineral scaling, microbiological fouling, and miscellaneous deposition on heat-transfer surfaces.

Cooling system design and operating characteristics vary widely, within individual plants, from site to site, and worldwide. Thus, selection and optimization of water treatment programmes must be a site-specific process. In most systems, optimized cooling water chemical treatment is the key to successful long-term operations. The subject of this part of ISO 16784 is, therefore, the establishment of criteria for the pilot-scale evaluation of the performance of cooling water additives under field-specific operating conditions.

This part of ISO 16784 is intended for use by cooling system owners/operators, water treatment companies and others who must evaluate the performance of cooling water additives under field-specific operating conditions.

This part of ISO 16784 was developed on the basis of NACE RP0300 [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

### 1 Scope

This part of ISO 16784 applies to corrosion and fouling in industrial cooling water systems.

This part of ISO 16784 covers the criteria that must be defined and implemented in a pilot-scale testing programme to select water treatment programmes for use in specific recirculating cooling water systems.

This part of ISO 16784 covers only open recirculating cooling water systems. Closed cooling systems and once-through cooling water systems are specifically excluded.

This part of ISO 16784 applies only to systems incorporating shell-and-tube heat exchangers with standard uncoated smooth tubes and cooling water on the tube side. Heat exchangers with shell-side water, plate and frame and/or spiral heat exchangers, and other heat exchange devices are specifically excluded. However, when the test conditions are properly set up to model the surface temperature and shear stress in more complex heat-transfer devices, the test results may predict what may occur in an operating heat exchanger of that design.

The test criteria established in this part of ISO 16784 are not intended to govern the type of bench and pilot-scale testing normally carried out by water treatment companies as part of their proprietary product-development programmes. However, water treatment companies may choose to use the criteria in this part of ISO 16784 as guidelines in the development of their own product-development test procedures.

### 2 Normative references

The following referenced documents are indispensable for the application 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 3044:1999, *Corrosion of metals and alloys — Basic terms and definitions*

ISO 16784-2, *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*