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Use of reclaimed water in industrial cooling systems —

Part 1: Technical guidelines

Utilisation de l'eau recyclée dans les systèmes de refroidissement industriels —

Partie 1: Lignes directrices techniques

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Foreword

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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 282, *Water reuse*, Subcommittee SC 4, *Industrial water reuse*.

A list of all parts in the ISO 22449 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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Introduction

Industries can use large quantities of water in their production processes. Among various industrial water uses, cooling water is a significant proportion of the total used. Industrial wastewater reuse is one of the promising ways to solve water shortage and to provide a non-conventional water source for cooling systems. In addition, for cooling systems, the most common water conservation method to optimize water use is increasing the cycles of concentration inherently. Information about different types and characteristics of industrial cooling systems is included in Annex A. In many countries such as the United States, Japan, Israel and Indonesia, industrial wastewater reuse in industrial cooling systems has been developed rapidly.

Reclaimed water originates not only from industrial wastewater but also from domestic wastewater. In consideration of diverse water quality of industrial wastewater and water from other sources, it is necessary to describe different types of industrial cooling systems which can use industrial wastewater or most of industrial wastewater mixed with domestic wastewater, as make-up water and to give their characteristics. However, there are no relevant ISO standards to guide the use of industrial wastewater or mainly of industrial wastewater mixed with domestic wastewater, as make-up water and solve the common problems such as corrosion and scaling in water reuse. This document is designed to promote the use of reclaimed water by providing technical guidelines for the use of industrial wastewater in industrial cooling systems. This should drive the design and operation of industrial cooling systems. The document should lead worldwide water reuse in industrial cooling systems and is of great significance to promote the reuse of water resources, to improve the water use efficiency, and to practice the concept of industrial circular economy.

The design of a cooling system is a complex matter balancing the cooling requirements of the process, the site-specific factors and the environmental requirements using technologies which allows implementation under economically and technically viable conditions. The process of designing industrial cooling systems is completed by the assessment of the best choice considering the other environmental issues and the constraints linked to the industrial process. However, as a non-conventional water source, reclaimed water can reduce the replenishment of freshwater when it is used as make-up water. If technically and economically possible, the use of reclaimed water improves environmental performances of the system.

This document renders technical guidelines for the use of reclaimed water in industrial cooling systems. It provides a basic framework for industrial cooling systems using reclaimed water.

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Use of reclaimed water in industrial cooling systems —

Part 1:
Technical guidelines

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1 Scope

This document defines terms related to industrial cooling water systems and specifies technical guidelines for the use of reclaimed water for make-up water purposes water in industrial cooling systems. It provides a basic framework for consideration in the design and operation of industrial cooling systems using reclaimed water. The aim of the document is to promote and to help the implementation of the use of reclaimed water in industrial cooling systems.

It provides:

— Terms and definitions;

— Technical guidelines for the use of reclaimed water in industrial cooling systems.

This document is applicable to cooling systems that are considered to work as auxiliary systems for the normal operation of an industrial process. However, the operation of a cooling system in relation to process safety is not covered in this document. In addition, some environmental concerns also need to be taken into consideration, for example the drift control or the use of some persistent biocides. This document can be used to encourage consistency within any organization engaged in the use of reclaimed water.

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 20670, *Water reuse — Terminology*

3 Terms, definitions and abbreviated terms

3.1 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 20670 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 http://www.electropedia.org/

3.1.1
blowdown (purge) water
water discharged from the system to control the concentration of salts or other impurities in the circulating water, which requires treatment either in a municipal treatment system or onsite

[SOURCE: ISO 16345:2014, 2.11]

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